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A New Style of Velocipede.

The desideratum to which all the efforts of velocipede inventors are now directed, is to make a machine, that, while it can be used on common roadways, will also combine enough amusement with utility to render it desirable. The inventor of the velocipede illustrated and described in this article, has kept both these objects in view, and has produced an entirely unique machine.

It is a bicycle, the wheels of which revolve around a common axis, with crank motions for both hands and feet. The rider sits astride of a saddle-bar in the center of an hexagonal frame from which uprights rise, connected at the top by an adjustable neckyoke. This yoke can be elevated or depressed to suit the stature of the rider. It is fixed to its place by means of spring bolts or catches. The uprights are strengthened by curved braces extending laterally to the axles on either side, which pass through them, and they are attached below to the extremities of the hexagonal frame. To these lateral braces the brakes are attached, so that they can be put on by lowering the elbows, and are provided with springs to take them off the friction wheels on the axles when they are not required. Two rock-bars attached to the inner side of the uprights are connected by short pitmans to the cranks, through which the power of the hands is applied. The cranks, also, receive the power of the feet through stirruped rods. Each wheel being independent of the other, the machine can be readily guided or turned about in a circle of twice its width.

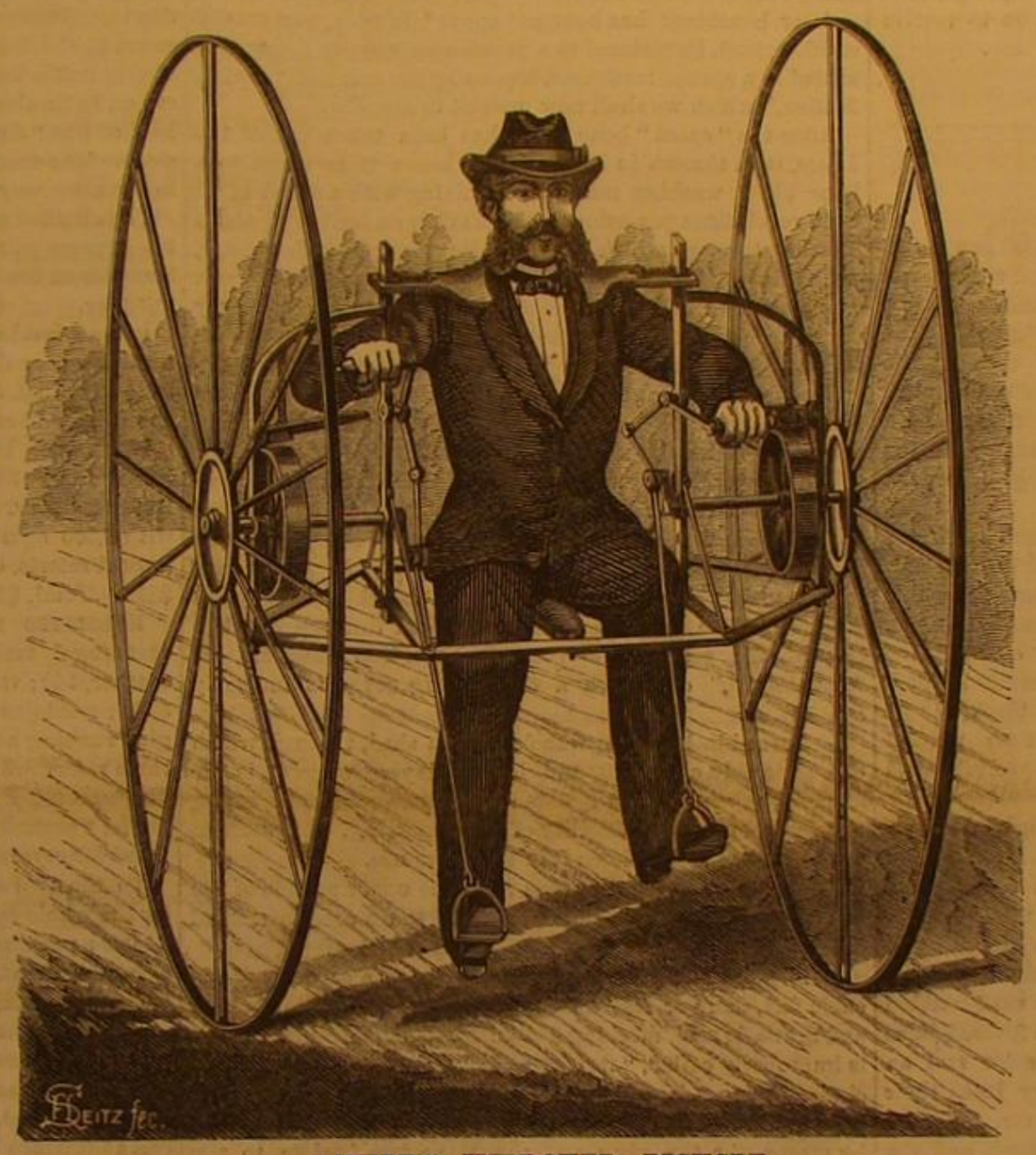
The wheels, for men of ordinary size, are about seven feet in diameter, having rims of steel, with a thick vulcanized rubber band for the tread. The rims are attached by double wire spokes to flanged central disks fixed to the axles. These wires may be interlaced, if thought best, but in either case the wheel is extremely light and elastic. The wires are stretched by means of nuts inside the flanges of the disks.

The perimeters of the wheels are made light and stiffened by corrugation. It may be found necessary to strengthen the wheels against lateral strain, on rough roads, by extending the axles and passing additional wires from the periphery to their extremities. This arrangement secures strength, with lightness and elasticity, but a wheel of ordinary construction may be used if desired.

The hexagonal frame, which supports the rider, is also adjustable on the uprights and lateral braces, as occasion may demand. The saddle-bar may be cushioned, which, owing to the elastic wheels and rims, will be in most cases sufficient; or it may be provided with a spring saddle if deemed desirable. Taking off the hexagonal frame from the uprights and lateral braces and removing the yoke, divides the machine into parts convenient for storage and shipment. When set up and in use, it is stiffened by iron rods or braces connecting the uprights with the corners of the frame, as shown in the engraving.

The saddle bar is swung loosely behind so as to be easily thrown off to the right or left. For ladies, it is proposed to replace the saddle bar by a curved tongue-shaped seat with connecting rods passing around the body on either side, and jointed for the lateral motion necessary to cast them off in front. The levers worked by the hands are for guiding, and to counteract the irregularity of the movements given by the feet; but should it be found desirable, a circular, instead of reciprocating, motion can be substituted by converting, with a few necessary changes, the lever into a winch. As the object is to get the lightest machine possible, the material will, to that end, be of steel, and the bars hollow or corrugated whenever practicable. It is proposed to attach, over their upper ends, a horizontal screen to protect from the sun and rain, likewise a small mirror that may reflect to the eye what is behind on the road.

It will be perceived that, with the fixed fulcrum for the shoulders and back, the whole muscular force of the rider can be exerted, through the legs and arms, to act, by means of the levers above and rods below, on the cranks, or as much on either as is wanted, and therefore, that for both propulsion and guidance he is under favorable conditions, the extensor muscles of all the limbs having the most effective play. As every revolution of the wheels will carry the rider twenty-two feet, his speed must be great on level and descending surfaces, while, from their large curve and elasticity of bearing, a comparatively smooth passage over inequalities is secured. The ease with which, withdrawing his foot from the stirrup, he can reach the ground, throw off the saddle-bar, and walk within his light machine up a hill, then, adjusting it, can slip on again and resume his journey, or perform his evolutions on rough or obstructing portions of the road, seem features that ought to secure for this machine a favorable reception, to say nothing of its superior capabilities for healthful exercise and invigorating movement.

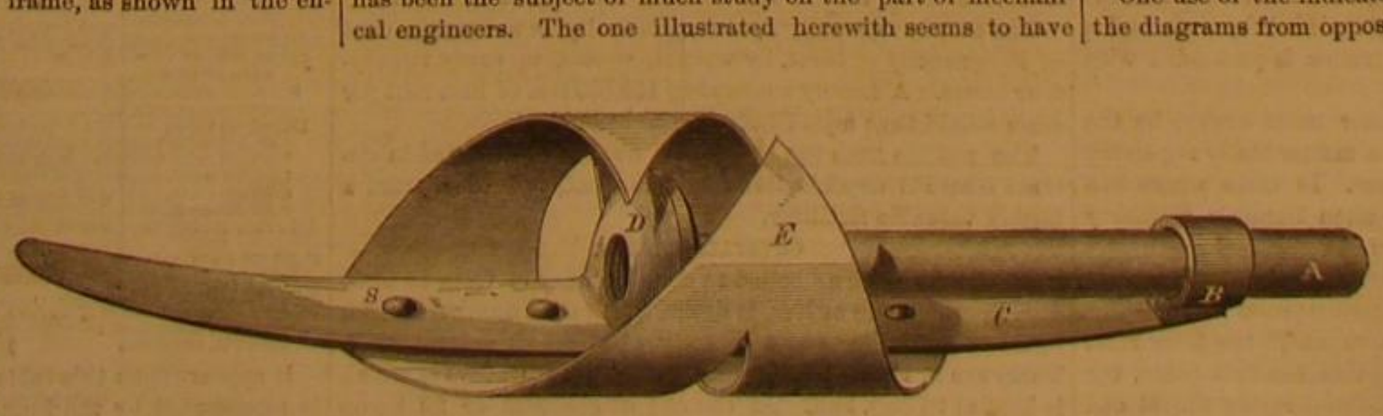


WHITE'S IMPROVED BICYCLE.

Patented through the Scientific American Patent Agency, April 13, 1869. Manufacturers may address John J. White, No. 526 Arch st., Philadelphia, Pa.

Improvement in Boiler Flue Cleaners.

A good and efficient tool for cleaning the flues of boilers, has been the subject of much study on the part of mechanical engineers. The one illustrated herewith seems to have many points of excellence, which will become apparent to practical men upon a description of its structure and operation.



MORSE'S PATENT BOILER SCRAPER.

The letter, A, in the engraving indicates a portion of the handle which passes through a ring, B, forged with and forming a part of the bar, C. The handle, A, after passing through the ring, B, screws firmly into the button, D, which is also forged with the bar, C, and forms a part of it. The point of the bar, C, has a gentle curve toward the longitudinal axis of the handle, A, and the other parts of the instrument, and is also tapered and rounded at the point. To the outside of the bar, C, is riveted the scraper plate, E. This scraper plate, when uncoiled is of rectangular form, having an opening in the center of the plate, of such shape as would be described by the intersection of two equal circles, the object of which is to multiply the cutting edges of the plate. The plate is bent spirally so that two points are in line with the bar, C, and the rivets which fasten the scraping plate to the bar, and the other two points are brought round opposite the bar as shown in the engraving. The handle may be made of gas-pipe, which gives sufficient strength with less weight.

The use of the button, D, is two-fold, *i. e.*, to form an attachment for the handle, A, and also to gather the soot and aid in its removal.

The scraper plate bent in the form, and attached in the manner described has great elasticity and is therefore capable of being inserted readily into flues of different sizes and cleaning them equally well. The curved point of the bar, C, in connection with the inclined edges of the scraping plate, compel the contraction of the latter, in entering flues of small size, while the elasticity of the plate forces its cutting edges firmly against the surface of the flues in the process of cleaning.

We understand these scrapers have made a very favorable impression where they have been tried. This improvement was patented through the Scientific American Patent Agency by M. and C. H. Morse, March 30, 1869. Orders and letters should be addressed to Monroe Morse, Franklin, Mass.

Application of the Indicator.

A new edition of Porter's "Richards' Steam Indicator" is announced by D. Van Nostrand as being in press; revised by F. W. Bacon, M. E., who has made copious notes and additions, as developed by American practice. This revision was needful and will be properly appreciated by the engineering public when the work makes its appearance. An extract from this work gives the following rules for applying the indicator to steam cylinders:

Of Attaching the Indicator.—When it is practicable, diagrams should be taken from each end of the cylinder. The assumption commonly made, that, if the valves are set equal, the diagram from one end will be like that from the other, will be shown by this instrument to be erroneous. This is owing to the difference in the speed of the piston at the opposite ends of the cylinder, which is, at the outer end of a direct-acting engine, from 35 per cent to 66 per cent greater than at the crank-end, the difference varying according to the degree of angular vibration of the connecting rod.

In side-lever or beam engines, these proportions are reversed, and the speed of the piston is greater at the upper end of the cylinder. Often, also, there is a difference in the lengths of the thoroughfares, and in the lead, or amount of opening, or the point closing; and many times the valves are supposed to be correctly set, when this indicator will show that they are not. These and many other causes, will make a difference in the diagrams obtained from the opposite sides of the piston.

One use of the indicator is in fact to show whether or not the diagrams from opposite ends of the cylinder are alike.

Pipes to be Avoided.—The indicator should be fixed close to the cylinder, especially on engines working at high speeds. If pipes must be used, they should not be smaller than half an inch in diameter, and five-eighths in the bends, and as short and direct as possible. Any engineer can satisfy himself with this instrument, that each inch of pipe occasions a perceptible fall of pressure between the engine and the indicator, varying according to its size and number of bends and the speed of the piston. Diagrams have been known to show, from this cause alone, 40 per cent less pressure than was actually in the cylinder. Probably the diagrams taken from engines, generally show in nine cases out of ten, the lead or the pressure or both, untruly, from the incorrect manner in which the instrument is attached.

Where to Connect the Indicator.—On vertical cylinders, for the upper end, the indicator cock is usually screwed into the cover. Sometimes it is attached where the oil-cup is set, this being removed for the purpose. For the lower end, it is necessary to drill into the side of the cylinder, at a convenient point in the space between the cylinder bottom and the piston, when on the center, and screw in a short bent

pipe, with a socket on the end to receive the indicator cock. This indicator can be used in a horizontal position, but it will be found much more convenient to put in a bent pipe, and set it vertical. Sometimes it will be necessary to drill in the side of the cylinder at the upper end also, especially in double cylinder engines having parallel motions, when the indicator cannot generally be set on the covers. Care must be taken that the piston does not cover the hole when on the center. No putty is necessary to make these small joints, and it should never be used, as it is liable to clog the instrument. If the screw fits loosely, a few threads of cotton wound around the stem will prevent the escape of steam.

On horizontal engines, the best place for the indicator is on the top or upper side, at each end; if it cannot be placed there, bent pipes may be screwed into the covers or into the side of the cylinder. In other respects follow the directions given for vertical engines. The indicator should never be set to communicate with the thoroughfares. The current of steam past the end of the pipe or the hole reduces the pressure in the instrument, and the diagram given is utterly worthless, as any engineer can readily ascertain by making the experiment.

The stop-cock being screwed firmly in its place, screw the indicator down to its seat, turning it to the most convenient position, and make it fast by turning the coupling; then move the guiding pulleys to their proper position to receive the cord, and the instrument is in readiness for use.

BEET ROOT SUGAR.

No. X.

TECHNOLOGY.—PART VII.

FILTRATION.

"In loading" a filter, the metallic sieve is placed at the bottom of it, through the man-hole, and covered with a wet cloth. A layer of bone black a few inches thick is then carefully spread over the cloth, rammed down tight, and the man-hole door closed. The filter is then filled through the top by emptying the boneblack into it from sacks, until within 18 inches of the top. A coarse cloth fitted into a metallic ring is then spread over the upper surface of the bone black to prevent displacement or the passage of scums, and the cover of the filter tightly fitted on.

New bone black, containing soluble salts, and having a disagreeable flavor must be thoroughly washed before being used for the clarification of saccharine solutions. For this purpose the filter is filled with water (hot if possible), which, at the end of 15 minutes, is run rapidly out by opening the lower cock of the filter to its full extent. Hot water is much preferable to cold for the washing of bone black, as it increases its durability, and at the same time renders it more efficacious in the production of limpid, well-flavored sirups.

Bone black which has been used and "revivified" does not in general need washing before being employed for the filtration of carbonatated juice, but must always be so prepared before filtering sirups through it.

After a certain period of time, which varies according to circumstances, the bone black loses, to a certain extent, its power of purifying juice or sirups; this, for carbonatated juice, is known to have taken place when the filtered juice issues from the filter with a yellowish-brown color and an ammoniacal odor, and for sirups, when they loose their "golden" hue, and acquire an unpleasant flavor. In such cases the flow of saccharine fluid must be stopped, and the filter filled with hot water, which is allowed to run out until it marks from 1° to 1½° Baumé. The cock is then closed for fifteen minutes, at the expiration of which the liquid is again tested by means of the areometer. If the density has increased the quantity of water used has been insufficient. The bone black, after continued use, finally becomes "spent," after which no amount of hot water, alone, will return to it its clarifying properties.

The operation of filtration must be regular and continuous. If a diminution of the flow at the outlet should occur, this is produced by the obstruction of the meshes of the upper cloth of the filter by dirt, or by scums having agglutinated the upper layers of bone black. In such a case the bone black is taken up to a depth of two feet, replaced by new, and a fresh cloth put over it, when the operation is proceeded with as before.

The quantity received into the filter must always be the same as that which escapes from it, a matter easily regulated by the cocks for egress and ingress. In cases where bad juice or sirups are being worked it often becomes necessary to refilter several times in succession.

The juice from the scum department is run into the same filters as the juice from the carbonatating pans.

When the bone black has become "spent," the filter must be renewed. This is done as follows: In the first place, the upper layer of foul bone black is taken up with a shovel and laid aside; the filter is then emptied of its contents through the lower man-hole, and the lower sieves and cloth taken out. This is only done after the liquid from the filter has been brought by addition of water (after having stopped the flow of juice) to a density of 1° to 1½° Baumé.

The carbonatated juice is run into the top of a newly-washed filter until the liquid escaping through the bottom marks 1° to 1½° Baumé. The lower cock is then closed, and the juice allowed to gradually reach the top cock, which must first be opened to one-half and later to three-quarters of its extent, but not sufficiently to cause a disturbance of the solid contents of the filter. It is best to receive the juice of only one pan on a filter at one time. This necessitates the use of two filters for every three carbonatating or defecating pans.

The same filters which have been used for clarifying the sirups are employed for the same length of time, for the clarifying of the juice, but filters which have been used for juice must never be used for sirups.

Every time a filter is emptied its internal surface must be washed by dashing hot water into it by the bucket-full, and by rubbing with a wash rag. It is then to be white washed with weak milk of lime by means of a broom. The sieves must also be well scoured and limed.

The filtered carbonatated beet root juice is run from the filters into a *monte-jus*, which carries it to the reservoir of the concentrating vacuum pan; the filtered sirup is run into a *monte-jus*, which carries it to the boiling pan.

BONE BLACK.

This being a very important item in the manufacture of beet root sugar, will detain us a few moments.

The bone black used in this branch of manufacture is the average "grained" bone-black, not the pulverized such as is employed by druggists.

If of a good quality its color is a lusterless black, and it must very strongly adhere to the tongue when applied to it. It must weigh from 42 to 45 lbs. per cubic foot, if heavier it contains water or adulterations. Bone black which has been used once or oftener, and "revivified," has the bluish tint of slate, weighs heavier than new black, and is less porous.

After boneblack has become "spent" it may, to a considerable extent, be restored to a pristine energy, by being submitted to a special treatment, known by the name of "revivification," which we shall now proceed to describe.

After the "spent" bone black has been taken out of the filters, it is thrown in heaps, from whence it is taken to a bone black washing machine, revolving with a speed of 12 to 15 revolutions per minute, and having an incline of about 8 inches, through which runs a constant stream of hot water, which is obtained from the condenser of the vacuum pans. The black issues from this washing machine in an apparently dry state, and is received into baskets placed at its lower extremity, in which it is conveyed to an iron drying floor, heated by the waste heat of the bone-black furnaces. It is here laid in heaps of from one-half to two-thirds of a foot in thickness, and continually stirred both day and night.

When perfectly dry the bone black is placed into high, narrow, vertical iron retorts, placed in a furnace, and heated until these last acquire a peculiar "*brown-red* heat," at which degree the temperature must very carefully be maintained (by the management of dampers) for a period of twenty-five minutes. The contents are then dropped through the bottom of the retorts into portable sheet-iron receivers, or "smotherers," on which a tight-fitting cover is instantly adapted.

The bone black is then wheeled into a shed, through which the air freely circulates, and laid in layers, when it is immediately sprinkled with water from an ordinary watering pot, to exclude the possibility of its reigniting. As soon as the black has cooled down it is ready for use.

The muddy bone black taken from the upper portion of the filters and that which has been several times used is treated differently to what we have just described.

It is placed into wooden tubs, or vats, of a capacity of 200 cubic feet, more or less, and submerged in a mixture of water and muriatic acid, marking 2° Baumé. Effervescence, or as it is improperly called, "fermentation," soon sets in, and is concluded in 6 to 8 days.

The water is now drawn from the "fermented" bone black by means of a tap plug, and the black itself taken to the bone-black washer, from whence it goes to the drying floor and furnace, as before described. In many works the whole of the bone black used is both "fermented" and "roasted."

Bone black is known to be sufficiently washed when water, dripped from it, and placed in a clean tumbler, is perfectly clear and transparent after the deposition of the suspended fine particles has taken place.

The quantity of bone black needed, and the length of time it can be employed before becoming "spent" varies greatly with the nature of the beets and the degree of perfection of the previous defecation and carbonatation. The quantity must be so calculated as to include the quantities in process of revivification as well what is in actual use in the filters.

The average quantity needed, practically, is twenty per cent of the quantity of beets, by weight, worked up every twenty-four hours. A factory consuming 150,000 lbs. of beet root per diem would thus need 30,000 lbs. of bone black.

The residue from the bone-black washer is collected in cisterns where it deposits itself as fine mud, and constitutes a highly valuable fertilizer.

CRYSTALLIZATION.

The beet root sirup boiled to a consistency of from 40 to 42 deg. Baumé, more or less, is distributed into a number of iron forms or crystallizers of a capacity of about 12 gallons each. These are left quiet in an apartment the temperature of which is kept at 95 deg. Fah. At the end of eighteen or 20 hours the upper crust formed is punched through, and in from five to eight days the sugar is "made." If crystallization is progressing favorably, a thin "mirror" soon forms at the surface in the crystallizer, and at a later period this sirup covers to a certain depth the mass of crystallized sugar.

The contents of the forms are next emptied into "centrifugal turbines," revolving drums, the outer surface, of which is covered with metallic tissue through the meshes of which the sirups flow, by the action of the centrifugal force, while the crystals of sugar are retained within. These centrifugals are of various construction, but the velocity of their circumference must not be inferior to from 160 to 180 feet per second.

In a very short space of time the sugar (first product), is ready to be scooped out from the inside of the centrifugals.

If it be desired to make very white sugar, it must be further washed by means of a jet of fine spray or of steam while the turbine is in motion. This washing of the crystals of sugar injures the "grain" to a certain extent, by melting off their sharp angles. The *first* suger is kept separate from the second and third, being of superior quality. The sirup escaping through the meshes of the centrifugal is received in a *monte jus*, carried to a reservoir, and from thence to the boiling pan, when it is again reduced to a density of 40 to 42 deg. Baumé.

This *second* product is run into iron crystallization tanks of a capacity of 400 gallons each, and kept in a special apartment heated to 100 deg. Fah. In from eleven to fourteen days the *second* sugar is crystallized, when it is "centrifugalized," as was the *first*.

The sirups resulting from these "seconds" are in turn boiled to proper consistency, and collected into iron tanks of a capacity of 1,000 gallons. These are kept in a room at a constant temperature of from 100 to 112. deg. Fah., and from four to six months the "third sugar" is ready for working up.

The residue from the third sugar is *molasses*, and is collected into cisterns for the distiller's use.

After being broken up in a "lump-breaking" machine and passed through a screen the sugar is ready for market.

If the sirups from the *first* and *second* sugars are high colored, they will need clarifying. This is done by adding water to them until they mark from 28 to 30 deg. Baumé, heating by steam to ebullition in an open pan, with full open steam cock, adding half a bucket of ox blood (well beaten up with switches), or, in its absence, white of eggs or milk, and a pint and a half of fine "dust" bone black per thirty-five cubic feet of sirup. The scums are skimmed as they form, and are treated in the same way as the scums of defecation.

The clarified sirup is run through a special filter kept for the express purpose, and is then run into the boiling pans. Sirups from the first, second and third, must never be mixed together.

It is advisable to keep a bucket of cold water constantly in readiness near these boiling sirups during clarifying, so as to instantly allay, at any time, sudden foaming or too violent ebullition and consequent overflowing of the pan.

ESTIMATES FOR THE BONE BLACK DEPARTMENT OF A BEET ROOT SUGAR FACTORY WORKING 150,000 LBS. OF BEETS EVERY TWENTY-FOUR HOURS.—One bone-black furnace with 2,500 square feet (50 × 50) of drying surface and 14 elliptical retorts, cost, $1,100; bone washer, $110; smotherers, $112. Total, $1,322.

ESTIMATES FOR CRYSTALLIZATION DEPARTMENT.—Four centrifugal turbines of latest construction, $1,120; sugar crusher, 140; transmission of motion to turbines and crusher, $220; *monte-jus* and gutters, $190; one six-horse power engine running at a speed of 80 revolutions per minute, $380; three reservoirs for sirups of a capacity of 750 gallons, $180; two hundred crystallizers for "firsts," $520; twelve crystallizers for "seconds," $360; eight crystallizers for "thirds" $540. Total for crystallization, in gold, $3,550.

To the above estimates must be added: Piping and cocks for the whole establishment, $3,600; vats, $300; various tools, $1,000; packing and unpacking of machinery, $2,000—beside freight and duties on the whole apparatus, the total weight of which we have estimated to be about 200 tuns.

We have now reached the conclusion of the series of operations by means of which "raw sugar" is made from the beet root. In our next and last article we shall exhibit the amount of labor needed, and give careful estimates of what it would cost to produce beet root sugar in the United States.

For the Scientific American.

STATISTICS OF THE PRODUCTION OF IRON.

(Concluded from page 333.)

BY PROF. PETER TUNNER.

Among the non-metallic products of mines salt is the most important. We cannot take notice of its price in those countries where it is a monopoly, as in Austria, but taking its commercial price as a standard, it averages about one florin per cwt. Of less importance are sulphur, vitriol, alum, graphite, manganese, and tungsten, for the cost of which see particulars below. From the unity prices previously discussed, we infer the following values of yearly production:

	Florins.	Florins.
2,514,000,000 cwts. coal @ one-fifth florin	502,800,000	
640,000,000 " " @ " " for the manufacture of iron	140,000,000	352,800,000
60,000,000 cwts. coal @ one-fifth florin for all other products		
191,800,000 cwts. iron @ 4½ florins		863,100,000
45,883 mint pounds gold @ 675 florins	310,421,025	
2,923,000 mint pounds silver @ 45 florins	128,833,000	
1,581,000 cwts. copper @ 57 florins	90,117,000	
4,926,500 cwts. lead @ 12 florins	59,115,600	
2,350,000 cwts. zinc @ 9 florins	21,150,000	
All other metals together in the value of	20,800,000	610,438,625
80,000,000 cwts. salt @ 1 florin	80,000,000	
1,000,000 cwts. sulphur @ 4 florins	4,000,000	
Various vitriols and alums	3,000,000	
250,000 cwts. graphite @ ½ florin	500,000	
40,000 cwts. manganese		
700 cwts. tungsten		87,500,000

It appears from this table that the yearly production of iron is represented by the immense sum of 863 million florins, or $431,500,000 gold. This sum exceeds the value of all the other metals, and it is larger than that of the aggregate of all other mineral products. The article next in value is coal, and it may therefore well be maintained that the iron and coal industries represent the two principal departments of human activity in the present age.

The production of the precious metals being chiefly confined to America and Australia, iron receives thereby a much higher importance in European industry than our first table seems to show, in which the productions of all countries of the world are compared with each other. It can, for instance, be proved that the value of the iron production in the Austrian empire is four times as large as that of all other metals; in Germany it is six times as large, etc. But this is not all. The variety of uses to which iron may be applied is surprising.

It is employed in the strongest parts of engines as well as in the finest wheels and springs of a watch; in building the mighty iron-clads; in the bulky death-spreading cannon; in the most delicate surgical instrument! It shows its importance when we consider in what proportion its value is enhanced when fashioned into the weighty anchor, the finest fishing-hook, the plowshare, the mower's scythe, or the cambric needle. The values of the precious metals, on the other hand, when leaving the refiners' furnace, differ but little from those of the coined money. While, for instance, the most delicate watch spring is worth a million times more than an equal weight of the steel bar from which it was made, the value of the most elaborated gold or silver article is seldom double the value of the refined metal.

Various articles of daily use have been proposed as indexes of the wealth and civilization of nations. Statisticians and social economists, who have investigated this subject, have arrived at the conclusion that there is no product better adaped for this purpose than iron, and it may be truly held that nearly all branches of human activity are deriving direct or indirect benefit by an increased consumption of this metal.

I have constantly, for thirty years, given attention to the statistics on the diffusion of iron, and I give as follows the results of my investigations:

The yearly average consumption of iron per individual amounts in Great Britain to 100 lbs.; England alone, 150 lbs.; United States of North America, 90 lbs.; Belgium, 70 lbs.; France, 55 lbs.; the German Zollverein, 50 lbs.; Sweden and Norway, 25 lbs.; Switzerland, 22 lbs.; Austria, 20 lbs.; the German part of Austria, 45 lbs.; Italy, 15 lbs.; Russia, 11 lbs.; Spain and Portugal, 10 lbs.; the East Indies (population 180,000,000), 1 lb.

It may be mentioned yet with respect to this table, that England, Belgium, and Sweden appear in too favorable a light, on account of the circumstance that these countries are the only ones which produce larger quantities of iron than they consume themselves, and also because of the fact that the smelting of iron itself requires a comparatively considerable amount of this metal.

Vegetable Electromotors.

The *Chemical News* contains an article contributed by Edwin Smith, M. A., giving results of researches in a field which so far as we are aware has been hitherto untraversed. He says: It is well known that a voltaic combination may be made of two liquids and a metal, if one of the three acts chemically upon one and only one, of the other two; thus—we may employ copper, nitrate of copper, and dilute nitric acid, or platinum, potash, and nitric acid. Connect a platinum crucible with one terminal of a galvanometer, pour in a little solution of caustic potash, place in this the bowl of a tobacco-pipe having the hole stopped up with wax, pour into the bowl a little nitric acid, dip in the acid a small slip of platinum foil, and connect this with the other terminal of the galvanometer; a powerful deflection of the needle indicates the presence of an electric current and shows its direction to be from the alkali to the acid, the platinum serving merely as a conductor. It occurred to me, when performing this experiment, that an electro-motive combination might just as well be made of two vegetable substances, with platinum for conductor, provided only they were of a nature to act chemically upon one another—an alkaloid and an organic acid, for instance. It also seemed to me not unlikely that, wherever two flavors are habitually conjoined in our cookery and eating, the reason why they mutually improve each other is because a certain amount of electric action is set up between the substances employed to produce them. The *rationale* of the right blending of flavors might be found partly, no doubt in chemistry, but partly, also in galvanism.

Pursuing this idea, I tried pairs of eatables which generally go together, such as pepper and salt, coffee and sugar, almonds and raisins, and the like, and found that a voltaic current more or less strong was excited in every instance which I tested. Bitters and sweets, pungents and salts, or bitters and acids, generally appear to furnish true voltaic couples, doubtless in consequence of the mutual action of some alkaloid salt and an acid or its equivalent. As others may like to repeat or extend the experiments, I will describe shortly my mode of procedure: Cut two pieces of platinum foil about 5 inches by 2½ inches, and a number of pieces of filter paper a trifle larger. Well-washed linen is sometimes more convenient than filter paper. Have a small wooden board near the mercury cups of the galvanometer, and let a short copper or platinum wire, dipping into one of the cups, rest on the board. The substances to be tried must be brought to a state of solution, the stronger the better, by infusion, decoction, or otherwise. Suppose coffee and sugar are to be operated upon; solutions of both having been prepared, dip into each a slip of filter paper; place one slip on one of the pieces of platinum foil, and the other on the second piece. Next lay the first slip and its foil on the board, with the metal touching the copper wire before mentioned. Lay the second slip with its platinum upwards, so that the coffee and sugar come into even contact with slight pressure, and immediately connect this upper slip, through a bit of copper wire, insulated from the touch, with the other terminal of the galvanometer. Deflection occurs instantaneously, and may be increased to a considerable vibration by breaking and making circuit at the right swing of the needle. After a few distinct vibrations, it is well to turn over the whole pile of slips just as they are, and connect opposite ends with the galvanometer, so as to reverse the current. This is desirable for the sake of confirming your previous observation, and of correcting any slight disturbing cause arising from the wire and mercury connectors, temperature of the hand, etc. It will be found that coffee and sugar have the same electrical relation to each other as zinc and platinum. Coffee, in fact, is the positive, sugar the negative element. I subjoin a table of the results of numerous experiments, conducted in the manner above described:

ELECTRO-POSITIVE.	ELECTRO-NEGATIVE.
Coffee	Sugar (loaf).
Tea (black)	"
Cocoa	"
Nutmeg	"
Cloves	"
Cinnamon	"
Mace	"
Vanilla	"
Almonds	"
Rhubarb(tincture)	"
Starch	"
Starch caramel	"
Gum caramel	"
Cane sugar caramel	"
Milk sugar	"
Gum	"
Almonds	Raisins
Horseradish	Beetroot
Onion	"
Horseradish	Table salt.
Mustard	"
Pepper (white)	"
Mustard	Tartaric Acid.
Ginger	" "
Cayenne pepper	" "
Pepper (white)	" "
Tea (black)	" "
Tobacco	" "
Quinine (Howard's)	" "
Gentian root	" "
Lemon juice	" "
Horehound	" "
Lavender water	" "
Quassia	" "
Peppermint	" "
Raw potato	Lemon juice.
Rind of Lemon	"
Peruvian bark	"
Camphor (tincture)	"
Laudanum	"
Arnica (tincture)	Dilute Sulphuric Acid.
Peruvian bark	" "
Quinine (Howard's)	" "
Iodine (tincture)	Turpentine.
Caustic potash	"
Starch	"
Starch	Iodine (tincture).
Caustic potash	Neat's-foot oil.

It is somewhat difficult to eliminate from these experiments all error arising from difference of temperrature, if the galvanometer is tolerably sensitive. Care must be taken to bring the pair of solutions operated upon to the same temperature before testing them; otherwise a thermo-electric current from the hotter to the colder liquid may affect the needle, and mask the true electrical relation between the two, so far as it depends upon their chemical nature.

ASTROLOGY AND ASTROLOGERS.

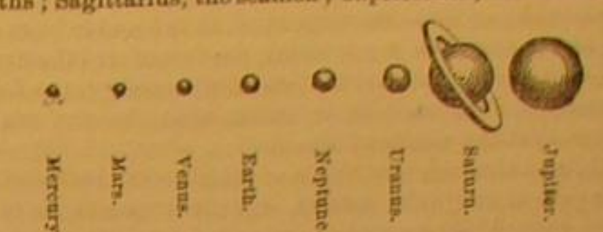
To use the rather strong language of a cotemporary, there are still fools who are not only fools, but who seem willing, nay anxious, to spend money to prove themselves so. The advertising columns of the New York dailies contain the proof of this assertion, in the numerous advertisements of fortune tellers, clear-sighted physicians, and astrologers. A very little investigation will convince the incredulous that not only do these imposters make money, but some of them make a good deal of it, by playing upon the credulity of the ignorant and superstitious. The belief that these pretenders have the power to foretell events is not confined to the totally uneducated. Will it be believed, that a lady educated sufficiently to occupy with credit the position of principal of a department in one of our city public schools, did on a recent occasion consult one of these quacks in full faith as to his powers? We know this to be true, and are also possessed of information that clearly proves this superstition to be wide spread, extending even into the higher classes of society.

The following extracts from "Diecks on Astrology," will show the absurdity of putting any faith in these deceivers, if indeed, anything need be said in this enlightened age of the world upon such a topic.

"Astrology is merely a philosophism, being empirical, wholly visionary, a mere fanciful system compounded of incongruous mixtures of astronomical with human events, of mythology and theology, and of facts with pure fiction. It has been variously designated Judicial, Hororary, Atmospherical, and Mundane Astrology. It has also many offshoots subservient to magic or the black art, sorcery, witchcraft, and other pretended mysticisms, ostentatiously styled occult philosophy.

"We may first observe that astrology lays no claim to inspiration, but affects a very ancient unknown origin, tracing back to a dark, heathenish, and superstitious age, in the very infancy of traditional knowledge, when the boldest assertions of the seer [!] were received as the authority of an oracle, no one daring to question their validity. Whatever is remotely possible the astrologer accepts as a fact, while, ignorant of much around him, he assumes with the utmost complacency an intimate acquaintance with the sun and planets thousands upon thousands of miles off; the sun, 807,076 miles in diameter, while he himself inhabits a globe only 7,916 miles in diameter, from which the moon is 238,000 miles distant, and the sun 400 times that distance. The accompanying diagram shows the relative diameters of the planets.

And these immense bodies revolving millions on millions of miles away in immeasurable space, are described by him as fashioning an infant's nose, directing the fortunes or misfortunes of lovers, ordering the property of traders, meting out diseases, and improving or deranging men's mental faculties. And, as if such puerile influences were not sufficiently preposterous, we are informed by the modern seer [!], Zadkiel, that the twelve signs of the Zodiac not only 'rule' the several parts of the human frame, but also those of a ship, as Aries, the bow; Taurus, the cutwater; Gemini, the rudder; Cancer, the bottom; Leo, the upper works; Virgo, the hold; Libra, parts above the water's edge; Scorpio, the seamen's berths; Sagittarius, the seamen; Capricornus, the ends of the



vessel; Aquarius, the captain; Pisces, the oars in galleys, the wheels in steam vessels, and the sails in others; but these latter, being above water, we are left in doubt about the ruler of the submerged screw propeller.

"To show what a modicum of learning, and how trifling an acquaintance with matters of natural philosophy will serve the astrologer, we will turn to a modern treatise published in the year 1801, by Francis Barrett (styling himself a student of natural and occult philosophy), a quarto volume of upwards of 370 pages, entitled 'The Magus, or Celestial Intelligencer,' which affords a pretty clear insight into the nature of superstitions which, from an ancient period even to that date, obtained credence, and were popular with the multitude. Treating of the wonders of natural magic, previous to entering on the main topic of his treatise, he adduces a few of what he conceives to be ordinary matters of fact, assuring us that—if any one shall, with an entire new knife, cut asunder a lemon, using words expressive of hatred, contumely, or dislike, against any individual, the absent party, though at an unlimited distance, feels a certain inexpressible and cutting anguish of the heart, together with a cold chilliness, and failure throughout the body; likewise of living animals. If a live pigeon be cut through the heart, it causes the heart of the party intended to be affected with a sudden failure; likewise fear is induced by suspending the magical image of a man [whatever that may be] by a single thread; also, death and destruction by means similar to these; and all these from a fatal and magical sympathy.

"The loadstone, he observes, possesses an eminent medical faculty against many violent and implacable disorders; the back of the loadstone, as it repulses iron also removes gout, swellings, rheum, etc., that is of the nature or quality of iron. Likewise the wearing of the loadstone eases and prevents the cramp and such like disorders and pains.

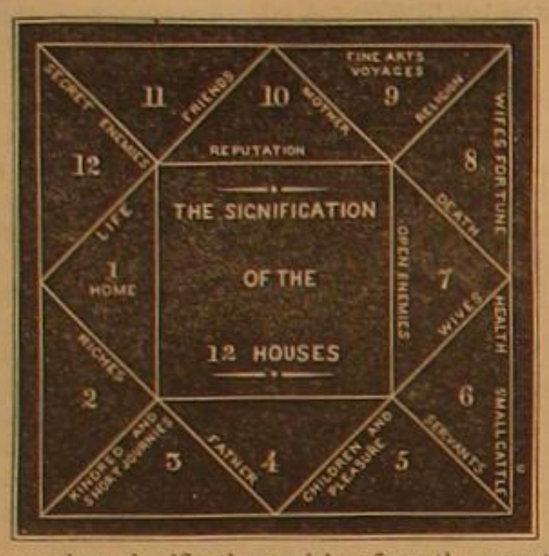
"The influences of the stars appear to be as intimately known to astrologers as though they had walked among and carefully examined and fully realized their occult properties; for example: In every work observe Mercury, for he is a messenger between the higher gods and the infernal gods; when he goes to the good he increases their goodness; when to the bad, he hath influence on their wickedness. It is an unfortunate sign or planet, when it is by the aspect of Saturn or Mars especially, opposite or quadrant, for these are the aspects of enmity; but a conjunction, a trine, and a sextile aspect, are of friendship; but yet, if you do already behold it through a trine, and the planet be received, it is accounted as already conjoined. Now, all planets are afraid [!] of the conjunction of the sun, rejoicing in the trine and sextile aspect thereof.

"They say of the sun and moon; the sun is the lord of all elementary virtues; it disposes [Qy. 'of'] even the very spirit and mind of man. The moon, says Barrett, measures the whole space of the zodiac in the time of twenty-eight days; hence it is that the wise men of the Indians, and most of the ancient astrologers, have granted twenty-eight mansions to the moon, which being fixed in the eighth sphere, do enjoy divers names and properties, from the various signs and stars which are contained in them; through which, while the moon wanders, it obtains many other powers and virtues; but every one of these mansions, according to the opinion of Abraham [? reference], contained 12 degrees, 51 minutes, and also 26 seconds. In the first quarter of these mansions, the first conduces to discords and journeys; the second to the finding [? the hiding also] of treasures, and to the retaining of captives [Zadkiel ought to have been consulted by the Abyssinian Expedition]; the third, to benefit sailors, huntsmen, and alchemists; the fourth, to the destruction and hindrances of buildings, fountains, mills, gold mines, the flight of creeping things, and begets discord; the fifth, to help the return from a journey, the instruction of scholars, and confirms edifices, gives good health and good will; the sixth to hunting and besieging towns and revenge of princes, destroying harvests and fruits, and hinders the operation of the physician; the seventh, to confirm gain and friendship, is profitable to lovers, and destroys magistracies. In a similar manner the remaining three quarters have the characters of their general mansions allotted to them with equal exactness, and, of course, indisputable veracity also.

"We have here a fair example of the arrogant assumptions of ancient, and indeed of all astrologers, magicians, and sorcerers—men who are incompetent to elucidate the ordinary phenomena of nature in the animal or vegetable creation, and yet with unbounded effrontery, affect to build up an empirical system, delivered in a language of their own invention, a pompous parade of jargon made up of the most incomprehensible materials, which, if wholly due to antiquity, partakes of ancient simplicity, credulity, deceit, and superstition; and if somewhat polished and refined to suit the advances of literature and science, has never been able to prove the correctness of its groundwork, or afford a solitary instance of its possessing any meritorious quality beneficial to mankind; while, on

the other hand, its evil consequences have been many, by destroying the peace and happiness of thousands, encouraging deceit, and misapplying in its ignoble pursuit the time and labor and property of its ardent but deluded admirers.

"In Judicial Astrology it is not thought requisite to consider more than a certain number of the planets after a method simplified by ancient astronomers, which is found to be so compact and so complete in governing the destinies of the human race, that modern intelligence has failed to enlarge the field of heavenly influences. Varley notes that the ancients discovered that the circle of the Zodiac, about 16 degrees in width, and through the middle of which runs the Ecliptic, or sun's path through the twelve signs, contains the heavenly bodies, named planets, and the principal fixed stars, and nearly the whole of the material, or significators, from which predictions are obtained. He remarks that, in forming a horoscope this circle is divided into twelve equal parts, corresponding with the spaces containing twelve hours. These twelve divisions are called houses; and they always remain fixed, while the Zodiac, with the twelve signs and all the heavenly bodies belonging to it, are considered to be moving through them all every twenty-four hours. The 'lord' of the ascendant is the planet which rules the signs rising at birth. In drawing horoscopes it is usual to make the figure square instead of round—as below:



"The various significations arising from the aspects of the starry heavens at the time of birth are so exceedingly numerous, that we must refer the curious in such matters to the works themselves, in which all these pretended revelations are minutely recorded. Mankind rank astrologically as being of four temperaments: 1. One class is said to answer to the fiery trigon, also called diurnal, masculine, and choleric, consisting of Aries, Leo, and Sagittarius, which contains the spirited, generous, magnanimous, and princely natures. [Qy. Present example of princes]. 2. We have next the earthy trigon, being nocturnal, feminine, and melancholic, consisting of Taurus, Virgo, and Capricorn, containing the careful, sordid, and penurious qualities. 3. The aërial trigon, which is diurnal, masculine, and sanguine, consisting of Gemini, Libra, and Aquarius, contains the humane harmonies and courteous principles. And 4. The watery trigon, which is nocturnal, feminine, and phlegmatic; namely, Cancer, Scorpio, and Pisces, including the cold, prolific, cautious, and severe qualities. * * * As affecting physiognomy we are assured that—the Scorpio noses are more acquiline than those of Aries, and are more frequently conspicuous for a sort of bracket-shape beneath, * * * the mouth appears in the act of pronouncing the word 'severe.' When we meet in volume after volume with page after page of such composition as this, when we reflect on the sublimity of the heavens and the paltriness of such combinations as are here given of the planets with mundane affairs, we ask the reasons for arriving at such—and of course get a lot of balderdash. Zadkiel, in prefacing a work by Lilly, says: 'If a proposition of any nature be made to any individual, about the result of which he is anxious, and, therefore, uncertain whether to accede to it or not, let him but note the hour and minute when it was first made, and erect a figure of the heavens [see the figure], and his doubts will be instantly resolved. * * * The works claiming to expound this pretended occult philosophy prescribe such childish processes that one naturally wonders how in the midst of so much impudent imposture, astrology and its kindred pursuits ever found or retained any honest partizans. Take for example the use of fumigations, such as of frankincense, etc., to Saturn; of cloves, etc., to Jupiter; of odoriferous woods to Mars; of all gums to the sun; of roses, violets, etc., to Venus; of cinnamon, etc., to Mercury; of the leaves of vegetables to the Moon; of all or any of which there must be a good perfume, odoriferous and precious, in good matters; but in evil ones quite the contrary. The Zodiac is also favorably affected by proper suffumigations. * * * They affect to have suitable bonds by which spirits can be bound, invoked, or cast out. * * * The exorcisms and conjurations of magicians are so audaciously profane and blasphemous as to be unworthy of even a passing notice."

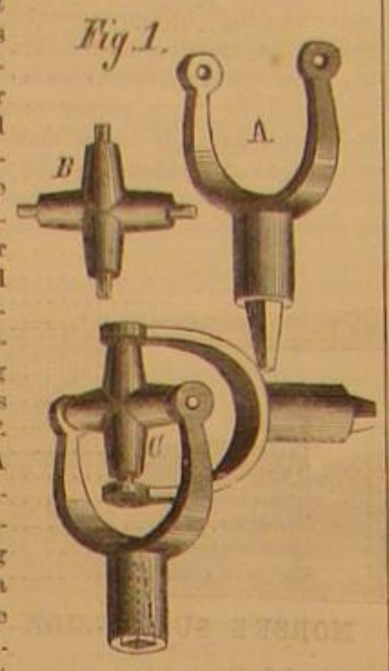
SHAFTING, PULLEYS AND BELTS.

No. III.

Our last article on the above subject, on page 264, left for consideration the balancing of pulleys, laying-out belt holes through floors, running belts at varying angles, and methods of hanging shafting.

The building into which machinery is to be introduced should be constructed for that especial purpose. This is not always possible, many buildings erected for a different purpose being used for the reception of machinery. Still, it is far better that machinery should go into a building specially adapted to its reception. The walls should be firm enough not to be affected by the jar inevitable in running machinery, the floors should be strong, and the spaces between the beams adapted, as nearly as may be, to the lengths of the sections of shafting, or to the points of support. The main shaft is better supported on a row of columns and running in bracket bearings. In this case the posts are braces connecting at least two floors and thus affording a much stiffer resistance to trembling. But, whether bracket or hanger, the boxes should be adjustable, in order to keep the shaft in line. There are numbers of improved hangers and boxes in the market that answer this requirement, but we shall not designate any one as superior to others. If it should be required to place a hanger between flooring beams, the floor to which it is attached should be strengthened with a generous piece of plank. For securing hangers we think lag screws to be superior to bolts with nuts, where there is sufficient thickness of wood. A wooden straight-edge reaching from one bearing to another is better for leveling hangers and boxes than a twine, which will sag more or less. Some use short cylinders of iron turned to fit the box and having a central hole drilled longitudinally through them. This is an excellent plan, as the eye may sight through, or a string be passed through to determine the level.

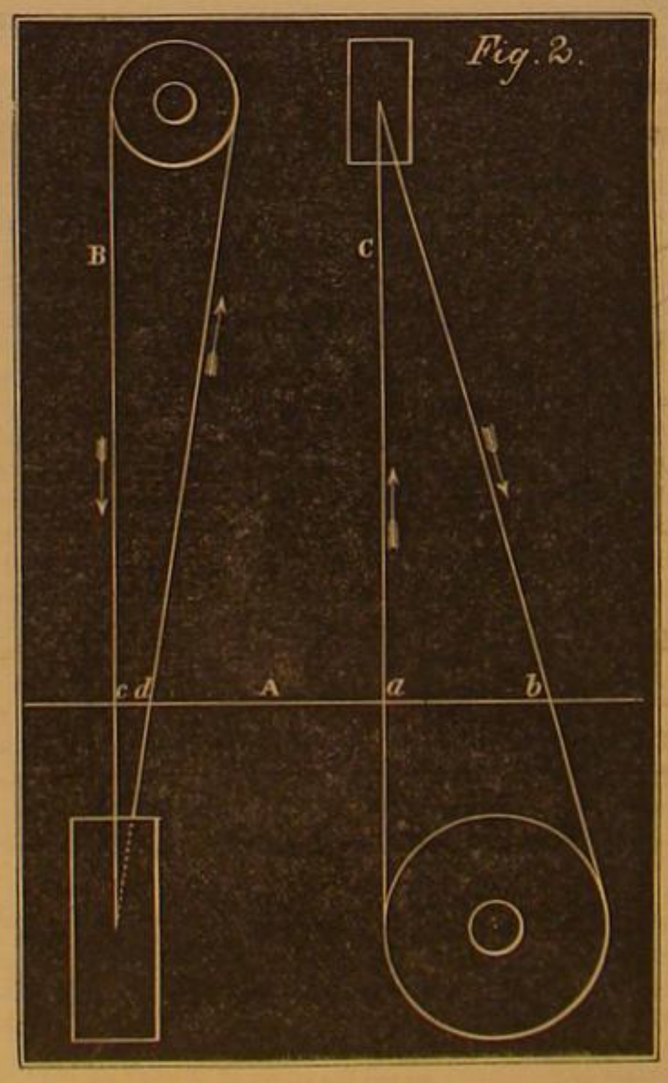
Fig. 1.



Where holes are to be bored through the floor close to a wall, post, or other vertical obstruction, a handy tool, similar to that shown in Fig. 1, comes into play: It is easily forged and need not be finished with the elegance of contour our artist has seen fit to give it. A is one of the yokes and B the cross; they are seen united at C. The shank of one yoke has a tapering square hole to receive a bit or auger, and the other is a tapering square shank to fit the stock of the bit-brace. The device is a "universal joint" and can be readily worked at an angle of 45°. (The engraving shows an angle of 90° to exhibit its construction more perfectly).

The method of laying out belt holes through floors to avoid unsightly patches on the floors, occasioned when belt holes

Fig. 2.



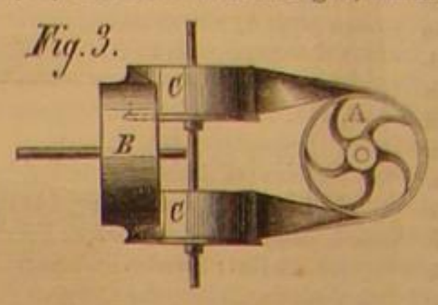
are laid out by guess, we published on page 169, Vol. XVIII, but will re-introduce it here. If a belt is to be carried from a pulley on an overhead shaft to one on any floor above, the distance from centre of lower shaft to ceiling—under side of floor—should be measured and noted; then the thickness of floor; next the distance between top of floor and centre of upper shaft. If one pulley or shaft is directly over the other, the size of pulleys and width of belt being known, you have all the data necessary, if you measure the distance of one shaft from the wall of the building, which is done by dropping a plummet from centre of shaft or diameter of pulley and measuring to the wall from that point. From these data, whether the two shafts are in the same vertical plane, whether the diameters of the pulleys are equal, and whether the belt is to be carried through one, two, three, or even four floors, or not, the intelligent mechanic can lay out a diagram that will enable him to cut his belt holes accurately. The diagram may be laid out full size on a swept floor, or on a reduced scale on a board or sheet of paper. Measures thus made can easily be transferred to the floor through which the holes are to be made.

For a "quarter twist" belt we cannot do better than re-publish a diagram (Fig. 2) produced on page 85, Vol. XVIII, with the writer's direction. Lay out on a floor with chalk line and "tram" two views of the pulley, or by scale on paper, as above.

B is the belt running in the direction of the arrow on to the lower pulley, and C is the belt running in the opposite direction. Therefore, drop a plumb line representing the perpendiculars, B and C, and draw the diagonals governed by the diameters of the pulleys, marking the distances *a b* and *c d* on the floor, A. Now drop a plumb line from each side of the centre of face of upper pulley to the floor and from one point *c*, thus found, lay off the distance, *a b*, in a line parallel with the upper shaft, and from the point *a* the distance, *c d*, parallel with the lower shaft. These points are the places at which the holes should be cut.

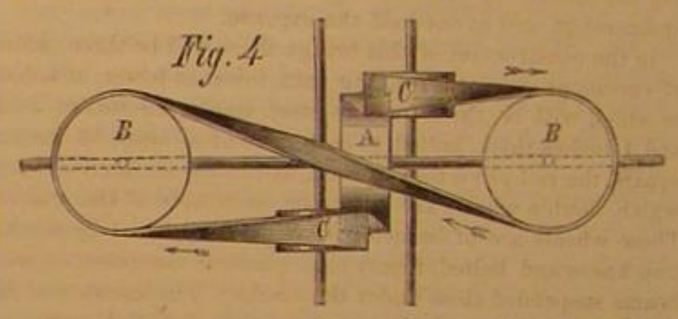
"Quarter turned" or "corner turned" belts are run generally by the device seen in Fig. 3, which represents two shafts placed at right angles, the belt from A or B passing around two flanged pulleys, or guides, C, turning loosely on a fixed upright shaft, and sustained in position by a collar under the hub of each. It is possible to run pulleys by this device which not only have varying diameters, but the shafts of which are on different levels, but the results are not so good, owing to unequal strain on the belt. It is better to confine this method to shafts on the same level and to pulleys of equal diameter, and the useful limit of angle of shafts is that of 45° or less. A greater, or more obtuse angle is better run by means of guides on two uprights.

Fig. 3.



Since the preparation of these papers we have received several communications on this subject, one of which, with the the illustration, Fig. 4, we introduce: The plan is to drive two

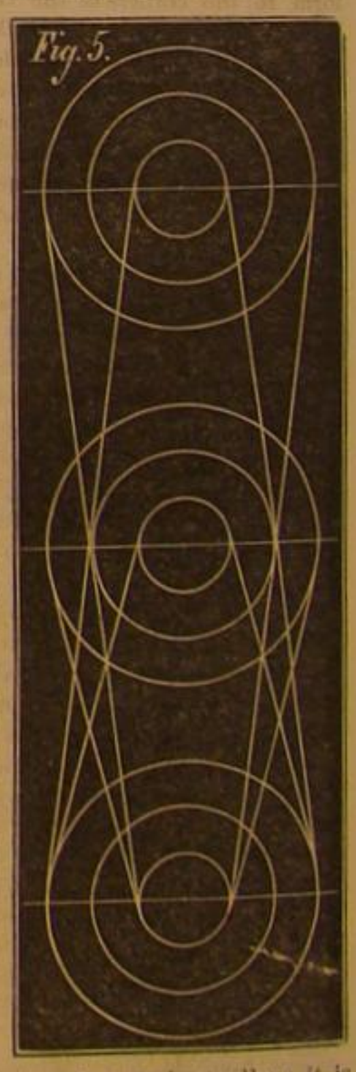
Fig. 4



shafts, at right angles to the main, by one belt. The belt passes from the top of the pulley, A, on the main shaft, around C, to the top of B; then from the bottom of B, around C, to the bottom of A. The shafts of C may turn with the pulleys and be supported in an elegant iron frame. The belt will run either way. W. H. H. Whiting of Chicopee, Mass., is the inventor.

Another writes that the variations of cone pulleys are not correct, the belt being the tightest on the fast speed, whereas it should be the reverse. The diagram, Fig. 5, will show the reason why and suggest its own remedy. It is only necessary with a pair of dividers to measure from the centres of the pulleys shown by the horizontal lines to the points of contact of the belt, on either pulley, at either distance between shafts. Our correspondent and our intelligent readers generally will readily understand the case from an examination of the diagram.

Fig. 5.



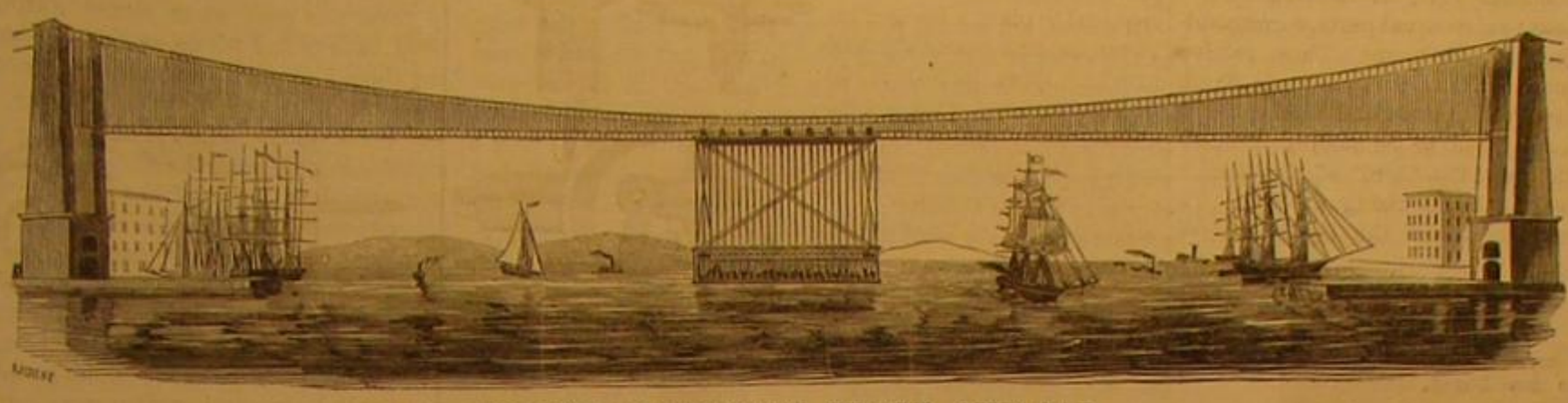
Pulleys may be balanced by swinging them on arbors between lathe centres and noting their positions as their gravity determines it. On the top side drill and tap two holes, in which seat machine screws with flat heads the shanks projecting through from the face or outer side. Then by securing pieces of iron as weights to this point until the pulley is balanced the amount necessary to balance the pulley is found. This amount of lead is then melted and cast in a mold formed by clay. The screws serve to hold the lead in place. Modifications of this plan will suggest themselves to the mechanic.

If set screws are preferred to keys in securing pulleys, it is best to make them of cast steel, with hollow points, the ends beveled to an edge surrounding the hole, and tempered to a dark straw. When set up, these screws cut circular indentations on the shaft and exert an enormous force of resistance. Belts should be run with grain side to the pulley, it being found that they will drive 34 per cent more than with flesh side to the pulley. Pulleys covered with leather, iron pulleys polished, and mahogany pulleys polished, rank for working value as 36, 24, and 25 per cent, respectively, wood and iron uncovered being almost identical.

Bridging the East River, Crossing in an Aerial Car.

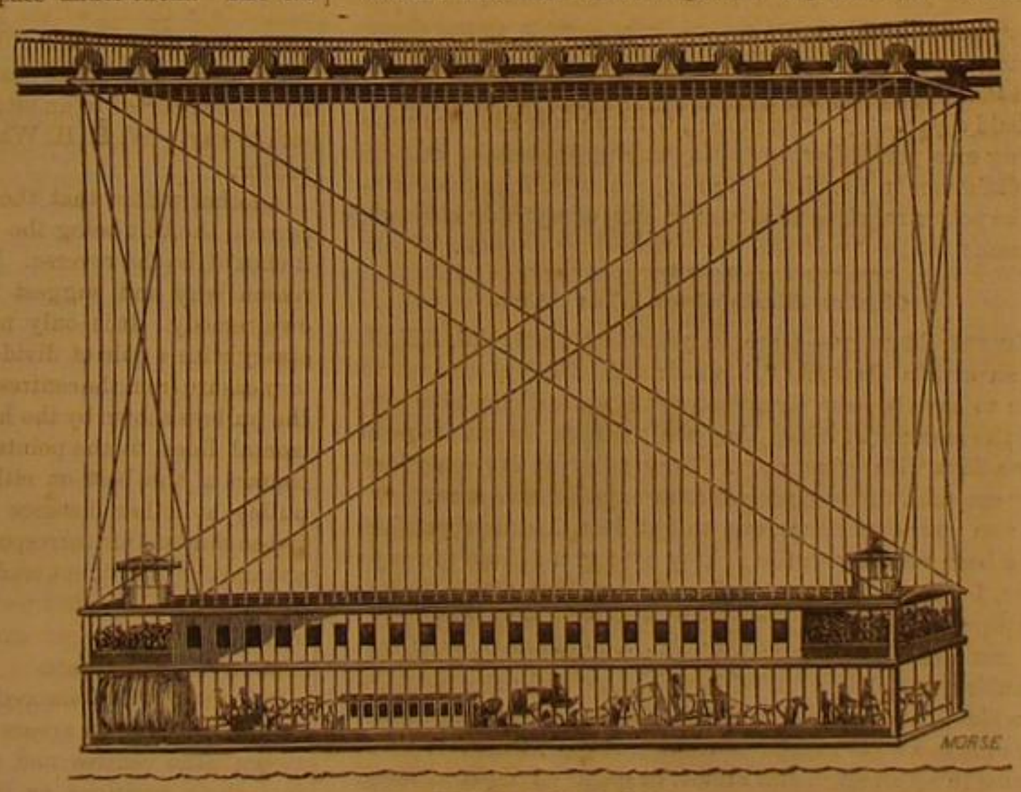
The crossing of streams or chasms by means of a sliding car suspended on a rope stretched from either side, is not a new idea. It has been practiced however, heretofore, in a rude and imperfect way. Mr. J. W. Morse, of this city, has considered this principle as capable of a more extended application than has yet been made, and to that end has devised a car and suspension bridge adapted to the transportation of large numbers of people together with teams and their loads, which he thinks specially applicable to transit between New York and Brooklyn over the East River. We give engravings of the elevated suspension way with the car as it would appear midway in its passage over the East River, an elevation of the car drawn to a larger scale, and a front and side of the pulleys, showing their construction.

The construction of the bridge itself, with its cables, towers, braces, etc., is the same in all respects, except weight, as the most approved suspension bridges now in existence, differing only in the mode by which it is proposed to cross it. The cars are to run *under* the superstructure instead of over it—suspended to the track above, in place of resting upon it. The starting points of Morse's bridge will be directly from each bank of the river; the abutments and towers resting upon, and the termini of the route being the wharves on either side. The cars will leave the shores running parallel with the water within a few feet of the surface and land their freight in the same manner, and, if required, at the same place, as the ferry boats do now, only it is thought with much greater facility, carrying large numbers of people and making the transit in one-fourth the time, with greater safety and comfort, and at one-half the expense.



MORSE'S SUSPENSION TRACK AND CAR.

In the construction of this bridge there will be three cables of enormous strength, running from tower to tower, attached to which will be three double steel tracks, 18 inches deep and 4 inches thick, bolted to each side of a beam 12 inches square, the rail projecting upward at the top six inches, upon which double wheels are to run on each side of the tracks. These wheels are of immense strength, supported by strong iron knees and bolted firmly to a platform composed of iron beams suspended close under the tracks. The tracks will be laid at an elevation of 140 feet above the level of the river, so as to allow vessels of any size to pass under them. The car will be suspended below from the platform by means of round steel rods one and a half inches in diameter and of sufficient length. They will be three feet apart, with braces of the same material running transversely from the top corners of the platform to the corners of the car below. The three steel tracks will be suspended from the cables with one and a half inch steel rods, two feet apart, making continuous girders 18 inches deep and 20 inches in width, fastened securely to the abutments at each end.



THE SUSPENSION CAR.

The car will be 160 feet in length by 40 feet wide and two stories high. The lower story of the car will be exclusively appropriated to horses, carts, cars, and other vehicles, and the upper will be reserved for passengers only. It is estimated that the car will accommodate five thousand passengers at each trip—the passengers and freight leaving the car on one side while others enter at the opposite, thus enabling speedy discharge and loading without confusion. The car is to be drawn across by means of a stationary engine and a wire rope running on friction rollers. The pilot, who is stationed above in the look-out or pilot house, can regulate with his wheel the speed of the car, and with the aid of the telegraph back or stop it as occasion may require.

It is estimated that Morse's suspension car will convey over the East River in the course of twelve hours 75,000 people, beside 5,760 horses and carts, accomplishing as much as nine of the present ferry boats and requiring only two minutes, and even, if necessary, but one minute, to cross the river.

As there will be no necessity for extended abutments to this bridge, as is the case with the Roebling plan, occupying whole streets in New York and Brooklyn at inconvenient distances from the ferry, Morse's plan, beside saving the labor of walking a great distance before getting upon the bridge, will not cost one-third the amount in its construction. It is thought that, when loaded to its utmost capacity with passengers and freight, Morse's suspension track and car will not weigh one-quarter as much as the Roebling bridge without any load upon it at all. It has the advantage of avoiding, by passing under instead of over the bridge, the perils and discomforts of heavy winds and storms to which the other is necessarily exposed at its great altitude.

It is also estimated that the suspension track can be completed and ready for use within one year, and Brooklyn, if she chooses, can own it all herself without recourse to outside stock. The Union Ferry Company say that the Roebling bridge will not affect their interests in the least, as people will prefer taking the chances in the boats rather than be compelled to walk or drive from Chatham Square in New York, to the junction of Main and Fulton streets, in Brooklyn, in all seasons and weathers. Cartmen and working people generally, after a day's toil, will prefer the easy transit from dock to dock, to the journey of a mile and a half over house tops and a high bridge exposed to all inclemencies. By Morse's bridge the crossing may be made in the vicinity of either of the present ferry sites, while the Roebling starting place will necessarily be from points remote from the river. Beside these advantages is to be considered the great difference in the weight of the contemplated bridges. While the structure required for laying the track on Morse's plan is a mere skeleton of comparative lightness, although of great strength, and has an elevation above the river sufficient for the passage of vessels of the largest class, the necessity of flooring, railings, extra beams, etc., in the Roebling bridge adds greatly to its weight. It is calculated that the dead weight of the last named bridge and cable will be 3,483 tuns; the weight of teams and people—say 100,000 per day—will average 1,270 tuns more, making a total weight at any given time during the business part of the day of 4,753 tuns. The hight of the Roebling bridge is only 118 feet and in the center but 130 feet above the surface of the river—not room enough for large vessels to pass under, and near the docks a good sized schooner could not get past. This last mentioned obstacle has called forth remonstrances from various ship owners and masters of vessels interested in the free navigation of the river, and is considered as an objection of the greatest importance, which the adoption of Morse's plan will entirely remove.

We are informed that competent engineers and scientific mechanics have decided that the suspension track and car invented by Morse is stronger and safer, and far less expensive in the construction than any other proposed.

Its safety and convenience are thought by the inventor to be far superior to that of the proposed suspension bridge designed by Mr. Roebling.

Having thus fairly stated the views of the advocates of this plan, we think it must be obvious to every reader that there are great objections to it. The concentration of the great weight of the car with the enormous load it is intended to carry upon a limited part of the bridge, instead of its distribution over the entire length, as is the case with ordinary travel, would necessitate greater strength than the ordinary suspension bridge and increase the liability of accidents.

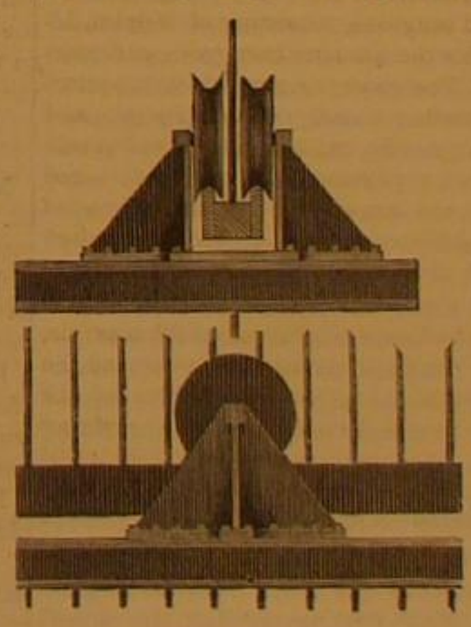
Secondly, we fail to see the advantage in swinging a vessel over a navigable river when it can be so much more easily and cheaply floated across. It is as if one should propose to raise the ferryboats now plying between the two cities and transport them with their loads, high and dry through mid air, in preference to the method of navigation now employed.

The scheme might however, be applied to the crossing of rapid, dangerous streams, and deep cuts in the neighborhood of mines where it is necessary to transport coal, lumber, and ores across, and on a smaller scale might be perhaps used to advantage under such circumstances. A drawing and model of this device can be seen at Room 22, No. 117 Nassau street New York city.

THE GREAT INDUCTION COIL.

One of the greatest scientific wonders, even in this wonder-producing age, is unquestionably the great induction coil—or inductorium, as the German physicists term it—at the Polytechnic Institution. It is an instrument of remarkable power and capacity, and possesses the highest scientific interest. We briefly described this apparatus three weeks since, but, as a marvel of science, it deserves a more detailed notice than our time then permitted us to give. In designing this induction coil, which is about six times as large as any previous production of the kind, Professor Pepper's object was to obtain an easily controlled source of electricity, combined with a degree of tension sufficient for the scenic requirements of the Polytechnic. In carrying out this object, the Professor enlisted the services of Mr. Apps, of the Strand, who has himself effected many important improvements in induction apparatus, and to whom is due the construction of the present powerful machine; but, although so extremely powerful, it is nevertheless perfectly safe to the manipulator, so carefully has every contingency of accident been guarded against. The machine consists of an ebonite barrel, 9 feet 10 inches in length, supported at each end on two ebonite pillars. The barrel was made at the Silvertown Works, and is the largest ever turned out there. It contains the compound coil, and of itself weighs 477 pounds, the whole machine weighing 15 cwt.

The primary wire is of copper of the highest conductivity 0·0925 inches diameter (B.W.G., No. 13), and 3,770 yards in length; the number of revolutions of the primary wire round the soft iron core is 6,000, its arrangement being three, six, and twelve strands. The total resistance of the primary coil is 2·201400 British Association units; and the resistances of the primary conductors are respectively for the three strands, 0·733800; for the six, 0·366945; for the twelve, 0·1834725 B. A. units. The soft iron core is composed of straight wires of very soft iron, each wire being 5 feet in length, and 0·0625 inches in diameter. The diameter of the bundle of core wires is 4 inches, and their weight 123 pounds. The secondary wire is 150 miles in length, 0·015 inches (B.W.G., No. 29). diameter, and is covered with silk. The total weight of the wire is 606 pounds, and its electrical resistance 33,560 B. A. units. This secondary coil is 4 feet 2 inches long, and the insulation is calculated for safety at 95 per cent beyond absolute requirement. The secondary wire is insulated from the primary by an ebonite tube 8 feet in length, and one-half inch in thickness. The condenser is made with sheets of varnished paper and tinfoil, arranged in six parts, each containing 125 feet super, or a total of 750 feet super.



THE PULLEYS.

The machine was originally tried with a contact breaker detached from the great coil, and having an independent electro-magnet; up to ten Bunsen cells with the great inductorium, this worked well, but when the battery was increased to thirty or forty cells it became unmanageable. A Ruhmkorff break, with platinum amalgam and alcohol above it, was substituted, which saved the points, but the spirit was now and then violently ejected and set on fire. Professor Pepper then proposed a modification, which has proved successful, remaining in perfect working order during a series of experiments extending over eight hours. The commutator regulating the admission of the battery current is provided with a locking apparatus, and the whole coil is most carefully and effectually insulated from the floor and surrounding apparatus, as are also the separate portions of the apparatus from each other. The battery power is at present supplied by forty Bunsen cells, each containing a pint of nitric acid. It is, however, intended to substitute for this, a Grove's battery of the largest size ever made, and which is in course of construction. It will consist of pipeclay cells, 2 feet square upon the sides, and 4 inches wide, with walls one-eighth of an inch thick.

In working the great induction coil, the sparks obtained from it with five Bunsen cells are 12 inches in length; ten cells give sparks 14 inches in length; fifteen cells give 17½-inch sparks; twenty cells give 21-inch sparks; twenty-five cells give 23-inch sparks; thirty cells give 23½-inch sparks; thirty-five cells give 26-inch sparks; forty cells give 27½-inch sparks; and with fifty cells, sparks from 28 inches to 29 inches in length were obtained. After eight hours working, the coil gave, with fifty cells, a spark 25½ inches in length. It was also found that of the proportions of the condenser used, one-half gave the longest spark. The spark is not such as is generally produced under similar circumstances, but is a thick wire of light, surrounded by a wide waving flame 2 inches or

3 inches thick, and which can be blown aside from the spark. The spectroscope gives a perfectly continuous spectrum, like the light of day, only that it is barred with the bright lines of the substances in combustion. The flame of the spark, with a very slight blast of air, rises to, at least, 12 inches in hight when it is passing about the same distance horizontally.

Beside the gigantic Grove's battery, there is also a Leyden battery in course of construction, the present one being inadequate to represent the full power of the coil. The first part of this battery, consisting of 250 feet super of coated glass, is now nearly completed. There is also a very large and elegant arrangement of Gassiott's cascade in course of construction, which is also to work with the great induction machine, and which will embody several important improvements that have been suggested by Mr. Gassiott. The most recent experiments with the coil have shown that as yet no limit as to the quantity effects can be established, and it is exceedingly probable that by a very few minutes' working, the large coil would charge, at least, 1,000 Leyden jars of very large size. The coil, too, is probably destined to throw a new light upon scientific research, and to solve the problem—what is ozone? In reference to the amount of this element, and the density at which it may be produced, very few experiments have as yet been made. But enough is seen in the extraordinary reddening effect of the flame of the spark on litmus paper, to show that we are likely very soon to solve the ozone problem. —*Mechanics' Magazine.*

Creosote as Fuel.

The London *Daily News* says: "For a long time past creosote has been almost a drug in the market, the demand for it for the chief purpose to which it had been previously applied, viz., as a preservative of timber, having almost ceased with the completion of the great railways, and the depression in the railway interest which has of late years prevented the further development of that branch of commercial enterprise. The gas companies have been glad to get rid of it on any terms, and that which had for some years been a valuable refuse of gas manufacture became almost worthless. Its application to heating purposes for which it seems admirably adapted, will, however, probably restore the equilibrium of value which the causes referred to have tempoarily disturbed, and at the same time introduce a fuel which, where a very extreme temperature is required, promises largely to supersede the use of coal. At Mr. John Schwartz's sugar refinery in Pelham street, Spitalfields, more than one thousand gallons of creosote oil are daily consumed in heating his two furnaces, which are of one hundred and forty horse-power, and he speaks of it as a most sncccssful experiment. According to his calculation, two hundred and twenty gallons of the oil—the cost of which is one penny a gallon—equal in heating power to two and a half tuns of coals, and one pound of the oil will evaporate thirteen pounds of water, whereas one pound of coal will only evaporate seven pounds of water.

"As a matter of course care is required in the mode of, or rather in the arrangements for using it; but if the directions are followed out, it is not only more economical but more cleanly, and in all respects far less offensive than any other kind of fuel, emitting neither smoke nor smell. Mr. Schwartz's furnaces are supplied from a large tank, from which the creosote flows through a pipe into the furnace, along the sides of which it is propelled by a jet of steam. Coming in contact with the fire (of which there is a small basis in the shape of a red hot coke and brick) it ignites, and burns fiercely with a pure white flame; and the combustion, being perfect, leaves no residuum of any kind. It should be added, as another economical feature in the use of creosote oil, that, as applied to the furnaces in question, no stoking is necessary, consequently stoker's wages are saved; and, again, no expensive apparatus is required to comply with the Smoke Nuisance Prevention Act, since smoke there is none."

Falsetto Voice.

Dr. Marcet, of the Brompton Consumption Hospital, has been looking down the throat of one of the Tyrolese singers who have lately been warbling at St. James' Hall, the object of the inspection being to ascertain the physiological conditions which produce the beautiful falsetto notes for which the Swiss artists are celebrated. The observations were made by means of a laryngoscope, a little instrument whereof the principal member is a mirror placed at the back of the patient's mouth. It is pretty generally known that the human vocal apparatus consists of a pair of membranes situated horizontally in the throat, and just touching at their edges. A drum-head, with a slit across it, may convey a popular idea of them. In the act of singing, the lips of these cords, as they are called, are brought into contact, and they approach each other throughout their whole length, and remain parallel. When they are set in vibration, by the passage of air through them, under these the ordinary conditions, a full chest note is emitted; but if they do not meet in their entire length, either a posterior or anterior portion of them remaining apart, the sound is no longer full, but feeble and shrill; the note emitted is what the stringed instrument player calls an harmonic, and what the singer calls a falsetto, or head note. The violinist who would bring out an harmonic so touches a string that, instead of making it vibrate as a whole, he divides it into segments, each of which vibrates by itself, and emits the note due to its short length, instead of that which the full length of the string would yield. The same sort of thing appears to be done by the falsetto singer; the adept can at will shorten his vocal cords so as to pass instantly from one to its harmonic. The muscular process by which this transition is effected is not clearly made out, so that it cannot be determined whether all singers are alike gifted with powers of head-singing equal to the Tyrolese, or whether Alpine melody grew out of peculiar capabilities of Alpine throats.

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

The Advantage of Large Wheels for Vehicles.

Messrs. Editors:—Your correspondent, "J. J. C.," in No. 20, present volume, places himself in a wrong position, inasmuch as he gives us an idea at variance with well known principles, that have been, and easily can be demonstrated. I refer to his law of friction as applied to large cart wheels in comparison with small ones, where he asserts that there would be double the friction on the six-foot wheel that there is on the twelve-foot one.

Of course, we are led to suppose that the load is the same on the axles of both pairs of wheels, and that the load is passing through the same space in a given time. If this supposition is correct he is wrong, and the advantage of the large wheel is not to be attributed to a decrease of friction. It is a well known law that friction *in* and *of* itself is constant, whatever may be the velocity; that is, the resistance caused by the contact of the axle with its circumscribing box or bearing, is the same, whether we have one revolution per minute or one hundred, other causes of resistance remaining the same. For an illustration, take the same cart, with wheels twelve feet in diameter, all weighing 1,200 lbs., moving two miles an hour. ascertain the friction, remove the large wheels and substitute the small ones, and if the weight is the same the friction will be the same if the cart moves at the same speed.

If this law is correct then the advantage of large wheels is not on account of there being less friction, but from another cause which has no relation to it; and this advantage depends on the road, whatever it may be, whether there are obstructions, like stones, sand, mud, or the settling down of the road bed under the wheels, however slight; or, in case of railways, the inequality of the surface of both wheels and rails, and the joints at the head of each rail; or, perhaps, a better and more palpable illustration, the cart passing over cobble-stone pavement, or a corduroy road, composed of large round logs. Here, of course, the small wheel falls lower in passing from stone to stone or log to log, than the large wheel, and has to raise the load higher between each, hence as much more power to move the cart at a given speed is required, as the variation in a line described by the axle of the small wheel and that described by a large one, is greater or less when compared with a straight line.

Again, if the large wheel comes in contact with a stone one foot high, it is overcome easier than the small wheel, because the raising the load is not so abrupt—the power is applied longer and through more space—in proportion as the circumference of the large wheel approaches nearer a straight line than that of the small wheel.

Could a perfectly round wheel, with an unyielding surface, rolling on a perfectly smooth unyielding surface be attained, the difference in the size of the wheels would have no effect on the power required to move the cart, everything else being the same. F. W. B.

Chairs Made from Gas Pipe.

Messrs. Editors.—I see in your last issue, Vol. XX, No. 20, an article headed, "A Chair Wanted," in which you seem to have become disgusted with the articles now used, and the manner in which they are temporarily put together now-a-days with glue only. They seem to last only until they are sold, thereby necessitating another sale soon.

From your experience, one might imagine that you have often been vexed with the rickety concerns. From my experience, I would suggest a good chair or office stool, made of gas pipe.

I am a gasfitter by trade, although at present a clerk in a plumbing establishment. I have had several office stools, all of which, in wear, have resulted in the manner described. I have made a stool myself of small gas pipe, which is nearly as neat in appearance and almost or quite as light in weight as a wooden one, and I defy any man to make fifty wooden stools that will last as long as this one. It is so strong and firm that the weight of twenty men could not break it down. I am a young man, comparatively speaking, and should I live to be seventy-five years old, I feel satisfied this chair, from its strength, would be just as good at the expiration of that time, as it is now. An arm chair may be made as good and comfortable to sit in of the same material (gas pipe).

Nelson Hoyt, Jr.

Easton, Pa.

[We consider the device of our correspondent as a very practical and efficient one, and have no doubt such stools and chairs, for office use, would find ready sale if introduced into the market. Whether they could be made sufficiently elegant for domestic use, may perhaps be questioned, but we see no reason why the principle might not be so extended. —Eds.

To Inventors--Field Cotton Thrashing Machine.

Messrs. Editors:—The great want of the South is a machine for gathering cotton from the field. The negroes work well enough in the cultivation and picking of cotton until the cold weather sets in, then they relax in their labors, and no inducement can be offered that will stimulate them to the unpleasant task of cotton picking with anything like the necessary diligence, so that a large proportion of the late cotton is lost in the field.

Inventors have hitherto endeavored to construct machines that would supply the place of the fingers, and pick the cotton clean and free from trash. This I conceive to be the wrong direction. Let us have a thrasher, or other machine propelled by horse power, that will go into the field (after the frost has swept the stalk clean of leaves and has opened all, or the great majority of the bolls on the stalk), and stradling one or two rows, as the case may be, thrash or beat the stalks and limbs with their bolls all to pieces, delivering the mixed mass of cotton, wool, and trash into a proper receptacle, thence to be conveyed, by attending wagons, to the gin house, there to be cleaned by proper machinery. The leading idea is to get the cotton out of the fields and under shelter, so that it may be cleaned at leisure during the winter months.

I think the cotton can all be recovered from the trash and broken stalks and branches, by the use of a gin called the roller or Parkhurst gin, made in your city previous to the war. What has become of the manufactory since I do not know. This gin carded the cotton very rapidly and efficiently from the seed when mixed with any quantity of limbs, bolls, broken and whole, and all sorts of trash. After purchasing them I ceased the endeavor to pick my cotton clean, but gathe ed it in the roughest manner, limbs, bolls, anything. The point was to gather it and let the gin cleanse it. It made a better sample with the roughest stock than the ordinary saw gin with the cleanest picked cotton. With this gin a thrasher is practicable, if further manipulation were necessary the other machines used to cleanse cotton in the cotton factories, might be used. That some inventive genius could take hold of this idea and perfect a machine would be conferring the greatest possible benefit upon the cotton interest, and secure to himself princely fortune, I conceive to be by no means an impossibility. I hope some one will try it.

Austin, Miss. H.

Poppies and Opium.

Messrs. Editors:—During the war, a farmer in Middle Georgia, latitude 33° 20', made opium from the common poppies, some had white and others red blooms. The poppies raised in Turkey, for opium, have larger capsules than those usually grown in the Southern States. Both are hardy and easily raised, the seeds falling on the grounds where raised one year and come up the next spring in great abundance. A deep, rich, moist soil is best for the poppy; in dry seasons irrigation would increase the crop. The seeds may be planted at any time in the winter, or early spring—November or December is the best time.

Some of the opium was given to a practicing physician, who made it into laudanum, and used it in his practice. He said it was much stronger than the opium he purchased at the drug stores.

Three feet is wide enough between the rows, with the plants six to ten inches apart. When the blooms drop, the capsules, or seed pods, are cut with a sharp knife, the incisions shallow and perpendicular, and nearly the whole length of the capsules. This operation must be performed near sunset, and while there is enough light to see, to prevent evaporation and desiccation of the opium, and it must be scraped off as early as practicable the next morning, for the same reason. A spoon with sharp edges is a good implement for that purpose. Three or four incisions in each pod is sufficient at one time, equi-distant apart; they may be cut again between the first incisions with like success the second time. Cutting the capsules perpendicularly facilitates the gathering of the opium. The tediousness of slitting and scraping the seed pods will limit the quantity of opium made.

Here is a fine field for the chemist to extract opium, or morphia, at least, from the leaves, stalks, and capsules, as they all contain opium. After the juice that exudes from the pods is scraped off, it is placed in plates in the sunshine to dry, and is worked by hand, before it becomes dry and hard; that is all that is necessary. When dry, it is pure opium. No flower garden can excel a field of poppies in bloom.

W.

Indian Springs, Ga.

A California Chair.

Messrs. Editors:—The chairs answering the demands of the *American Builder*, page 312 Scientific American, current volume, are actually in existence, though apparently known to few only. They were seen not a year ago in California, but their place of manufacture is unknown. All glue is dispensed with, but many years' wear testify to their durability. When seen they were admirably adapted for parlor, dining room, or kitchen; if suitable for office chairs, deponent saith not. Two long and two short, two to two and a-half inch turned pieces, with the turned connections, all of firm, sound wood, are firmly held together, while the seat and back are durably and elastically formed by strips of sound raw hide, hair retained. These are all the materials.

R. H.

Does the Resistance Increase as the Square or Cube of the Velocity.

Messrs. Editors:—Having observed several communications under the above heading in the Scientific American, allow me to state a few facts on the subject.

The English iron-clad steamship *Hercules*, when tried at Stokes Bay last January, attained a speed of 14·69 knots with 8,528·75 H.P., and 12·12 knots with 4,044·91 H.P. In this case the power varied as the cube of the velocity, nearly, calculated as follows: $\sqrt[3]{4,044·91} : \sqrt[3]{8,528·75} :: 12·12 : 15·54$, instead of 14·69, actual speed, the difference being 0·85 knots, which is probably due to the fact that the form of the *Hercules* is a very bad one to be driven at such high speed. The resistance varied as the square of the velocity, thus: With 20 lbs. mean pressure in cylinders, the engines made 71·51 turns per minute, and 55·29 turns with 12·26 lbs pressure.

Now $(71·51)^2 : (55·29)^2 :: 20 : 11·95$; which, subtracted from

12·26, leaves the small difference of 0·31 lbs. I think these facts will settle the question that the resistance to which a vessel is subject varies as the square of the velocity, and the power to produce this velocity varies as the cube of the velocity. F. E. K.

Mississippi State Fair.

MESSRS. EDITORS:—We thank you for calling attention, in a recent issue, to the State Fair to be held in this city in October next, under the auspices of the Planters, Manufacturers, and Mechanics' Association of Mississippi. We expect, and and shall be delighted to see in attendance manufacturers from the North, East, and West, with machinery, agricultural implements, etc. Our State Fairs, before the "late unpleasantness," were very successful, but our industrial interests, under free labor, are receiving an attention not known to the old order of things. We have the soil, climate, and energy to at least reconstruct our pecuniary affairs, and will be thankful for all the aid received, either through immigration or by the introduction of labor-saving machinery. Persons intending to visit the State Fair are requested to send their address to the undersigned, with a list of the articles they propose placing on exhibition.

J. L. POWER, Corresponding Secretary.

Jackson, Miss.

VELOCIPEDE NOTES.

The velocipede having ceased to be a novelty upon our streets and public parks, it has entered the arena of the race course, and we may look for a good deal of exciting amusement. In New York, the warm days of the past month have had no injurious effect upon the veloce-riding fraternity or upon the pastime. In fact the indications are the reverse of what was predicted; for the great sensation has taken a firmer hold than was anticipated upon its devotees.

The first out-door race of the season took place on the Union Course, Long Island, on Tuesday, April 27th, in presence of about five hundred spectators, the assemblage being decidedly the most respectable one seen on the course since the time racing was in the hands of reputable people. The great drawback to the success of the race, was the condition of the track, the sandy dust on the main portion of it lying several inches thick, thus making the track hard for horses and still harder for the bicycle.

The conditions of the first race were: Distance one mile. Not less than four contestants. Driving wheel of each machine not limited in diameter. First prize, gold medal, valued at $150. Second prize, $35 cash. Third prize, $10 cash. Fourth prize, entry fee returned.

The entries for this race included Messrs. Monod, Burroughs, Brooks, Darling, Hill, and Pickering. Pickering was winner of the first prize, the gold medal, and Darling the second, $35.

The conditions of the next race, the third on the programme, were as follows: Distance one mile. Not less than four contestants. Driving wheel not to exceed 36 inches in diameter. First prize—handsome velocipede, valued at $125. Second prize—silver cup, valued at $50. Third prize—$40 in cash. Fourth prize—$10 cash.

The entries for this included Messrs, Martin, Scully, Duryea, Conlan, "Stranger," and Young Carnival; and a good start being effected, a lively and exciting contest took place despite the heavy condition of the track.

The following is the score;

FIRST RACE.

1. W. Pickering, on a 40-inch Pickering machine, Time 5.57
2. Darling—38-inch Monod machine, time 6.05.
3. Hill—41-inch Demarest machine, time 6.10.
4. Burroughs—50-inch Demarest machine, time 6.20.
5. Monod—38-inch Mercer and Monod machine, distanced.
6. Brooks—48-inch Wood machine, distanced.

SECOND RACE.

1. Martin—36-inch Martin & Co. machine, time 6.42.
2. "Carnival"—33-inch Monod machine, time 6.46.
3. Duryea—36-inch Mercer & Stevens machine, time 6.52.
4. "Stranger"—33-inch Merrill & Co. machine, time 6.56.
5. Scully—36-inch Union Co. machine, time 7.06.
6. Conlan—36-inch machine, ruled out for foul riding.

Frank Swift, who is matched against Fred. Hanlon, rode fifty miles recently, at the Oswego rink in 4 hours 17 minutes. This beats Walter Brown's Boston time considerably. He made 750 circuits of the Oswego rink to complete the fifty miles.

No American rider has yet equaled the time made by Moret, a Frenchman, at Carpenteas, France. He was the winner there in a race, distance 1,680 meters (or 1 mile 77 yards), in 2 minutes 40 seconds. He has often accomplished 12 Kilometers (7 miles and 800 yards) in 30 minutes, and 100 kilometers (62 miles and 250 yards) in 7½ hours.

The tropical folks also have a "hankering" after the headless "steed," and during the past week a consignment of velocipedes was shipped to Jamaica, West Indies, from this city. Ward, of Cortlandt street, also sent three to Montevideo, to the proprietor of a public park in that city, who proposes to use them on his grounds, and it is only a few weeks since the Hanlons sent a number to Mexico.

The *Velocipede Messenger*, of Chicago, is responsible for the statement that there has been invented in Pittsburgh, a velocipede of one wheel, which can be propelled by the combined force of five men, who may occupy comfortable seats on the automatic horse. The wheel is ten feet in diameter. Five gentlemen can ride on it as comfortable as in a carriage. It can be propelled at the rate of a mile in two minutes.

A four-wheeled velocipede has been constructed in Buffalo, which will carry a lady, besides the driver, with a carpet bag, etc.

LADY'S VELOCIPEDE DRESS.

"Let the outer dress skirt be made so as to button its entire length in front—the back part should be made to button from the bottom to a point about three-eighths of a yard up the skirt. This arrangement does not detract at all from the appearance of an ordinary walking costume. When the wearer wishes to prepare for a drive, she simply loosens two or three of the lower buttons at the front and back, and bringing together the two ends of each side, separately, buttons them in this way around each ankle. This gives a full skirt around each ankle, and, mounted, the dress falls gracefully at each side of the front wheel. A club of six young ladies have taken this velocipede costume under their special care, and declare that if it is not sufficiently perfect, they will soon make it so, as they are bound to be prepared for the track this summer; they practice regularly every morning and are even now good riders."

The country girls, in the East, are practicing "on the sly," with a view to public diversion of themselves and their respective neighborhoods, when the roads are in good condition.

It will not be very surprising if women—or at least the young ones—learn to dress so neatly for this sport and to demean themselves so gracefully on the velocipede as to fairly conquer the prejudices of men into consent to their general adoption of the pastime.

Type-setting and Distributing Machine Wanted.

"It is discreditable to the inventive genius of this country that the one great mechanical want of the time is still unsupplied. Each of the leading newspaper publishers of this city—apart from expenses for white paper, press-work, ink, editorial, reportorial, and correspondents' salaries, and the thousand incidental demands for the production of a great daily—pays from $100,000 to $200,000 a year for composition alone. Publishers, throughout the country, of newspapers, magazines, and books, pay proportionately for this single item of type-setting. This enormous cost prevents the publishers of papers from giving their readers the literal "volumes" of matter they would gladly do from day to day were they not hampered by the delays and the cost of composition. What we want—what every large publisher in the country wants—is a type-setting machine which will both expedite and cheapen the cost of composition at least 25 per cent and perhaps 50 per cent. Type-setting should be so cheap that publishers can print books and papers in this country and sell them at the low prices which obtain, in England. A London house has printed the "Pilgrim's Progress" in clear type, on good paper, so that the book can be retailed for a penny. News and illustrated papers are sold in England at nearly proportionately low rates. We have not, as yet, reached this point of progress in this country, although, in proportion to our population, there are more readers here than in any other nation on the globe. We want the means of supplying the demand for reading matter. The inventive talent of this country produced the steamboat, the cotton-gin, and the electric telegraph. It is fully equal to the production of the perfect type-setting machine which shall rapidly and cheaply do the entire composition of the publishers of the country. Nothing else so profitably suggests itself now to American inventors. We invite the press of the country to join in subscribing for a prize that shall be worthy of the attention and competition of every skilled inventor in the country. This prize should not be less than half a million dollars; and, if the leading publishers in the country can be induced to combine in such an offer, the *World* will gladly head the list with $25,000 as its own subscription. To the successful man who produces the called-for instrument, a quarter million dollars would be gladly given by the publishers of the country. The rest of the prize should be distributed to the second, third, fourth, and fifth best machine, in proper proportion, so that the labor of the inventors may not be thrown away and as an encouragement to every inventor to strive to win the capital prize. Inventors! go to work to-day. The prize will, undoubtedly, be offered. The demand for the type-setter is imperative!"

[We copy the above proposition from the *World*. The want expressed by our cotemporary is, no doubt a serious one. Much, it is true, has been done to meet it, but, at the present moment, there is no machine for setting and distributing type that perfectly fills all the conditions required.—EDS.]

Church Market in New York.

A great many churches have been sold in this city, and in every instant the buyer made a fine thing. Grant Thorburn, that "cannie Scot," who from a penniless nailmaker became a wealthly florist, says that his greatest stroke of luck was purchasing the old meeting-house in Liberty street.

The Dey street church was purchased by a veteran butter merchant, Israel Cook by name, who sold it for mercantile purposes, and thereby made more in a single operation than the profits of hundreds of dairies.

The Garden street (Exchange place) church gave way to the massive structure of the Bank of the State of New York.

The Baptist church in Nassau street passed into the hands of Townsend, the famous sarsaparilla man, who used it as a depot for his quack stuff, after which it went to banking purposes.

The Murray street churches were both sold at auction, and yielded enormous profits to the purchasers.

The Chamber street church next passed away, and its site is now devoted to trade.

The Duane street church, the next in order, was sold at auction for $27,000. In a short time its purchasers sold it for $45,000, and its site is now occupied by an auction house.

The Broadway Tabernacle, which stood ready for the next change, soon went into the market, and the lot is now worth an advance of $100,000.

The Church of the Messiah and the Amity street Baptist Church were both of them lately purchased by A. T. Stewart, in whose hands they have advanced enormously. Their present condition reminds us of Hamlet's pregnant exclamation, "To what base uses may we come at last!" The former is a theater, while the latter is turned into stables for Stewart's horses.

The Dutch church, which is now used as a Post Office, brings $20,000 per annum to the Consistory, and, when the new Post Office shall be finished, the lots on which it stands will sell for $300,000.

The Brick Church afforded a neat operation. It was put into the market in 1854, and with its cemetery (three-fourths of an acre in extent) was sold for $175,000. A year afterward the new owners sold it at auction for $350,000, and the plot at present valuation would be worth a million.

In this catalogue may also be included the Pearl street church, which the bookseller Appleton purchased at a bargain, and also the Broom street church, which the Merchants' Express Company bought for a stable, and were immediately offered $40,000 advance.

To these interesting examples is to be added the recent sale of the Scotch Presbyterian Church (Dr. McElroy's) on Grand street. The congregation having moved up town three years ago, the property, 125x100 feet, was sold for $120,000. It was purchased by the Masonic body with the intention of erecting a hall, but their views changed, and it was sold by them at an advanced of $40,000. Hardly a year has elapsed when it is again put into the market, and brings a further advance of $30,000. With these precedents we are safe in advising any one who wants to get rich to buy a church. The chances are not exhausted. All churches below Union square must go into the market, and in a few years the entire space between that square and the Battery, two miles in extent, will be denuded of all symbols of worship, with perhaps one exception. Mammon will then enjoy an undisturbed reign.

Glycerin for Preserving Natural Colors of Marine Animals.

While collecting on the coast of Maine last summer, I made numerous experiments with glycerin, most of which were eminently satisfactory. At the present time I have a large lot of specimens which have the colors perfectly preserved and nearly as brilliant as in life. Among these are many kinds of crustacea, such as shrimp and prawns, amphipods, and entomostraca; also many species of starfishes, worms, sea-anemones. The starfishes and crustacea are particularly satisfactory. The internal parts are as well preserved as the colors, and in these animals the form is not injured by contraction, as it is apt to be in soft-bodied animals, either by alcohol or gylycerin. The only precaution taken was to use very heavy glycerin, and to keep up the strength by transferring the specimens to new as soon as they had given out water enough to weaken it much, repeating the transfer two or three times, according to the size or number of specimens, or until the water was all removed. The old can be used again for the first bath. In many cases the specimens, especially crustacea, were killed by immersing them for a few minutes in strong alcohol, which adds greatly in the extraction of water, but usually turns the delicate kinds to an opaque, dull white color, but this opacity disappears when they are put in glycerin, and the real colors again appear. Many colors, however, quickly fade or turn red in alcohol, so that such specimens must be put at once into glycerin. Green shades usually turn red almost instantly in alcohol Specimens of various lepidopterous larvæ were also well preserved in the same manner.

The expense is usually regarded as an objection to the use of glycerin. The best and strongest can be bought at about $1 per pound, but recently I have been able to obtain a very dense and colorless article at 42 cents per pound, which is entirely satisfactory. As there is no loss by evaporation, the the specimens will keep when once well preserved, it merely covered by it. The expense for small and medium sized specimens is not much more than for alcohol.—*A. E. Verrill, Yale College.*

Mosquitoes.

The eggs of the Mosquito are laid in a bowl-shaped mass upon the surface of stagnant water by the mother fly. After hatching out they finally become the "wiggle-tails" or wriggling worms that may be seen in the summer in any barrel of water that is exposed to the atmosphere for any length of time. Finally, the "wiggle-tails" come to the surface, and the full-fledged mosquito bursts out of them, at first with very short limp wings, which in a short time grow both in length and in stiffness. The sexes then couple, and the above process is repeated again and again, probably several times in the course of one season. It is a curious fact that the male mosquito, which may be known by its feathered antennæ, is physically incapable of sucking blood. The mosquito is not an unmitigated pest. Although in the winged state the female sucks our blood and disturbs our rest, in the larva state the insect is decidedly beneficial by purifying stagnant water, that would otherwise breed malarial diseases. Linnæus long ago showed that if you place two barrels of stagnant water side by side, neither of them containing any "wiggle-tails" or other living animals, and cover one of them over with gauze, leaving the other one uncovered, so that it will soon become full of "wiggle-tails" hatched out from the eggs deposited by the female mosquito; then the covered barrel will in a few weeks become very offensive, and the uncovered barrel will emit no impure and unsavory vapors.—*Entomologist.*

AUSTRIA has 3,000,000 acres of forests, produced by planting. Their value is estimated at several hundred millions of florins.

Improvement in Door Locks.

Security from those marauders who prowl at night, seeking for some easy avenue of entrance to our dwellings, to despoil us of our property, is something in the attainment of which all honest people feel a deep interest. Those devices which have hitherto been considered as affording the greatest security are, for the most part, expensive and complicated. The object sought in the invention herein described and illustrated, is the combination of the catch-bolt and lock, in a cheap and efficient manner, and also to afford security from pick-locks.

The method whereby these objects are attained is shown in the engraving. A represents the outer plate of the lock, which is shown with the inner plate removed. B is the lock-bolt, to which is attached a guard bar, D, having a longitudinal slot in its forward part, which receives a stop, C, formed upon the the bolt, B. The forward and backward movement of this bar is limited by a projection, E, on the bolt, B, which enters notches formed on the lower edge of the bar. The rear or inner end of the guard-bar is held down by a spring attached to the bolt, B, as shown in the engraving. A thumb-piece, F, is pivoted to the rear or inner end of the bolt, B, and passes out through the side of the outside plate, A, serving to move the bolt when released from the operation of the dog, G, as will hereafter be shown. A wire connects the forward end of the bolt, B, with a second thumb-piece, H, at the top of the outside plate, A. The dog, G, is drawn into the vertical position by a coiled spring, and is made to resume the position shown in the dotted outline by the notched bar and thumb piece, I, pivoted to the lower end of the dog, G, and passing through the outside plate, A, upon which it catches when the coiled spring has drawn it into the position shown in the engraving. When the dog, G, has been pushed by the bar, I, into the position shown by the dotted outline, it is held in that position by raising the thumb-piece, H, which, by its wire attachment, raises the bolt, B,—shown in the engraving as shot out, and fastened by the shoulder, P, on its under side,—to the level indicated by the horizontal dotted line in the engraving. The thumb-piece, F, then serves to draw back the bolt and unlock it.

The dog, G, acts upon the under side of a second dog, J pivoted to the catch bolt, K, which, when raised to the position shown in the engraving, locks the catch-bolt by abutting against a stud, L, attached to the outside plate, A, and passing through a slot in the catch-bolt. When the dog, G, is pushed back into the position shown by the dotted outline, the dog, J, also drops into the position shown by the dotted outline below it, and the catch-bolt is unlocked. The catch-bolt, K, differs in nothing else, materially, from the catch-bolts in common use. M is the post to which the inside plate is screwed as in ordinary locks.

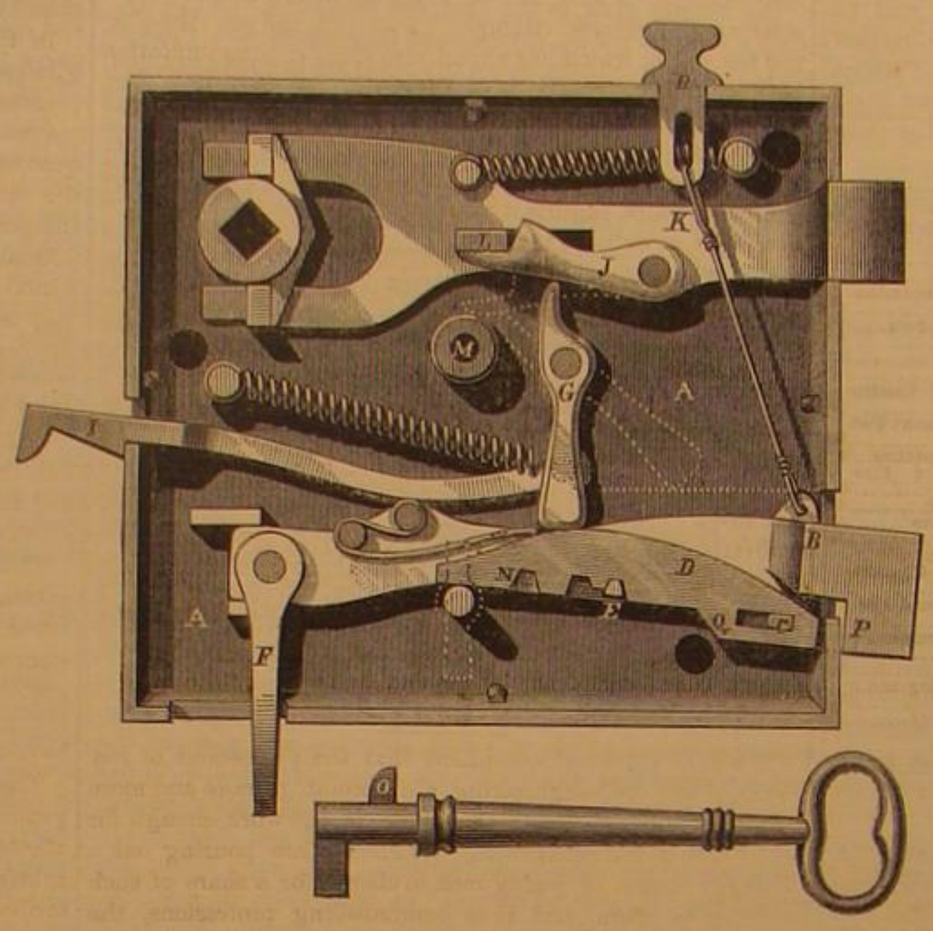
Having thus described the parts of the lock, we will describe its operation, which will also include a description of the key. The bolt being shot out and locked in the engraving, we will proceed to unlock it. We first lift up the bar, I, to release it from the outside plate, A, and press it inward until the dog, G, has reached the position shown by the dotted outline; then raise the thumb-piece, H, which raises the bolt, B, to the level shown by the horizontal dotted line in the engraving; we can now shoot back the bolt by the aid of the thumb-piece, F.

Both bolts are now unlocked, but as it is convenient to use the bolt, B, independently of the catch bolt, K, and also independently of the dog, G, or, in other words, to use it like an ordinary lock, provision is made for this requirement. In order to accomplish this, the key is provided with a ward, O, on the opposite side from the ward which locks and unlocks the bolt. Presuming that the bolt, B, is unlocked in the manner above described, the guard bar, D, remaining in the same relative position with reference to the bolt, B, as shown in the engraving, the notch, N, would be brought directly over the keyhole. This notch is so cut as to form an inclined plane, against which the rounded surface of the ward, O, presses when the key is pushed into the lock. This pressure raises the guard-bar, D, so as to release it from the projection, E, on the bolt, B. A quarter revolution to the right slides the guard-bar along until the end remote from the key meets the shoulder of the bolt at P, making a continuous plane between the points, P and Q, which will remain continuous until the guard-bar is again raised, as the projection, E, engages again with the guard-bar, by the notch next to the one with which it was it was held at first, as shown in the engraving. The guard-bar cannot be thus raised except by an entire revolution of the key backward, which unlocks the bolt and places the key in position to be withdrawn. The key being now taken from the lock, the bolt can be shot and both it and the catch-bolt securely fastened by simply pushing forward the thumb-piece, F, the parts then occupying the position shown in the engraving.

When thus locked no amount of picking at the keyhole will avail to unlock it, as the keyhole is closed by the dropping of the bolt. The key itself will not unlock it until the proper adjustment of the parts by the use of the thumb-pieces is effected.

The combination of the several elements of this device to perform the complex movements required is very simple, and, we think, not likely to get out of repair. It can be used with a night key by first shooting the bolt with the key, then carrying it back by the thumb-piece, F, when it can be unlocked at pleasure from the inside, and remains always open to the night key from the outside.

This lock was patented through the Scientific American Patent Agency, April 20, 1869, by D. V. Miller, of Weedsport, N. Y., and has been assigned to Miller & Kiernan, of the same place, whom address for further information. A limited amount of territory will be disposed of.



MILLER'S COMBINED BOLT AND LOCK.

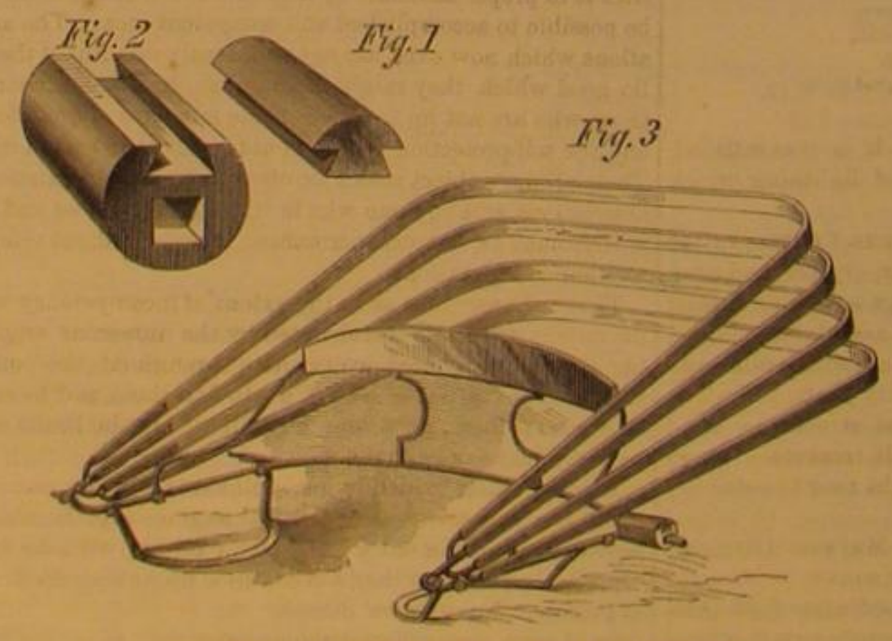
How to Select a Clothes Wringer.

In purchasing a clothes wringer we prefer one with cog-wheels, as they greatly relieve the rubber rolls from strain that would otherwise occur, and add much to the durability of the machine. The next point is to see that the cog-wheels are so arranged as not to fly apart when a large article is passing between the rollers. It matters not whether the cog-wheels are on one end or both ends of the shaft, if large articles disconnect them, they are entirely useless. This is very important, for the larger the article, the greater the strain; therefore, if the cog wheels separate so as to disconnect, they they are of no service when most needed. We have taken some pains to examine the various wringers, and much prefer the "Universal," as lately improved, because it has long and strong gears (Rowell's Patent Double Gear), and is the only wringer with "patent stop" for preventing the cog-wheels from separating so far as to lose their power.—*New England Farmer.*

[Having used for many months the kind of wringer mentioned above, we fully indorse all that is said of it by our New England cotemporary.—Eds.

Improvement in Prop Blocks for Buggy Tops.

All persons who have ridden in carriages, the tops of which are constructed in the ordinary manner, must have observed, and have been annoyed by the jar arising from throwing the top back, and also by the bumping which takes place, in going over a rough roadway, between the bows and the hitherto rigid and inelastic prop block.



STICKEL'S IMPROVED PROP BLOCK.

The invention, which we here illustrate, is designed to obviate these annoyances, and to give immunity from the wear upon the top, consequent upon the constant friction between it and its support when thrown back. It consists in making the bearing surfaces of the prop block of india-rubber, the construction of which is shown in Figs. 1 and 2 in the engraving. Fig. 1 represents a segment of a cylinder of rubber, dovetailed to fit into the prop block, which is made of the form shown in Fig. 2. This improved block is shown attached to the skeleton of a buggy top, in Fig. 3. The device is so simple, it is surprising that it was not earlier thought of. The advantages claimed for it are obvious. The inventor will dispose of the entire right for the United States, or will give the right to manufacture on a royalty.

This device was patented through the Scientific American Patent Agency, July 30, 1867, by W. H. Stickel, whom address at Dayton, Ohio, Postoffice box No. 490. Whole patent for sale.

Meteorology.

Meteorology has of late years made great progress in France, so far at least as regards the organization of a regular system of observation. This, it must be allowed, is in a great measure due to the enlightened exertions of Mr. Duruy, the Minister of Public Instruction, who, in 1864, provided all the primary normal schools with good instruments, and recommended the pupils to keep registers of barometrical and thermometrical readings, the fall of rain, the state of the weather, etc. The system is now in full of activity at all those establishments, where observations are now taken every three hours between 6 A. M. and 9 P. M.; but at seventeen of these schools also at midnight and 3 o'clock A. M. The average annual temperature is obtained by eight observations daily. As for the barometrical observations, they have been turned to good account, in obtaining forecasts of the weather, according to Admiral Fitzroy's system, which has been adopted and improved in France.

The barometrical readings registered at the normal schools are of great public importance, as every storm announces its proximity by a considerable depression. Nor do these readings stand alone; they are combined with hygrometrical observations, testing for manifestations of ozone, etc. Nothing is omitted, and at the end of each year the loose leaves on which the various data have been registered, are made up into books. Here again there is a decided improvement; that of 1865 only comprising the path of common storms and hurricanes, while that of 1866 also gives the zones visited by hail storms, and special remarks on the climate of France, and that of 1867 contains a fourth part, consisting of various papers and documents on the general results obtained. The latter are peculiarly interesting; from them we learn that the storms visiting France chiefly come from the Atlantic, with the exception of local ones engendered by the winds of the Mediterranean, when they skim the declivities of the south-eastern coast. Another remarkable result is this: that hail is produced by two clouds, one above the other, with a considerable distance intervening between them. These clouds cross each other at a certain angle; a noise is then heard like the rumbling of a cart, and is immediately followed by a shower of hail. With the straitened means at his disposal, Mr. Duruy has done wonders, and he may well be proud of the result.

Wooden Pavement.

In San Francisco they are using a wooden pavement, the blocks being sawed in such shape that when laid down they will occupy a position in which the grain of the wood, instead of being vertical, will lie in an inclined position, with V-shaped grooves or recesses arranged between their upper portions, and filled with gravel unmixed with asphaltum, or other waterproof or binding substance, this last being considered unnecessary. The grooves or recesses are caused to break joints, and are, of course, designed to facilitate the foothold of horses passing over the pavement. It is claimed that by this plan of laying the blocks the latter are caused to mutually sustain each other, that their surfaces are less subject to being battered and abraded by iron-shod hoofs and the tires of wagon wheels, and that the expansion of the blocks consequent on the absorption of moisture, instead of causing the pavement to "arch," will simply make each block slide slightly upon the inclined surface of its neighbor. The blocks employed in the experiments thus far made with this kind of pavement, have been subjected to a preservative process, in which the pores of the wood are filled with sulphates of lime and iron. The Nicolson pavement is now being laid in several of the cross streets of that city, and gives great relief from noise and jar. The citizens generally appear to like it.

How to "True" a Corundum Wheel.

W. E. Driscoll, of Bedford, Ind., writes to the *Dental Cosmos* as follows: "Presuming that many have been annoyed in getting corundum wheels to run true, or to give them an even surface when rough, each indispensable in making good joints, I offer the following suggestion: The wheel being adjusted to the lathe, revolve it very fast, holding a piece of corundum stone against the uneven or wabbling surface, and in a short time you will find the *piece* melting and uniting with the wheel, so as to make it perfectly true in all respects."

Invention is calculation, not discovery.

Scientific American.

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Contents:

(Illustrated articles are marked with an asterisk.)

ANCIENT AND MODERN WONDERS.

The "seven wonders" of the world, or the seven historical monuments of the constructive skill, and magnificent art of the ancients are: First, "THE GREAT PYRAMID OF EGYPT," which, according to Herodotus, was built by Cheops, King of Egypt, about 900 years before Christ. Pliny says that 360,000 men were employed 20 years in building this pyramid, and that 12,760 million pounds of granite were used in its construction. Second, "BABYLON THE GREAT, THE LADY OF THE KINGDOMS, THE GLORY OF THE WHOLE EARTH." The same historian states that the walls of the city were sixty miles in circumference, built of large bricks cemented with bitumen and raised around the city in the form of a square, protected on the outside by a ditch lined with the same material. They were 87 feet thick and 350 feet high. The city was entered by 25 gates on each side, of solid brass, and strengthened by 250 towers. The outer walls surrounding the palace of Nebuchadnezzar were six miles in extent, and the hanging gardens were so high that they overtopped the walls of the city. Third, "THE GOLD AND IVORY STATUE OF JUPITER OLYMPUS," done by Phidias, the greatest artist that ever lived. The god was formed of gold and ivory, 58 feet high, seated on a throne, and almost touching the roof of the building. According to Strabo the workmanship must have been exquisite. Phidias embodied Homer's impersonation of the god:

> "He spoke, and awful bends his sable brows,
> Shakes his ambrosial curls, and gives the nod,
> The stamp of fate, and sanction of the god.
> High heaven with trembling the dread signal took
> And all Olympus in the center shook."

The artist inquired of Jupiter himself if he was satisfied, and the approval was given by a flash of lightning which struck the pavement of the temple.

Fourth, "THE TEMPLE OF DIANA OF THE EPHESIANS" at Ephesus. The temple was built of cedar, cypress, and even gold, and within it were treasures, offerings to the goddess, of works of art, the value of which almost exceeded computation. Praxiteles, the celebrated Greek sculptor carved the altar, and during a period of two hundred and twenty years, the whole of Asia Minor assisted in enriching the structure. Nero robbed it, however, of much of its valuable treasures. As an architectural work it was doubtless brought near to a state of perfection.

Fifth, "THE MAUSOLEUM, OR TOMB OF MAUSOLUS," erected at Halicarnassus, B.C. 353. It was nearly square in plan, 113 by 93 feet, having around its base a peristyle of 36 Doric columns 60 feet high, while the superstructure rose in a pyramidal form to the hight of 100 feet. It was very richly adorned with sculpture by Greek masters, but it is very likely that the tomb of Mausolus was inferior to that of Napoleon in Paris.

Sixth, "THE PHAROS OF ALEXANDRIA," an ancient lighthouse consisting of several stories and galleries of prodigious hight, with a lantern on the top continually burning. It was built to subserve a useful purpose by one of the Ptolemies, and was so famous that all lighthouses after it were called by the common name of Pharos. The ancient Pharos was 450 feet high, and several Arab historians mention a telescopic mirror of metal which was placed on its summit and used to burn the vessels of enemies, by directing it so as to concentrate the rays of the sun upon them.

Seventh, "THE COLOSSUS OF RHODES," described as a giant figure 105 feet high, placed across the harbor of Rhodes, with a stride of fifty feet from rock to rock; vessels passed under it in full sail. A lamp blazed in its right hand. An internal spiral staircase led to its summit, and around its neck was suspended a glass in which ships might be discerned as far off as the Egyptian coast. It was an object of worship, but was thrown down by an earthquake, 224 B.C., fifty-six years after its completion.

It will be observed, that with the exception of the ancient "Pharos," not one of the seven wonders of the world possessed any intrinsic utility.

We might easily, however, point to seven modern wonders of the world, greater as works of skill than those of the ancients, which are not merely objects for wide-eyed admiration, but are daily and hourly benefiting the entire race. The modern system of land and marine steam transportation, of which the Pacific Railroad just completed is the most prominent example on land, and our magnificent and staunch ocean steamers the greatest triumph of man over the sea; the electric telegraph, which has annihilated time in communication between the remotest parts of the earth; the modern suspension bridges, under which the Colossus might have walked without stooping or knocking his hat off; our immense tunnels, through which the iron horse plunges heedless of the mountain which engulfs it; our steam hammer, so ponderous in weight, so delicate in its action; our spinning jennies and mules whereby a single person can spin a thousand threads with greater ease than the ancient matrons could spin one; our modern printing press, which preserves the thought of the entire world as a rich inheritance for future ages; our—but we have already our seven modern wonders of utility and we might easily name seventy. All the glory, all the barbaric magnificence of the ages recorded in history, could not, if compressed into a single epoch, equal those of the century we now live in—a century which is regarded by many as one in which utilitarianism has degraded man's æsthetical nature. Let those who will, sigh that the world goes backward. They think so only because the standpoint from which they look at progress makes the direction of events seem reversed.

KID GLOVE ENGINEERING.

We hear a general complaint that the professions of mechanical and civil engineering are becoming more and more unreliable as avocations; that there is not work enough for those now in the ranks, while the schools are pouring out a constant stream of young men to clamor for a share of such business as offers, and thus overcrowding professions, the members of which are already too numerous.

The real trouble is that these professions, like those of law and medicine, are filled with quacks, who, by an outside show of learning, obtain business which they are not entitled to, and which they are incompetent to adequately perform. Pecksniff's who employ "Tom Pinches" to do work for which they take the credit, are more common in these professions than might generally be credited. Men who by pomposity of manner and diction, lead outsiders to place trust in their knowledge, while their real ignorance and incompetency are concealed under the veil of silence. Our readers will recollect the rustic wisdom of the father who told his son to say nothing and no one would suspect him to be a fool.

There are many who write C.E. and M.E. after their names, whose only ability consists in skillfully pilfering the designs of others, and copying their drawings and specifications; and as those who employ engineers are to a great degree incompetent to pass upon their merits or demerits, such pseudo-engineers are enabled to secure business which ought to fall into the hands of more competent men.

The only protection that can be secured against these parasites is in proper association, admission to which should only be possible to accomplished and competent men. The associations which now exist are not sufficiently mindful of the public good which they might accomplish, by discountenancing those who are not up to a reasonable standard of qualification and the self-protection which would result from such a course. Their primary object seems too often to be merely existence as associations, and any one who is willing to pay fees and dues, is welcomed as so much permanent income without reference to other considerations.

That our assertions as to the extent of incompetency which prevails is correct, is corroborated by the numerous engineering abortions scattered everywhere throughout the country. One need not go out of New York to find them, and he cannot miss seeing them, go where he will within the limits where public works can be found.

Another thing, which in our opinion is injuring more especially the profession of mechanical engineering, is, that the schools are turning out a set of men puffed up with the foolish conceit that because they have studied books they are finished engineers. No greater mistake can be made, and the failures of such men reflect dishonor upon the entire profession.

The graduate, kid-gloved and perfumed, who has studied perhaps with sufficient thoroughness the chemistry of iron working, finds himself put to the blush by the practical knowledge of a smutty-faced puddler, or, as in a case we lately knew, that in setting a steam valve on a portable engine by pure computation, he becomes the laughing stock of an entire establishment, for omitting to take into account the effects of expansion upon the boiler.

"A cat in gloves catches no mice" is as true of mechanical engineers as of cats, and when we find sound theory and good sense in connection with hands that are hard and black, or that have in their day been hard and black at the forge, the lathe, and the vice, we find a man who knows his business, and can build machines, pictures of which he has never seen in a book.

QUALITATIVE ANALYSIS.

It is often a matter of wonder to those unversed in chemical science, how the ingredients of the most complex mixtures and compounds can be determined. A quantity of soil is sent to the analytical chemist, and, in a short time, he is able from his examination to not only state definitely the names of all the elementary substances it contains, but their quantity, and the peculiar combinations in which they are present. A person dies from supposed poisoning. Portions of the stomach and its contents, with the lungs, liver, or other viscera, are placed in the hands of the analyst, who quickly traces out the poison, if it be present, ascertains its nature, and whether it is present in quantity sufficient to cause death, and does this with such certainty that he can testify in a court of law, to the presence of the poison, as positively as though he had seen it go down the throat of the deceased. Even mathematical operations give no greater certainty than the expert chemist derives from his results.

In this article we shall attempt to give our readers a glimpse of the principles which underlie qualitative analysis; premising that it is a subject difficult to treat in a popular manner, and deferring for some future occasion the subject of quantitative analysis, or the determination of the quantities of the different substances present in a given mixture or compound.

Qualitative analysis, as its name implies, is a separation of a mixture or compound into its components. The separation may be immediately followed by recombination into new substances, and in fact this combination is one of the means whereby the analyst determines the separation of an ingredient and therefore infers its presence.

Qualitative analysis comprises investigations made to ascertain the presence of a certain substance or of a number of specified substances, as well as investigations made to determine all the substances contained in a compound.

The determination of the presence or absence of a single substance in a solution is a comparatively simple matter, but when it is necessary to determine the nature of all the substances present in a mixture of elements or compounds the problem becomes a complicated one, and its solution must be sought upon the assumption that all known substances *may* be present.

The operations in analytical chemistry depend upon the general principle that like causes always produce the same effects. The analyst proceeds by bringing into contact known substances with those which are to be determined, under prescribed conditions, the effects of which upon the reaction have become known to him by experience. The nature of the reactions which invariably take place upon such contact, are also known to him by experience; in fact, experience is the foundation of knowledge with him, and the study of books is only a guide to him in getting experience during his days of pupilage. No chemist's testimony would be admitted in a court of justice not based upon experimental knowledge. From this it will be seen that analysis cannot be pursued by formulæ, like the preparation of subscriptions in an apothecary's shop. Such formulæ are useful in learning the art of analysis, but their truth must have been demonstrated in the experience of the chemist before they are available for actual work.

To illustrate the above statement we will suppose a chemist to have gone through with the preliminary work of the analysis of a stomach to detect the presence of strychnia, by the process called the "Rogers and Girdwood's method," and to have reached the final test. This test is as follows, according to "Fresenius:" If a few drops of concentrated sulphuric acid be added to a little strychnia in a porcelain dish, solution ensues without coloration of the fluid. If, now, small quantities of an oxidizing agent be added, as solid chromate of potash, the fluid strikes a beautiful blue-violet color. The assertion of this fact, even by so good an authority as "Fresenius," would not authorize any chemist to swear to it as a fact; his own experience would.

The analyst therefore, taught by experience, can positively assert, that under certain limiting circumstances, if a substance sought be present the addition of certain other substances, will always produce certain results, which, if they occur, are a direct proof of its presence. The reagents selected as tests will be such as produce distinct and unmistakable reactions, such as are not produced except when the substance sought is present.

To illustrate this point let us suppose a liquid under examination for salts of ammonia. The analyst knows by his previous experience that if salts of ammonia are in the liquid, the addition of hydrate of lime will decompose them, when the ammonia will be freed and exhibit its characteristic odor. It will also restore the blue of litmus, previously reddened by acids, and will form white fumes of chloride of ammonium when brought into contact with the vapors of hydrochloric or acetic acid. From these facts he infers that ammonia is present, and that it is in a state of combination, as if anything more than an extremely small quantity of free ammonia were at first present, the peculiar smell of this substance would be perceptible before the addition of the lime. For the detection of extremely minute traces of ammonia chloride of mercury is an extremely delicate test. It produces a white turbidity in solutions which contain only ·000003 of their weight of this gas.

The reader will now see that in qualitative analysis, which has for its objects to detect the presence of substances without regard to quantity, it is not necessary that the entire substance under examination should be separated into its elements, but that correct inferences in regard to their character can be made from the reactions which take place when other reagents are added, or when certain physical changes, as fusion, solution, ignition, etc., are effected.

Thus bodies may disappear in the process of solution so entirely that the microscope is impotent to detect them, to reappear when some other substance is added, to disappear again upon the addition of still another reagent, and so on *ad infinitum*. The deadly poison, which secretes itself in food or drink, is swallowed, and performs its work of death, reappears again in the test tube of the analyst to bear witness against the homicide. So great certainty attends the detection of poison that fewer homicides escape the punishment of their crimes when accomplished by such means than when death is procured by violence. The time was before the science of chemistry had made its present advances, when people might be deprived of life by subtle poisons with little fear that its presence could be determined and when symptoms were the only evidence of poisoning. But that time has passed and modern science is now a very sleuth-hound on the track of those who attempt to take human life in this manner.

MUSICAL INTERVALS.

The present musical scale, to which all modern musical instruments are attuned, has been made the subject of study by eminent scientific men, among whom Helmholz may be said to be the most prominent. Tyndall, in his lectures on sound, touches very lightly upon this topic. He defines a musical sound to be one which "is produced by sonorous shocks which follow each other at regular intervals with a sufficient rapidity of succession." The octave of any tone is produced by double the number of vibrations which produce that tone. The division of the interval of the octave into intervals including five tones and two semitones makes the modern diatonic scale. If the whole of this scale be divided into semitones, we have the chromatic scale of twelve semitones.

The discussion of this subject has lately been quite prominent. Several papers have been read upon it before the French Academy. M M. A. Cornu and E. Mercadier have expressed the opinion that a single musical scale will not satisfy all conditions. They affirm that the intervals in a scale of melody are not precisely the same as in a scale of harmony. They remark that sounds that are pleasing in succession as melodies, are not necessarily pleasing when superposed as harmonies, and we may even be astonished that the intervals, hitherto considered the most perfect, as the octave, the fifth, and fourth, do not satisfy both conditions.

The ear detects faulty intonation in melody much more readily than in harmony, unless the volume of tone be subdued. Musical composers avail themselves of imperfect chords in passages where large volume of sound is employed, and powerful organs cover up discords that would be intolerable in instruments of less power.

The subject is beset with many difficulties. The instruments, which have been constructed with a view to remedy the defects of those which require what is called temperament in tuning, have never become popular. They have required too complex mechanism, and new systems of notation and fingering.

We believe that the maxim, "let well enough alone," may aptly apply to those who are engaged in the discussion of this subject Are not the instruments we now possess sufficiently accurate in their intonation to satisfy the refined ear? We think they are, and that in this respect they had better be let alone.

There is little doubt that instruments may be devised that would add to the resources of the orchestra, and that there is still room for improvement in the action of such instruments as require a keyboard as well as in other respects. There is also room for improvement in the mechanism of brass instruments, especially those known as valve instruments; but we think an attempt to reach any further refinement of intonation unnecessary and impracticable.

PROGRESS IN THE ART OF CASTING METALS.

Immense as have been the advances in all kinds of mechanical work during the last half century, it is quite doubtful whether any other department has more to boast of than the art of casting metals. Readers not yet on the downhill of life can recollect the clumsy, rough-surfaced castings which thirty years since formed the best work the founderies could then produce. Now the finish and lightness of hollow ware, stove castings, etc., leave little to be desired.

Since that period the application of this art to architectural purposes, has grown into a vast industry. The casting of stoves has also developed a trade of great proportions. There is scarcely a town in the United States large enough to find a place in a general map of the country that has not its foundery, where job work of all kinds, stoves, plows, and other agricultural implements are made.

But progress in this art is not confined to the increase in the amount of work done, but is none the less remarkable in the methods of doing the work. It would be difficult to devise a form so complex that an experienced founder would hesitate to undertake it. We, not long since, had occasion to have a peculiar form of pattern executed in a brass foundery and model shop. It was apparently so difficult to make, that though it was desirable to have it cast for the sake of economical manufacture, we consulted the foreman of the shop—a first-class mechanic—in regard to the practicability of constructing patterns that could be molded. His reply was, "If you consider it desirable to cast this piece in its present form, *it must be cast so.*"

"But can you cast it so?"

"It is many years since anything has been brought to this shop that we could not cast, and we don't intend to have such an event occur now. Let us make the patterns and we will make the casting."

The piece was cast to our entire satisfaction.

It is within our recollection that the casting of iron cylinders with brass linings has been introduced, a process now successfully practiced in casting pump barrels, and cylinders for other hydraulic machines. Within that time also malleable castings have been brought nearly to perfection. We were shown a few days since a quantity of small castings, said to have been made of a species of steel, which had been heated and hammered and bent and twisted, in a manner that showed they were in no respect inferior to forgings in strength and malleability. These castings were made in Scotland. We also saw lately a specimen of skill in molding and casting brass, being nothing less than a continuous chain with hooks at each end, which had, as a curiosity been made by a skillful pattern maker and molder.

Neither must we omit to mention the perfection to which the casting of statuary, both of iron and bronze, has been brought. Some of these are models of artistic beauty, both in design and finish. The casting of small articles of malleable metal, is also largely on the increase, and people are beginning to learn that such articles are not necessarily liable to break because they are cast. Time was when cast iron was unfit for any purpose where much strength was required, but the malleable castings of modern times are often better than the same articles made of wrought iron, and their cheapness is gradually extending the demand for them. We predict that the time will come when most small articles of iron will be cast, and forging will be the exception, instead of the rule as at present.

The amount of scientific research and experiment now being brought to bear on the real nature of iron and steel, and the improved methods of manufacturing these most important metals, can hardly fail to produce as great improvements before the close of the present century as have taken place already. It may even yet be found possible to cast edge tools of as good quality as those now forged from steel.

ONE-SIDED RECIPROCITY ABOUT PATENTS.

We have received through our correspondent at Montreal a copy of the proposed patent bill for the Canadian Dominion, introduced by Hon. Mr. Chapias. We have examined the bill with some care, and regret to state that it retains the only feature which has hitherto rendered the Canadian patent system odious; viz., excluding all non-resident alien inventors from the right to take patents. Canada is the only civilized country on the face of the earth that refuses to accord a spirit of reciprocity in respect to patents for new inventions. Omission to do this can only be explained by the fact that the Canadian people desire to prey upon the ingenuity of our own and other inventors. If Canada will abolish her patent system entirely, then we shall have no reason to complain; but the Government carefully enacts a patent system to grant patents to resident subjects, but as respects the rights of aliens they must reside in the country for one year next preceding the application, and make oath to the invention as original.

This system is a libel upon justice; and we sincerely hope that the Canadian Parliament will modify the bill before it finally becomes a law. We hope, also, that our Government will not enter into a new treaty of reciprocity with Canada without insisting upon a recognition of the right of American inventors to take out patents in the Dominion.

We call the attention of the Secretary of State to this matter. We insist that our men of ingenuity have long enough submitted to this injustice.

USEFUL MEN---PERSONAL SKETCHES.

If our country has any one need to supply, it is that of men who are willing to devote themselves to the propagation of truth and the diffusion of useful knowledge. It is therefore with much pleasure that we introduce to our readers an extract from a letter recently received at this office from Rev. J. M. Baker, of Fayettville, Texas. He says:

I have been detained from superintending the construction of a new model of my "Universal Cultivator," by the protracted sickness of my wife. She died last week in the triumph of a Christian faith.

I am extensively known in Mississippi, Louisiana, and Texas as an itinerant minister, and could act as an agent for any laudable invention, or newspaper, etc. My plan will be to travel in a two-horse rockaway, preach on the Sabbath, lecture during the week on Agriculture, and sell patents and act as an agent, should you or any of your friends want an agent in Texas, Louisiana, or Mississippi. For my standing and respectability I would refer you to "Bangs' History of Methodism," minutes of the Ohio conference, 1817. In the history, the "M," by oversight of my friends, was left out and my name appears as "Job Baker." For my present standing I refer you to Isaac G. Johns, Editor of the Galveston *Christian Advocate*, Texas.

It has struck my mind that the "asbestos roofing" would suit in Western Texas. There is no pinery west of the Colorado river, in Texas. The whole western world is settling up. Shingles range from $6 to $8 per thousand.

It will be evident to all our readers that this correspondent, Mr. Baker, is one of those rare citizens, who is willing to make himself generally useful.

The letter of Mr. Baker, reminds us of a subscriber—another of that rare and useful class—who formerly resided in Iowa. In writing to us upon some business matters he stated that on week days he was "farmer, glazier, and homeopathic physician, and on Sundays a preacher of the blessed gospel."

Of the same class of useful citizens, though not a preacher is Mr. George Sibbald, of Preston, Md., who has made several inventions, but owing to misfortunes he has not been able to obtain means sufficient to perfect and patent them, and desires to obtain the assistance of a partner for that purpose.

Mr. Sibbald's narrative of the misfortunes which have overtaken his family are peculiarly touching. He says:

I have only a few days ago executed powers of attorney with gentlemen of high standing to prosecute the recovery of our grandfather George's estate—three millions of acres of land. The original deeds are lost, but all the records show possession.

I cannot even pay for an advertisement for a partner to bring out such an invention as my high-pressure air engine. Oh! if you could only even advertise for me, a few lines, on credit, how kindly I would take it. Other papers have often advertised for my father—many columns—about his claims, etc., on long credits, for hundreds of dollars. Our family is one of the most ancient and largest owners of real estate, and of ships and mills, in the country. We are descended from the ancient family of Sibbalds, of Scotland, and my brother-in-law's family, from the ancient Setons of Scottish history; his grandfather was Sir Andrew Seton; and my mother's house is related to the Lord Norths, of England; her great-grandmother was Lady North; and she is also connected with the Snowdens of Wales, England. We all have our family arms; that of the Sibbalds is a cross argent on an azure field; and the motto on the several branches is beautiful. The Seton arms are a sword and crescent and lilies. The sword was given by Robert Bruce for service in the "Holy Wars." My mother's arms are stars and shells, and a peacock crest. I seal this letter with my grandfather's silver seal, having his initials—a bequest to me—and for whom I am named.

Sometimes thoughts pass through my mind that this government is a failure, and that the "Japanese Prince," who is reported to have "laughed himself to death" at the idea of a people attempting to govern themselves, was not so foolish after all. I have long thought that we shall, finally, have an Empire, and that the alleged prophecy of James Hoag, the Quaker, will yet be entirely fulfilled, as truly as the fore part has been. I have seen so much corruption and injustice among politicians, and have suffered so much, that excuse me gentlemen if I have given but a moment's place to such passing thoughts. I sometimes think that the rebellion of this country against "old England," was wrong, and that Providence has repaid us in the same manner, perhaps; and that perhaps the best thing might be to go back to old England, and unite again under the "cross flag" of the greatest of nations—to prevent more civil wars and ruin.

There is something anomalous in this case of Mr. Sibbald. Here is a gentleman of honorable lineage struggling with the direst misfortunes, when the records clearly show, as he asserts, that he is an heir to an estate of three millions of acres. No wonder, when such injustice is allowed, that the sufferer should turn his attention to the mother country where his ancestry runs almost upon royal lines. We should be glad if the publication of this brief story of the Sibbald family should result in bringing assistance to this ingenious descendant.

Spontaneous Ignition of Fireworks.

Mr. R. Trevor Clarke, in a communication to the *Times* on the frequency of fires in pyrotechnical manufactories—which he thinks may, in many cases, be attributed to the spontaneous combustion of that class of fireworks called colored fires—observes, "That these compositions, the active agent in which is chlorate of potash, occasionally 'go off of themselves,' has long been known, but, I believe, no definite information on a subject so important, has ever been laid before the public. Herewith I send you, what I know of my own knowledge in the matter: Firstly, mixtures of chlorate of potash, sulphur, and black oxide of copper are almost certain to ignite sooner or later, at uncertain periods, after mixing, and without premonitory phenomena. Secondly, mixtures of chlorate of potash, sulphur, and nitrate of strontia, in quantities larger than about an ounce, will frequently take fire within a few hours after they are made. When nitrate of baryta is substituted for strontia, the liability is nearly as great. When sulphuret of antimony or charcoal is added, the liability is greatly lessened, but probably not entirely done away with. Thirdly, when any of these compositions have become damp and ineffective from the deliquescent nature of the salts employed, and are submitted to too much heat for the purpose of drying them, they will suffer a peculiar and sudden decomposition followed by actual ignition. In the second case mentioned, decomposition is manifested by the evolution o an orange-colored gas, which hangs as a cloud or vapor over the compound. If the desiccation of the salts has been thoroughly effected prior to mixing, and the atmosphere be in a damp state from weather or any other cause, the mixture, unless at once secured from moisture, will often ignite in an hour from the making. In the third case, as soon as the temperature rises to a certain hight, the mass begins to hiss and bubble, suffering a kind of fusion, accompanied with the production of the gas or vapor before alluded to. Of the nature of this vapor, which smells both of chlorine and nitric oxide, I am ignorant. The action is probably catalytic, and induced by the energetic absorption of moisture from the air. Our chemists could do no better service to the community than by investigating this matter thoroughly."

How to Use Carbolic Acid.

A Canada paper states that Messrs. Salt of Birmingham, have constructed a very ingenious and well-designed apparatus for the vaporization of carbolic acid, by means of which that valuable disinfectant can be diffused through the rooms of a house without any of the disadvantages attending its use in its ordinary liquid state. The apparatus consists of a receptacle for the acid covered by a finely perforated lid. Beneath the receptacle is an air chamber, and beneath this chamber is a recess for a spirit-lamp. Two or three tablespoonfuls or more of carbolic acid, if in the liquid form, or a portion of the crystals having been placed in the upper receptacle, the lamp is lighted, and in a few moments the acid begins to evaporate and the vapor is diffused into the atmosphere of the apartment through the perforated plate. The apparatus will be found an excellent addition to the sick room, where it is found desirable to use carbolic acid as a disinfecting agent. Its great advantage is that it can be so manipulated as to keep the atmosphere charged with a distinct but not unpleasant odor of the acid, by increasing or diminishing the supply as may be required, and it will thus be found particularly handy and useful in private houses.

Electric Actions for Organs.

Attention has been attracted lately to the application of electricity to actions for organs, on both sides of the Atlantic, and several devices of the kind have been patented in England, France, and America. These devices have demonstrated the feasibility of the plan. The object to be attained in the use of an electric action is to obviate the necessity of the complicated system of wooden trackers and its adjuncts, and to make a far lighter action, which will admit of the placing of the key board at any distance from, and in any position relatively to the organ itself.

Mr. H. L. Roosevelt, of New York, patented through the Scientific American Agency, April 13, 1869, a very pretty, and in several respects unique device, relating to an improvement in electric organ actions.

This device requires a separate battery for each octave of the organ. This arrangement obviates the burning of the connections and waste of battery power.

Another prominent feature is the use of glycerin as a protective superstratum on the mercury in the cups, which effectually prevents oxidation and evaporation of that metal, as well as the oxidation of the point of the connecting wire. The ingenuity and efficiency of this feature of the invention will be at once obvious to those conversant with the difficulties which it is designed to obviate.

The pedal action and the manual are electrically united at the will of the performer by means of a sliding wedge or its equivalent, by means of which the mercury cups of key and pedal are connected by a wire dipped into both, and which causes a current from the key battery to be opened and closed by the action of the pedal.

This brief description will give a general idea of the nature of the invention to those conversant with the details of electric machines. Without drawings and voluminous description it cannot be made very clear to those not posted in such details. The action works easily, and without the disagreeable rattling of the old tracker actions. An organ with this action attached is now on exhibition at the factory of Messrs. Hall & Labaugh, the well-known organ builders in this city, where those interested are invited to call and examine its merits for themselves.

Editorial Summary.

ANOTHER SWINDLE.—Mr. D. A. T. Black, who resides in Pennsylvania, has forwarded to us a letter addressed to him, by C. C. Havens & Co., of 649 Broadway, Actuaries, Bankers, and Financial managers of the New York Jewelers' Co-operative Union—wherein Mr. Black in notified that ticket, No. 418 has drawn a gold watch valued at $200, and that 5 per cent on its valuation must be paid within twelve days from date of notice. Mr. Black with all the innocence of Moses at the Fair, writes to us that the circular has come to him unsolicited, and not wishing to be imposed upon he asks us to investigate the matter in his behalf. If Mr. Black cannot see *swindle* all over the face of the various papers sent to him, then we advise him to forward the $10, and learn just what such scoundrels are up to.

THAT remarkable carboniferous substance known as "mineral caoutchouc," which has hitherto been chiefly found at Castleton, in Derbyshire, England, in the lead mine of Odin, along with lead ore and calcite, is reported as discovered in Adelaide, South Australia. It is found in Australia on the surface of the ground, where the soil is sandy, through which it would appear to have exuded from beneath. When burnt off occasionally by the bush fires, it is found again after the winter season, in considerable quantities and of various thicknesses. Analysis proves it to contain 8·2 per cent, or somewhat more, of a pure hydro-carboniferous oil. Its value for gas-manufacturing purposes would be great, and it is also believed to be applicable to the production of certain dyes.

THE London *Athenæum* reports the discovery in the Bodleian Library, Oxford, of a single copy of a work printed by William Caxton, the first English printer, who commenced the practice of his art about the year 1480. Very few of the issues of ths pioneer publisher are in existence. The pamphlet just discovered is a short treatise upon death-bed repentance, and consists of sixteen quarto pages. The author of the treatise is unknown, but it appears to be a translation from the original Latin. The title, which forms the first paragraph of the first page, title pages being introduced later, is as follows: "Here begynneth a lytyll treatyse schortely compyled, and called *ars moriendi*, that is to saye the craft for to deye for the helthe of mannes sowle."

THE Macon and Brunswick Railroad is now wholly under contract, and will be completed from Brunswick to station No. 6. The junction of the Savannah, Albany, and Gulf Railroad by t e first of July, and to Macon by the first of November next, in time for the State Fair, and for the cotton crop of 1869. This road gives Macon three outlets to the sea, *via* Macon and Augusta Railroad and Charleston, S. C., Georgia Central to Savannah, and Macon and Brunswick to Brunswick. The Macon and Brunswick Railroad will also build a line of telegraph from Macon to Brunswick.

MELTED lead, which has a specific gravity of 11·5 will float on melted iron, which has a specific gravity of 7. This has been recently explained by Prof. Karmarsch, of Hanover, who finds that the lead when melted forms a hollow spheroid, which is filled with some vapor of lead, making it specifically lighter than iron. In smelting, however, certain ores of iron which contain lead, the lead is found at the bottom, where, owing to its specific gravity, we should expect to find it.

DR. CARTER MOFFAT has succeeded in fixing on paper the beautiful figures which are produced when oils, etc., are allowed to fall, drop by drop, on a surface of pure water, and which Professor Tomlinson, has shown to be characteristic of each oil. The method is very simple, and is, briefly, to obtain a pattern on water, note the time, lay on the paper, glazed sized downwards, for an instant, take out, draw through a plate of ink, remove, and wash with water. The process is capable of great extension, and will be valuable to paper stainers and others.

A NOT uncommon adulteration of glycerin is to mix sugar and dextrine with it. These substances have not hitherto been easy to discover when mixed with the glycerin; the following process is, however, said to answer perfectly: To 5 drops of the glycerin to be tested add 100 to 120 drops of water, 3 to 4 centigrammes of ammonium molybdate, 1 drop of pure nitric acid (25 per cent), and boil for about a minute and a half. If any sugar or dextrine is present, the mixture assumes a deep blue color.

ACCORDING to M. Millon, the disagreeable odor of bisulphide of carbon can be got rid of by distilling it with quicklime, the two having been in contact twenty-four hours. The distillate is received in a flask partially filled with clean copper turnings. The lime remaining in the retort is strongly colored. By means of the deodorized bisulphide, MM Millon and Commaille have separated the perfume of milk to the extent of recognizing certain plants eaten by the cow—the *Smyrnium olusatrum* among others.

HERR PAALZOW has been making experiments from which he concludes that there is no relation between the conductibility for heat and that for electricity. He has experimented on the following substances, and has found that they have the following order in point of conductibility of heat and electricity:—Heat: Mercury, water, sulphate of copper, sulphuric acid, sulphate of zinc, solution of sea-salt. Electricity: Mercury, sulphuric acid, solution of sea-salt, sulphate of zinc, sulphate of copper, water.

PATENT OFFICE DECISION.—We hope none of our readers will omit to read the decision of Commissioner Fisher, published in another column. It is not only an interesting paper, but it sets forth in a strong light the views of the new Commissioner of Patents as to what constitutes a new and useful invention within the meaning of the law. There is a spirit of freshness and liberality about this decision which will commend it to the favor of inventors.

THE CASTOR BEAN is becoming an important article of culture in Texas. This year hundreds of acres are planted; the soil is prolific, and in some instances has yielded 60 bushels of castor beans to the acre. Very little machinery has as yet been introduced for getting out the oil. The ramie plant is also attracting attention. It is looked upon as of great value to the South for the purpose of making ropes.

A PLUMBER of Davenport, Iowa, bought 35,000 pounds of army belt buckles at the Rock Island Government sale for about seven cents a pound. They cost nearly one dollar a pound, and would have supplied an army of more than two hundred thousand men. They are to be melted down for the brass and solder.

IT has been suggested to us by a distinguished engineer that the diamond turning tool noticed in our last issue might be advantageously applied to trueing up ordinary grindstones. The suggestion is based upon the character of the tool as well as actual experiment in its use for this purpose.

THE German astronomer, Maedler has measured the hight of 1,093 mountains in the moon. Twenty-two of these are higher than Mount Blanc, which is within a few feet of being three miles high; six are above 19,000 feet. The highest observed mountain in the moon is 24,844 feet high.

THE *Chicago Tribune* says that a business depression of more than ordinary weight is felt in that city. There is dullness in trade; the receipts and shipments of grain are below their usual average; and there is less than the usual demand for houses to rent and improved property for sale.

VELOCITY OF THE WIND.—It is stated that, at Philadelphia, the mean velocity of the wind during the entire year, is found to be about eleven miles an hour; at Toronto its annual average velocity is nine miles; and at sea it is estimated at eighteen miles.

RUB some bichromate of potassa fine, pour over it about twice the bulk of sulphuric acid, and mix this with an equal quantity of water. The dirtiest brass is cleaned in a trice. Wash immediately in plenty of water, wipe it, rub perfectly dry, and polish with powdered rotten-stone.

A MACHINE has been invented and put in operation in California, which, it is said, has cut, thrashed, cleaned, and sacked the wheat from twenty acres in ten hours, with only three men to work it.

THE high price asked for pianofortes, it is stated, is due to the great strength required in the frame of the instrument to resist the tension of the strings, which, in some instances, amounts to sixteen tuns.

THREE cooperative stores have failed in St. Louis during the past eighteen months.

ALUMINUM bells have been manufactured in France and Belgium. The experiment is a success.

HOW TO KEEP CANALS OPEN IN WINTER---DECISION OF THE COMMISSIONER OF PATENTS.

U. S. PATENT OFFICE, May 11, 1869.

In the matter of the application of Robert A. Cheeseborough for letters patent for preventing canals or other water courses from being closed by ice.

The various modes of treating this application in the different tribunals through which it has passed have involved the subject in unnecessary obscurity. The real issues are few and simple.

The applicant claims to have invented a new and useful mode of preventing canals from freezing. The purpose to be accomplished is certainly new, and the means by which it is to be accomplished are somewhat startling. They consist briefly in placing steam boilers at stated intervals, and connecting them with iron pipe, through which superheated steam is passed; at the bottom of the canal, under the water, which is, by this means, to be raised to a temperature above the freezing point.

This bold attempt to reverse or arrest the ordinary processes of nature by providing a summer river in the midst of winter, would, I think, be pronounced by most persons a great novelty, an original, as well as striking conception. Yet the Examiner finds no difficulty in anticipating it by bath tubs, wash boilers, and the like, which have been heretofore heated by iron pipes, and by raceways where hot water has been poured upon the ice to thaw it.

The applicant having, like Columbus, put the egg on end, there is now no difficulty in suggesting the means, and accordingly, he is informed, that others might build fires by the side of the canal or put furnaces under it, or in short, heat it in other ways.

It is some tribute to the utility of the plan proposed by applicant that none of the means suggested will conform in practibility with that described in his patent. At a later stage in this application doubts were expressed as to its utility, and the application was suspended until the applicant should furnish proof that his scheme was practicable, and that it would not cost more than it would come to. He promptly accepted the test, and produced his affidavit, backed by two others, civil engineers, approving the utility of the plan, submitting estimates of its costs, and giving the details of various experiments made upon flowing water in miniature canals of different lengths. Upon this state of facts, the two questions remain for solution—Does this invention posesses patentable novelty and utility?

It must be remembered, upon the first point, that the invention does not consist in the discovery that water may be prevented from freezing by the application of heat, or that heat may be applied by steam pipes laid under water, or merely in placing two steam pipes at the bottom of a canal. It consists in a system of heaters, composed of steam boilers placed at proper intervals along the line of a canal, for the purpose of supplying superheated steam to sections of pipe laid upon the bo tom of the canal and extending between those intervals. It is this system as a whole, and not the minor details of it, for which applicant asks a patent.

This is undoubtedly new, and in the language of the English courts in a late case, it lay so far out of the ordinary track of the prior applications of heat or steam to water as not to be obviously suggested by them. A man might heat his bath tub for a long time before it would occur to him to devise a plan by which the boys might bathe in the Erie canal in mid winter.

Viewed, therefore, as a new organization for a new purpose, I have no difficulty in finding that this invention possesses patentable novelty.

I have still less difficulty with the second question. Utility, in the eye of the Patent law, refers rather to a utility of purpose than a utility of means. If the end which the inventor purposes to accomplish be useless, mischievous, frivolous, or immoral, he can obtain no patent, although the means which he proposes may be ingenious, and, *for his purpose*, of great utility. A burglar's tool may be admirably adapted to break open doors and shutters, and, for that purpose, be eminently useful, and yet a patent would unquestionably be denied. On the other hand, if the purpose be a good or useful one, the utility of the means need not be carefully scanned.

If the means are inferior to the old way of doing the same thing, or inferior to other new ways, the invention sinks into obscurity, and is soon forgotten. The best test of utility is use, and in the busy competition of trade this test is so n applied, and the judgment of the inventor is affirmed or reversed by an inexorable tribunal.

This Office may readily apply the first test. It may determine whether the purpose of the invention is a proper one. It has no means of applying the second. It cannot enforce the trial of the invention upon a scale sufficient to develop its usefulness, nor upon any scale. It is furnished with a drawing and a small model. From these it would be, in the majority of cases, trifling with the rights of inventors to attempt to pronounce *ex cathedra*, upon the value of their inventions. It can only see that the purpose proposed, if accomplished, would be useful, or that the plan does not show the absence of some part obviously essential to any end whatever. Beyond this, it can only oppose the opinion of man to man, an opinion by which if all your great inventions had been tried when first presented to the Office or the public, the great majority of them would have been strangled at birth by the unfriendly hand of adverse criticism.

Tried by the tests which I think ought fairly to be applied to it, I think this invention proposes to accomplish a purpose that is eminently useful. The feasibility of it, in point of expense, I leave to those who may hereafter contract with the applicant.

The decision of the Board of Examiners-in-Chief is reversed, and a patent is ordered to issue.

(Signed) S. S. FISHER, Commissioner.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

BESSEMER STEEL.—The *London Mining Journal* says that it is understood that Mr. Bessemer has signified his willingness to reduce his royalties from 2*l.* to 7*s.* 6*d.* per tun, except for steel rails, for which a rebate of 20*s.* per tun is already allowed. Ordinary Bessemer steel will thus be reduced nearly 2*l.* per tun, and rails about 1*l.* 10*s.* This will remove all inducements which might otherwise exist to infringe the patent rights remaining to Mr. Bessemer after the expiration of his principal patents in the course of next year, and at the same time will give an impetus to the steel rail trade, by permitting the steel rails to be sold in the market at a price but little higher than that of iron. If the Heaton process should solve the question of converting cheap pig iron into steel, iron rails may, probably, be entirely displaced.

A REMARKABLE CAVE.—A remarkable natural cave has just been discovered near "White Pine," in the newly-developed silver district of Nevada. The opening is about six feet in diameter. On clearing the aperture from the loose rocks with which it was encumbered, a room twenty-five by forty feet was discovered, with passages leading from it to an indefinite distance, none of which has yet been explored. The walls are composed of lime stone, intermixed with spar and mineral-bearing quartz, which promises to yield rich returns to the miners.

The 10,000 pound equestrian statue of Washington, destined for the Public Garden in Boston, is rapidly approaching completion at the Ames establishment in Chicopee. The most of the work now remaining to be done is the caparisoning of the charger astride which the colossal figure of the Father of his Country is to be placed.

English workingmen are said to have formed a joint stock association, shares one pound each, for the purpose of facilitating their emigration to this country. They have sent out a delegation to Nebraska to report on the desirableness of that country for a home.

The Colorado *Miner* says that the largest piece of silver bullion ever produced in the United States was recently taken off the cupel at the Brown Company's works. The weight was 532 pounds Troy; currency value $10,000. The amount of ore was between 29 and 30 tuns.

The engineer of the Suez Canal, M. Lesseps, proposes to get up an international excursion party of 100 gentlemen of different nationalities, who are to meet at Paris next spring, and thence proceed to Egypt, to be present at the opening of the canal. The line of the excursion from that point lies through China and Japan, across the Pacific ocean to San Francisco, and via Pacific railroad to New York.

The value of Australasian gold imported into Britain during the two months ending February 28, of this year, was 638,586*l.* as compared with 853,900*l.* in the corresponding two months of 1868.

The extraordinary expenses incurred by the city of San Francisco by reason of the earthquake and the prevalence of the small pox, during the past year, amount to $300,000.

The Mont Cenis tunnel has penetrated through the quartz and has come to a stratum of soft stone. The work is expected to be finished, on account of the easy working of this stone, about six months earlier than was heretofore estimated.

The Missouri Pacific Railroad Company have ordered 46 new engines, 350 freight cars, and 1,500 tuns of new rails, preparatory to the change to the narrow gage, which, it is contemplated, will be made in June.

The tariff in dispatches between this city and England, on and after the 1st of June, will be $10 (gold) for ten words or less, and $1 (gold) for each word in excess of the limit.

The people of St. Mary and New Iberia, La., have organized an Immigrant Labor Association, in order to meet the increasing demand for laborers in that portion of the State.

The St. Louis and Illinois Bridge Company commenced operations on the Illinois side of the river on the 11th of May. The boring was begun and will be continued until the rock is reached on which to lay the foundation of the shore abutments.

A Pittsburgh oil firm have obtained a verdict against the United States Telegraph Company, in the Court of Common Pleas, for damages amounting to $10,000 for not transmitting a business telegram.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

ATTACHMENT TO BORING BRACES.—John S. Fray, Bridgeport, Conn.—This invention relates to a new and useful attachment to braces for boring with bits, augers, etc.

WHEEL FOR VEHICLES.—Virgil Price, New York city.—The object of this invention is to construct a light wheel, which can be used on velocipedes and other vehicles, and which will combine all the requisite strength with great lightness and simplicity of construction. It consists in the application of a corrugated tire, made of sheet or thin metal, which is so shaped that it is higher at or near the edges than in the middle, and which is at or near both edges supported by a double set of spokes that project from the hub of the wheel. By corrugating it, thin metal, otherwise weak, will receive the requisite strength.

WATER REGULATOR AND ALARM ATTACHMENT.—N. L. Smith, Derby, Conn.—This invention relates to a new apparatus for regulating the hight of water in a steam boiler, or for sounding an alarm in case there is too little or too much water in the boiler. The invention consists in the use of a vessel, which is, by jointed or flexible pipes, connected with the boiler, but not arranged within the same, and which, when it is filled with water, overcomes the power of a spring or weighted lever, and descends, operating by that motion, either a valve to the pump, or whistle, or a lever for throwing the pumping engine out of gear, while it will be raised to set the pump or alarm in motion when too little water might be in it.

ROCKING CHAIR.—Gaetano Formica, New York city.—This invention relates to a rocking chair of that class in which the seat is pivoted to a supporting frame, and held in front and rear by a spring or springs. The invention consists in connecting the apparatus with a rotary fan on the back of the chair, so that said fan will be set in motion and revolved whenever the chair is rocked on its support.

MACHINE FOR STAMPING LACE PAPER.—Albert Rohrbeck, New York city.—This invention relates to a new machine for stamping the perforated lace paper, used by confectioners, cigar makers, and others. Such paper was heretofore perforated by a steel-cutting tool, which was struck by hand to cut at once through a number of sheets, it requiring many strokes of the hammer before the whole cutting face of the tool was made to act.

CURTAIN FIXTURE.—C. E. Fritts, Oneonta, N. Y.—This invention relates to a new curtain fixture, which is so arranged that the curtain can be retained at any desired hight, or entirely wound upon, or unwound from the roller.

COMPOSITION FOR FLOORS.—Theodor Landmann, Cincinnati, Ohio.—This invention relates to a new composition for sidewalks, cellars, kitchens, and floors of all kinds, and has for its object to produce a floor or walk which is not affected by the heat of the sun or of an oven, which can be readily cleaned, and cannot be perforated by rats, mice, or other animals.

BREECH-LOADING FIREARM.—Gustav Schulz, Fort Madison, Iowa.—This invention relates to a new breech-loading needle gun, which is especially adapted for hunting, but which may also be advantageously used for military purposes. Its object is not so much to obtain rapidity for loading, but more particularly certainty of action, accuracy, and lightness. The invention consists in an entirely novel apparatus for holding and operating the needle, which apparatus is of very simple construction, and easily operated.

WINDOW SHADE FIXTURE.—G. W. Nell, Philadelphia, Pa.—This invention relates to a new cord-tightener for window shade fixtures, and consists of a plate or holder, which is provided with a toothed inner face, and of a forked-shaped hook sliding thereon. This hook fits over the teeth of the holder, and is arrested by the same, in any desired position so as to keep the cord stretched, the said cord being fitted over the hook, or over a roller arranged thereon.

HORSE HAY RAKE.—E. R. Spear and W. R. Spear, Orland, Ind.—This invention has for its object to furnish an improved revolving horse hay rake, which shall be simple in construction, easily operated, and effective in operation, doing its work quickly and thoroughly.

VENT FOR CANS, ETC.—Theodore W. Burger, New York city.—This invention has for its object to furnish an improved vent for cans and other packages for putting up oils, varnishes, and other liquids, which shall be simple in construction, conveniently operated, and not liable to become choked up

MONEY DRAWER.—R. B. Zwahlen, New York city.—This invention relates to a new device for locking money drawers, and all other drawers, so that they cannot be opened by pressing the bolt down with the edge of a knife or other sharp instrument inserted between the top of the drawer and the top plate. The invention consists chiefly in setting the lock some distance below the top edge of the drawer, and in attaching a bar to the top plate of the counter, table, or bureau, into which bar the bolt is locked. This bar reaches behind the crevice formed above the front plate of the drawer, and prevents the application of any tool through said crevice.

WOOD-MOLDING MACHINE.—W. A. McDonald, Morrisania, N. Y.—This invention relates to a new machine for sawing the facings of moldings and of ornamental designs by means of circular or straight saws, so that, especially for ornamental pendants and projections, the machine can be advantageously employed. The invention consists more particularly in the application of a new saw blade, which has the cross section of the molding to be cut, and which is gradually tapered to a point, and toothed on its tapering edge, so that every portion of the cross section is thereby made to cut.

TWINE WINDER.—Marcus Brown Westhead, Manchester, and C. B. James, Redditch, England—This invention relates to a new manner of preparing the ordinary flat twine winders to make them at once holders for thread, needles, pins, buttons, or other articles, and the invention consists in transforming the ordinary flat winders upon which sewing or embroidering thread is usually wound into cases, sheaths, or receptacles open at one or both ends to contain packet or packets of needles, a few pins, or safety pins, or a strip or strips of buttons or hooks and eyes, or a combination of any or all of these articles with the sewing the material.

MACHINE FOR SEPARATING SLATE FROM COAL.—L. P. Garner, Ashland, Pa.—This invention consists in an arrangment of a circular grate upon a horizontal axis, the bars of which are of peculiar form, especially adapted to the purpose through which the coal is caused to pass, together with certain devices to prevent the same from clogging.

CURTAIN FIXTURES.—Benj. F. Cloud, Philadelphia, Pa.—This invention relates to improvements in curtain fixtures, designed to provide an improved arrangement of means for suspending the rollers of curtains, such as are arranged for winding on rollers at the top of the window, so that the roller may be lowered from the top of the windows when required, to allowa full passage thereat for air or for other purposes.

GATE ATTACHMENT.—John W. Everham, Pittsgrove, N. J.—This invention has for its object to furnish an improved gate attachment, which shall be so constructed and arranged as to serve either as a hinge or latch as occasion may require.

EVAPORATOR.—Henry Stollar, Watertown, Ohio.—This invention has for its object to furnish an improved evaporator, designed especially for evaporating sorghum juice, but equally applicable for evaporating other saccharine juices, which shall be so constructed and arranged that the sirup may be "finished" by the heat of the evaporating juice in such a way that it may be impossible for the said sirup to be scorched or burnt during the operation.

DEVICE FOR SEIZING ANIMALS.—Daniel Fasig, Rowsburgh, Ohio.—This invention relates to implements or devices employed in seizing any particular animal from a group or number confined in a pen or small lot. It is designed more particularly for seizing hogs, where any one, or a number, are selected and are to be separated from the main body for slaughter or sale.

PREPARING ZINC FOR ORGAN PIPES AND OTHER PURPOSES.—C. Fogelberg, New York city.—This invention has for its object to furnish a method for preparing zinc for organ pipes and various other purposes, in such a way that the zinc will not oxidize and so that the amount of its expansion and contraction from changes of temperature will be very greatly diminished, while at the same time its softness and firmness will be greatly increased.

MEMORANDUM BOOK.—J. H. Guest and E. Faucett, New Albany, Ind.—This invention relates to a new and useful improvement in books for keeping memorandums and for other purposes, and consists in attaching the book to the cover by means of a hinge of leather, cloth, metal, or other suitable material.

LOCKING DEVICE FOR STOP COCKS.—Valentine T. Hall, Brooklyn, N. Y.—This invention relates to a new and improved method of securing stop cocks of gas, water, and steam pipes, and stop cocks used for all similar purposes, from being opened, turned, or removed without the use of the proper key.

LOCK.—J. Wayit Jones, Paducah, Ky.—This invention relates to a new and useful improvement in locks for dwelling houses and all other buildings.

IRONING BOARD.—Thomas M. Richards, Philadelphia, Pa.—This invention relates to a new and useful improvement in tables or boards for ironing or laundry use.

OPERATING DRILL.—T. D. Keith, Mayville, Wis.—This invention relates to a new and useful improvements in operating drop drills in the process of drilling through rock, earth, or other material, in artesian well or other kinds of earth boring.

LOCKING CASE FOR STOP COCKS AND CONNECTIONS.—Valentine T. Hall, Brooklyn, N. Y.—This invention relates to a new and improved method of securing stop cocks and connections for gas, steam, water, and other fluids and liquids.

PUMP HANDLE BRACKETS.—J. W. Cole, Mt. Pleasant, Iowa.—This invention relates to improvements in metallic brackets, on which the handles of wood pumps are pivoted, whereby it is designed to provide a bracket which may be more permanently secured to the stock, and which will admit of more freedom of action for the handle than those now in use.

CHILD'S CRIB.—Mrs. A. R. Swartz, Carlisle, Pa.—This invention consists in the provision of adjustable bottoms for the cribs, whereby the beds may be adjusted nearer to or farther from the top of the railing, according to the activity of the child and its consequent danger of falling out.

DISTILLING APPARATUS.—Daniel Woodard, Springfield, Tenn.—This invention relates to improvements in distilling apparatus designed to provide an attachment for the boilers or stills, as commonly arranged, whereby the vapor may be filtered through charcoal, instead of exposing the whole body of the liquors to the charcoal, as is commonly practiced; also an arrangement to facilitate the charging of the apparatus with coal and discharging the same.

DRILLING MACHINE.—John H. Roberts, Nashville, Tenn.—This invention relates to improvements in machinery for operating drills for drilling artesian wells, designed to provide an improved arrangement of driving mechanism to lessen the unequal strains upon the engine and other parts arising from the sudden lifting and discharging of the drill rods; also certain improvements in the trip motion calculated to provide a more smooth and easy working device; also, to provide a convenient and simple device for throwing the trip mechanism into or out of gear with the driving cam, or for varying the effect of the same upon the drill, and also certain improvement in guide apparatus for the drill rope.

PRESSER FOR SEWING MACHINES.—Sara Tutton, Tunkhannock, Pa.—This invention consists of a presser made in two parts, capable of employment, together as an ordinary presser, the parts being separated longitudinally through the center, and one so arranged with an independent shank working vertically in brackets upon the other, that when required it may be raised up out of contact with the cloth, and turned back in the direction opposite to that of the working position. The attachment of the presser support is such that the presser may be adjusted laterally.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 11, 1869.

Reported Officially for the Scientific American.

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89,840.—SCAFFOLD.—Geo. Adams, Jr., Alexander, N. Y.
89,841.—BEEHIVE.—Thos. Atkinson, Memphis, Tenn.
89,842.—TUCK CREASER FOR SEWING MACHINES.—I. W. Barnum, New York city.
89,843.—CORN MARKER, PLANTER, AND CULTIVATOR.—Elias Barto, Tiffin, Ohio.
89,844.—COTTON-BALE TIE.—G. N. Beard, St. Louis, Mo.
89,845.—CAP FOR PRESERVE JARS.—Louis R. Boyd, New York city.
89,846.—REFRIGERATOR.—H. R. Bozorth, Philadelphia, Pa.
89,847.—COMPOSITION METAL FOR EYELETS.—G. B. Brayton (assignor to "The Novelty Eyelet Company,") Boston, Mass.
89,848.—SPARK-CONVEYING DEVICE.—J. G. Breslin, Lancaster, Ohio.
89,849.—PUMP.—Samuel Brillinger, Clarence Center, N. Y.
89,850.—SHEEP-SHEARING TABLE.—D. L. Cady, Mason, Mich.
89,851.—PUNCHING MACHINE.—Wm. Churchill, St. Louis, Mo.
89,852.—COMBINED LOCK AND LATCH.—G. W. Cilley, Norwich, Conn.
89,853.—COMBINED LOCK AND LATCH.—G. W. Cilley (assignor to himself and W. P. Adams), Norwich, Conn.
89,854.—STOPPING MECHANISM FOR MACHINE FOR DOUBLING YARN.—I. W. Clarke, Providence, R. I.
89,855.—VEGETABLE FIBER TO IMITATE HAIR.—Andre Couturier, Trinidad, Cuba.
89,856.—COCK FOR WATER CLOSET.—Hugh H. Craigie, New York city.
89,857.—WATER CLOSET.—H. H. Craigie, New York city.
89,858.—WASTE TRAP FOR WASHBASINS.—H. H. Craigie, New York city.
89,859.—WATER CLOSET.—H. H. Craigie, New York city.
89,860.—STAVE JOINTER.—H. A. Crossley, Cleveland, Ohio.
89,861.—COMBINED STOVE LID AND DAMPER.—Wm. Doyle, Albany, N. Y.
89,862.—SELF-INDICATING WEIGHING SCALE.—J. G. Dyer, Chicago, Ill.
89,863.—STOVE GRATE.—Wm. Hailes, Albany, N. Y.
89,864.—MACHINE FOR CLEANING HAIR FROM HIDES.—Alfred Hasbrouck, Ithaca, N. Y.
89,865.—LUBRICATOR.—J. W. Hewitt and Robert Hewitt, Allegheny City, Pa.
89,866.—MACHINE FOR MOLDING METAL DISKS, RIVETS, etc.—P. L. Higley, Cincinnati, Ohio.
89,867.—HARVESTER RAKE.—Stephen Hull, Poughkeepsie, N. Y.
89,868.—INVALID BEDSTEAD.—L. J. Johnson (assignor to himself, C. B. Stodder, and Harvey Chapman), Norwich, Conn.
89,869.—DIE FOR DRAWING AND REDUCING WIRE.—Robert Kent, Brooklyn, N. Y., assignor to Thaddeus Fowler, Seymour, Conn.
89,870.—CLOTHES DRYER.—Gideon King, Eminence, Ky.
89,871.—LANTERN.—E. M. Lang, Portland, Me.
89,872.—COMBINED SUSPENDER AND SHOULDER BRACE.—H. B. Leach (assignor to E. C. Penfield), Philadelphia, Pa.
89,873.—VEGETABLE SLICER.—Geo. Leman and G. W. Beals, Springfield, Mass.
89,874.—UMBRELLA.—John McAuliffe, New York city.
89,875.—TRUSS.—J. L. McAlemy, Memphis, Tenn.

89,876.—MANUFACTURE OF STEEL-FACED IRON PLATES.—Hugh McDonald, Pittsburgh, Pa.
89,877.—SHOE-KNIFE AND GAGE.—Robert R. McDonald, Syracuse, N. Y.
89,878.—TILE MACHINE.—J. C. Mckenzie, Adrian, Mich.
89,879.—VEIL-HOLDER.—S. M. Meyenberg, New York city.
89,880.—REVOLVING GRATE IN HEATING STOVES.—Glendy Moody, Falmouth, Me.
89,881.—SHEET METAL FROM LEAD AND ZINC.—Curtis C. Cady Morgan, Auburn, N. Y., assignor to himself, Curtis C. Cady, and Elmore P. Ross.
89,882.—SEED DRILL.—W. H. Nauman, Dayton, Ohio. Antedated April 13, 1869.
89,883.—CURTAIN FIXTURE.—G. W. Nell, Philadelphia, Pa.
89,884.—HARDENING AND WASHING "RANSOME CONCRETE STONE."—Richard Norris, Jr., Baltimore, Md.
89,885.—PUMP.—D. C. Owen, Adams county, Ill.
89,886.—KEY.—Emery Parker, New Britain, Conn.
89,887.—PRINTING TELEGRAPH.—George M. Phelps, Brooklyn, N. Y.
89,888.—GRATE BAR FOR FURNACES AND HEATERS.—Jesse Reynolds, Philadelphia, Pa.
89,889.—BREECH-LOADING FIRE-ARM.—Westley Richards, Birmingham, England.
89,890.—COTTON GIN.—C. G. Sargent, Westford, Mass.
89,891.—COTTON GIN.—C. G. Sargent, Westford, and A. B. Ely, Newton, Mass.
89,892.—PUMP.—John Seeberger and Joseph Seeberger, West Troy, N. Y.
89,893.—GATE FASTENER.—Henry S. Shisler, Manheim Township, Pa.
89,894.—PARLOR GAME.—A. W. Smith, Birmingham, Pa.
89,895.—REVOLVING BIN.—E. J. Smith, Chicago, Ill.
89,896.—BEEHIVE.—C. E. Spaulding, Theresa, N. Y. Antedated April 8, 1869.
89,897.—ROCKING CHAIR AND ROTARY FAN.—Martin Stiefenhofer, City Island, N. Y.
89,898.—PAPER FASTENER.—J. F. Tapley (assignor to himself, Samuel Bowles, B. F. Bowles, and Clark W. Bryan), Springfield, Mass.
89,899.—HAY SPREADER.—J. F. Thomas, Ilion, N. Y.
89,900.—MILK COOLER.—Asaph Thompson, Hudson, Ohio.
89,901.—MILK COOLER.—Asaph Thompson, Hudson, and Jas. Darling, Northfield Township, Ohio.
89,902.—BREECH-LOADING FIRE-ARM.—S. F. Van Choate, Boston, Mass.
89,903.—COOKING STOVE.—T. B. Walker, Wakefield, Mass.
89,904.—FEED-REGULATOR FOR MILLS.—Martin Weaver (assignor to to himself and Philip Foreman), East Earl Township, Pa.
89,905.—VENTILATOR AND REFRIGERATOR.—Wm. Wellington, Rockford, Ill.
89,906.—WOOD-SPLITTING MACHINE.—Wm. L. Williams, New York city.
89,907.—FLOUR BOLT.—W. H. Allen, and Wm. Stoddard, Winona, Minn.
89,908.—CAR WHEEL.—R. N. Allen and L. W. Kimball, Pittsford, Vt., assignors to themselves, W. H. Mallory, and E. L. Butterfield, New York city.
89,909.—PNEUMATIC PUMP.—J. A. Bailey, Detroit, Mich.
89,910.—EXPLOSIVE COMPOUND.—Otto H. Bandisch, Berlin, Prussia, assignor to Fred. Volckmann, Hoboken, N. J.
89,911.—MACHINE FOR CARVING.—Virgil W. Blanchard, Bridport, Vt.
89,912.—BED BOTTOM.—A T. Boon and J. H. Bell, Galesburg, Ill.
89,913.—CAR COUPLING.—A. Branshaw, Fond du Lac, Wis.
89,914.—VENT FOR CANS.—T. W. Burger, New York city.
89,915.—BRAIDING FOOT FOR SEWING MACHINES.—Dan'l C. Chester, Ogdensburg, N. Y.
89,916.—STEAM GENERATOR.—J. M. Clark, New York city.
89,917.—CURTAIN FIXTURE.—B. F. Cloud, Philadelphia, Pa.
89,918.—PUMP.—J. W. Cole, Mount Pleasant, Iowa.
89,919.—FOOT MEASURE FOR SHOEMAKERS.—Charles Cross, Louisville, Ky.
89,920.—HORSE HAY-FORK.—Fred. Ebert, Saxonburg, Pa.
89,921.—NEEDLE WRAPPER.—Geo. Ewart, New York city.
89,922.—DEVICE FOR SEIZING ANIMALS.—Daniel Fasig, Rowsburg, Ohio.
89,923.—BANJO.—John Field, New York city.
89,924.—ROCKING CHAIR.—Gaetano Formica, New York city.
89,925.—ATTACHMENT TO BORING BRACE.—J. S. Fray (assignor to himself and Horace Pigg), Bridgeport, Conn.
89,926.—CURTAIN FIXTURE.—C. E. Fritts, Onconta, N.Y.
89,927.—COAL SCREEN.—L. P. Garner, Ashland, Pa.
89,928.—MEMORANDUM BOOK.—Jas. H. Guest and Elwood Faucett, New Albany, Ind.
89,929.—LOCKING DEVICE FOR STOP COCKS.—V. T. Hall, Brooklyn, N. Y.
89,930.—LOCKING CASE FOR STOP COCKS.—V. T. Hall, Brooklyn, N. Y.
89,931.—DOOR LOCK.—J. Waytt Jones, Paducah, Ky.
89,932.—OPERATING DRILL.—T. D. Keith (assignor to himself and E. J. Dahm), Mayville, Wis.
89,933.—COMPOSITION FOR FLOORS, SIDEWALKS, ETC.—Theo. Landmann, Cincinnati, Ohio.
89,934.—COFFEE ROASTER.—Israel Long, Terre Haute, Ind.
89,935.—WARP-BEAM FOR LOOM FOR WEAVING SKIRTS.—F. X. Loughery, Kelleysville, Pa.
89,936.—ELECTRIC ALARM.—C. T. Mason, Sumter, S. C.
89,937.—MACHINE FOR CUTTING MOLDINGS IN WOOD.—W. A. McDonald, Morrisania, N. Y.
89,938.—HORSE HAY-FORK.—D. B. Neal (assignor to himself W. W. McClenacken, and E. C. Chase), Mount Gilead, Ohio.
89,939.—EXTENSION END BOARD FOR WAGONS.—Stewart Neill and Adam Pick, Chillicothe, Ill.
89,940.—PEN.—H. L. Pratt, Beverly, Mass., administrator of the estate of E. L. Pratt, deceased.
89,941.—BOILER SCRAPER.—H. L. Pratt, Beverly, Mass., administrator of the estate of E. L. Pratt, deceased.
89,942.—DOOR FASTENER.—Wm. Quayle, Warsaw, Ill.
89,943.—IRONING TABLE.—T. M. Richards, Philadelphia, Pa. assignor to J. H. Eaton, Burlington, N. J.
89,944.—ROCK DRILLING MACHINE.—J. H. Roberts, Nashville, Tenn.
89,945.—APPARATUS FOR STAMPING LACE PAPER.—Albert Rohrbeck, New York city.
89,946.—DRAINING APPARATUS.—John Roy, New Orleans, La.
89,947.—BREECH-LOADING FIREARM.—Gustav Schulz, Fort Madison, Iowa.
89,948.—BRIDGE.—Fred. H. Smith, Baltimore, Md.
89,949.—ALARM FEED-WATER REGULATOR FOR BOILERS.—N. L. Smith, Derby, Conn.
89,950.—HORSE RAKE.—E. R. Spear and W. R. Spear, Orland, Ind.
89,951.—EVAPORATOR.—Henry Stollar, Watertown, Ohio.
89,952.—APPARATUS FOR SUPPLYING AIR TO HYDROCARBON BURNERS.—Jas. Stratton (assignor to W. W. Glenworth), Phil'a., Pa.
89,953.—CHILD'S CRIB.—A. R. Swartz, Carlisle, Pa.
89,954.—SASH HOLDER.—J. H. Teahl and J. C. Zimmerman, Eberly's Mills, Pa.
89,955.—BREECH-LOADING ARM.—L. B. Tiebel (assignor to himself and Charles Matters), Hudson City, N. J.
89,956.—HORSE RAKE.—Albert Tschop and Jacob Hartman, East Berlin, Pa.
89,957.—PRESSER-FOOT FOR SEWING MACHINES.—Sara Tutton, Tunkhannock, Pa.
89,958.—COTTON PLANTER.—A. R. Wiggs, Iuka, Miss.
89,959.—PIPE CUTTER.—A. G. Wilder, Cohoes, N. Y.
89,960.—VELOCIPEDE.—B. F. Wilson, Geddes, N. Y.
89,961.—APPARATUS FOR DISTILLING AND PURIFYING SPIRITS.—Dan. Woodard, Springfield, Tenn.
89,962.—TILL CHECK.—R. B. Zwahlem, New York city.
89,963.—BOLTING REEL.—J. T. Agner, Lexington, Va.
89,964.—VELOCIPEDE.—John Allgaier, Philadelphia, Pa.
89,965.—BREECH-LOADING ORDNANCE.—Wm. Bacon, Monticello, Kansas.
89,966.—SAMPLE HOLDER.—G. L. Bailey, Portland, Me.
89,967.—FASTENING FOR COLLARS.—M. B. Battey, Washington, D. C.
89,968.—CORN HARVESTER.—J. C. Beam, Woodside, Ill.
89,969.—HEAD-BLOCK FOR SAW MILLS.—A. M. Beard, Hillsborough, N. H.
89,970.—PICTURE NAIL.—J. W. Bishop, New Haven, Conn.
89,971.—APPLE PARER AND SLICER.—G. W. Brokaw, Lodi, N. Y.
89,972.—HORSE RAKE.—Irvine Carman, Sandwich, Ill.
89,973.—HARVESTER.—G. T. Coolman and Chas. M. Young, Corry, Pa.
89,974.—RAILROAD CAR VENTILATOR.—William G. Creamer, Brooklyn, N. Y.
89,975.—SASH FASTENER.—J. L. Devol, Parkersburg, W. Va.
89,976.—CAR SEAT.—J. S. Diack, Aurora, Ill.
89,977.—VELOCIPEDE.—C. J. Doty and A. S. Dickinson, Washington, D. C.
89,978.—GATE HINGE.—J. W. Everham, Pittsgrove, N. J.
89,979.—CORN HARVESTER.—J. H. Fisher and Chas. Holcomb, Mendota, Ill.
89,980.—PROCESS OF PREPARING ZINC FOR ORGAN PIPES AND FOR OTHER PURPOSES.—Carl Fogelberg, New York city.
89,981.—LAWN MOWER.—Thomas Garrick, Providence, R. I.
89,982.—WOODEN BURIAL CASE.—Joseph Gawler, Washington, D. C.
89,983.—GRASS RENOVATOR.—James Gould, Lexington, Mass.
89,984.—HAND-SPINNING MACHINE.—Belville A. Grant, Lockport, Ill.
89,985.—CRACKER MACHINE.—Gordon Y. Gray, Niles, Mich.
89,986.—FURNACE FOR STEAM AND OTHER ENGINERY.—C. B. Gregory, Beverly, N. J.
89,987.—SEWING MACHINE.—Lev. Griswold, Brooklyn, N. Y.
89,988.—DISTILLATION OF HYDROCARBON OILS.—Henry Grogan and George T. Lape, New York city.
89,989.—COMBINATION LOCK.—Henry Grosse, Tiffin, Ohio.
89,990.—PLANING MACHINE.—E. P. Halsted, Worcester, Mass., assignor to R. Ball & Company.
89,991.—SUPPLEMENTAL HORSESHOE.—Thomas P. Handy and Christian R. Kleibacker, Baltimore, Md.
89,992.—PRESSURE GAGE FOR HYDROSTATIC PRESSES.—Thos. Harbottle, Brooklyn, N. Y.
89,993.—FOLDING BEDSTEAD.—Thos. B. Harkins, Bristol, Pa.
89,994.—WASHING MACHINE.—Robert Hermance, Schuylersville, N. Y.
89,995.—UNDERPINNING FOR BUILDINGS.—Increase S. Hill, Boston, and Andrew Burnham, North Chelsea, Mass.
89,996.—PITCHER.—J. H. Hobbs, Wheeling, W. Va.
89,997.—LITHOGRAPHIC PRESS. — August Hoen, Baltimore, Md.
89,998.—APPARATUS FOR FREEING PETROLEUM AND OTHER LIQUIDS FROM GAS.—Albert H. Hook, New York city, assignor to Smith Gardner.
89,999.—CAR SPRING.—E. J. Horner, Wilmington, Del.
90,000.—TURBINE WATER WHEEL.—Abijah Hubbell, Salisbury, Conn, assignor to himself, George V. Capron, and E. P. H. Capron.
90,001.—WASHING MACHINE.—Abel L. Hurtt, Monticello, Ind.
90,002.—CHURN.—H. E. James, West Alexandria, Pa.
90,003.—MACHINE FOR MAKING CUT NAILS.—S. K. Jones and George H. Snow, New Haven, Conn., assignors to S. K. Jones, A. A. Wilcox, Lysander Flagg, and Jesse Cudworth, Jr.
90,004.—GRAINING APPARATUS.—Wm. H. Kay, Lemont, Ill.
90,005.—FEED DEVICE FOR SAW MILL.—John E. Keyt, Louisville, Ky.
90,006.—METHOD OF PREPARING AND EMBOSSING WOOD.—William Kopp, Louisville, Ky.
90,007.—POCKET LANTERN.—Charles Mackh, Elgin, Ill.
90,008.—CORN PLANTER.—Napoleon Maisonneuve, Kankakee, Ill.
90,009.—AUTOMATIC FAN.—John Maltry, Morrisania, N. Y.
90,010.—SAW-SHARPENING DEVICE.—Thomas Markland, Jr., Philadelphia, Pa.
90,011.—FLOUR BOLT.—Rufus S. Mitchell and George Z. Kessinger, Elizabeth, Ind.
90,012.—CARBURETER.—Edmon L. Mix, Rochester, N. Y.
90,013.—BAG TIE.—George Murray, Waterloo, N. Y.
90,014.—COMPOUND FOR HARDENING CAST IRON.—Byron W. Nichols (assignor to himself, Cornelius Aultman, George H. Buckins, Percy S. Sowers, and A. Clark Tonner) Canton, Ohio.
90,015.—WATER COCK.—Henry S. North and Thomas Thompson, Middletown, Conn., assignors to themselves and Daniel R. Benham.
90,016.—BOOT CRIMP.—Abraham Overholt, Gardenville, Pa.
90,017.—ADVERTISING CALENDAR.—John D. Parsons, Albany, N. Y.
90,018.—COMBINED CARRIER AND DRESSER FOR TOBACCO.—Fredrick August Pauck, St. Mary's, Ohio.
90,019.—STEAM PIPE FOR REVERSING STEAM ENGINES.—Joseph B. Pedrick (assignor to himself and Joseph F. Gent), Columbus, Ind.
90,020.—HARVESTER.—John G. Perry, Kingston, R. I.
90,021.—LAMP SHADE HOLDER. — Joseph T. Pope, New York city.
90,022.—METHOD OF SHEATHING VESSELS, ETC.—Dan Read, Hudson City, N. J.
90,023.—RAILWAY RAIL.—Samuel J. Reeves, Philadelphia, Pa.
90,024.—BREECH-LOADING FIREARM.—Benjamin S. Roberts, United States Army.
90,025.—LEVELING STAFF. — William H. Robinson, Vermont, Ill.
90,026.—BUCKLE.—George W. Roland, Salem, Oregon.
90,027.—LUMBER DRYER.—W. C. Scott, Richmond, Ind.
90,028.—HOG RING.—W. S. Shoemaker, Towsontown, Md., and E. H. Shoemaker, Lancaster, Ohio.
90,029.—COUNTING REGISTER.—Gerard Sickels, Boston, Mass.
90,030.—COFFEE AND TEAPOT.—Michael Simons, Middletown, Conn.
90,031.—HOSE.—George C. Smith, Matteawan, N. Y.
90,032.—VELOCIPEDE.—Hugh Smith, Newark, N. J.
90,033.—STEAM GENERATOR.—Thomas S. Speakman, Camden, N. J.
90,034.—VELOCIPEDE.—Charles Spring, Hyde Park, and Andrew Spring, Weston, Mass.
90,035.—WASHING AND FULLING MACHINE.—James Taylor, Philadelphia, Pa., assignor to himself, Benjamin Schofield, and Thomas Branson.
90,036.—CHILD'S TABLE TRAY.—Alexander Turner, Newark, N. J.
90,037.—CORK FASTENER.—E. D. Wetherbee, Worcester, Mass.
90,038.—STUMP EXTRACTOR.—Balaam W. Weaver, Transitville, Ind.
90,039.—POWER PRESS FOR HAY, ETC.—Jacob H. Wittmer, (assignor to himself and William Siple), Manor, Pa.
90,040.—GLASSWARE MOLD.—Alonzo E. Young, Dorchester, Mass., assignor to Boston Silver-glass Company.
90,041.—MACHINE FOR FORMING OVAL TENONS.—C. W. Cotton, Portsmouth, Ohio.
90,042.—WASHING MACHINE.—Thomas H. De Motte, Woodford county, Ill.
90,043.—SAWING MACHINE. — William Gardiner, Stoneborough, Pa.
90,044.—MEASURING CAN FOR LIQUIDS.—Joseph S. Gold, Springfield, Ill.
90,045.—MACHINE-MADE STITCH.—Alexander Harroun, Jr., Onondaga county, N. Y.
90,046.—CENTER BOARD.—Beverly Kennon, New Orleans, La.
90,047.—AUTOMATIC BOILER FEEDER.—Paul Narcisse Joseph Macabies, Paris, France.
90,048.—TONIC BITTERS.—J. H. McCartney, Dansville, N. Y.
90,049.—METHOD OF ATTACHING TO THE SOLES OF BOOTS AND SHOES HEELS MADE OF VULCANIZED WOOD.—F. Henry Morgan, Beverly, Mass.
90,050.—MOSQUITO AND FLY NET.—A. M. Rogers, Brooklyn, N. Y.
90,051.—AIR INHALER.—Z. Rogers, Chicago, Ill.
90,052.—BOOK CURB.—Mary A. H. Saurman, Philadelphia, Pa.
90,053.—WINE AND CIDER PRESS.—Jacob Scholer, Burlington, Iowa.
90,054.—MOSQUITO-BAR FRAME.—Henry Searle, Washington, D. C.
90,055.—CLOTHES-LINE CLAMP.—W. S. Shoemaker, Towsontown, Md., and E. H. Shoemaker, Lancaster, Ohio.
90,056.—GRAINING MACHINE.—W. H. Smith, New York city.
90,057.—PHOSPHATE FERTILIZING COMPOUND.—David Stewart, Port Penn, Del.
90,058.—DERMATIC MEDICATOR.—I. R. Weisiger, Danville, Ky
90,059.—SEWING PACKAGE.—Marcus Brown Westhead, Manchester, and Charles Bartleet James, Redditch, England, assignors to Marcus Brown Westhead.
90,060.—RAILWAY CAR.—Daniel Fitzgerald, New York city.
90,061.—WASHING MACHINE.—H. H. Waters, Atlanta, Ga.

REISSUES.

66,957.—BASE-BURNING STOVE.—Dated July 23, 1867; reissue 3,426.—W. C. Durant, West Troy, N. Y.
86,948.—APPARATUS AND PROCESS FOR EVAPORATING LIQUIDS.—Dated February 16, 1869; reissue 3,427.—Division A.—J. J. Sherman, Albany, N. Y.
86,948.—APPARATUS AND PROCESS FOR EVAPORATING LIQUIDS.—Dated February 16, 1869; reissue 3,428.—Division B.—J. J Sherman, Albany, N. Y.
73,666.—KNOB LATCH.—Dated January 21, 1868; reissue 3,429.—H. C. Storrs, New York city.
9,041.—SEWING MACHINE.—Dated June 15, 1852; extended seven years; reissue 3,430.—Wheeler & Wilson Manufacturing Company Bridgeport, Conn., assignees, by mesne assignments, of A. B. Wilson.
83,131.—SAW FRAME.—Dated October 20, 1868; reissue 3,431.—Beauman Butler, St. Johnsbury Center, Vt., for himself, and B. M. Tillotson, Manchester, N. H., assignee of C. F. Ramsay.
38,519.—TABLE TRAY OR WAITER.—Dated May 12, 1863; reissue 3,432.—P. A. Doherty, Boston, Mass., assignee of Jane G. Waterman (widow) and J. D. Martin, administrator of the estate of Nathaniel Waterman, deceased.
56,043.—BRIDGE.—Dated July 3, 1866; reissue 2,586, dated April 30, 1867; reissue 3,433.—David Hammond, Canton, Ohio.
38,694.—HYDRANT.—Dated May 26, 1863; reissue 3,434.—J. G. Murdock, Cincinnati, Ohio.
79,421.—BOAT.—Dated June 30, 1868; reissue 3,435.—Elisha Waters and G. A. Waters, Troy, N. Y.
84,626.—HEATING STOVE.—Dated December 1, 1868; reissue 3,436.—W. E. Marston, Troy, N. Y., assignee of Elizabeth Hawks.

DESIGNS.

3,478.—FRAME FOR A SEWING MACHINE.—W. B. Bartram, Danbury, Conn.
3,479.—FLOOR OIL CLOTH, ETC.—Hugh Christie, Morrisania, assignor to Deborah Powers, A. E. Powers, and N. B. Powers, Lansingburgh, N. Y.
3,480.—FLOOR OIL CLOTH.—Hugh Christie, Morrisania, (assignor to Deborah Powers, A. E. Powers, and N. B. Powers), Lansingburgh, N. Y.
3,481.—ICE PITCHER.—Nathan Lawrence, Taunton, Mass.
3,482.—COOK'S RANGE.—John Martino, Jacob Beesley, and John Currie (assignors to Henry McCleneghan), Philadelphia, Pa.
3,483.—COOK'S STOVE.—John Martino, Jacob Beesley, and John Currie, Philadelphia, Pa., assignors to Charles Sharpe, and E. L. Thomson.
3,484 and 3,485.—CARPET.—C. T. Meyer, Bergen, N. J. assignor to E. C. Sampson, New York city. Two Patents.
3,486.—SEWING MACHINE FRAME.—L. Porter, Rochester, N. Y.
3,487.— STOVE.—Garrettson Smith and Henry Brown, Philadelphia, assignors to E. S. Shantz and Joseph Johnson, Royar's Ford, Pa.
3,488.—LAMP PEDESTAL.—Stephen Spoor, Phelps, N. Y.
3,489.—FIREMAN'S BADGE.—J. L. D. Sullivan, Somerville, Mass.
3,490. —MUSIC RACK.—Chas. Zeuner, Cincinnati, Ohio.
3,491.—FUR SET BOX.—Jason Crane, Bloomfield, N. J.
3,492.—SET OF BLOCKS FOR AN ALPHABET PUZZLE.—Henry Johnson, Wauregan, Conn.
3,493.—PLATES OF A STOVE.—Rodman Backus, Albany, N. Y.
3,494.—GLASS WARE.—W. O. Davis, Portland, Me.
3,495.—ORNAMENTING THE EDGES OF PAPER COLLARS.—Franklin Field (assignor to himself and Charles K. and Charles A. Brown), Troy, N. Y.

EXTENSIONS.

STEAM GENERATOR.—Finley Latta, of Cincinnati, Ohio, administrator of A. B. Latta, deceased.—Letters Patent No. 12,982, dated April 10, 1855.

PLATE HOLDERS FOR CAMERAS.—A. S. Southworth, of Boston, Mass.—Letters Patent No. 12,700, dated April 10, 1855: reissue No 1,049, dated September 25, 1860.

FURNACE FOR BURNING WET FUEL.—Aaron Woodman, New York city, administrator of Moses Thompson, deceased.—Letters Patent No. 12,678, dated April 10, 1855; reissue No. 398, dated October 7, 1856 reissue No. 446, dated March 31, 1857.

SLIDE REST FOR LATHES.—Chester Van Horn, Springfield, Mass.—Letters Patent No. 12,747, dated April 17, 1855.

DREDGING MACHINE.—Chas. H. Fondi, Mobile, Ala.—Letters Patent No. 12,720, dated April 17, 1855.

SHIPS' WINDLASS.—James Emerson, of Lowell, Mass.—Letters Patent No. 12,718, dated April 17, 1855; reissue No. 1,020, dated July 31, 1860.

MANUFACTURE OF SLATE PENCILS.—N. C. Harris, of Poultney, Vt.—Letters Patent No. 12,739, dated April 24, 1855.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,029.—HEATING BY STEAM FOR MANUFACTURING AND OTHER PURPOSES.—Colin Cairns, New York city. April 5, 1869.

1,032.—LOOMS FOR WEAVING.—J. W. Drummond, Schenectady, N. Y. April 5, 1869.

1,033.—MANUFACTURE OF PAPER.—Z. C. Warren, Brooklyn, N. Y. April 6, 1869.

1,040.—BAKING OVEN.—Joseph Vale, Beloit, Wis. April 6, 1869.

1,050.—PERMANENT WAY OF RAILWAYS.—D. R. Pratt, Worcester, Mass April 7, 1869.

1,061.—STEAM GENERATOR.—J. B. Root, New York city. April 8, 1869.

1,080.—WATERPROOFING PROCESS.—Charles Toppan, Wakefield, Mass. April 9, 1869.

1,083.—FIREARM.—S. F. Van Choate, Boston, Mass. April 10, 1869.

1,088.—ROTARY ENGINES, PUMPS, AND METERS.—J. F. Denavarro, New York city. April 9, 1869.

1,096.—SEWING MACHINE.—Albin Warth, Stapleton, N. Y. April 10, 1869.

1,108.—STITCH FOR SEWING TOGETHER STRAW, BRAID, ETC., AND MACHINERY FOR MAKING THE SAME.—N. A. Baldwin, Milford, Conn. April 10, 1869.

1,134.—JOINTS FOR RAILROAD RAILS.—Joseph Adams, Fair Haven, Vt. April 13, 1869.

1,136.—APPARATUS FOR MAKING COMPOUND TELEGRAPH WIRE OR CONDUCTORS.—Alanson Cary, New York city, M. G. Farmer, G. F. Milliken, and J. M. Batchelder, Boston, Mass. April 13, 1869.

1,152.—APPARATUS FOR BURNING LIQUID HYDROCARBONS.—Homer Taylor, Montreal, Canada. April 14, 1869.

1,171.—VALVES AND VALVE GEAR FOR STEAM ENGINES.—A. K. Rider, New York city. April 15, 1869.

1,178.—MANUFACTURE OF HEAVY HYDROCARBON OILS.—J. Merril, Boston Mass. April 16, 1869.

1,079.—STEAM BOILERS, ETC.—J. A. Miller, New York city, April, 9 1869.

1,081.—PRESSES FOR COMPRESSING COTTON, ETC.—Messrs. J. H. Adams & Coombs, New York city. April 9, 1869.

1,087.—MOTIVE POWER.—W. F. Goodwin, New York city. April 9, 1869.

1,131.—MANUFACTURE OF BOOTS AND SHOES.—E. P. Richardson, Lawrence, Mass. April 13, 1869.

1,135.—FAN BLOWER.—Patrick Clark and J. R. Shotwell, Rahway, N. J. April 13, 1869.

1,181.—SAFETY ATTACHMENT TO BURNERS.—J. S. Lipps, Brooklyn, N. Y. April 16, 1869.

1,184.—RIFLED FIREARMS AND ORDNANCE, AND IN AMMUNITION FOR THE SAME.—O. F. Winchester, New Haven, Conn. April 17, 1869.

1,199.—FRICTION MATCHES AND MATCH BOXES.—W. H. Rogers, New York city. April 19, 1869.

1,201.—FEED WATER APPARATUS.—Philander Shaw, Boston, Mass. April 19, 1869.

1,303.—PRODUCING PURE IRON DIRECT FROM CRUDE IRON ORE.—Edward Brady, Philadelphia, Pa. April 20, 1869.

1,215.—LAMPS.—J. M. Perkins and M. W. House, Cleveland, Ohio. April 20 1869.

1,245.—LOCKS.—Nicholas Petre, New York city. April 22, 1869.

1,290.—SMELTING AND OTHER FURNACES.—Samuel Oakman, Boston, Mass April 26, 1869.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

G. C. K., of Ky.—We are informed that marble that is yellow from age, or covered with green fungoid patches, may be rendered white by first washing it with a solution of permanganate of potash, of moderate strength, and while yet moist with this solution, rubbing with a cloth saturated with oxalic acid. As soon as the portion of the stone operated upon becomes white, it should be thoroughly washed with pure water to remove all trace of the acid. Care is necessary in using the acid as it is violently poisonous when taken into the stomach, and has frequently been the cause of death by being mistaken for Epsom salts.

T. W. B., of Ky.—You may transfer an exact image of a brass die impression, taken in ink upon the surface of steel, by previously coating the steel with white wax dissolved by the aid of spirits of turpentine. The evaporation of the turpentine will leave an even thin layer of wax upon the steel. Or you can take a tracing of the brass die with ordinary tracing paper and a lead pencil, and laying the tracing on the steel previously coated, can transfer it by gently rubbing on the back of the paper. The second querry you make is not clear. The glass used by watchmakers and jewelers is powerful enough for use in ordinary engraving.

W. A. B., of Geo.—We shall be glad to receive from you, or any other of our numerous correspondents items respecting the development of industrial interests in the country.

S. B., of N. Y.—We have no personal knowledge of the magic diamond. We cannot of course keep the run of the character of all the articles advertised in our columns.

E. G. B., of D. C.—Raw hide dissolves completely in water heated under pressure. Thus dissolved it has all the properties of crude glue, in fact it is a crude glue, and will adhere to any surface to which ordinary glue will adhere.

M. J., of Ky.—The best wheel for gumming saws is a vulcanized rubber and emery wheel. You can not advantageously use a wet stone for this purpose.

W. H. E., of Del.—A ball projected on an inclined surface in the direction of the descent will traverse a greater distance than it would on a level surface.

C. W. G., of Pa.—The nearer to the stand pipe the discharge of water takes place, the greater will be the throw from the butt of a hose, on account of reduced friction, all other things being equal.

J. H., of Pa.—Your suggestion about an inventor's assistant agency, appears well upon paper, and similar schemes have been attempted, but without success. We cannot give it our approval as a practical plan of operating new improvements.

RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will be given; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgment of their funds.

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TO Match Manufacturers.—Prof. H. Dussauce, Chemist is ready to furnish the most recent processes to manufacture every kind of matches and chemicals employed in the fabrication. Address
Prof. H. DUSSAUCE, New Lebanon, N. Y.

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150-HORSE POWER BOILERS AND ENGINE for sale cheap. For particulars and descriptive circular, address
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22 2 525 Minor st., Philadelphia, Pa.

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Chemists and Importers, 55 Cedar st., New York.
22 4

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For Land and Marine Purposes. Pocketbook form, roan gilt.....$1 75.
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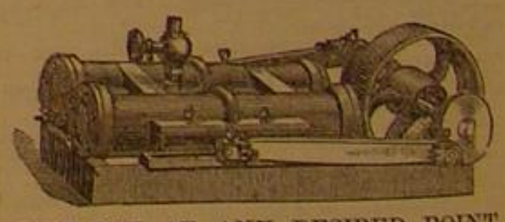

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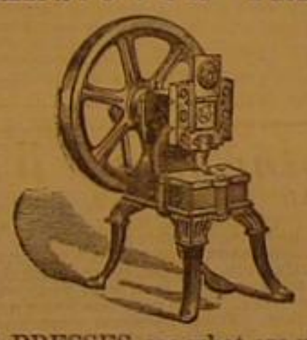

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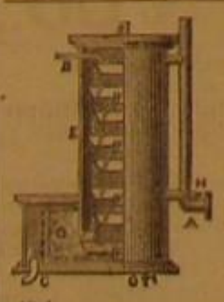

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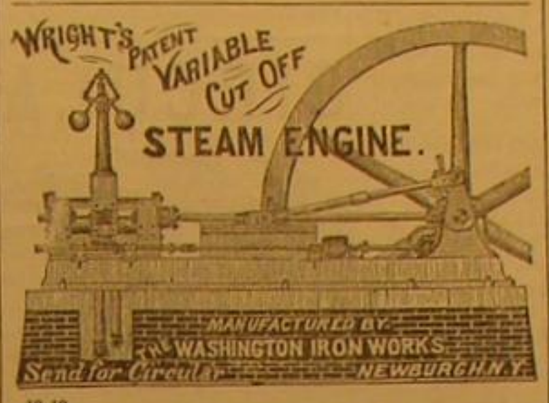

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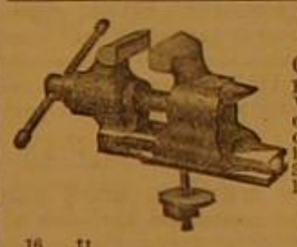

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Vol. XX.—No. 23. [NEW SERIES.] NEW YORK, JUNE 5, 1869. $3 per Annum. [IN ADVANCE.]

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Subsequent experiments made by Messrs. C. Kœchlin, Cordillot, and Lauth, have led to the substitution of sulphide of copper for the sulphate and chloride of this metal, whose presence seems indispensable to the production of aniline black. A good printing paste, which does not weaken the fabrics and does not corrode the scrapers and the rollers of the printing apparatus, is made as follows:

Heat and digest—water, 1 lb.; starch, 2 lbs.; sulphide of copper, 8 ozs. On the other hand, mix and heat—torrefied starch, 2 lbs. 6 ozs. water 4 lbs.; gum tragacanth water, 1 qt.; hydrochlorate of aniline, 1 lb. 9½ ozs.; sal ammoniac, 3½ ozs.; chlorate of potassa, 9½ ozs. Then mix the two compositions, print, and expose the fabric in the ageing room for 24 hours, and at a temperature from 77° to 104° Fah.

Here is another paste by Mr. Käppelin: Starch paste, 2½ gals., chlorate of potassa, 7 oz.; gum tragacanth water 5½ lbs.; sulphide of copper 14 ozs.; sal ammoniac, 9 ozs.; a salt of aniline (tartrate) 2½ lbs., which is added last.

Tartrate of aniline does not corrode the steel scrapers, and is gradually transformed into hydrochlorate of aniline by the sal ammoniac of the mixture. Nitrate and hydrochlorate of aniline are the only salts of aniline which can produce the black

After 24 hours' standing in the ageing room, the prints are drawn through a bath containing 2 per cent of carbonate of soda, steamed, and washed.

Acids will turn the color to green, but alkalies will restore the black. A solution of bichromate of potassa intensifies the color; but an excess of this salt is apt to impart a reddish hue.

The best aniline for black is the one which contains a mixture of aniline and toluidine, and which is sought for in themanufacture of reds.

The sulphide of copper is made by dissolving at the ordinary temperature 2 parts of sublimed sulphur in 2 parts of caustic soda, at 38° Baumé. After 24 hours' standing and frequent stirrings, the solution is complete, and is thrown into a warm solution of 10 parts of sulphate of copper in 250 parts of water. The precipitate is washed and drained until about 10 pints are obtained, each pint therefore corresponds to 1 pound of sulphate of copper.

Lucas paste.—It contains acetate of copper and hydrochlorate of aniline, without sal-ammoniac, and has been submitted to a peculiar process. When used, this paste is mixed with 6 to 8 times its volume of starch paste. The temperature of the ageing room is about 104° Fah.

Paraf's paste.—It is a mixture of hydrochlorate of aniline, chlorate of potassa, hydrofluosilicic acid, and a thickening. It produces a very fine black when applied with copper or brass rollers, which furnish the copper necessary to the development of the color. If no copper is present, the shade is only a dirty blue.

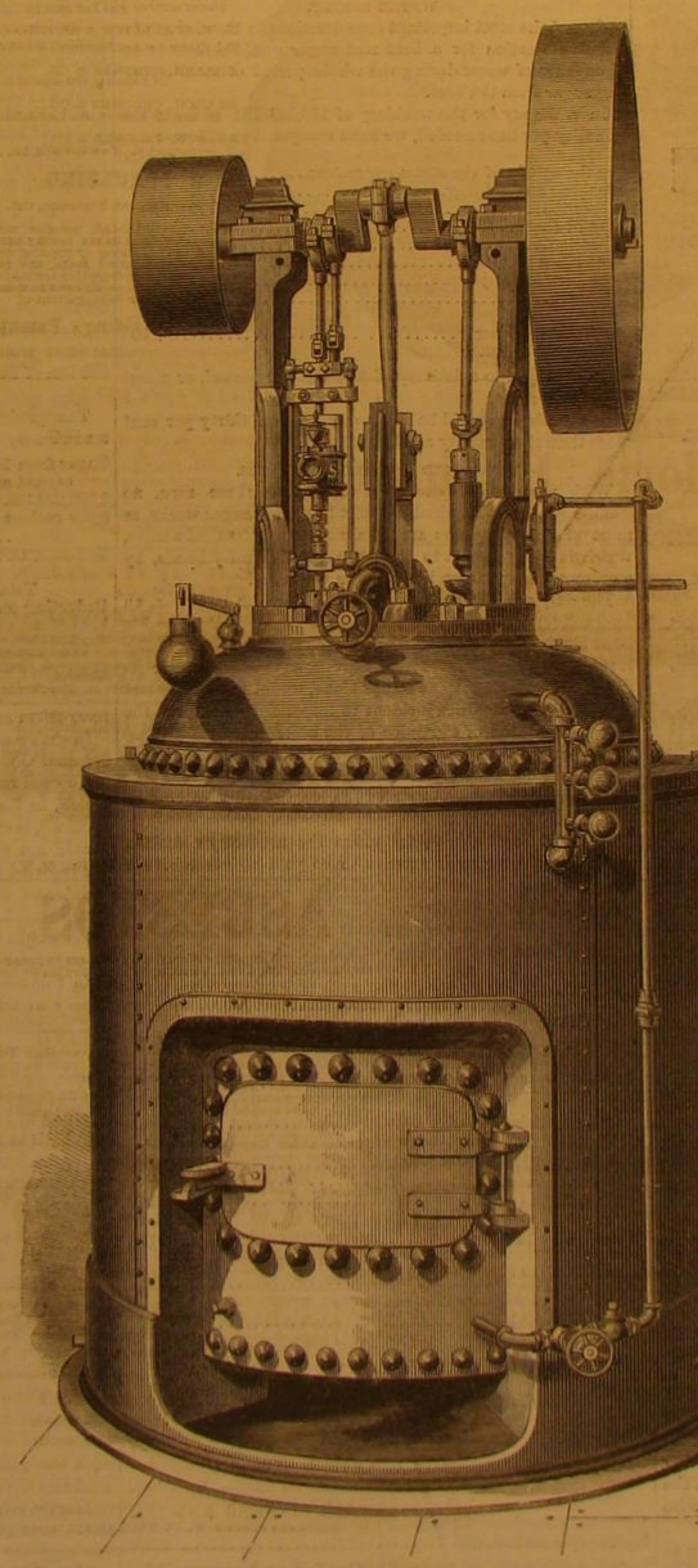
All these aniline blacks are remarkable as being very fast, unalterable by acids or alkalies, and even by chlorine to a certain point. If chlorine is not used in great excess, the black color will reappear; if in excess, the color remains fallow. Aniline black may also be printed simultaneously with madder and most steam colors.

All the compositions for producing aniline black must be acid, and the more acid there is, the more rapid is the production of the black. We ought, however, to remain within proper limits, otherwise the fiber may be weakened.

The degree of acidity of the paste will also vary with the thickenings employed. Gum senegal requires more acidity than torrefied starch, and the latter more so than white starch or gum tragacanth.

In printing aniline black care should be taken not to print upon, or too near other places previously mordanted; the mordant would be acted upon, and if it contains acetic acid, this acid once liberated would prevent the formation of black, which will be only gray.

There is also danger of spontaneous combustion, so rapid is the oxidation going on, when the printed piece is allowed to remain folded and wet. It should be immediately spread out in the ageing room. —*Dictionary of Dyeing and Calico Printing.*



BAXTER'S PORTABLE STEAM ENGINE.

Improvement in Steam Generators, and in Steam Engine Valve Devices.

The portable engine which forms the subject of this article, has attracted considerable attention from the simplicity of its construction, and its efficiency. It is an ingenious method of applying principles in steam engineering acknowledged to be theoretically correct, but always considered as practically difficult of attainment. The three prominent features of this engine are, first, the placing of the cylinder within the steam dome of the boiler, second, the construction of the boiler; and, third, the cut-off valve; the latter being the subject of special patent, as well as the boiler. The inventor, Mr. Wm. Baxter, of Newark, N. J., has employed some novel applications of mechanical principles in the perfection of this engine, exhibiting a fertility of device which sustains the reputation acquired by his improvements in other fields of invention.

Fig. 1, is a perspective view of the engine and boiler combined, with the valve improvement attached; the construction of which will be easily understood by reference to Figs. 2, 3, and 4, which respectively represent a vertical section of the steam generator and elevations of the working parts of the engine, represented in a somewhat simplified form to show the main features more clearly, and to aid in its description.

The heated products of combustion rise from the grate, spread in the combustion chamber, A, Fig. 2, descend through the vertical flues, B, into the gas chamber, C, then again ascend through the smoke chamber D, and finally escape through E. This smoke chamber is formed by an external cylindrical jacket extending entirely around the boiler proper, rising and contracting to meet the boiler below the water line as shown in the engraving.

The water envelops the top of the combustion chamber, A, and fills the space between the descending flues and the smoke chamber, and also between the flues and the combustion chamber, surrounding the flues, and covering the top plate of the gas chamber; thus securing a very large heating surface in an extremely compact manner, and leaving ample space in the steam dome, in which the cylinder is placed vertically, as shown in the engraving. The cylinder is attached to a circular bed plate, which also forms a cap to the steam dome. The pillars sustaining the crank shaft and its attachments also rest upon, and are bolted to this bed plate, so that in transportation the removal of the bolts which hold the bed-plate in position, separates the engine proper from the boiler, without disturbing the adjustment of the valve, or otherwise affecting the relation of the working parts.

These parts are shown in Figs. 3 and 4—at least such as are essential to this description; the fly wheel and a portion of the crank shaft being broken away to admit of enlarging the parts desired to be shown. Fig. 3 shows the bed plate, H, above mentioned with the cylinder and valve in place, and the peculiar and novel device designed to act as both a regulator and cut-off.

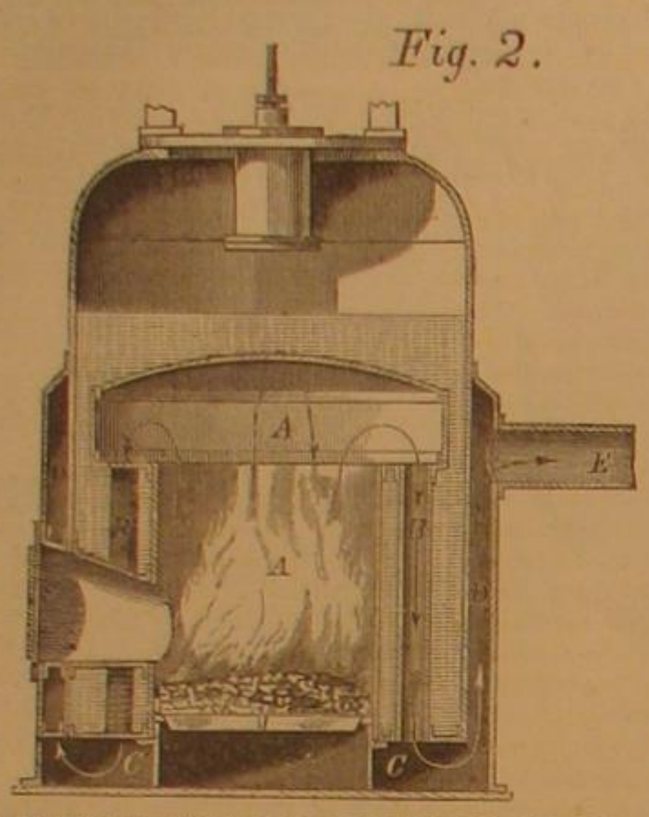
The valve, F, has a sleeve, G, attached to it, which plays vertically through a stuffing box in the bed plate, H. This sleeve with the main valve, F, is driven by the eccentric, I. Through the sleeve, G, plays a connecting rod, J, which works the cut-off valve, K. The rod, J, is attached to a piston, L, Fig. 4, which plays in an oil cylinder, M. The spaces on either side of the piston, L, communicate with each other through a port, N, in the wall of the oil cylinder. The oil cylinder, M, is further connected by the rod, O, with the eccentric, P, Fig. 3, which imparts motion to M, and through it to the piston, L, the rod, J, and the cut-off valve, K.

The cylinder, M, is filled with oil, which, when the port, N, is fully opened, is transferred from one side of the piston, L, to the other at each stroke, so that the latter will move the cut-off valve, only when it reaches the top or bottom of M; but when this port is partially cut off by the screw valve, S, Figs. 1 and 4, so that the power required to force the oil through the port is greater than that required to move the cut-off valve, K, the latter moves before the oil in M has been all passed through the port, N, and the steam may thus be cut off at any part of the stroke, by the proper adjustment of the screw valve, S. The action of this cut-off is so delicate that the slightest turning of S affects the movement of the engine, which may be as readily stopped by the closing of the port, N, as by shutting the throttle valve, since the closing of this port makes the cut-off valve cover either port in the principal valve, F, at precisely the time when it otherwise would begin to admit steam to the cylinder.

Whenever also the motion of the engine has a tendency to accelerate by the sudden throwing off of belts or any other cause, the oil cylinder, M, and its piston act as a governor, since any acceleration of the crank shaft is at once communicated through the eccentric, P, Fig. 3, to the cylinder, M, and as the power required to force a given quantity of oil through the port, N, increases relatively to the velocity with which it is moved, the piston, L, is moved more rapidly than before the acceleration, and cuts off steam sooner.

The valves are held to their seats by the simple pressure of the steam in the boiler, as shown in Fig. 3.

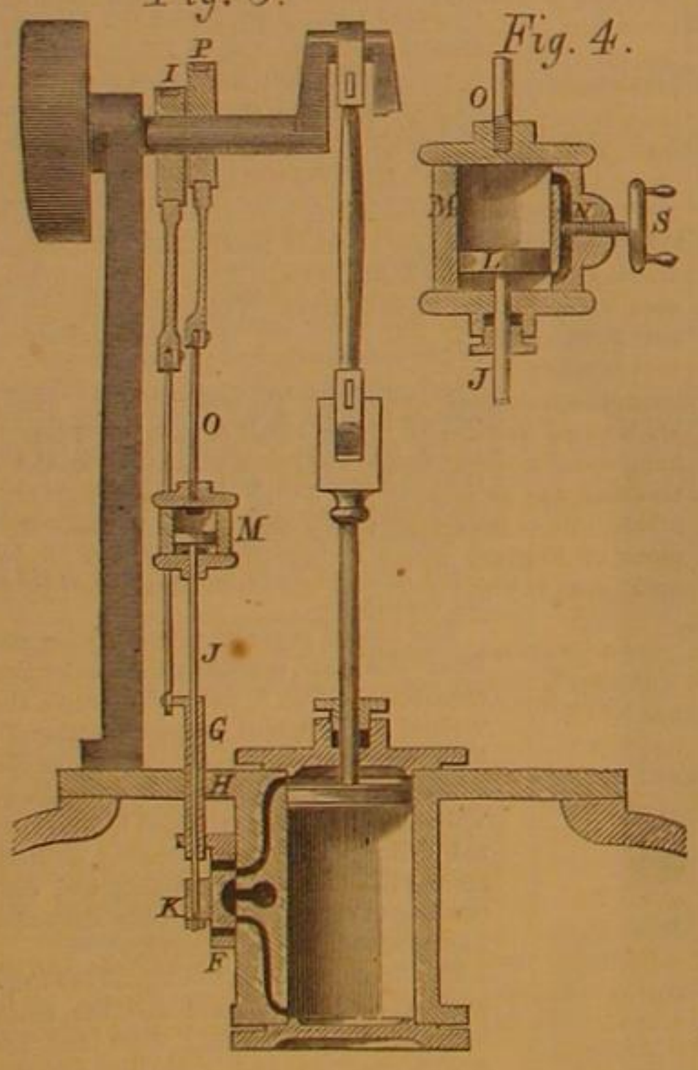
Fig. 2.



VERTICAL SECTION OF STEAM GENERATOR.

Fig. 3.

Fig. 4.



ELEVATION OF WORKING PARTS OF THE ENGINE.

The arrangement of the parts gives a very compact and neat appearance to the engine; and the construction of the boiler, together with the immersion of the cylinder in steam of the same temperature as that which enters it, enables the inventor to use the method of expansion to great advantage. The result is a very economical use of fuel. We are informed that an engine cutting off at quarter stroke, and driving machinery to the extent of 4-horse power, consumes only 80 lbs. of anthracite coal per working day of 10 hours, a result sufficiently remarkable, but which is well attested.

The patent on the steam generator was granted Oct. 27, 1868, but a reissue bearing date April 20, 1869, has been obtained. The patent on the improvement in steam engine valve was also granted Oct. 27, 1868, and reissued April 13, 1869. Communications may be addressed "Baxter Wrench Co.," Nos. 23, 25, and 27, Lawrence street, Newark, N. J., where this engine may be seen.

BEET ROOT SUGAR.

No. XI.

TECHNOLOGY.—PART VIII.

CONCLUSION.

WATER SUPPLY.

One of the most important considerations in the choice of a suitable location for a beet root sugar establishment is an abundance of water during the whole period of manufacturing sugar from the beet.

In a factory for the working of 150,000 lbs. of beets the quantity per hour needed, we have computed as follows:

	Pounds.
For the supply of the steam generators	3,000
Washing and pulping	6,000
Defecation	1,000
Milk of lime	100
Filtration	4,000
Bone black washing	6,000
Concentration of juice	73,190
Boiling	19,900
Total per hour	113,190

or 1,882 cubic feet.

This is equal to a delivery of 32·5 lbs. per second, or about half a cubic foot.

In practice, it would be safe to reckon on thirty per cent more than the quantity as here stated.

LABOR AND GENERAL ESTIMATES.

With perhaps the exception of two or three men, no "skilled" labor is required in new beet root sugar works, as most of the operations are of a simple, mechanical nature, which is easily taught to the "greenest" country hands, by a competent superintendent and his overseers.

The only skilled hands really needed are an engineer, an hydraulic pump man, a defecator, a sugar boiler, and a bone black burner. Of these, the defecator and sugar boiler it would be best to import from Europe, as the best "sugar refiner," accustomed to cane sirups alone, would not understand the practical difficulties incident to important minutiæ in the special treatment of the juice of the beet.

We here give a general estimate of the cost of labor for a 150,000 per diem factory on the basis of one dollar per shift; of which two take place every 24 hours, the work being continuous day and night.

We have added as a separate item the necessary additions to be made for the extra salaries to be paid to specialists in the various departments. Our calculation is based on a campaign of 100 working days.

I.—WASHING AND PULPING.	
Transportation and washing of the beets. 14 men, 2 shifts per 24 hours, is 2,800 days labor at $1	$2,800
Press department, 28 men, 2 shifts per 24 hours, is 5,600 days at $1	5,600
Sack washing and darning, 8 women, 2 shifts, is 1,600 days at $1	1,600
II.—DEFECATION.	
8 men per 24 hours is 800 days labor at $1	800
III.—SCUMS.	
6 men per 24 hours is 600 days at $1	600
IV.—CARBONATATION.	
250 days at $1	250
Monte-jus	200
Carbonic acid (preparation of)	200
V.—FILTRATION.	
3 men every 24 hours at $1	300
VI.—CONCENTRATION.	
2 men every 24 hours	400
VII.—BOILING.	
2 men every 24 hours	400
VIII.—CRYSTALLIZATION AND CENTRIFUGALS.	
1,500 days labor	1,500
IX.—GENERATION OF STEAM.	
2 shifts of 3 men is 600 days at $1	600
X.—BREAKING AND PACKING.	
5 men per day	500
XI.—MEN IN THE YARDS, ETC.	500
XII.—MANAGEMENT.	
1 general superintendent and 2 overseers	4,000
Bookkeeper and clerk	1,600
XIII.—EXTRAS.	
Carpenter, plumber, smith (3 months)	1,500
Extra pay to skilled laborers	2,500
General total of cost of labor for one year's campaign, in currency	25,850

The quantity of coal consumed by such an establishment as we have described would average 600 tuns, which at $6 per tun would cost $3,600.

The bone black, 30,000 lbs., would cost for the first outlay, at 5 cents per lb., $1,500, but in succeeding years would only amount to replacing of waste

The lime used would amount to 4,500 bushels, and cost about $1,400.

The cost of 15,000,000 lbs. of beet roots to be worked up into sugar would, at $3 per tun, be $22,500.

ANNUAL EXPENSES.

Summing up the above, we calculate that the yearly expenses will amount to:

Labor	$25,850
Coal	3,600
Bone black (waste)	500
Lime	1,400
Purchase of beet roots	22,500
Adding 20 per cent for incidentals	10,370
We have a total of	$64,420
To which has to be added taxes and insurance, which we have computed at	1,945
Interest on capital invested, at 7 per cent	4,793
Making a grand total of	$71,158

FIRST COSTS.

The first outlay for the establishment of machinery, buildings, etc., may be summed up as follows:

Production of steam	$4,480
Washing and pulping	7,274
Defecation	1,420
Scums	640
Sacks, trays, sack washing	3,110
Carbonatation	3,050
Filtration	2,2·0
Evaporation of juice	10,070
Crystallization and turbines	3,550
Bone black department	1,770
Pipes and cocks	3,000
Packing and unpacking	2,000
Tubs and tanks	200
Brickwork	2,500
Sundries and tools	2,000
Freight on 200 tuns of machinery	1,200
Total, in gold	$49,124
In currency at gold 1·35 it would be	$66,317·40

Adding $10,000 for the erection of the works, and $1,500 for first cost of bone black, we have the sum of $77,817·40 needed for the first establishment in the United States of a manufactory of sugar from beet roots for the produce grown on 500 acres of ground, and which ought to produce at least 1,200,000 lbs. of raw sugar.

REALIZATION.

The products to be realized in our example of a sugar manufactory would be as follows:

Sugar from 15,000,000 lbs. beets, at 8 per cent of sugar, and sugar sold at 12 cents per lb	$144,000
2,700,000 lbs. pulp, calculated at 1 cent per lb	2,700
5,000 gallons molasses at 40° Baume at 25 cents per gallon	1,250
Residues, as fertilizers	1,000
Total	$148,950
Deducting annual expenses and interest as above	71,158
Leaves net annual profit of	77,792

We have every reason to believe that, with careful management, the quantity of sugar obtained in the United States will range as high as 10 per cent instead of 8 per cent, which we have taken as our basis.

In such a case the net income would be $184,900, and the net annual profit $113,742.

No good reason can be assigned why a branch of industry, which, in Europe (although exorbitantly taxed by internal revenue), is considered one of the most profitable investments, should not succeed and prosper in this country, where no tax is levied on beet root sugar, where it is protected by the tariff, and where all other conditions are favorable to its development.

We ought to make ourselves self-supporting in the matter of our sugar supply.

In this case, money-making and independence from foreign supply would be sure to go hand in hand, and the producer and consumer both gainers by it.

We now conclude our long series of articles on beet root sugar. We shall regret neither the space they have occupied in our paper nor the labor we have bestowed on them, if they prove to be the means of stimulating the establishment on a firm basis in the United States of a most important branch of agricultural industry, which must eventually assume an enormous extent on this continent, and which may, before many years, drive foreign sugar from our market.

Oil among the Ancients.

The ancients knew no method of refining oil. As a great luxury they mixed it with perfumes, such as essence of roses and sandal-wood; but this rather detracted from, than added to the burning properties of the liquid, and all that was obtained by the process was an increase of fragrance and a diminution of light. The dwellings of wealthy men like Verres, Mæcenas, and Lucullus, who expended extravagant sums upon scented oils, would not have borne comparison, in point of lighting, with the grimiest tap-room of a gas-lit public house. The gold and silver lamps, hung by slender well-wrought chains to marble pilasters, only yielded at their best a lurid tapering flame, that gave out an enormous deal of smoke, fluttered in the slightest breeze, and went out altogether at a gust of wind. Neither was it possible to steady the light by closing the apertures through which the air came; for, had Roman or Grecian houses been possessed of glass windows, they would soon have become uninhabitable. The fresco paintings of Pompeian villas, the delicate colors on the walls of urban palaces, would, in less than a month, have been hopelessly coated with lamp soot. At the end of an hour's conference of an evening, a party of noble Romans would have resembled a congregation of chimney sweeps. A tunic dyed in Tyrian purple would have acquired a mourning hue in no time.

ROLLING MILL GEARING.

The heaviest cog-wheels in the world—always excepting Mr. Isherwood's screw steamships—are to be found in iron rolling mills. Nothing at all resembling this gear is to be discovered in flour or cotton mills, or in any other situation on land where steam power is employed. Spur-wheels 18 ft. to 25 ft. in diameter, 24 in. wide on the face, and 8 in. or 9 in. pitch, are not uncommon; while pitches of 6 in. and widths of 18 in. and 20 in. may be met with in almost any little rolling mill we can enter. The quantity of gearing employed in driving an ordinary rail or forge train is even more remarkable than its dimensions. First, we have a tremendous spur-wheel on the engine shaft, working into a pinion on the fly-wheel shaft, which gears again into a spur-wheel, on the shaft of which is a square end to take the coupling-box and breaking-spindle to the rolls. We have, in this arrangement, three spur-wheels and six bearings, all of the largest and heaviest class; and this, be it observed, is rather a simple mill than otherwise. When a hammer, a shears, and a second train have to be driven, we generally find as much gearing as would fill a good-sized modern dwelling-house, running at a high velocity, for the most part badly put to work, and, therefore, noisy and liable to accident. It is not too much to say, in fine, that at least one-half of the whole power developed is expended in keeping this gearing in motion; while its first cost represents one-half the capital invested in the plant of any iron mill.

It is worth while, under such circumstances, to consider whether gearing may or may not be dispensed with; and whether we can or cannot improve upon arrangements admittedly objectionable if tested by comparison with other mills. In dealing with the subject, we must first ascertain why gearing is used at all. This point is soon settled. The velocity at which ordinary trains run varies between 40 revolutions per minute for sheet mills and 100 revolutions per minute for bar or rail mills. Higher and lower velocities are met with, no doubt, but the two which we have named are those most usually adopted, and all that we shall say on this subject just now, will be sufficiently illustrated by cases afforded by those two speeds. Now the work to be done in rolling iron is excessively variable, and it is, therefore, necessary to employ great fly-wheel power, in order to store up force at one time, sufficient to carry the bar, rail, or sheet, through the rolls at another. Without going into mathematics, we may state here that the force afforded by any fly wheel for overcoming the resistance offered to the rolls of a train, varies as the square of the number of revolutions, the weights being the same. Thus, a fly wheel running at 80 revolutions per minute, would be practically four times as efficient as one similar in all respects, and running at 40 revolutions. Therefore, it has come to be looked on as an axiom by rolling mill engineers, that the fly wheel cannot be run too fast. As a consequence, in old works, we always find it put on a second-motion shaft, never on the engine shaft. In the endeavor to obtain high fly wheel speed, we find the first cause for the introduction of gearing in rolling mills.

The second reason lies in the fact that until a few years back, slow moving engines of great size were alone employed to drive sheet and rail trains. These engines had a long stroke, and ran at but eighteen or twenty revolutions per minute. This being too slow for any but blooming rolls, gearing became a necessity. The enormous dimension usually imparted to rolling mill gearing, is explained by the fact that it is exposed to many shocks and jerks which are peculiar to the work which it performs, and that for the most part it is roughly and cheaply made, and carelessly put together. We have, we believe, given in the foregoing paragraphs, every valid reason which can be alleged in favor of the use of clumsy, heavy, costly gearing in rolling mills. It remains to be seen whether these reasons are or are not incontrovertible.

Taking the last phase of the question first, we may state that during the last few years better materials, better proportions, and superior workmanship have been introduced by many makers, such as Claridge, North & Co., and others, with a view to keep down the weight of mill gearing, and with much success, especially in Staffordshire; and it is, beyond question that still more may be done in this direction. But it is quite in another way that we must look for radical improvement. We must begin at the fountain head, and instead of heavy, lumbering, slow working engines, resort to the use of machines making a fair number of revolutions without an excessive piston speed. A good deal has already been done in this direction, we are happy to say. At Woolwich arsenal the splendid bar mill is driven direct at some 60 revolutions per minute by a horizontal engine. In this case power is stored up in one of the finest fly wheels in England, weighing 50 tuns. The sheet train of the Warrington Wire Iron Company is driven direct by an engine fitted with a 60-tun fly wheel. These great weights are rendered necessary by the comparatively slow speed of the trains. When velocities of 100 revolutions are attained a 20-tun wheel will answer every purpose. As an illustration we may cite the Pendleton works, near Manchester, where a 16-in. rail mill is driven direct at 100 revolutions per minute, by a horizontal engine with a 26-in. cylinder and 4 ft. 6 in. stroke. This engine has been running constantly for the last fifteen years, with few or no repairs. The advantage of this system cannot be over-estimated. The cost of a great mass of heavy gearing is saved; the price of the engine is not nearly that of a larger and slower running machine; the chances of breakdowns are reduced to a minimum; and the expense of repairs, wear and tear, and lubrication, is obviously very greatly diminished.

When, as in sheet mills, the rolls run too slowly to permit the engine to be coupled direct to them with advantage, the best plan will still be to use a small engine, running at some 70 or 80 revolutions per minute, and carrying on its shaft a spur-pinion gearing into a spur-wheel on a second-motion shaft driving the rolls direct; we thus retain a high velocity in the fly-wheel and a cheap engine, although some of the disadvantages connected with the use of gearing, unavoidably remain.

The gearing at present usually employed in reversing mills consists of no fewer than five huge spur-wheels and pinions, beside the clutch-boxes. The entire arrangement is simply a barbarous relic of the past. Reversing mills should be driven by small, high-speed coupled engines, without fly wheels, and fitted with a link motion. The first cost is not greater than that of the normal arrangement, while the waste of power and the chances of derangement are greatly reduced. Those who wish to realize what can be done in this direction, should see for themselves engines and mills designed by Mr. Ramsbottom for Crewe, and others manufactured by Messrs. Tennant, Walker & Co., of Leeds, for America.

The above is from the *Engineer*. There are many mills in this country to which these criticisms apply. But the greater number of our *rail* mills have engines coupled directly to the trains—vertical engines, too, which take up the least room. And, for work no heavier than rails, our three high mill is a vast improvement on the reversing mill. Indeed, with proper lifting gear, it is probably better for the heaviest work, such as 15 in. beams. In some of the new English rail mills, two or even four trains are connected to a single engine by no end of cog-wheels.

We can copy the English practice with advantage in many cases; but in the matter of rail mills, our neighbors should study our practice, for instance at Reading, where they would see three 23-inch 3-high trains, driven each by its own direct vertical engine, at 60 to 80 revolutions; at Harrisburg, where a 40 in. by 60 in. direct vertical engine drives a 24-in. 3-high *steel* train, four rolls long, at 60 revolutions; and at Johnstown, where a similar engine, with a 60-tun fly wheel, drives, direct, a 21 in. puddle train five rolls long, and two squeezers. —*Van Nostrand's Engineering Magazine.*

Relative Merits of Wire Ropes and Chains for Hoisting Ores.

Mr. Warrington Smith, in his lectures at the Royal School of Mines, in London, thus discusses the relative merits of wire ropes, hempen ropes, and chains for hoisting ores: "As regards size and strength, these vary considerably. When only manual labor is employed, and the weight lifted is, perhaps, not more than 1 cwt., a very light chain or rope would do, but when we come to steam power, and have to lift several tuns at once from great depths, as in the north of England collieries and iron mines, the rope must be of extraordinary strength. The ordinary rope of three strands was used for many centuries, until a practice grew up in the deeper mines of employing flat ropes, which were found to go down and up in an even plane, and more steadily than round ropes, which are constantly twisting about. In 1830, in the Hartz mines, the question of the amount of money swallowed up in the wear and tear of ropes came under discussion, and it was proposed to make the rope of iron wire, which was then largely tried not only there, but in other parts of Europe, although at first there was great prejudice felt by the men against it. They like a good thick rope, which was very natural, for in travelling up and down these great depths men did not fancy trusting their lives to a little rope not thicker than their thumbs. They were, however, found to be consistent with great economy. They were made of three strands, with a very slight amount of twist, each strand containing a greater or less number of wires. After a while the ropes were made round, with a hempen core, but as in use they were found to have a great deal of torsion, beside not wearing well, in consequence of their not being well looked after and cared for in passing through the shafts, and thus the wire became apt to break, so that you might often see a rope with pieces of wire projecting from it. Whenever this was seen it became high time either to condemn the rope altogether as useless, or to have the shaft examined at the places where it came into contact with the rope, to prevent further damage. In collieries the ropes are carefully protected from coming into contact with the side, and they last very well. The advantages of wire are very considerable. The prime cost is not much less, but a given weight of wire-rope will support a much greater burden than a hempen rope will, so that when an engine is taxed to the utmost, and can only raise a small amount of mineral, the adoption of wire rope would enable it to raise more. Another substance used for ropes, with a considerable advantage, is the fiber of the American aloe, used largely in France and Belgium. At the Grand Hornu some observations were made in order to test its usefulness. At one of the shafts there (No. 8), 355 meters deep, where four tubs are raised at a time, the rope is flat, made of aloe, and consists of six ropes, of three strands each, bound together; this did excellent work, and compared favorably in durability and efficiency with ropes made of other materials. It is usual to make the ropes taper, because the lower end has the weight to sustain all through the operation, while the upper part passes round a drum, and so has a less proportion of weight to sustain.

Chains are frequently employed, and in metalliferous mines perhaps more than anything else. They are mostly single-linked chains, and differ considerably in weight per fathom. In collieries they are largely employed, even to a depth of 450 yards, and the men are lowered to and from their work by this means. It is, however, a dangerous thing to trust men's lives to a single-linked chain, as a flaw in the iron or a bad joint might produce the most fatal consequences, and of late the practice has been very much discontinued, except, perhaps, in the Cornish mines, although it is not uncommon for tolerably new chains to break in a sudden and unexpected manner. Chains are very useful in metalliferous mines, because they may be easily twisted and turned round sharp corners, which is not the case with ropes, which, when large and strong, have a great amount of rigidity. If chains are used they ought to be made of the best charcoal iron, no matter what the cost may be, and care should be taken that the maker is a careful man, and understands the nature of his work. A good chain-maker is a person who deserves high pay, because a great amount of responsibility rests on him. Chains, also, ought to be frequently overhauled, brought up out of the pit, well washed, and every link carefully examined, which, if it were done more frequently and more systematically, would keep down the number of accidents considerably. In some districts, to obviate the danger of sudden fractures, a compound instead of a single-link chain is used, and occasionally a stub of wood is driven through every alternate link to prevent kinks when it passes round the drum.

Although the wire rope has a great superiority over the ordinary hempen rope or chains, it requires to be used with great caution, for if it be turned over a barrel of too small a diameter, it will not last long, and may snap very suddenly. This makes it, as a rule, inapplicable to windlass works in metalliferous mining, or, indeed, in the coal fields, where the operations are preliminary, and only conducted for the purpose of searching. A wire rope never ought to be carried over a windlass or pulley of less than 3 ft. in diameter, and when the rope is of great strength, not less than 6 ft. This, therefore, puts the employment of wire-rope with a windlass quite out of the question, as no ordinary windlass has the requisite diameter. Where, however, special arrangements are made, and a drum of 3 ft. diameter is adopted, it may be used, and I could mention examples in which the wire rope has done good service under those circumstances. For instance, in Austria, at a certain pit, 47 fms. deep, where two drums were used, the smaller of which was 32 in., experiments were made, and without going into particulars as to time of filling, etc., the amount raised by one man in seven hours was 1,269,634 foot-lbs., or 3,141 per minute, by the second 1,175,411 foot-lbs., or 2,902 per minute, which, reduced to the usual standard, will give results considerably in excess of those laid down by most authors, and, as you will remember, of Professor Weisbach, who gives 2,448, and Mr. Walker, the late President of the Institute of Civil Engineers, who gives 2,640. Exceptionable kinds of windlasses are sometimes devised to meet peculiar circumstances; as, for instance, in the extraction of the brown coal obtained in the south of France they use windlasses at which four men can work at once. Perhaps, however, there is no nation which understands the use of the windlass better than Spain, as in the mountainous parts of their mining districts they have no water power available. Indeed, water has frequently to be carried by mules up to the mines for the use of the men. The amount of work performed by the windlass there is very large, the apparatus being contrived on a large scale, so as to employ four men in turning it. There is only one other exceptional kind of windlass that I need mention, and that is where in some foreign countries, in slate quarries, the drum is turned into a sort of treadwheel, with steps put on the side upon which men walk. The capstan is not much used, except in particular districts. Considering the great extent to which this apparatus is used, and the great attention paid to many of its details, it is rather wonderful that no better means have been devised for the safety of the men who are lowered and drawn up in these workings. Their lives hang upon a mere thread, and, to say nothing of the rope breaking, any accident to men at the windlass would let the kibble, tub, or bucket go with a run to the bottom. In the north of England, however, they do use a clevis or spring hook, so as to prevent the possibility of accidents of this kind.

A Valuable Scientific Museum Destroyed.

The St. Louis Academy of Science has recently suffered the loss by fire of its valuable collection of books, pamphlets, maps, etc. The museum contained six hundred specimens of marine shells, donated by the Smithsonian Institute, and was unusually rich in crania, skeletons of birds, and reptiles, together with Dr. Pope's mounted skeletons of mammals, purchased in Europe and transported at great expense; also about 1,200 specimens of minerals, embracing a full suit of Missouri minerals and ores. There were also an extensive collection of the bones and teeth of extinct animals, and fossil turtles collected from the Mauvais Terre, Dakota, by Prof. Hayden; also the collection of rocks, illustrating various geological periods, amounting to four or five hundred specimens, including those collected by Dr. Wizlizenus during Colonel Doniphan's expedition to New Mexico.

Beside the above, there were any quantity of Indian relics and curiosities, including a birch bark canoe; also the specimens of porcelain, collected from a porcelain tower blown up by the China rebels, and presented to the Academy by Lieut. Clarke, United States Navy. All were destroyed, a loss which is irreparable.

FREE TRADE.—It is believed by many of our most careful thinkers that the present unsatisfactory financial condition of the country grows chiefly out of our excessive foreign importations. At the present rate the imports for the year will exceed the exports by more than $100,000,000, which difference must be made up in coin or its equivalent. This seems to be a plain matter of fact, and one that all can understand. Our present tariff, although rating very high, brings us in debt to foreign nations a hundred millions per annum. Now what would be the effect if we should adopt the principle of free trade? It seems to us that our country would soon be filled with foreign goods at prices far below the cost of their production here. Result—prostrate manufacture, idle hands, dull market towns, poor farmers, and a general stagnation. In other words, free trade means destruction to home industry.

THE LEVERING PATENT DESK.

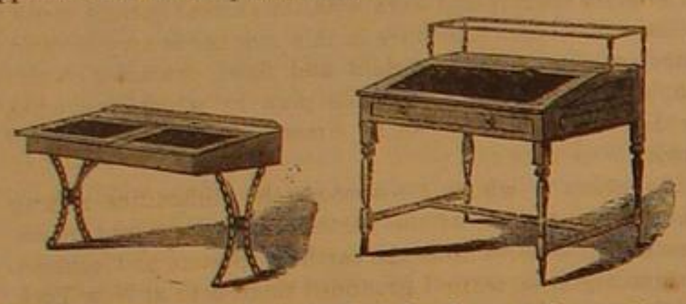
One of the characteristics of the present age, is the constant effort to improve the articles in daily use in our dwellings and offices, and to add to our household conveniences and facilities for the transaction of business. The writing desk has received its full share of attention from inventors, but the idea of rendering its upper surface a means of something more than mere support for documents, and a plane on which to write, seems to have been heretofore somewhat overlooked.

The object of this invention is to combine the advantages of the smooth top with those of a surface which will, at the same time, answer the purpose of a slate or blackboard, on which temporary writing and figuring may be performed with the ordinary crayon or slate pencil.

The feature of this invention which has been made the subject of patent, is the adaptation of a slate surface to the tops ot desks, for schools, counting rooms, or for any other purpose for which such desks may be desirable.

For schools the use of this desk obviates the breaking of slates and the expense of replacement, and what is a still more important consideration, obviates much of the noise in schoolrooms attending the use of loose slates, and the marring of the tops of ordinary desks by the attrition of slate frames.

The illustrations we give of different patterns of this desk, show them to be tasteful in design, and also exhibit fully the application of the improvement.



The composition used is equal in hardness and smoothness to the stone slate, while at the same time they retain figures better. The latter are however, readily removed by a damp cloth or sponge. These desks have been introduced into some counting rooms in this city, and we understand give good satisfaction.

In commercial schools and colleges, they would be of special service, as they can be used with great advantage in teaching writing and book-keeping. For mechanics who frequently wish to draw temporary plans they are also very useful.

Two patents have been obtained on this desk, and a reissue is now pending. The surface may be made of stone slate as well as composition, but the composition is more convenient to apply, and is considered superior in other respects.

Manufacturers and dealers in school and counting-house furniture would do well to give attention to this improvement. The inventor, Mr. W. W. Levering, may be addressed, at 35 and 37 Park Place, New York city, and he is ready to negotiate with parties desirous to obtain rights to manufacture.

Patent Office Affairs.

Commissioner Fisher has given his decision in the case of the Heck thread dressing patent, an extension of which was asked. The application was rejected on the ground that the invention was not new at the time the original patent was applied for, and that the patent should never have been issued.

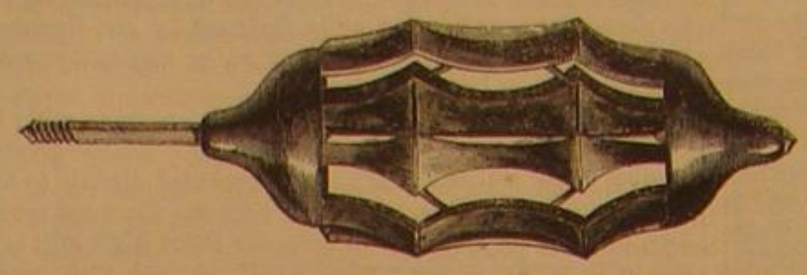
Extension have been granted in the following cases: Stevens, Crosby, and Pearson, of Boston, for a seed planter. Thomas J. Silsby, administrator of Arad Woodruff, of Boston, for improvement in machinery for spinning, and to Thomas J. Knapp, for an adjustable tenoning tool.

The senior member of the Board of Examiners-in-chief, Mr. Hodges, who acts as Commissioner in the absence of that officer, has heard the argument and given his decision upon the following application for extensions of patents: Jacob A. Connover, of New York, for a wood-splitting machine; George W. Brown, of Galesburg, Illinois, for a corn planter. Mr. Hodges in both cases granted the extensions prayed for. The Commissioner having been employed as counsel in lawsuits in which these parties were interested, left the office temporarily in the charge of Mr. Hodges, while these parties were before it. It was from parties interested in the latter case that the telegram was sent to Senator Trumbull to prevent Colonel Fisher's confirmation, stating that he was employed as counsel in five cases involving several millions of dollars.

F. W. Ritter has been promoted from a clerkship to Second Assistant Examiner, and assigned to Professor Hedrick's class of chemicals, and James Lupton, of Ohio, has been appointed second class clerk. Peter Nodine has been appointed machinist and superintendent of the model room, vice Cornelius Jacobs, removed.

PRATT'S ELASTIC BOILER-TUBE SCRAPER.

As the engineering public is gradually becoming educated to the realization of the economy of keeping boilers clean, a considerable number of devices have been patented to meet the demand for a good tool to clean out flues. Brushes have been tried, but the deposit which forms in flues needs something more powerful than them for its effectual removal. We last week illustrated an improved boiler flue scraper, and this week we lay before our readers a description and engraving of another device for the same purpose, the invention of Mr. E. L. Pratt, deceased, late of Beverly, Mass., a patent for which was granted to H. L. Pratt, administrator, May 11, 1869.



This scraper consists of two tapering heads, the broad parts of each facing the other, fixed upon a pipe or rod at a short distance from each other. The broad ends of the heads have mortise-like recesses formed in them, which receive the ends of the cutters; the mortises being large enough to admit considerable play of the cutters to and from the longitudinal axis of the instrument. Each of the cutters has two cutting edges at right angles with its longitudinal axis, so arranged that any part of the surface, omitted by the forward one, shall be scraped by the other. These are also contracted in the middle into a shape approximating the section of an hour-glass, so that all the soot falls into the central part of the instrument between the cutters, and is drawn out with it. The cutters are pressed out against the sides of the flues by elliptical plate springs, which also permit the scraper to enter and clean flues of various sizes. The cutters are to be made of chilled iron which will render them very durable. From the cutting edges of the cutters extend, toward each head, ribs which facilitate the entrance of the instrument; and they also have a central rib extending between the cutting edges, which facilitates the entering of the hinder cutting edges, while it is sufficiently depressed not to interfere in the least with their operation.

The scraper is so cheaply made that it is designed to furnish them for every diameter of tube, and in such case, the cutting edges are made to fit the curvature of the interior surface of the flue.

It is claimed that this scraper is cheaper, more durable, and effective than any form of wire brush.

Orders should be addressed to Miller's Falls Manufacturing Co., 87 Beekman st., New York city.

Improved Hose Pipe.

This hose pipe combines the solid jet, spreader, and stop cock, in one. It is so constructed that by simply turning, with the

BABBITT'S HOSE PIPE.

thumb and forefinger, the milled nut near the small end, the jet is either entirely checked or diffused in drops, as with the ordinary sprinkler, or fine like mist, so that the most delicate plant may be watered by it without injury.

It is simple and compact, and perfectly easy to operate. We have used one of these hose pipes and find it very satisfactory. For florists it is the very thing wanted. Arrangements have been made to supply hose dealers throughout the United States. For particulars address the patentee, F. S. Babbitt, Taunton, Mass.

How Granite is Affected by Fire.

There are few people having any connection with the building trade in this country but have an idea of the strength and durability of granite, its excellent qualities for the general purposes to which stone is adapted, rendering it of almost universal utility. Granite is composed of mica, quartz, and felspar, and its quality is easily discovered by the proportion and arrangement of these; but sometimes traces of other minerals are visible, and influence its density and color proportionately. Geologists accept it as an igneous rock, from the fact of its unstratified condition and the perfection of its crystals, which seem not to have been worn by friction as others are that are found in sedimentary formations. Another peculiarity that it possesses is the quality of indurating or hardening other bodies with which it comes in contact, and this renders it a superior stone for house-building purposes. It is well known that granite walls, if properly built, need no supplementary linings to make them damp-proof, and that mortar will adhere to them and "set" in a manner similar to that which it does when applied to brick. It must not be thought, however, that this peculiarity arises from either porosity or absorption, for experiments have proved that granite is as dense and impervious to moisture as any stone that we possess, except basalt, and consequently its indurating property must be the result of something else—probably, as far as mortar is concerned, of evaporation caused by the latent heat of the stone, such as all pyrogenous bodies are known to possess. But, to be more practical with the subject, we will refer to Wilkinson's experiments on the different varieties of building stone—experiments that were conducted with an amount of care and exactness that leaves little room for doubt as to the accuracy of their results. The average weight of granite he sets down as 170 lbs. per cubic foot, and the quantity of water that it absorbs by immersion about ¼ lb. per cubic foot. The weight of limestone per cubic foot andthe quantity of water that it absorbs, he sets down similarly.

Now, from this it is apparent that it is not by absorption that granite maintains dryness, but rather by some other influence that it exercises; for limestone and it being bulk for bulk of equal weights and equal absorbing tendencies, it might naturally be expected that their damp-resisting qualities would also be equal. Such is not the case, however; for while moisture is unnoticeable on the granite, it appears plentifully on the limestone, or exudes through the plaster in case it is covered, although both stones may be subjected to the same weather influences.

As a fire-resisting stone, granite ranks medium, and, like calp, the inferior qualities are the best adapted to this purpose. In many parts of Ireland where it can be obtained, and where bricks are not available, it is used for lining lime kilns—a requirement for which it has been found very suitable. It sometimes, too, supplies the place of fire lumps in the backing of kitchen grates and in lining ovens, and in such positions answers very well.

The harder descriptions yield soonest to the influence of fire, as they "break up" into more regular portions than the softer kind, which rather undergo a wasting process by disintegration.

It may be well here to observe that, unlike the generality of building stones, granite will hold together firmly, even though it may be severely fractured. The friction of its component parts, supplemented by the toughness of its mica, acts with a degree of power that requires the exertion of considerable force to effect separation, and this, although its cohesive properties are completely destroyed. The general fractures by fire are vertical, and in nearly all cases parallel to the face, but sometimes they traverse the face in different directions, the change chiefly depending on the quality of the stone and the direction of its mica.

The granite that we noticed in Messrs. Meade's concerns after the fire was the coping of the wall between their premises and the railway station. The stone is of medium quality. Its projection on that side in contact with the fire was carried off in a line with the face of the wall, but other than this it did not exhibit symptoms of yielding that could be called serious, although at times during the fire the flames completely enveloped it.

In Messrs. Barrington's concerns, too, in Kings'-Inns street, where a terrible fire occurred some years ago, the granite piers and copings withstood the intensity of the heat without sustaining injury beyond the chipping of some projections, and the injury here, as in the former case, we believe to be the result of a reaction, caused by the water coming in contact with the intensely-heated stones. The opinion on this matter is strongly supported by the fact that in the lining of lime kilns, where granite is submitted to violent heat for considerable periods, it exhibits tolerably fair resisting qualities, never yielding in mass, and but slowly by disintegration.

We, therefore, look upon it as a material that may with safety be used in structures intended for fire-proof purposes. —*Irish Builder.*

W. W. Corcoran, a retired banker, has conveyed to a Board of Trustees, the Corcoran Art Building in Washington, to be held in perpetuity as a free picture gallery. The property is a very valuable one, and Mr. Corcoran proposes to endow the gallery with a cash gift of three hundred thousand dollars. August Belmont, of this city, is going to give a dozen of the most valuable pictures from his private collection as his contribution. Mr. Corcoran's gift aggregates something like one million dollars, and places him among those to be forever spoken of as great public benefactors. It is a noble thing, and, if the money is judiciously expended, the collection will become a source of deep interest and instruction to all classes of our citizens who are able to see it.

SKINNING AND STUFFING OF SMALL QUADRUPEDS.

In a recent article we gave directions for the skinning and stuffing of birds. We will now supplement those directions with information necessary to enable the amateur to skin, stuff, and mount small quadrupeds.

The directions for stopping the flow of blood, etc., are to be observed as with birds, but it is advisable to thrust cotton into the nostrils, mouth, and vents of small quadrupeds to prevent the efflux of any discharge which is likely to occur, particularly if the animal has been feeding freely not long before it was shot. As fine shot should be used as is consistent with success in the hunting of such animals, for reasons which are obvious.

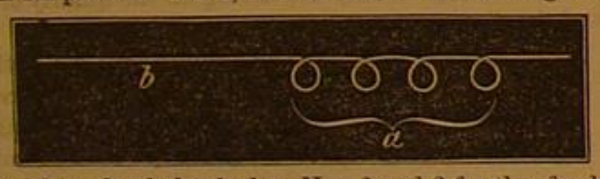
The skinning is begun by making a longitudinal incision between the hind legs, extending quite back to the vent, the hair having previously been carefully parted so that it may not be cut. Care should be taken to only cut through the skin, and not cut into the abdominal cavity. The skin can now be separated from the flesh and turned back as far as the thigh, which is now severed at the joint. When this is done on both sides, the gut should be drawn out and severed a short distance from the vent. The tail should also be disjointed at the root. This being done, the skin can be loosened around the body until the fore legs are reached, when they should also be dissevered. The skinning now proceeds along the neck till the skull is reached. Here considerable care is necessary to remove the skin without damage to ears, eyelids, and lips. The skin is left attached to the skull after the skinning has proceeded far enough to expose the muscles of the jaws, and must be separated from the body at the first joint of the neck. The tongue, eyes, and muscles remaining attached to the head, are now to be carefully removed, and the brain taken out from an opening in the back of the skull cut through for that purpose. To make this opening amateurs can use a small gimlet or bit, with very small animals and a larger one as circumstances may demand. The legs are now to be skinned out quite down to the claws, which completes the operation of skinning.

During the entire process all fluids escaping must be immediately soaked up with cotton. As soon as the skin is removed it should be thoroughly rubbed with arsenical soap, not omitting the inside of the skull and the mouth cavities.

The method of stuffing is conducted on similar principles to that described for birds, but there is rather more difficulty in replacing the facial muscles. For this purpose a pair of slender-jawed pliers will be found very convenient.

We copy verbatim from the *American Naturalist*, the following directions for mounting the skin of a small animal like a squirrel.

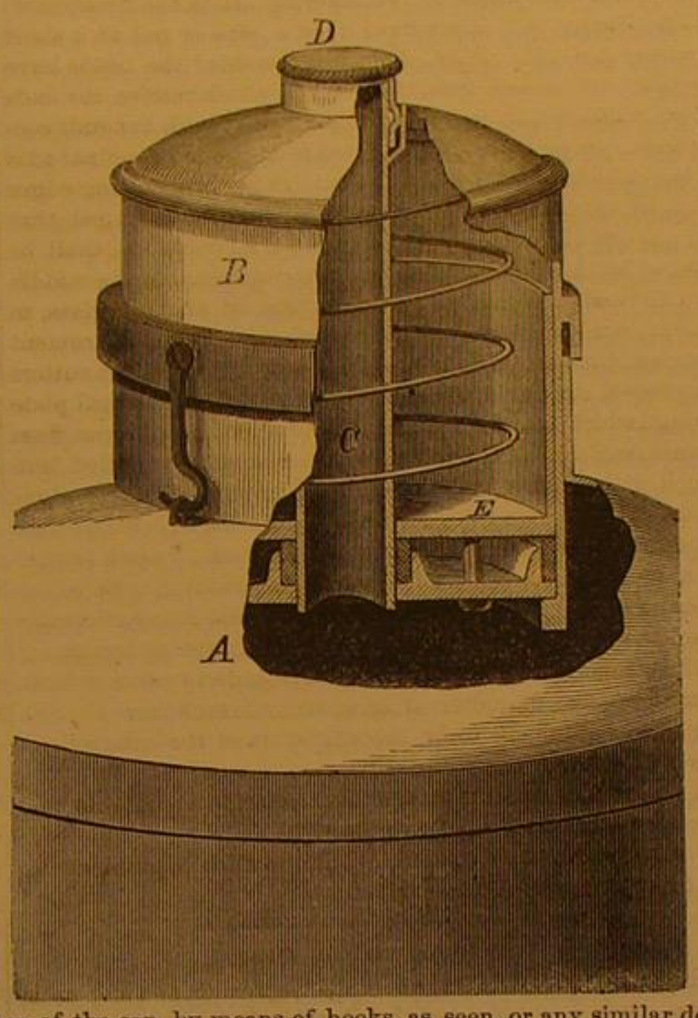
"Provide yourself with cotton, thread, and twine; also the stuffing forceps, a pair of pincers, file, and wire cutters. With the aid of the forceps supply the various muscles of the face and head, by inserting cotton both through the mouth and eyelids. Take annealed wire of the proper size, and cut from the coil six pieces: No. 1, two or three inches longer than



the total length of the body; Nos. 2 and 3 for the forelegs; Nos. 4 and 5 for the hind legs; each of these should be two, or even three inches longer than the limbs they are to support; No. 6, for a support to the tail, of the same proportionate length as the others. With a large pair of scissors, cut fine a quantity of tow, and with this, and the aid of the long forceps, stuff the neck to its natural dimensions. Taking wire No. 1, bend in it four small rings, the distance between the two outer representing the length of the body taken from the skin, *a*, leaving one long end for a support to the head and neck, *b*. Mold tow about that part containing the rings, and by winding it down with thread, form an artificial body, resembling in form and size the natural one taken from the skin. Sharpen the projecting end to a fine point with the file, and insert it up through the cut tow in the neck, and thence through the skull; the skin should then be pulled over the body. Wires, Nos. 2 and 3, should then be placed in position, by inserting them through the soles of the feet, up within the skin of the leg, and through the body of tow, until they appear upon the opposite side. With the pincers bend over the end of each, forming a hook; the wires must then be pulled backwards, thus fastening the hooks firmly into the body. The loose skin of the limbs should then be stuffed with cut tow, taking care to imitate the muscles of the living subject. Nos. 4 and 5 can be fixed in position after the same manner, unless the animal is to rest entirely upon its tarsi (as in the case with the squirrel when feeding), then the wire must be inserted at the tarsal joint instead of the sole of the foot. If any depressions appear in the skin they must be stuffed out with the cut tow. Wire No. 6 should now be inserted at the tip of the tail, and forced down within the skin, hooking it into the body in the same manner as the leg wires. Stuff the tail to its proper dimensions with cut tow, and carefully sew up the incision along the abdomen. Having prepared a board about three-quarters of an inch thick, pierce in it two holes at a proper distance apart for the reception of the leg wires (four holes would be needed if the animal were to stand upon all extremities), these must be drawn through upon the under side until the feet of the specimen rest close upon the upper surface, then they should be clinched, taking care that the wire does not protrude above the surface of the board as it renders the support unsteady. The different joints of the limbs can now be imitated by bending the wire at the proper points; also, a curve can be given to the back, and the tail can be set into proper position by simply bending the wires into the required shape. The eyes should now be placed in their position, a little putty having been previously inserted within the eyelid to serve as a cement. Care should be taken in arranging the eyelid, for the expression depends altogether upon this point. Clip off any superfluous wire which may extend above the head with the wire cutters. The specimen should be placed in some locality free from moisture and allowed to dry thoroughly, when it is complete for the cabinet."

BURGHARDT'S IMPROVED MILK CAN STOPPLE.

In the transportation of milk to market and its delivery to consumers, much of it is badly injured, especially in hot weather, by the breaking of the butter vesicles, so that the fluid is in an intermediate state between pure fresh milk and butter. This is occasioned by the jolting to which it is subjected, an operation analogous to churning. It is evident, therefore, if the milk can be kept motionless it would be as fresh at the end of its journey as when first put into the can. In the device herewith illustrated this is very ingeneously accomplished. In place of the usual stopple, or cover, there is put on the can, A, a cylindrical cap, B, that is secured to the



top of the can by means of hooks, as seen, or any similar device, a joint being made by a rubber ring seated in the cylinder. In the center of the cap is a tube, C, closed at the top by a cap, D, fastened with snugs and inclined channels similar to the method for securing the lamp in an ordinary lantern. This tube is open at the ends, forming direct communication with the interior of the can. A piston, E, fits closely the interior of the cylinder and the exterior of the pipe and is kept down by a spiral spring inside the cylinder.

When the can is filled, the cylinder is secured to the can and then milk enough poured into the tube, C, to fill it to the top. The bottom of the piston bears on the surface of the milk and the spring resists the tendency of the milk, when jolted to move. The utility of the improvement is evident.

Patent pending through the Scientific American Patent Agency. Further particulars may be obtained by addressing J. M. Burghardt, Great Barrington, Mass.

Patent Office Decisions.

Commissioner Fisher has given his decision in the interference case between the applications of S. M. Clark, late of the printing division of the Treasury, and A. C. Fletcher, of New York city. The only question to be decided was that of priority of invention, both of the parties having invented a self-canceling stamp, and, so far as any evidence is shown, without any knowledge of the other's labors.

He has also given his opinion in the interference case of White and Purdy for a box opener, giving the patent to White. In this case two neighbors claim to be the original inventors of the same tool.

Arguments on the celebrated Harmann and Gilmore millstone dressing machine interference case was heard on Tuesday, the 18th of May. This is a very interesting case, and has excited considerable attention from inventors and others interested in patents; not so much on account of the direct interest as upon the side issues incidentally involved.

In 1863, or thereabout, John T. Gilmore, of Painesville, Ohio, obtained a patent for his machine, but did not push its introduction to any great extent. In 1867, one Gooley applied for and obtained through some oversight of the office a patent for precisely the same thing. The patent, upon coming before the courts, was set aside by Judge Olin, a year or two since.

Before the issue was made, Gooley had sold his patent to a gentleman from London for $130,000, and $40,000 had been paid upon it. In order to make himself whole in the matter this gentleman induced Hermann, a Frenchman, to apply for a patent in this country for his French patent taken out in France in 1854. Some changes were made in the machine, and in its new form it was submitted to the Office for a patent. An interference was declared, and the case came before Commissioner Fisher upon a question of priority of invention, and a claim that the machine patented by Harmann and that by Gilmore were unlike. Without closely scrutinizing the other questions, the Commissioner rejected the application of Harmann on the ground that his invention was in "public and common use" in this country prior to his application for a patent from the United States.

Upon the appeal of S. W. Adwen, of Rochester, N. Y., who applied for a patent for a mode of baling hay and straw, Commissioner Fisher has reversed the decision of the Board of Examiners, and ordered a patent to be issued.

Telegraph Lines and the Aurora Borealis.

Mr. George B. Prescott, well-known as an electrician and author of valuable works on the telegraph, makes the following interesting explanation of a phenomenon noted in the case of the recent auroral display:

"On the evening of the 15th of April a magnetic storm of unusual force prevailed over the entire northern section of the country, which so seriously affected the operation of the wires that, on some circuits, they could only be worked by taking off the batteries and employing the auroral current instead. The effect of this great disturbance of the earth's magnetism was manifested with particular power upon the wires between New York and Boston, and for several hours the lines upon this route depended entirely upon this abnormal power for their working current. During the prevalence of this storm, however, I operated upon two wires between the above cities by a plan which rendered them as free from the effects of these earth currents as a local circuit.

Every one has observed that the auroral current comes in waves of ever-changing polarity, corresponding in length and direction with the scintillations of the visible aurora. Sometimes these waves continue but a few seconds, and sometimes for a longer time, but their constant change of polarity prevents the successful operation of a wire, because at one moment the auroral wave may augment the strength of current on the line, while at the next it entirely neutralizes it. Therefore, it has frequently been found advisable to remove the batteries entirely and work with the auroral current alone. But the operation of the lines in this manner is very unsatisfactory, owing to the uncertain and fitful character of this force; and, therefore, any feasible plan by which the wires may be worked under such circumstances is worthy of adoption.

"The plan by which I overcome the difficulties arising from the disturbance of the earth's magnetism was by disconnecting two wires from the earth at Boston, and connecting them together, while I grounded them both at New York, thus forming a loop extending from New York to Boston. As the two wires were both upon the same supports, the auroral wave traveled over each in the same direction, and, by uniting the two wires at one end, the auroral influence upon one wire was made to neutralize that upon the other, and thus the wires were left entirely free.

"Of course it makes no difference how often the polarity of the auroral current changes, or how much the strength of this current may vary, since the direction of the current, and its strength, change as much upon one wire as the other, and therefore the current upon one always exactly equals and neutralizes the other."

Recipes for Colored Potters' Glazings.

WHITE GLAZING.—Prepare an intimate mixture of four parts of massicot, two parts of tin ashes, three fragments of crystal glass, and one-half part of sea salt. The mixture is suffered to melt in earthen-ware vessels, when the liquid flux may be made use of.

YELLOW GLAZING.—Take equal parts of massicot, red lead, and sulphuret of antimony. Calcine the mixture and reduce it again to powder, add then two parts of pure sand, and one and a-half parts of salt. Melt the whole.

GREEN GLAZING.—Two parts of sand, three parts massicot, one part of salt and copper scales, according to the shade to be produced. The mixture is melted as directed above.

VIOLET GLAZING.—One part of massicot, three parts of sand one of smalt, and one-eighth part of black oxide of manganese.

BLUE GLAZING.—White sand and massicot, equal parts, one-third part of blue smalt.

BLACK GLAZING.—Two parts of black oxide of manganese, one of smalt, one and a-half of burned quartz, and one and a-half of massicot.

BROWN GLAZING.—One part of fragments of green bottle glass, one of manganese, and two parts of lead glass.

The Phelan Prize Billiard Cue.

We have had the gratification of personally examining this cue, with which the public have been made more or less acquainted through the daily press, and which was won by Mr. John Deery, at the grand billiard tournament held in this city and closing on May 10th. It is valued at $600, and was designed by Mr. Phelan, of the firm of Phelan & Collender, billiard table manufacturers in this city, and is a very beautiful piece of workmanship. It is of ivory, tipped by a large and beautiful diamond, with handle mounted with gold, mother-of-pearl, and valuable jewels. The fortunate winner will be more fortunate still if he succeeds in keeping it against all contestants.

THE underground railroad bill has been revivified by the Legislature. The charter is in the hands of responsible men and we trust that this important work may be carried forward without delay. The corporators are allowed two years to begin the construction of the tunnel, and are to have three years thereafter in which to complete it to the Harlem River.

The Materials of the Universe.

A great part of the magnificence of spectrum analysis consists in the extent of its application. Not bounded by the system to which we belong, it carries out its gaze to the utmost limit where light is manifested in sufficient quantity to be comprehended in its grasp. And therefore it would only be a natural consequence of our achievement in solar discovery that those remoter strongholds of mystery should be assailed in turn. Too much, of course, ought not to be expected in the result of a proceeding of such extreme delicacy, and requiring such intense exertion of vision. We have to deal with no glowing disk, no golden shield displaying at once its blazonry but with points, which the highest effort of the most powerful telescope can invest with no true dimensions; whose apparent magnitude is but an illusion—where light is all. But that light, because it is light, shall be made to tell us of its origin; and if it speaks but in a whisper, that whisper shall bear an interpretation of wonder. And what is that interpretation? It will not lead us to "doubt that the stars are fire," flaming with intrinsic, not visible by reflected light; for their mere aspect, combined with their extreme apparent minuteness, has already excluded that doubt. It will not announce to us as a discovery that they are suns; for such would be the natural inference of any one who considered that, at a sufficient distance from the eye, our sun must necessarily be dwarfed into a star. But it will tell us this fact, utterly undemonstrable in any other way, that those suns are so far identical in chemical constitution with our own, that they have the spectrum of solid or fluid incandescence, interrupted by the bars of developed and reabsorbed light given out by volatilized elementary matter—that they are so far similar as to contain many of the same elementary lines—that they are so far dissimilar as to exhibit bands corresponding neither with solar nor terrestrial elements and indicating materials utterly unknown and inconceivable. That interpretation tells us, too, how in certain stars the incandescent gases seem to give out their brilliant lines unreversed by traversing a cooler external shell; and how, in one case at least, a temporary blazing out of light depended upon an actual ignition of a vast volume of hydrogen; it was for the time "a star on fire." Nor is that all. There are, irregularly dispersed throughout the heavens, small patches of a misty aspect, a great proportion of which are proved by the use of powerful telescopes to consist of densely compacted aggregations of extremely minute stars; while others, by their obstinate resistance to this mode of analysis, and the "milky," or to use an artist's term, "sponged out" character of their light indicate some other constitution. Little had that constitution been suspected before the spectroscope of Huggins applied the decisive test. Long ago, indeed, the bold speculations of Sir W. Herschel and Laplace had ascribed to them the combination of mist and fire, and viewed in them the embryo state of future suns and their dependent planetary systems—an hypothesis as captivating to the imagination of some, as unsatisfactory to the mental habits of others. But, whether acceptable or displeasing, this is not so. At a subsequent epoch, indeed, that "nebular theory" had been viewed with less favour, in consequence of the overstraining of a plausible analogy. So many of these cloudy masses, once deemed "irresolvable," had given way before the recent increase of optical power, that it was not unreasonably inferred that instrumental deficiency alone prevented a similar analysis in every case. Yet appearances were occasionally against that inference, and this time appearances were right. The spectroscope has taken up the investigation where the telescope could carry it on no longer, and pronounces the nature of many of those bodies to be truly that of a fiery mist, composed, however, not, as had been fancied, of all the uncondensed materials of a future sun and planets, but of a very few gaseous elements, whose insulation in space and incandescent condition, can never cease to be a source of amazement.—*Frazer's Magazine.*

The Power of Attention.

In proportion to a man's power of attention will be the success with which his labor is rewarded. All commencement is difficult, and this is more especially true of intellectual effort. When we turn for the first time our view upon any given object, a hundred other things still retain possession of our thoughts. Our imagination and our memory, to which we must resort for materials with which to illustrate and enliven our new study, accord us their aid unwillingly, indeed, only by compulsion. But if we are vigorous enough to pursue our course in spite of obstacles, every step as we advance will be found easier, the mind becomes more animated and energetic, the distractions gradually diminish, the attention is more exclusively concentrated upon its object, the kindred ideas flow with greater freedom and abundance, and afford an easier selection of what is suitable for illustration.

And so the difference between an ordinary mind and the mind of Newton consists principally in this, that the one is capable of a more continuous attention than the other—that a Newton is able, without fatigue, to connect inference with inference in one long series toward a determinate end; while the man of inferior capacity is soon obliged to break or let fall the thread which he has begun to spin. This is, in fact, what Sir Isaac, with equal modesty and shrewdness, himself admitted. To one who complimented him on his genius, he replied that if he had made any discoveries it was owing more to patient attention than to any other talent. Like Newton, Descartes also arrogated nothing to the force of his intellect; what he had accomplished more than other men, he attributed to the superiority of his method. Nay, genius itself has been analyzed by the shrewdest observers into a higher capacity of attention. "Genius," says Helvetius, "is nothing but a continued attention." "Genius," says Buffon, "is only a protracted patience." "In the exact sciences, at least," says Cuvier, "it is the patience of a sound intellect, when invincible, which truly constitutes genius." And Chesterfield has also observed that "the power of applying an attention, steady and undissipated, to a single object, is the sure mark of a superior genius."—*Sir William Hamilton.*

Important Experiments with Heavy Guns.

The London *Times* gives the following interesting summary of the results of recent experiments with heavy guns at Woolwich:

"One pattern of the Woolwich coiled wrought-iron gun endured 400 rounds with ordinary service charges of 30 pounds, English large-grain cannon powder, and 714 rounds with battering charge of 43 pounds; in all 1,114 rounds—a test far beyond anything that such a gun could probably be called upon to resist even during a great war. The gun remains perfectly serviceable. The gun and its ammunition were calculated for each other, regard being had both to power, endurance, weight and cost; and that there may be no mistake as to the powers of the Woolwich 9-inch gun with battering charges of 43 pounds, we give the *maximum* penetrations which the gun is capable of effecting, as laid down by the Committee on Fortifications: into earth 40 feet, into concrete 12 feet, into brickwork 12 feet, into rubble masonry 8 feet, massive granite 2 feet (but with fracturing and disintegrating effect to a much greater depth and over a considerable area), into iron plating 11 inches.

"The second gun fired 400 rounds with 30-pound charges, and 649 with 43-pound charges—1,049 rounds in all. During the firing of the 400 30-pound charges, and during 207 of the 43-pounds charges, the vent was in rear of the usual place. The last 442 rounds with 43 pounds were fired through a vent, in the ordinary service position, which is more severe upon the gun. The piece is now unserviceable, but became so by a most gradual and easily watched process. About 200 rounds before the end of the trial, a flaw was detected in the steel tube. It developed gradually, though the steel barrel is tightly gripped by the wrought-iron exterior, up to the 1,002d round, when gas was discovered escaping from the indicator hole—a small orifice bored in all our heavy guns to give notice when a steel tube is cracked through. The proof was continued with full battering charges, until, at the 1,049th round, the steel tube shifted forward about two inches, and closed the vent, so that further firing became impossible. Thus, though the gun is unserviceable, it has stood an enormous test, and yielded slowly at last, step by step."

Spectacles.

With most persons, there is an epoch in life when the eyes become slightly flattened. It arises, probably from a diminished activity of the secreting vessels. The consequence is that the globe is not kept quite as completely distended with fluids as in youth and middle age. There is thus an elongated axis of vision. A book is held further off to be read. Finally, becoming more flattened by the same inactivity within, the difficulty is met by putting on convex glasses. This is the waning vision of age. If, however, when that advancing imperfection is first realized, the individual persists in the attempt to keep the book in the old focus of vision—even if he reads under perplexing disadvantages, never relaxing, but perseveringly proceeding just as he did when his eyes were in the meridians of their perfection, the slack vessels will at last come up to his assistance, and the original focal distance will be re-established.

This statement will unquestionably be combated, energetically, by those who use glasses. But it will be a waste of forensic powder, because the fact is established beyond cavil. We do not pretend it will be successful in every instance; but generally, if glasses are once resorted to, then the opportunity of doing without them is forever lost.

Very aged men may be noticed reading fine print; and ladies, too, by scores, who resisted glasses at the age of life referred to who enjoy all the comfort of distinct vision, and they will, until, like the deacon's chaise, every stick in the vehicle falls to pieces at the same time.

Therefore, begin with a firm resolution never to use glasses of any kind, for reading or writing. The ancients knew nothing about such contrivances; if they had, there would have been poor eyes in abundance, and oculists to meet the emergency. Cicero never complained of imperfect vision at the age of sixty-three. He even wrote his last letter by torchlight, on the eve of being put to death by the waiting soldiers. Humboldt died at ninety-two, having never been embarrassed with those modern contrivances, lunettes. John Quincy Adams, illustrious for scholarship, at a ripe old age saw without them. Indeed, it would be a laborious enterprise to collect a catalogue of names in the chronicle of literary fame, of men and women, who were independent of glasses.—*Dr. J. V. C. Smith.*

Patents.

Those wishing to secure patents can save themselves much time and trouble by applying direct to Munn & Co., of New York. They have now been engaged in this business twenty-five years, and have the most extensive facilities for obtaining patents in the world. Their establishment is literally a patent office of itself, and, as we have had several dealings with them, we can speak advisedly of their promptness in putting through any business intrusted to them. About one-third of the entire number of applications filed at the Patent Office in Washington pass through their hands, and their charges are very reasonable, while they are very accommodating in advising as to the probability of obtaining a patent, where there is any likelihood of infringement, before allowing the applicant to incur any expense. They publish a pamphlet giving full instruction as to the mode of applying for patents, which is sent free by mail; and they are also well known as the editors of SCIENTIFIC AMERICAN, a paper devoted exclusively to new inventions and scientific subjects, which has had, for many years, a large circulation throughout the United States, and which is recognized as the highest authority on all such subjects. Their corps of specification writers and counselors are made up from the ranks of the Patent Office, and are fully posted as to the merits of new inventions, from practical experience, obtained while examiners there, and they make no charge for advice before receiving applications for patents.—*Galveston Daily News.*

On the Substitution of Sodium for Phosphorus in Lucifer Matches.

Dr. H. Fleck, of Dresden, has instituted a series of experiments with the view to obtain a non-poisonous paste for application to lucifer matches. He ascertained, by some preliminary experiments, that sodium, when minutely divided along with explosive substances, becomes highly inflammable when simply moistened with water. A mixture, constituted according to the formula—

$$(KO,NO_5)+Na+2C=(KO,CO_2+NaO,CO_2)+N,$$

formed a grayish-colored mass, which, on being touched with a moistened glass rod, ignited like gunpowder; this mixture was, however, found to be unfit to ignite ordinary brimstone matches for a cotton wick soaked in petroleum. In order to mend this defect, black sulphuret of antimony was substituted for the charcoal, according to the formula—

$$3(KO,NO_5)+Na+(SbS_3)=NaO,SbO_5)+3(KO,SO_3)+3N,$$

and the mixture made up of—

0·5	grammes of	sodium	= 4·65 per cent.
66·0	"	nitrate of potash . . .	=61·39 "
36·5	"	sulphide of antimony .	=33·96 "

Provided that during its manufacture this mixture is kept thoroughly dry, it has been found to answer admirably well. The mode of making it up is briefly as follows: Pure solid paraffine is put into a well-stopped glass flask, and melted over a sand bath; when fluid, clean pieces of sodium are added, and liquefied under the paraffine. As soon as the metal is thoroughly liquefied, the flask is closed and shaken for about ten minutes, which has the effect of granulating the metal, or rather reducing it to a fine powder. The metal is then poured out of the flask along with the paraffine, and the sodium taken out of the paraffine by means of a clean dry spoon; from 30 to 35 per cent of paraffine remains adhering to the metal; this, however, does not impair its inflammability, while it tends to preserve the metal.

Owing to this increase, instead of 5 grammes, 6·6 grammes of the metallic powder thus obtained must be weighed off. The incorporation with the other ingredients, previously well dried and warm, is effected under petroleum in metallic mortars, but each of the substances is first mixed with some petroleum, and pulverized separately before being triturated with the sodium; instead of gum or glue, caoutchouc, previously soaked in light petroleum oil at 110 deg. C. for ten or twelve hours, is used as mass to form an adhesive paste with the other materials. According to several accounts from Germany, this plan of substituting sodium for phosphorus has been favorably taken up by some of the largest and leading manufacturers of lucifer and fusee matches. There is said to be not the least danger in the transport.—*Deutsche Industrie Zeitung.*

Ocean Telegraphy.

Ocean telegraphy, says Morgan's *Trade Journal*, has made good progress. Before the end of the summer we shall, in all probability, have another transatlantic cable laid—the one from Brest to the French island of St. Pierre, and then on to a convenient landing place on the coast of the United States, not far from Boston. Again, a project to extend telegraphic communication from Cuba (already in connection with Florida) by Porto Rico through the West India Island, is favorably entertained. Prussia, too, we hear, is beginning to think of securing more direct communication with America. It has been suggested that if a cable were laid from a point on her seaboard round by the north of Scotland and by the western shore of Ireland, to join the Anglo-American cables at Valentia, Prussia would send all the North of Europe messages by this route.

It is understood that the Prussian Government have had the subject recently before them, and that a concession has been granted to carry out an Atlantic cable, having North Germany for its termini. The old project of the North Atlantic is being again mooted. That route was to go by Iceland, Greenland, and so on to Canada and the United States, Denmark being the assumed starting point. The cable to India by the Red Sea is going on satisfactorily, and an auxiliary line—one between Marseilles and Malta—is spoken of.

All these projects indicate increased convenience and gain to the public. At present the use of the ocean telegraph is confined to the commercial community; but ere long, when the tariff is reduced from Europe to America and to India, the general public will send messages as freely as they do by the land wires. We may reasonably hope, too, that the cost of submarine cables will be reduced by-and-by, and this will do more to cheapen messages than anything else. Gutta-percha and india-rubber have had a very good time of it. Can we not get some other material, natural or artificial, that will serve as well as either of them?

DEODORIZER FOR EARTH CLOSETS.—J. S. Kelly, of White Plains, N. Y., notices approvingly our article upon the value of earth closets, and considers it a subject of great importance. Mr. Kelly recommends dried peat as the most powerful absorbent of decomposing organic matter. Being composed entirely of vegetable matter it takes up the ammoniacal vapors, which cannot be thoroughly done by earth.

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

Expanded Steam.

MESSRS. EDITORS:—In your issue of May 15th, your correspondent from Keokuk further criticises the cards published by the Wood & Mann Steam Engine Company, and conveys the idea that the engine at Elmira he refers to was one of the same class of engine built by this company. This company have never sold any engines at that point, and from his description he could not have referred to a Corliss Engine, or any other first-class cut-off, and the one he speaks of was undoubtedly some engine claimed as a cut-off; but we will venture the assertion that were the facts thoroughly understood it would be found to be a puppet-valve engine, or some other throttling valve gear, imperfectly made, and proportioned with insufficient fly wheel, and also to have other serious defects, such as no first-class builder understanding cut-off engines would have adopted.

It seems we failed to get at the precise meaning of his previous article, and it suggests the importance, especially on subjects of a scientific nature, of carefully measuring the signification of words used in discussion.

When your correspondent wrote, "No such card could have been taken from any engine," he referred, it appears, to the deductions made from the card, and not to the card itself. The correctness of the deductions we are prepared to maintain, but can only reiterate the statements we have already made. Why steam at 60 lbs., expanding 16 times, showed 3 lbs. terminal pressure on that card was owing to re-evaporation and to leakage of steam valve. That kind of valve has, on that account, since been discarded, and a Corliss valve substituted.

The indicator does not gage the actual amount of steam used, for it does not in whole or part register the loss due to condensation, leakage, etc. Of these it takes no note, but it does give an insight into the working condition of an engine obtainable in no other way.

One point your correspondent makes is this: When the steam valve opens after the piston begins its forward movement, why does the entering steam line on a card fall forward, compression having apparently ceased? This I cannot explain, but believe negative lead always produces that effect on a diagram. Perhaps some of your readers, familiar with indicator cards can explain why.

Regarding the relative value of the "country engine," and the "short cut-off," it seems to us that any theory, after long years of practical success, ceases to be a theory, and becomes an established fact.

We humbly submit that the practical value of highly expanded steam as a motor, is, in 1869, an established fact.

HOWARD ROGERS.

Utica, N. Y.

The Use in Conjunction of Boilers of Different Sizes and Patterns.

MESSRS. EDITORS:—It is often the case that boilers of different sizes and patterns are used together, and being set on same level is always thought sufficient to secure a uniform hight of water in them. I have two tubular boilers of different patterns to generate steam for a stationary engine. They are connected together in the steam room by a two-inch pipe and in the water space at bottom of firebox by another pipe. There has always been considerable trouble in keeping the same level of water, or rather a proper level, in both boilers.

The boilers are of the following dimensions:

No. 1. Firebox surface 80 feet; flue surface 513 feet; grate surface 12·3 feet; contents of boiler exclusive of flues and internal firebox 67·8 cubic feet; thus giving somewhat over seven feet of heating surface to one of capacity.

No 2. Firebox surface 75 feet; flue surface 458 feet; grate surface 10·8 feet.

Contents of boiler exclusive as above, 109·3 cubic feet, being not quite five feet of heating surface to one of capacity. No. 2 was fed by a pump attached to stationary engine. No. 1 had an injector. When No. 1 was fired briskly, the injector had to be used to keep water over the crown sheet of No. 1, while No. 2 was too full. The only remedy we had for it was to fire No. 2 very hard and ease up a little on No. 1, a course not always convenient, especially when much steam was needed. Reasoning, that though the gage indicated the same pressure in both boilers, that No. 1 had the advantage, from the greater disparity of heating surface as compared to capacity, I put in a pipe from the front end of firebox of No. 2, and connected it at extreme end of No. 1, thus taking the water driven from No. 1 into No. 2 from its hottest point, and leading it back into the, comparatively, cool part of No. 1. The result was all I anticipated, there is now no trouble in keeping the water at a uniform hight in both boilers, making steam somewhat easier, probably on account of more uniformity in the quantity of water, and possibly on account of a current in and through both boilers.

S.

Huntsville, Ala.

How to Calculate Quantity of Water Consumed by a Boiler.

MESSRS. EDITORS:—Will you please answer through the columns of your paper for the benefit of your readers engaged or interested in waterworks, the best method of calculating the quantity of water consumed by a boiler (in all its parts) through the number of square feet of boiler and flues exposed to fire per hour or day.

A. B. C.

St. Louis, Mo.

[One half square foot of grate surface is usually estimated as yielding 1-H. P. Of course this rule is not absolute, owing to the different varieties of boilers and their varying merits. 12 square feet of heating surface is 1-H. P. Same remark applies to this rule.

1 cubic foot of water is required to generate 1 pound of steam.

As your object is to ascertain the amount of water used for which payment is to be made, we will add a statement in regard to heating buildings by steam pipes which may be advantageous. We have been to considerable personal trouble to ascertain these facts. In the latitude of New York city, where rooms are heated by steam in pipes running around their sides, the amount of condensation is ·357 (three hundred and fifty-seven one-thousandths) lbs. of water per hour for each square foot of superficial surface exposed. Where the steam passes through a coil (inclosed usually in an ornamental screen) the amount of condensation is ·29 (twenty-nine one-hundredths) of a pound of water per hour. This when the temperature is kept as near 60 deg. as possible. A higher degree greater condensation, and consequent use of water. These estimates are merely averages, as much depends upon exposure of pipes by frequent opening of doors, windows, etc —EDS.

The Bedfordian System of Astronomy---The Explosive Theory of the Origin of the Celestial Bodies.

MESSRS. EDITORS:—There is one great glory in your social compact. Here in England they inquire the length of a man's purse; you the weight of his brain. Here, however grand the invention or great the discovery, unless the discoverer or the inventor can show that he has "blue blood" in his veins, he is sure to be snubbed more or less; and the old story, "Can any good thing come out of Nazareth," is uppermost upon their lips, as well in the scientific as in the religious world.

These remarks are occasioned by the publication, in one of our magazines, *The Student*, of a paper entitled "a New Theory of the Universe," by Mr. Proctor, B.A., F.R.A.S. The fact to which I desire to call your attention is, that this "new theory," as it is called, is a flagrant plagiarism of "New Theories of the Universe," by James Bedford, Ph.D., published in pamphlet form, and entered at Stationers' Hall here in October, 1854—nearly fifteen years ago!

By reference to your file about 15 months since (I have not a copy at hand at the moment) you will see that you have done Dr. Bedford the honor, as well as the justice, to refer to his theories in an article headed, I think, "Relation between Meteors and Comets," and which article I subsequently found quoted in many of the leading journals on this side the Atlantic. A comparison of the "Bedford Theories of the Universe" with the theory published in the *Student* (February, March, and April numbers) and purporting to be Proctor's, will enable your readers to judge to whom the honor belongs of having propounded what is now believed to be the true theory of the Universe.

Had Mr. Proctor quoted Dr. Bedford, it would have been seen that his paper was an able and full amplification and verification of that gentleman's theories. This would have done Mr. Proctor credit, and Dr. Bedford but simple justice.

London, April, 1869.

LIBRA.

Phosphorescence of Sugar.

MESSRS. EDITORS:—I have to record what to me is a hitherto unobserved fact.

Late in the evening, a short time ago, I had occasion to step to the cupboard for a lump of sugar. The bowl being empty I went into the next room, in the dark, to the store box, and in breaking off the required piece from the projecting points, I was astonished to see a flash of light start out from the fracture. I first thought it a light from the lamp shining through the opened door, and through some interstice of my clothing. I shut the door and returned it to the box, and found the flash strangely repeated at every fracturing touch I gave the mass. The sugar was a white coffee quality, damp when bought, but had dried hard.

The next day I went to the box, hooding out the light by covering my head and top of the box, but could get no manifestation. The next evening, at the hour of candle-lighting, I repeated the fracturing and found the glowing flash, ample as at first.

I should think it the crystallic "od" light Reichenbach announced some years since, but that it seems to exhibit to all alike of the number I have yet led to it. Can you, or any of your readers, inform me respecting its nature and cause?

Leavenworth, Kansas.

A. C. N.

[We can answer our correspondent, first, that the phosphorescence of lumps of dry sugar, when rubbed in the dark, has long been known. The phenomenon may be, however, new to many of our readers, and second, that the odic force of Von Reichenbach is in our opinion a myth. If not a myth it seems odd that other physicists should not have been able to detect it and have corroborated the researches of that celebrated philosopher.—EDS.

Capacity of Boilers.

MESSRS. EDITORS:—I have a tubular boiler, 8 feet long, 17 2¼th-inch flues; boiler 2 feet diameter. Engine, 7-inch bore, 10-inch stroke, in good order, new, and works finely. Driving-wheel 4 feet, runs 150 revolutions per minute, estimated 8-H. P. It drives a 26-inch "Queen of the South" corn-mill pulley on mill spindle 12-inch. I work 80 lbs. steam per steam gage, but can only run my engine 20 to 30 minutes when the steam is at 40 or below. I can get up 80 lbs. steam when the furnace is cold in 50 minutes. I pass my feed water through a heater and convey exhaust steam into smoke pipe 3 feet above the boiler. The smoke pipe is 14-inch diameter and 30 feet long. The draft in the furnace is good, especially when the engine is at work. The boiler is entirely covered with masonry.

If I have stated the case so that you can understand it, please tell me the trouble, and how I can remedy it.

W. C. B.

Louisville, Ala.

[The boiler referred to has about 80 square feet heating surface. Its diameter is too small, and the number of tubes not sufficient to give a good draft. If the engine takes steam the full length of the stroke, it would require a boiler of double the capacity, but if it cuts off at one-third or less, the same boiler should be sufficient.—EDS.

Law of Motion.

MESSRS. EDITORS:—During the last year I have been met so often with the assertion of an "absolute law of motion," before which everything that conflicts with it must give way, that I have been led to give the subject much thought, and have come to the conclusion that the following propositions are true, and would be glad to have them laid before your scientific and mechanical readers that they may state wherein they are not true.

1st. That motion is always a resultant or effect, and never a cause (excepting secondary).

2d. That a resultant or effect can have no law of its own.

3d. That what are called the laws of motion, are, in all cases, the law of the agent used in producing the motion.

4th. That the only absolute law there can be in regard to motion is "that where you increase motion you decrease power," and this can only be maintained for the simple reason that to assert to the contrary, would be to assert that you can produce an effect without a cause.

5th. That there is no law of motion.

QUERY.—Assuming a law of motion, as asserted, then if it could be caught and caged would it not be perpetual motion, or at least obviate all the objections to perpetual motion.

L. S. F.

Ice-making Machinery Wanted.

MESSRS. EDITORS:—The Frost King slighted us in this latitude last winter, so we are without ice and too far in the interior to get it elsewhere. Will you not favor us with an article in your paper on the subject of artificial ice, indicating what are the best processes and apparatus for making it cheaply and effectively, with the cost of the outfit for making any given quantity, and cost per tun or pound of making it. If you would call upon parties having processes or machinery for making ice effectively and economically, to advertise in your paper, it might result in their interest and the public good. If indeed there are any really practical and valuable methods of making ice artificially.

ICE.

Virginia.

Singular Effect of Transmitted Light.

MESSRS. EDITORS.—The object of this communication is to call your attention to a phenomenon which I have observed for the last year, an account of which will perhaps be of interest to your numerous readers. I have in my drug store a bottle of pulverized curcuma (*turmeric*). On the bottle is painted a green ground in the shape of a shield, upon which the name of the contents is painted with black paint. A coating of curcuma adheres to the bottle about 1-16th of an inch in thickness, excepting under where it is painted. Under the green ground, being what painters call transparent, a very thin coat adheres, and under the black letters not a particle is found. If a cast was taken inside the bottle a proper *fac simile* of the shield and lettering would be produced in relief.

J. M. SUTTON.

Jacksonville, Oregon.

Sleepy-Hollow Chair.

MESSRS. EDITORS:—I own a cheap but comfortable "Sleepy-Hollow chair," made of pine wood; it is on rollers, which are screwed to the legs; these rollers bothered me a good deal by coming off on account of the softness of the wood. It suggested itself to me, that if the screws were dipped in melted glue it would be an improvement. I did so, and now the rollers are as firm as if the wood to which they are attached had been of the hardest kind. This was at least six months ago. I think the experiment a good one.

H. J.

Washington, D. C.

Hot-Air Furnaces as Remedial Agents.

MESSRS. EDITORS:—Had I supposed my opponent would be catching at straws I would have said that my wife was always a feeble woman, and that probably her life has been saved by the beneficial effects of a hot-air furnace.

G. W. H.

Weed Cutter Wanted.

MESSRS. EDITORS:—Could not some of your inventors make a machine for cutting the weeds off ditch banks. Here we have ditches every half acre one way and every five the other, and often times diagonal ones. In old times these ditches were cut by hand four or five times a year; now, for the want of labor, they are either never cut or only once a year, with manifest injury to the crops. A mower in the shape of a traverse plow, with a knife eighteen inches or two feet long, would be the thing.

If there is an instrument in existence for executing such work while the crops are growing, let the maker advertise it.

S. R. STEWART.

New River, La.

THE survey of League Island, which has been recently ordered by the Secretary of the Navy, will soon be made. A similar survey will be made of New London, Conn. It will consist of soundings as to the depth of water, and capacity of the places for the construction of navy yards.

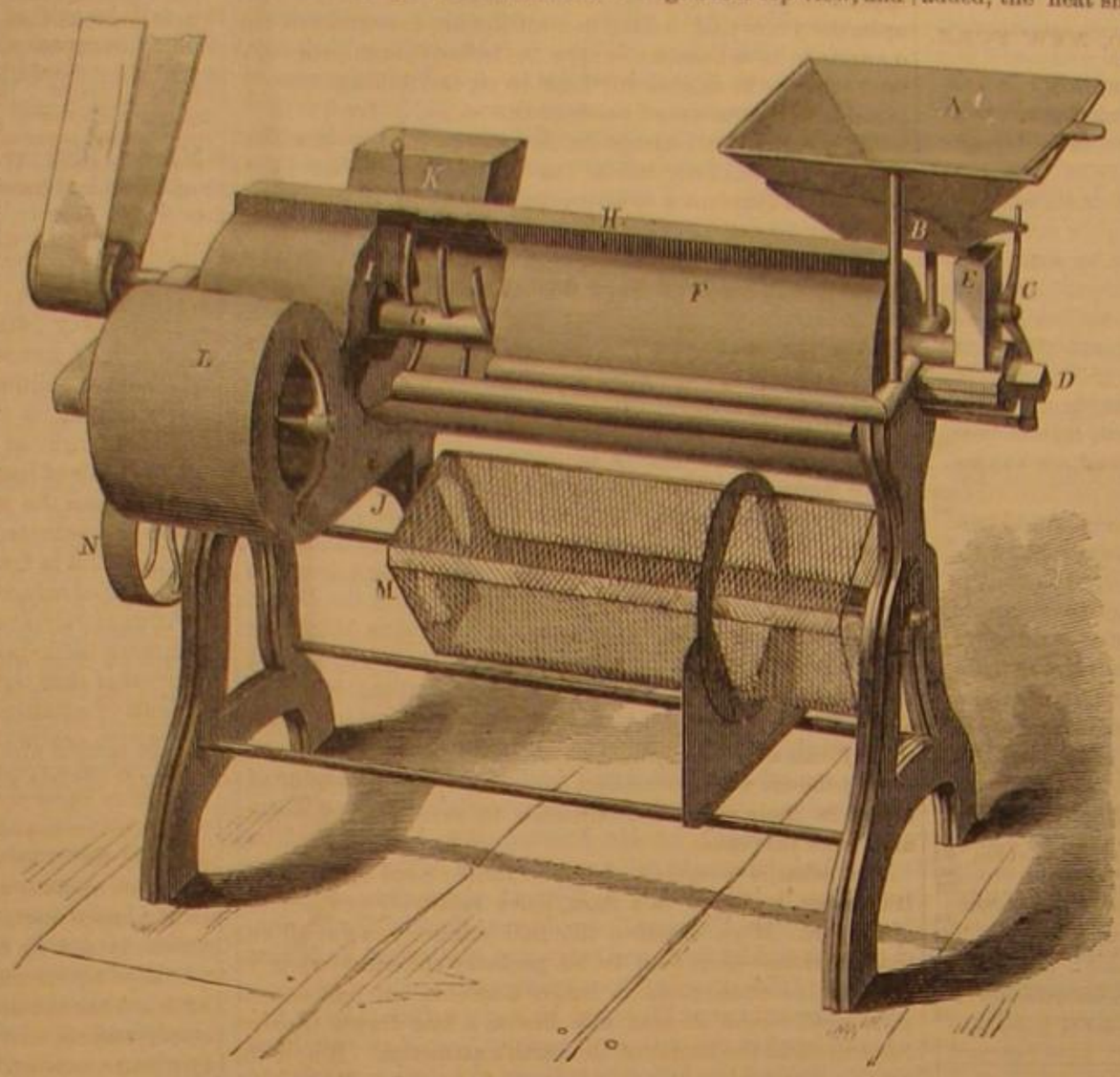
Manufacture of Hominy.

Those of our readers who reside in portions of the country where wheat is the staple, will hardly realize the extent to which Indian corn, prepared as hominy, enters into the food of the inhabitants of large sections of the United States. Not only is it a staple article of diet through most of the Southern States, but it also is in demand, to a less extent, throughout other portions of the country, and considerable quantities are also exported.

We herewith give an engraving and description of a new and improved hominy and pearling mill, invented by E. A. Duer, of Decatur, Ill., which is apparently a very efficient device for the preparation of this important article, as well as the pearling of barley, rice, and other grains.

In the engraving, A represents the hopper, provided with the ordinary shoe, B, which is vibrated by the oscillating bar, C, which is actuated by the knocker, D, attached to the main shaft of the mill.

The grain passes from the shoe into a vertical trough, E, provided at the bottom with a spiral conveyer, attached to the main shaft, which carries it at a uniform rate into the hollow cylinder, F. This cylinder is divided longitudinally and horizontally, so that the upper half, with the hopper supports, etc., may be lifted off as occasion may require. Within it, revolves the main shaft, G, to which are attached knives or beaters, arranged in spiral rows, so as to carry the grain along the cylinder to the end remote from the hopper, at the same time that it is beaten thoroughly by the knives. The cylinder is further provided with a longitudinal recess, H, placed at the top, into which the grain is thrown by the centrifugal force of the revolving shaft and beaters, and the object of which is to arrest the motion of the grain, and bring it repeatedly into violent contact with the knives. The cylinder is further furnished with a diaphragm, I, provided with an opening to allow the grain to pass after being sufficiently beaten. The object of the diaphragm is to prevent the too rapid transit of the grain to subsequent parts of the machine.



DUER'S IMPROVED HOMINY AND PEARLING MILL.

After the grain has passed the diaphragm it falls through a passage, provided with a slotted gate, which serves to regulate its fall toward the curved chute, J. In making this passage it traverses the lower part of an inclined air chamber, K, and is crossed by a current of air generated by revolving fans in the cylinder, L. These fans are attached to a shaft in the same manner as those in an ordinary fanning mill, and receive motion by means of a belt from a pulley on the main shaft. The beaten grain is thus winnowed on its way to the revolving screen, M, which is also driven by a belt from the main shaft running on the pulley, N. The air chamber, K, is provided on the back with a sliding door which serves to regulate the blast and affords exit for the dust and detritus. The elements of this mill are all well-known devices, and can be relied upon to perform their special parts of the work in the manner described. It is said to require only about one-half the power required by other mills, to perform a given amount of work. The arrangements for securing a uniform feed and discharge are praiseworthy features. The hull and chaff are completely separated from the hominy, or other grain, by the action of the parts above described. The machine is quite compact, occupying only about four feet square of floor surface. The knives are made of the best cast steel, and require sharpening only about once in four or five weeks, when the mill is doing full work. The machine has been in practical operation for some time, and the quality of its product is said to be very superior.

The inventor is confident that the regular feed and discharge secured by the arrangements we have described, will secure general favor for this mill. Offers for territory and propositions to manufacture will be considered. The mill was patented, August 4, 1868, through the Scientific American Agency.

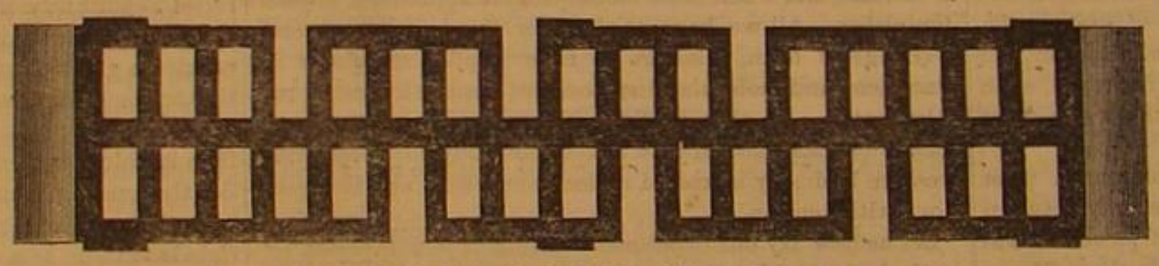
For further particulars, address Geo. W. Patterson, owner of the patent, P.O. Box 957, Decatur, Ill.

Requisites for Good Furnace Grate Bars.

The chief results to be secured in a good grate bar are economy in the use of fuel and durability. A great many patterns for grate bars have failed to secure these results, for want of recognition of the principles upon which they should be constructed in order to insure success. Grates burn out rapidly when too large a portion of their surface is exposed to the direct action of the fire, and too little surface is exposed to the air; and if to secure a large exposure to the cool air they are so made as to obstruct the draft, they fail to give perfect combustion. With such defective grates large quantities of unconsumed gases pass off with the smoke, the effect being to make the furnace, in which such bars are placed, approximate in its action to a gas retort; distillation taking the place of combustion.

All other things being equal, that grate will be the best which opposes the least obstruction to draft, presents the smallest surface to the direct action of the burning fuel, has the largest area in contact with the cold air which enters the furnace, and, at the same time, will withstand the effects of expansion and contraction.

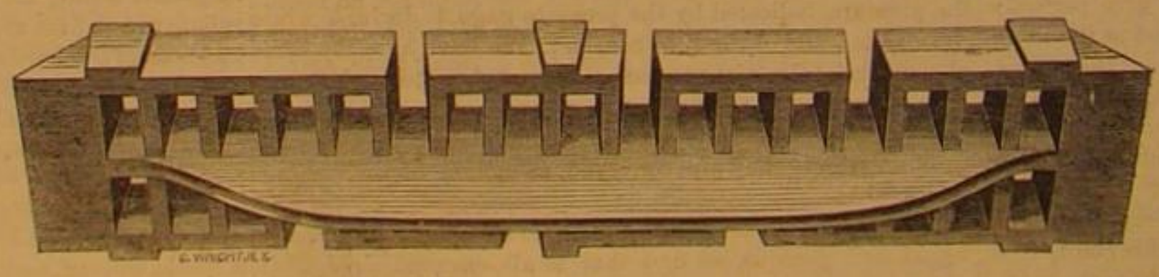
The form of grate bar shown in the engravings seems to cover the entire ground, all of the above principles being taken into full account in its construction. Fig. 1 is a top view, and Fig. 2, a view of the under side, inclined, to show to advantage an important feature of the bar; namely, the great depth of the central portion which projects below the other parts and forms a wide rib.



TUPPER'S FURNACE GRATE BAR.

This feature of course gives great strength, but it performs a still more important office, that of keeping the temperature of the bar at a much lower point, than could be the case without it. The heat from the upper portions is rapidly conducted away by this rib, which is constantly cooled by the influx of cold air from without. Thus is secured one of the main points.

A glance at the plan will show at once that the amount of space for the passage of air through this bar, is unusually large as compared with many other styles of bars; while the portion exposed to the direct action of heat is unusually small. The metal from which these bars are cast is a combination of different irons, which has been found to best withstand the effects of expansion and contraction.



Few claimants to public favor can show a better record than this has accumulated during a test of ten years' use in steamers, stationary engines, locomotives, heating furnaces, etc. The bar has been tried in all places and under all circumstances of severity, and found equal to the test. It is in use in more than 5,000 places, including many of the largest steamships, and many of the most prominent manufacturing establishments in the United States, and its merits are attested by a large number of manufacturers and engineers of high repute. It received the highest premium at the fifth exhibition of the Worcester Co. Mechanics' Association, in Massachusetts, and honorable mention at the Paris Exposition.

We commend this grate bar to the attention of all parties interested. Address all communications to Mr. L. B. Tupper, 120 West st., New York.

A LOTTERY has just been drawn in Vermont, and among the prizes were 8,000 gilt rings, worth half a cent each, and 150 empty flour barrels, while one young man, who held $300 in tickets, drew a blue-edged plate. This is a fair sample of the various lottery schemes that are so frequently palmed off upon the people. They are complete shaves.

Babbitt's Attrition Metal--Directions for Preparing and Fitting.

Melt 4 lbs. of copper, add, by degrees, 12 lbs. best quality Banca tin, 8 lbs. regulus of antimony, and 12 lbs. more of tin while the composition is in a melted state.

After the copper is melted, and 4 or 5 lbs. of tin have been added, the heat should be reduced to a dull red, to prevent oxidation; then add the remainder of the metal as above. In melting the composition, it is better to keep a small quantity of powdered charcoal on the surface of the metal. The above composition is called "hardening." For lining the boxes, take 1 lb. of this hardening and melt it with 2 lbs. of Banca tin, which produces the lining metal for use. Thus the proportions for lining metal are, 4 lbs. of copper, 8 lbs. of regulus of antimony, and 96 lbs. of Banca tin.

The article to be lined, having been cast with a recess for the lining, is to be nicely fitted to a former, which is made of the same shape as the bearing. Drill a hole in the article for the reception of the metal, say a half or three quarters of an inch, according to the size of it. Coat over the part not to be tinned with a clay wash, wet the part to be tinned with alcohol, and sprinkle on it powdered sal-ammoniac; heat it till a fume arise from the sal-ammoniac, and then immerse it in melted Banca tin, taking care not to heat it so that it will oxidize. After the article is tinned, should it have a dark color, sprinkle a little sal-ammoniac on it, which will make it of a bright silver color. Cool it gradually in water, then take the former, to which the article has been fitted, and coat it over with a thin clay wash, and warm it so that it will be perfectly dry; heat the article until the tin begins to melt, lay it on the former and pour in the metal, which should not be so hot as to oxidize, through the drilled hole, giving it a head, so that as it shrinks it will fill up. After it has sufficiently cooled remove the former.

A shorter method may be adopted when the work is light enough to handle quickly; namely, when the article is prepared for tinning, it may be immersed in the lining metal instead of the tin, brushed lightly in order to remove the sal ammoniac from the surface, placed immediately on the former and lined at the same heating.—*The Practical Metal-Worker's Assistant.*

A Drunkard's Cure.

"Some months ago, a gentleman advertised that he had discovered a sure specific for the cure of drunkenness. He would not divulge the secret of what compounds he used, but furnished the medicine at so much per bottle. He did not have so many applicants for cure as he expected, considering the extent of the disease. In fact, the more malignant cases did not seem anxious for relief. They rather appeared to enjoy their malady. A few, however, placed themselves under treatment, and some were cured—whether by taking the medicine or by not taking strong drinks, we are not prepared to say. One of the cured ones had faith in the medicine, rigidly carried out the directions of the doctor, and now has not the least taste for intoxicating drinks; whereas, one year ago, he was an inebriate, and could not get along with less than a pint to a quart of whiskey per day.

"He said that he had, at some trouble and expense, procured the recipe for the preparation of the medicine, which he had published for the benefit of suffering humanity. It is as follows: Sulphate of iron, five grains; peppermint-water, eleven drachms; spirit of nutmeg, one drachm; twice a day. This preparation acts as a tonic and a stimulant, and so partially supplies the place of the accustomed liquor, and prevents that absolute physical and moral prostration that follows a sudden breaking off from the use of stimulating drinks. It is to be taken in quantities equal to an ordinary dram, and as often as the desire for a dram returns. Any druggist can prepare the prescription."

We cut the above from an exchange. The prescription named is, as stated, a tonic and a stimulant; but we consider the dose too large by one-third. Considerable irritation of the stomach might be experienced by some patients from so large an amount of the sulphate. The sulphate should also be of the crystallized form. Apothecaries will understand this, but some people might be tempted to prepare the medicine themselves, and obtain for the purpose the dried salt, which is much stronger. We do not believe it can destroy the appetite for liquor, but it may lessen the cravings for it until the habit of drinking has been broken.

AN experimental test was recently made at the new public library in Cincinnati, of May's system of making buildings fire-proof. An oven had been built up next to the plastering and joist, which had previously been prepared with metallic lath and concrete, and was subjected to an intense heat for eight hours, but without any observable effect. The architect, builder, and some gentlemen of the Board were present, and seemed highly pleased and satisfied with the result.

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Contents:

(Illustrated articles are marked with an asterisk.)

IMPROVEMENTS IN THE STEAM ENGINE.

An immense amount of time and money has been expended upon new and ingenious cut-offs for steam engines. Each in its turn, as it was brought before the public, was supposed to excel its predecessors, either in its power of adapting the exact quantity of steam used to the work to be done, or its instantaneous action. The best modern engines show, by the indicator cards, between 60 and 90 per cent of the theoretical effect of the steam; in all cases the figures vary in proportion as care is exercised in keeping the temperature up in the cylinder. All these are improvements, and they tend toward greater economy in the use of steam. Before the steam engine can be called an economical power, our modern system of boilers must be immensely improved, or an entirely new system of applying the heat to the water must be contrived.

We all know that the steam engine is at present a most wasteful source of power, and that we realize only between 15 and 25 per cent of the theoretical amount of power derivable from the coal which is consumed. There is about 75 per cent lost somewhere in the boiler, and it seems as if it would be more important to make the vigorous attempts at improvement upon the boiler rather than upon engine. That which Watt did for the steam engine when he invented the condenser, some engineer of our own time can do by improving the boiler. As it is necessary to apply heat for the generation of steam, and as the boilers of all sea-going steamers must of necessity use salt water, the first improvement should be a better method of abstracting the salt from the water. This is at present performed by the use of surface condensers, but they are large and heavy, and withal do not give perfectly fresh water. This operation should be performed as the water enters the vessel, and before it has passed through the boilers, as in the surface condensation of the present system. As higher pressures and a greater degree of expansion have, so far, proved to be a source of economy, it is probable that we shall see the pressure raised above that which boilers now carry, and as a consequence the steam will be expanded to a greater degree. But before we can arrive at this point, it is necessary that the salt should be extracted from the water before it enters the boiler. What form the boiler may assume is more than any one can say, but so long as the heat is not applied in a better manner, we must lose a large amount. A large quantity of heat is lost by radiation from all parts of the boiler.

It is true we felt the exposed surface, but this is only a method of reducing a loss, which with our present form of boiler we must be subject to. Heat is lost as it travels from the furnace to the uptake, indeed some of the currents of heated gases generated in the furnace scarcely reach any of the surface of the boiler at all, but pass through the center of the tubes out through the smoke pipe, having done no work except to fill up spaces which otherwise would have been left vacant, this loss is greater in proportion as the diameter of the tubes or flues are increased. Where all the losses are, it is impossible to state, for it is most difficult to judge at what point heat is being given off in great quantities; points which we suppose are giving off large amounts may perhaps be wasting but a small percentage of the whole loss.

Watt, when he invented the condenser, made, we might well say, the last great improvement in the steam engine. Since his time the boiler has been changed, tubular boilers have been introduced, and the pressure is far higher than any used in his day. No doubt if Watt had been able to get the pressures in his cylinders as great as we now get them, he would have made use of expansion, fully appreciating its benefits. With the low pressures which prevailed, he carried expansion to its most economical limits. As we look back upon the years past, we see that all the improvements of any magnitude have been made upon the boiler; the improvements in the engine having merely kept up to, and followed closely, the change in the construction of the boiler.

The next great change in the steam engine—the next change that will promote the use of steam and add to its immense utility, will come by improvements in the boiler. We must attack the source of the evil if we wish to overthrow it, and in the faulty construction of the boiler the evil will be found and the difficulty conquered.

WHAT IS PRESSURE? AND WHAT WORK WILL IT ACCOMPLISH?

These are questions suggested by a letter from an esteemed correspondent, who has written us from Australia, in regard to his supposed discovery that pressure will perform work. He describes the method by which he intends to utilize the pressure of the sea upon the bottoms of floating vessels, to propel them without the aid of steam, so indefinitely that we can get no clear idea of the means employed.

The questions, which his letter has suggested as a subject for the present article, are not new; they have been long the subject of thought and discussion, and have been definitely answered. But though it is known to physicists, that pressure, merely, can never perform work, there are many men like our correspondent whose minds are not clear upon the subject, and errors in their views, and mistakes in invention, frequently arise from this cause.

First, what is pressure? A ball of rubber rests upon a table. It does not, regarded as a mass, move relatively to the point of support. If we examine this ball minutely, we shall find that its shape—supposed to be perfectly spherical when no pressure is sustained—is no longer a sphere, but has become a spheroid, whose shorter axis lies on a line drawn through its center and the center of the earth's attraction. If now the support be suddenly lowered away from the ball, pressure either is lessened or annihilated, and the ball, considered as a mass, begins to move; and we find by further experiment, that so long as the conditions of pressure are not altered, no relative motion will take place between the mass and the supporting body; and still further, that when the pressure is lessened, the ball approaches the spherical form, finally attaining that form when all pressure has been removed.

Now, if we approach this subject free from preconceived notions, to observe what has taken place, we find that when mass motion begins to diminish, what we call pressure begins to increase, and when mass motion begins to increase, pressure diminishes. All we have to show for this so-called pressure is change of form. Change of form implies molecular displacement, and molecular displacement implies increased molecular motion; so that, in this case, we have the simple conversion of mass motion into molecular motion. In this view, pressure is simply increased molecular motion, and is synonymous with tension.

Let us now try our experiment with a liquid inclosed in a vertical pipe, with a pressure gage inserted at the bottom. Let the pipe have a funnel at the top, into which water may flow to maintain a given head while the water is flowing through the tube, and an escape pipe to keep it down to the same head when the bottom of the tube is closed. If now the bottom be closed, the pressure gage will show an amount of pressure upon the sides of the pipe corresponding to the hight of the water column. And if the tube be composed of elastic rubber, we shall find that it expands until its resisting force is equal to the pressure upon its walls. If, now, the water be permitted to flow through a tap at the bottom, we shall find the pressure, indicated by the pressure gage, to decrease, while the elastic walls of the tube contract. We have here the same phenomena of diminished pressure, increased motion and change of form, we had in the first experiment.

With gases we also find pressure diminishing in the tubes through which they are conveyed, as motion of the column increased.

So after having examined the three states of matter, solid, liquid, and gaseous, we find that in all observed cases, diminution of mass motion, and increase of pressure are connected, and *vice versa;* while at the same time we find that all we can discover of pressure is a change of form in masses, greater or less as the so-called pressure is greater or less.

Now, whether we regard this change of form as the result of an occult force styled pressure, "*vis mortua*," or anything else we please to call it; or whether we reject the hypothesis of an occult force, and consent to consider pressure and tension as identical, and the representative of molecular motion, does not affect the fundamental truth that pressure, as pressure, never performs work, and that only when it partially or wholly ceases, mass motion, which is capable of being directly applied to work, supervenes. So that if it were possible for our Australian inventor to convert all the pressure which now sustains his vessel upon the surface into mass motion or direct power to perform work, the supporting power would be gone with the pressure, and though his vessel might go ahead, it would also go—to the bottom. Any portion of this pressure converted into motion, is so much subtraction from its supporting power, which is pressure.

The necessity for a more perfect understanding of the fundamental laws of physics on the part of inventors cannot be too strongly urged. The ground upon which nuggets of discovery, so to speak, could be picked up at random, by any one who had eyes, has been mostly explored. There are now no more nuggets. Those who get gold hereafter must mine scientifically, or return with empty pockets.

THE NEW YORK "TIMES" ON NITRO-GLYCERIN.

In the case of Widow Cuff against the Newark and New York Railroad Company, the evidence, given in the Hudson County Supreme Court, shows with what desperate recklessness the nitro-glycerin explosion at Bergen, in 1867, was brought about. Burns, the man in charge of the oil, was drunk and drowsy. Wishing to melt the glycerin, he dipped the can into a vessel of water, and then put a red-hot poker into the water. When he found this had no effect, he took an iron spike and hammered it into one of the cans to break up the frozen mass! Then came the explosion, at last. With proper care nitro-glycerin is as safe as gunpowder, though greatly more powerful.

The paragraph we have quoted is from the New York *Times*, of May 14th. The daily press of this city evidently thinks itself competent to discuss any and all questions, whether of political economy, science, or transcendentalism. But assuming as it does to be the universal instructor of the public, it ought on a subject involving great hazard of human life to speak at least intelligibly, if not intelligently.

What does the last sentence of the above paragraph mean? There is a substance known to chemists called chloride of nitrogen. It is formed by inverting a jar of chlorine gas in a solution of sal-ammoniac, and it floats upon the surface of the solution in oily drops. The circumstances under which this substance is likely to explode are so numerous, and the certainty that they can all be eliminated from an experiment is so difficult of attainment, that the most skillful experimenters hesitate to exhibit even the smallest quantities of it to a class. Even when experimenting with very small quantities, Sir Humphry Davy was wounded in the face by an explosion of this substance, and the celebrated chemist, Dulong, lost an eye, and had a hand maimed for life in an experiment with the same explosive. Yet it is just as true of this substance as of nitro-glycerin, that, with proper care, it is as safe as gunpowder; meaning by proper care, the certain and absolute removal of all circumstances under which an explosion is possible. The explosive itself is perfectly harmless without the circumstances, and the circumstances will never blow people into fragments without the explosive.

The great difficulty with nitro-glycerin is, that sometimes, through ignorance, and at others through heedlessness, proper care is not taken. Even the enforcement of proper care is a matter of difficulty. Leakages occur during transportation, when everything was supposed at the outset to be sound; and divers other accidental circumstances are liable to explode this substance which could not by any possibility render gunpowder unsafe.

That explosive is the safest which will explode under fewest conditions, provided the conditions are such as may be controlled by ordinary means.

The paragraph we have cited seems to convey the impression that in the Bergen disaster the means employed would have exploded almost anything but nitro-glycerin. The man was drunk. Surely, this of itself would have ignited gunpowder. He was drowsy. This would set fire to gun-cotton. He put the can into water. Everybody knows the wonderful igniting power of water upon combustibles. He stuck a hot poker into the water, utterly careless of the extreme inflammability of that liquid. Having failed to ignite this "safe," but powerful explosive, by any of the ordinary means enumerated, never known to fail with any other, this monster of recklessness had resort to an iron spike, an object of such deadly potency, that it can only be obtained by surreptitious means in any civilized country; and with this fell implement he *at last* effected an explosion.

The real facts in the case cited are that the very first agent employed by the unfortunate, and perhaps careless man, who ignited the nitro-glycerin, capable, in the manner he employed it, of producing ignition, did produce it with its awful results; and yet the *Times* makes this absurd attempt to torture the facts into a demonstration that it as "safe as gunpowder." Fie! Fie!

It is just because men do get drunk and drowsy and careless, and that many other unavoidable contingencies are liable to arise, which will explode nitro-glycerin more readily than dynamite and other less powerful explosions, that we deprecate the indiscriminate use of that terrible explosive compound.

A NOBLE INVENTOR.

Invention is confined to no rank or condition of life. The names of statesmen, warriors, divines, authors, merchants, bankers, manufacturers, and mechanics, are to be found enrolled among the benefactors of the race, as inventors and discoverers of new and useful improvements in the arts.

In the course of our professional experience we have frequently been called upon to take out patents for men distinguished for their labors in other departments of life. We were forcibly reminded a few days since of the ubiquitous character of inventors by a visit to our office of a venerable British Peer, the Earl of Mount Cashell, of Moore Park, a gentleman eighty years of age, who, a short time previous to his departure from his home, had employed our services to obtain for him a patent for an improvement in windows. Having a son residing near London, Canada West, his Lordship came over to pay him a visit, and on his return he called on us to inquire about his business. He mentioned the fact that he was a kinsman of the celebrated Lord Rosse, so well known for his scientific attainments and astronomical discoveries, and said that a vein of ingenuity runs through the family; and, furthermore, that he had a number of useful improvements

which he hoped to live long enough to patent for the benefit of the community. Here is an example of a British nobleman who feels a pride in classifying himself among inventors.

CULTIVATION OF OPIUM IN THE UNITED STATES.

Continued attention is given to the production of this drug in the United States. Recent tests go far to show that the quality of the opium raised in several sections of the country is good.

The editor of the *American Journal of Pharmacy* has made an assay of some laudanum made from Virginia opium, and finds that it equals in strength fair Turkey opium. On the contrary, Vermont opium is condemned as being merely an extract of poppy leaves and stalks, with a little true opium juice, very variable in composition, and wholly unfit to replace the foreign drug except in very large doses.

This defective quality is attributed to the mode of manufacture, described at length in the semi-weekly *Tribune* of March 5th by the inventor. The main features of this process are grinding and pressure, with use of some alcohol to extract the morphine. The juice thus obtained is dried, and then packed for sale. We agree with the *Journal of Pharmacy* that it must be impossible to obtain a good quality of opium by this process, but we are uninformed whether the proper method obtains opium of good quality and in good quantity from poppies grown so far North.

Mr. Robertson, the successful producer in Virginia, states that his experience is very limited, he having only cultivated the poppy in a garden on very rich soil, where the yield of opium was very great; he neither measured the land nor weighed the opium. He is satisfied that a deep rich soil is essential to a large yield; the poppy has a long tap root, which enables it to stand severe drought, provided the tap root can penetrate the soil to a sufficient depth. He thinks alluvial soils are best. The young plant is very tender, of slow growth, and cannot be successfully transplanted. The seed should be put in drills about three feet wide, the plants standing from one foot to eighteen inches apart, or even more, as it is a very vigorous grower. The last of July or early in August is a good time to sow the seed, as the plants stand the winter without injury. The single poppy he found to yield more opium than the double, and there is less trouble in obtaining it from the capsules. The single white poppy, or rather the poppy with white seeds, is generally considered the true opium plant. When the capsules are about half grown, or three or four days after the flower has dropped, is the proper time to make several longitudinal incisions on the capsule, taking care not to cut through the capsule.

The incisions should be made during the latter part of the day, and the thickened juice which exudes during the night scraped off the next morning with a dull knife. When it becomes sufficiently dried it can be put up in any shape or size that is desired.

HOW A WORKINGMAN MAY GET A HOUSE OF HIS OWN.

We have no desire in these remarks to say anything to the injury of those who make building a business, or rather, a speculation. If they have injured their business by shabby methods of building that is their business and not ours. But it is not only our business, but our duty, to point out to workingmen a method whereby they may provide themselves with comfortable dwellings, provided always that they possess habits of economy and skill sufficient to demand the average wages of skilled mechanics in this country.

It is undoubtedly true that no man can now be sure of obtaining any one of the cheaper class of houses in American cities, ranging in price from $1,000 to $5,000, properly constructed, unless he can supervise its erection himself, or has it supervised by some trustworthy agent. If he buys one already built he runs the risk of finding it sadly in want of repair after a few month's occupation. The timber has not been properly seasoned, the walls crack from the settling of the foundations, the roof will perhaps leak, the floors will sag, and repair will be added to repair, only to disappoint the hopes of the deluded purchaser.

It is true that in the best built houses there will be some cracking of the walls and shrinking of joiner work, but these necessary evils are not what we refer to; it is of their exaggeration, consequent upon gross and willful negligence in the erection of such buildings, that we speak. Timber reduced to the smallest size at which it could be expected to bear the strain to which it must be subjected, even if of the best quality, is put in without regard to any other requirement than size; so cross-grained sometimes that we have even seen it split obliquely across from the face of the hammer in nailing, and afterward spliced by strips of thin board nailed on to its sides with *small nails* so that it should not split a second time in the splicing. What matter! The house is made to sell, and if it will appear, when finished, to be well built, and keep up the appearance until sold, it has answered the purpose for which it was built, if not that for which it was bought.

The obvious moral to be drawn from these facts is that those who intend to possess comfortable and substantial houses should have them built for themselves, and thus see that proper materials and proper workmanship are employed. But how is this to be accomplished by men of very small means? "We must rent such houses as are built for us; we cannot build houses for ourselves," say they. "But *you can*," say we. It may take you one, three, or five years to do it, but you can do it, thus:

First, you must obtain a lot. We will say this lot is worth four hundred dollars. By joining a well-managed building lot association, of which many now exist in this country, you will be able to take advantage of the market and perhaps get it cheaper, and, as you will be more likely to save when belonging to such an association, we consider it a good plan to do so. But in order to get the required lot, you must, of course, save something in some way. Two dollars per week for two years, will give you a fund of $408, exclusive of interest, sufficient for the purpose. You can now raise money by mortgaging this property to a savings bank, or you may get help to build your house from a building association, which we believe exists in most large towns. These associations, upon the payment of a small sum weekly, will erect a house for you, taking a mortgage on the entire property as security, so that at the end of four years, or thereabouts, you may live in a house of your own, and the rent you are now paying will pay up the mortgage after a time, leaving you the property unincumbered.

If the property has been well purchased (the aid of such societies as we have described cannot be obtained otherwise), you can probably dispose of the property at a considerable advance on the purchase price at any subsequent period you see fit. In most of our growing cities the first value of your house and lot will have doubled on your hands by the time it is paid for, so that you could at the end of ten years from the time you laid by your first two dollars, realize by the sale of your property a very comfortable sum to have in bank, or to reinvest in business, which would never have been yours if you had paid all in rent to greedy landlords.

These remarks are specially applicable to workingmen in large and growing cities where rents are high, while suburban lots are low, and of easy access by means of horse cars and other facilities of modern travel.

KING-CRABS AND THE MANUFACTURE OF CANCERINE.

The last summer trip it has been our good fortune to snatch from the confinement of journalism, was made at Delaware Bay. The fine shores which skirt this magnificent body of water, are remarkable for the enormous swarms of king-crabs, or, as they are sometimes called, horse-feet, from their fancied resemblance to the foot of a horse, which annually visit them.

They deposit their eggs in the latter part of May, and in June, at which time their numbers are beyond estimation. The shore is strewn, at all seasons, with their shells. "The Geology of New Jersey" states that 100,000 per week have been captured on a shore length of 100 rods; 750,000 have been taken on one-half a mile of shore, and in one year 1,200,000 were taken on about one mile of coast. The same authority says "the number of eggs is very great. They are so thick that they can be shoveled up by the wagon load. Great numbers are thus gathered and carried away to feed chickens. When they hatch, the sand is fairly alive with the little creatures. A year or two since, a vessel took in a load of sand, and in two or three days so many of these young king-crabs appeared in it, that they were obliged to throw the whole overboard."

This animal is found along the whole Atlantic coast, but, for some reason, Delaware Bay seems a favorite resort for them. During the breeding season, no more novel and amusing sight can be exhibited to one not familiar with it, than these creatures coming in on a full tide. The water is one dense mass of teeming life. The imagination is bewildered in the vain attempt to estimate their numbers. In they come, rolling, and tumbling, and climbing, and struggling to reach the shore, and the ebb of the tide leaves large numbers an easy prey. Hogs are extremely fond of king-crabs, and large numbers are caught for that purpose. They are also gathered into pens, where they soon die, and their decayed bodies form an excellent manure. Land, so poor naturally that no wheat could be grown on it, has been so enriched by the application of this compost, that from 25 to 30 bushels to the acre has been produced.

An excellent compost is prepared by mixing the dead bodies of these animals with sawdust, straw, forest leaves, muck, mud, or barn-yard manure, or a mixture of these materials.

In some places their bodies are ground up after being desiccated, put up in bags, and sold as an artificial manure, under the name of "cancerine." Its value, at the works, is about $25 per tun. About eight hundred pounds per acre is the amount applied, and its fertilizing power is estimated as being about equal to half its weight of guano.

An analysis of cancerine, by Mr. Ingham, gives water, 9·32; organic matter, 70·86; lime, 4·35; phosphoric acid, 2·71; sulphuric acid, 5·17; alkaline salts, 3·68; sand, 3·88. The nitrogenous substances contained in cancerine are sufficient for the production of a little over ten per cent of ammonia, although the latter does not exist ready formed in it.

The habits of the king-crab are very imperfectly understood; after the breeding season the live ones disappear, and their place of resort during the interval is not known. It is estimated that if the onslaught annually made upon them, does not permanently reduce their numbers, the production of cancerine can be developed to many thousands of tuns annually.

The New Apothecaries' Act.

The general deprecation of the careless manner in which powerful drugs have hitherto been dispensed, in which we have taken a prominent part, has resulted in calling the attention of our legislators to the subject, and a law has been passed in this State which reads as follows:

SEC. 1. No person employed or in attendance at any drug store or apothecary shop shall prepare a medical prescription, unless he has served two years' apprenticeship in a drug store or is a graduate of a medical college or a college of pharmacy, except under the direct supervision of some person possessing some one of the before-mentioned qualifications; nor shall any one having permanent charge as proprietor, or otherwise, in any store in which drugs are sold by retail, or at which medical prescriptions are put up for sale or use, permit the putting up or preparation thereof therein, by any person, unless such person has served two years as apprentice in a retail drug store, or is a graduate of a medical college or a college of pharmacy.

SEC. 2. Any person violating the provisions of this act shall be deemed guilty of a misdemeanor, and shall be punished by a fine not exceeding $100, or by imprisonment not to exceed six months in the county-jail; and in case of death ensuing from such violations, the person offending shall be deemed guilty of a felony, and be punished by a fine not less than $1,000, nor more than $5,000, or by imprisonment in the State Prison for a term of not less than two years nor more than four years, or by both fine and imprisonment in the discretion of the Court.

SEC. 3. This act shall take effect immediately.

This is good so far as it goes; but in order that the public be properly protected, druggists ought to be made responsible for the character of the patent medicines and nostrums which they are in the habit of vending.

NEW TYPE-SETTING AND DISTRIBUTING MACHINE.

Mr. M. Umstadter, of Norfolk, Va., informs us that he has completed a machine that will justify ten thousand characters per hour, the work being done with far greater exactness than can be found in any printed book. The Norfolk *Virginian*, in speaking of this invention, says respecting it:

Other machines have been invented and put in operation, but the trouble with all has been the want of any appliance for "justifying," or making the lines the same length, with due regard for the space between words and the proper division upon syllables. This has, in every instance heretofore, been done by hand, and thus, as labor-saving implements the previous inventions have been of little value. To obviate this difficulty has been the chief care of the inventor in this instance, and he claims that his machine will set and "justify" as many type in a given space of time as six men. The justification is effected by a space of his own invention, of this shape X, formed of brass or steel strips riveted together in the middle, and capable of being compressed into one-half of the ordinary thickness.

The machine proper is two feet wide, and thirty inches long, divided into as many compartments as there are different types; into these compartments the types are placed in the proper position, filling the chamber, into which they fit loosely, their own weight keeping them pressed down to the bottom. In front of the machine is a double row of iron keys, lettered to correspond with the chambers of type. By pressing upon one of these keys a type is forced from the bottom of one of the chambers into an iron trough, fitted to the exact thickness of the size of type used, so that when once in the trough or slide it is impossible for it to fall over on its side. Underneath this trough runs a belt, furnished with steel hooks or teeth, and driven by a treddle beneath. These hooks convey the type along the trough to an apparatus at the end of the machine, where they are placed in regular order until a line is full, when the striking of a bell announces the fact to the operator, who, by simply pulling a small lever, places the line in an upright position on a frame.

The machine can be seen at David Morris' establishment, on Union street, where he is busily engaged upon an automatic distributing apparatus to be attached to the machine, when it will be the most perfect invention for the purpose yet brought before the public.

The sample of the work sent to us is very good, but no better than what has been done by other machines for the same purpose.

A Hygienic Ice Chest.

At the last meeting of the Massachusetts Institute of Theology in Boston, Dr. Garrett exhibited and explained what he he called a hygienic ice chest, which he claimed would ventilate a room by means of ice. The apparatus had the form of a secretary, the middle portion containing ice, the lower receptacle for the water from the melting of the ice, and the upper portion containing convenient shelves. He said the coldness of the ice would make a downward draft of air through a slit in the top of the apparatus, and that the air thus cooled and deprived of its moisture would issue from the sides into the apartment, purified and refreshed. He added that the noxious effluvia of the sick room would thus be drawn in upon and condensed by the ice, and remain in the water below. It was not claimed that it supplied any oxygen to or removed carbonic acid from the air of the room, but that it removed unwholesome effluvia.

Mr. Lowe spoke of the hygienic importance of the relative humidity of the air within and out of doors, especially in sickness. This apparatus, by its ice, would make the issuing air drier, and, therefore, more healthful in the dog days, when the damp air is so oppressive. Moist air is the best conductor of odors, and the moisture is lessened by the ice. He thought, however, that the ice should be put in the top and not in the middle portion of the apparatus.

Mr. Duncklee made some remarks on the importance of securing in our dwellings a certain relative humidity, and said that from 40 to 65 per cent is the best, both for sick and well.

Trial of Steam Fire Engines.

At a recent Steam Fire Engine trial, held at Springfield, Ill., the citizens, at the outset, appeared to be prejudiced in favor of the piston engine, as being more simple and capable of more continuous work at a high rate of speed; but the rotary machine seemed to secure friends from the first hour of the trial. On the important points of the time taken in raising steam, and the facility with which a working pressure is maintained, and the capacity for throwing a large amount of water, the rotary demonstrated superiority. The fact that though she threw her water a greater distance than her opponent, the hose and engine remained perfectly still, demonstrates her economy for repairs of machinery and hose. The consumption of fuel in the rotary was also much less.

THE workmen in the Springfield armory, in Massachusetts, have taken steps to form a workingmen's association, to cooperate with similar associations throughout the country on the eight-hour and other questions.

THE LATE REV. PATRICK BELL, LL.D.

The Rev. Patrick Bell, LL.D., minister of Carmyllie, in the Presbytery of Arbroath, the well-known inventor of the reaping machine, died recently, after almost attaining the Scriptural three score years and ten. He had been ailing for the greater part of a twelvemonth, and for the last four months of his life he had been entirely laid aside from ministerial duty. The celebrity attained by Dr. Bell was entirely due to the successful character of the invention with which his name is henceforth to be indissolubly associated in the history of the country. The father of the deceased was a farmer in Forfarshire; and when young Bell was a student, prosecuting his studies for the ministry at St. Andrew's University, in the year 1827, he turned his attention, on his brother's farm, to the practical application of his views on machine reaping, and in the following year the machine was working successfully. It was then almost as perfect a piece of mechanism as the best reaping machine of the present day. Its invention preceded that of the American machines by seven or eight years. At the Dundee meeting of the British Association, in 1867, Dr. Bell gave a very full and graphic account of the history of the invention. Some time after that meeting, a subscription of £1,000 was collected and presented to Dr. Bell, as a recognition of the great value and utility of his invention, and about the same time he was created L.L.D. by his *alma mater*. Dr. Bell was an excellent mathematical scholar, and fully studied the application of mathematical science to physics.—*Engineering.*

The White-footed or Deer Mouse.

This species of the *Mus* family has been noted for two characteristics, not confined to it alone, but still ra[illegible]. One is that it is an active tree-climber, and very frequently makes its nest upon or in trees, sometimes at a considerable distance from the ground; and the other is its mode of transporting its young, which, as usually observed, is by the latter adhering to the teat of the mother, who drags them along in her flight from danger.

In October last I observed a bunch of sticks and twigs in a thorn bush, about thirty inches from the ground, about the size of one's head and rounded on the top, with no appearance of ever having been occupied by a bird. When the ax-man struck the root of the tree, a white-footed mouse (*Mus leucopus*) rushed from the nest with two of her young family, fully half-grown, attached to her. She coursed up and down the limbs, and from one limb to another, dragging her heavy load after her. Occasionally both would drop down on either side of the limb along which she was dragging them. Sometimes when she would reach a lateral branch, the young hanging its whole length below it, she would *yank* the infant with a force truly surprising, which must have been a severe test upon the hold of the little one.

Two observations interested me particularly: First, the young were not adhering to the teat, which has been supposed to be the universal habit of this mouse, but were adhering to the outside of the thighs. In this observation I do not think I could have been mistaken, as I was struck with this peculiarity, and stood within a yard of them, and she stopped in plain view several times in apparent doubt as to which way to go, and once on a limb about an inch in diameter, and with one of the young hanging down on either side, which gave me the best possible chance for an accurate observation. The young, though large enough to have fled much faster than the mother could drag them, made no effort to assist in the flight, but contented themselves with passively hanging on. Second, the young were of a dull blue or lead color, darker than the common house-mouse, and showing no white on the feet, belly or sides, which is always observable in the adult.

My desire to secure them as specimens was overcome by my sympathy for the afflicted mother, and I allowed them to escape. This was done after having once retreated to the nest, and left it again upon a new alarm, when she ran out upon a limb as far as she could, and jumped to the ground, a distance of full four feet, the young still adhering to her.

I did not, as I should have done, examine the internal arrangement of the nest. If she had taken possession of an abandoned bird's nest, she had completed the structure by adding to it till the top presented a full convex form.—*J. D. Caton in the American Naturalist.*

The Channel Bridge.

The following is a translation of an article in the *Journal Officiel de l'Empire Francais*:

"The project of a bridge over the Straits makes each day further progress. The first model was completely finished some days ago, and is perfectly satisfactory. This small model is composed of a single arch, reduced upon an exact scale to the hundredth part of the size of one of those of the great bridge. It presents an absolute rigidity throughout; that is to say, it is not subject to any movement or oscillation; there is, consequently, no vibration calculated to disintegrate the metal.

"There is no more elasticity perceptible under foot than in walking on a pavement, and it can support without any deflection, a weight greater than that of twenty trains proportioned to the same scale, meeting in the middle of the arch. The weight of ten men does not produce a deflection of more than a few millimeters in its whole length, and as soon as it is relieved of its burden, it recovers exactly its first position; indeed, it is not necessary to employ several of the parts prepared to ensure rigidity. This result simplifies the question, and permits considerable economy in the cost.

"A second model of a size double that of the first is on the point of being completed, and if, as everything tends to show, the result is as favorable, the most skeptical will be unable to entertain the smallest doubt in respect of it.

"In any case, the problem is solved that bridges and viaducts of every size can be constructed in a single arch, without piers, from bank to bank. Already many orders for large and small bridges have been given—among others, a large bridge for a road and railway of a kilometer in length, which will unite St. Malo and St. Servan to Dinan; a foot bridge of a hundred meters over the basin of the lock at Calais; and several others for the departments."

Apparatus for Saving Life at Sea.

A new contrivance for saving life at sea has been made by M. C. J. Laurendeau, of Paris. It is composed of a quantity of thick cork, sufficient to float and sustain a person in the water, and is adapted to the abdomen and a part of the chest; a second supply of thinner cork is placed between the shoulders, and reaches to the nape of the neck. This arrangement is intended to produce perfect equilibrium, the part of the body unfurnished with cork acting as ballast. Should the bather desire to swim under water, the collar is removed, or the buoyant part turned from the side, the principal piece being furnished with nippers for closing the nostrils and a pipe or tube to breathe through, the end of which terminates in a funnel of cork, so as to float on the surface of the water. And, finally, a person may remain, and swim a considerable time under water, by making the principal piece of the apparatus both a means of buoying up the body and an air reservoir, from which the bather expels and draws in air by means of a double tube, the reservoir being divided into two compartments by an elastic partition; but this apparatus is intended only for good swimmers, and it would be necessary to carry ballast.

Editorial Summary.

HERR GROTOWSKY, of Halle, on the Saale, has made known some interesting facts on a new property of hydrocarbon oils which he has discovered. Exposing various kinds of oils in glass flasks to the rays of the sun for a period of three months he found invariably that they absorbed oxygen and converted it into ozone. The air was ozonized even in well corked vessels, the effect being, however, to some degree dependent upon the color of the glass. The respective results were noted after the lapse of three months. American kerosene, from petroleum, which had been exposed to light in white unwraped glass balloons, had become strongly ozonized so much so that it scarcely burned. The originally bluish white oil had assumed a vivid yellow color, and the specific gravity was found to have increased 0·005. American kerosene which had been kept in the dark for three months did not show any ozone at all, and burned satisfactorily. The oils were exposed from April to July, 1868. Those which had become strongly ozonized had also suffered a distinct change in odor, and the corks were bleached as if attacked by chlorine, while the other oils had remained unchanged in these particulars.

THE EFFECT OF CHARCOAL ON FLOWERS.—A horticulturist in England, purchased a rose bush full of promising buds—the flowers, however, were of a faded hue. He covered the earth in the pot about an inch thick with pulverized charcoal, and was surprised, some days afterward, to find the blooms of a fine lively rose color. He repeated the experiment another season with the same result. He then tried the powdered charcoal upon petunias, and found that both the white and violet colored flowers were equally sensitive to its action. It always gave great vigor to the red or violet colors of the flowers, and the white petunias became veined with red or violet tints; the violets became covered with irregular spots of a bluish or almost black tint. Many persons who admired them thought they were choice new varieties from the seed. Yellow flowers appear to be insensible to the influence of charcoal.

THE new Cab Company Act, which passed the Legislature during the last session, is shortly to go into operation. The company have a capital of a quarter of a million, with power to add one hundred and fifty thousand more, and are authorized to run their cabs or hansoms in any street in New York or Brooklyn that the Mayor of each city may direct. The following rates of fare are provided in the act, and a half fare additional may be demanded between midnight and six o'clock in the morning: "For any distance not exceeding one mile, for a single passenger, 30 cents, and for two persons, 40 cents; and at the same rate for greater distances, a fraction of a mile counting always as a mile. For any time not exceeding one hour, for a single passenger, 75 cents; for two persons, $1; and for any time additional, for each hour, or fractional part of an hour, at the same rate."

CHEAP POSTAGE SYSTEM.—Since the publication on page 315, current volume, of our notice of the abuse of the franking privilege by Hon. John T. Deweese, M. C., of North Carolina, in franking Swetland's circulars, we have had other complaints. It appears from the envelopes before us that Mr. Deweese not only signs his frank, but the superscription appears also to be done in the same hand writing. We could afford to pay a very liberal salary to any "M. C." who is open to do work of that sort. Our yearly postage bills are very large.

DWARF orange trees from China have reached Los Angeles, California, in good condition. "It is curious," says a writer, "to see an orange tree not over two feet high, and filled with blossoms and fruit." An acre of ground would contain over four thousand of such trees, and although each tree would produce not more than a half dozen oranges, yet the yield per acre would largely overbalance that of standard trees. A lot of bamboo plants, of a variety which grows to a hight of thirty feet, and from three to four inches in diameter, have also reached California.

THE Postoffice Department has received a telegram from Promontory Point, stating that the mails have been delivered at that place to the Central Pacific Road, and that the through line has been regularly established. The Butterfield Company were informed that their contract would cease on the junction of the roads. The cost by the Butterfield route for transporting the mails was $1,100 a mile, and by the railroad $200 a mile per annum.

WE desire to call the attention of our readers to the advertisement of the Colwells, Shaw & Willard Manufacturing Company, dealers in Patent Lead Encased Block-tin Pipe, published in another column. This pipe brings one of the purest and most harmless of metals into contact with water used for culinary purposes, instead of the poisonous metal-lead. Its merits are attested by a large number of eminent scientific and practical men.

FISH.—William Church, of Seymour, Conn., is engaged in pisciculture, and estimates that his present stock in trade consists of 500 trout, which will weigh from 1¼ to 1½ pounds each; 5,000 which will weigh 1 pound each; 20,000 which will weigh from 8 to 10 ounces, and 100,000 which will weigh from 2 to 4 ounces. In three years' time he thinks he will be able to send to market 200 tuns per annum.

Dingler's Journal recommends as a lute for covering the corks of vessels containing benzine or any of the light hydrocarbons or essential oils, a paste made of finely-ground litharge and concentrated glycerin. The mixture is spread over the corks or bungs, and soon hardens. It is insoluble in the said liquids, is not acted upon by them, and is quite inexpensive, as the commonest kind of glycerin can be used.

REPORT ON HEAVY ORDNANCE.—We are indebted to the courtesy of Hon. J. A. Garfield for a copy of the Report of the Joint Committee on Ordanance, presented to the U. S. Senate, February 15, 1869, for which he will please accept thanks. The notice of the subject-matter of this report is reserved for a future occasion.

WE, this week, conclude our series of articles on the manufacture of beet root sugar. They comprise the most copious and reliable information ever published in America on this industry, and may take the place of a hand-book with manufacturers and others who wish to be informed in regard to it.

PAGLIARI, an Italian chemist, has invented a kind of paper with which carbolic acid is so thoroughly incorporated that the paper when used to pack animal substances preserves them in a perfectly fresh state, without salt or any curing whatever.

NEW PUBLICATIONS.

PRINCIPLES AND PRACTICE OF ARCHITECTURE. Comprising Forty-six folio Plates of Plans and Details of Churches, Dwellings, and Stores Constructed by the Authors. Also an Explanation and Illustrations of the French System of Apartment Houses and Dwellings for the Laboring Classes. Together with Copious Text. By Sanford E. Loring, Architect, Chicago, and W. L. B. Jenney, Architect, Chicago, Graduate of the *Ecole Centrale Des Arts et Manufactures*, Paris. Chicago: Cobb, Pritchard & Co. Cleveland: Cobb, Andrews & Co. Philadelphia: Claxton, Remsen & Haffelfinger. Cincinnati: Robert Clarke & Co.

This work, though it contains a large number of artistic designs, as its title sets forth, is by no means devoted to this department to the exclusion of full discussion of the fundamental principles of architecture and other important topics connected with the art. The work is a large quarto, of which nearly one-third is devoted to the review of the history of the most important styles of architecture, truth in art, theories of construction, and a most important chapter on modern French architecture, in which the subjects of apartment houses of Paris and workingmen's cottages are elaborately treated. The illustrations are of a most excellent character, and as a specimen of a publication of this kind, the execution is praiseworthy throughout. We have not met with an architectural work more adapted to the wants of building associations than this, and its adaptability to the wants of young architects is unquestionable.

MODERN PRACTICE OF THE ELECTRIC TELEGRAPH. A Hand-Book for Electricians and Operators. By Frank L. Pope. New York: Russell Brothers, Publishers, 28, 30, and 32 Center street.

Mr. Pope, well known as a practical operator and electrician, and for merly connected with the office of the SCIENTIFIC AMERICAN, has given us an octavo of 128 pages, upon the above subject. His qualifications, both theoretical and practical, peculiarly fit him for work of this kind. He has had a large experience in constructing telegraph lines, and has spent much time in chemical and electrical researches. The book is written with a special regard to the general ignorance which prevails among operators about the theoretical part of their profession. Such knowledge is needed to change their labors from the drudgery of mere mechanical routine, to an intelligent and interesting occupation—one in which the brain may find employment as well as the hand. As a work of reference the book has one serious fault—it lacks an index. This want is, however, partially supplied by a copious table of contents. The book commences with a discussion of the various batteries in use for telegraphic purposes, and the generation of electric currents therefrom, from which starting point the subject is amplified in a plain and practical way through all its ramifications.

THE ECLECTIC, for June, contains a picture of Alexandria II. Articles—The Physical Basis of Life; Fergusson's Tree and Serpent Worship; Other Inhabited Worlds; Genius in Love; A Whist Reminiscence; Professor Tyndall on Sound; The Northmen, Heathen and Christian; The Mystery of the Grange; Lanfrey's Napoleon I.; He Knew he was Right, Chaps xxii., xxiii., and xxiv.; Physical Education; A Night Among Wild Fowl; The Recluse of Pulo-Penang; A Lunatic Colony; Alexander II., Emperor of Russia. Poetry. Notes on Books. Art. Science. Varieties. Terms of the Eclectic, $5·00 per annum. E. R. Pelton, Publisher 108 Fulton street, New York city.

THE ARCHITECTURAL REVIEW AND AMERICAN BUILDERS' JOURNAL for May comes to hand with its usual beautiful illustrations and a rich array of reading matter.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Minister of the Treasury of the Peruvian Government has recently offered to lease the quicksilver mine of Huancavelica to any responsible company or man for 100 years, at a rent of $5,000 per annum for the first 10 years, increasing afterwards, the lessee to give bonds for the prosecution of the work, and to incur a fine of $200,000 if the mine should be injured by false excavations. The Huancavelica mine is about 240 miles from Lima, and has always been regarded as little inferior to the celebrated Almaden mine in California; but the bad state of the Huancavelica, and the great obstacles offered by the mountain roads, have prevented it being profitably worked.

The Vienna Board of Trade have published a report on German railways, including those of the German Austrian provinces. According to this there were 13,639 English miles open for public traffic. The working expenses amounted in the highest case to between 96 and 100 per cent on the gross receipts, and in the lowest to 30 per cent, namely, the Turnau-Kralup and Kaiser Ferdinand's line. The highest dividend paid was 25 per cent, the lowest 2 per cent, and there were seven lines that paid nothing. By accidents during the last three years, from 1865 to 1868, there were 473 persons killed and 636 injured.

During the rainy season the macadamized roads of Paris are frequently inches deep in what is called macadam milk, which is a great nuisance in the sewers, filling them up very rapidly. An adventurous individual has found an application for this stuff, and at the same time, it is said, an income of £2,000 a year for himself. He collects the milk, allows it to settle in large tanks, passes the precipitate through silk sieves, and forms it afterward into what we call Flanders bricks, for knife cleaning, which sell at a franc each.

Addison county, Vermont, appears to be making progress in the raising of the poppy and manufacture of opium. It is stated that last year, a man in Monckton raised poppies and manufactured opium to the value of $3,000, and a number of farmers propose this year to cultivate the plant quite extensively. There are to be several acres of poppies on one farm in East Middlebury.

SILVER COIN.—Silver was first coined by the Lydians, by Phidon of Argos, 869 B.C. At Rome it was first coined by Fabius Pictor, 269 B.C. Used in Britain 25 B.C. The Saxons coined silver pennies, which were 22½ grains weight. In 1302, the penny was yet the largest silver coin in England. From 1816 to 1849 inclusive, there were coined at the mint in London, 11,108,-295*l.* 15*s.* in silver, being a yearly average of 444,330*l.*

The Government Commission have reported favorably on the plan of Mr Roebling for the East River Bridge, holding that a hight of one hundred and thirty-five feet, will not be an obstruction to commerce, and therefore the requisite Government consent, as provided for in the act of Congress, should be forthwith given to the proposed structure.

A new route is to be opened to India, from England, by way of Ostend, *via* Innspruck and the Tyrolese Alps. The same car will run through from Ostend to Brindisi, at the southeast end of Italy, and the passengers from London will reach Egypt in six days, or one day less than by way of Marseilles.

It has recently been decided by the New Hampshire Supreme Court, that travelers must withdraw their baggage from the keeping of railroad companies upon arrival; that the companies are under no obligation to store the baggage, and are not liable for its loss if "not removed within a reasonable time."

The *Boston Journal*, of May 19, reports that in the second week of May, the Hoosac tunnel at the east end, was driven thirty-two feet, and good progress made at the shaft and other headings. Five and a-third feet on one face is the best progress thus far made.

Reports from Nevada state that the ore from the Hale and Norcross lower level assays as high as $125 per tun, and that the whole mine yields at the rate of 1,100 tuns per week, averaging upwards of $60 per tun.

Parties in Albany are making arrangements to commence the manufacture of matches by a new process. They will use sodium instead of phosphorus. Sodium is as easily ignited, and is free of the unpleasant smell that attends phosphorus.

With the announcement of the completion of the railway to the Pacific comes the information that the last rail has been laid on the Rock Island and Council Bluffs road, thus finishing this line from Chicago to Omaha, and opening a competing road to the Missouri river. The work was pushed forward with remarkable energy.

A party of gentlemen in Jackson, Mich., recently organized a company for the manufacturing of soda ash, sal soda, bicarbonate of soda, caustic soda, chlorate of potash, and muriatic acid. Three hundred hands will be employed. The capital is about $500,000.

The Kansas Pacific Railway is now in operation from State line (Kansas City) to Sheridan, near eastern boundary of Colorado and head of Smoky Hill river, 405 miles; Leavenworth & Lawrence branch, 34 miles; Wyandotte branch, 2 miles. Total, 441 miles.

There are fifteen hundred miles of railroad under contract in Indiana. That State has never made such progress in the construction of railroads as she is making this year.

A large hotel, saw mill, shingle, and clapboard mill, a large tannery, a musical instrument factory, several stores, and a masonic hall will be erected in Foxcroft, Maine, during the coming season.

The Erie Railroad Company sell through tickets by the Union Pacific Railroad, from New York to San Francisco for $197 35.

The first invoice of tea from Japan for St. Louis was shipped on the 10th May, thus inaugurating the overland trade with China and Japan.

The Amador mine, at Sutter creek, according to the *Amador* (Cal.) *Ledger*, produced $65,000 during the month of February.

The pig iron product of Great Britain in 1858 was 4,800,000 tuns; the United States, 1,603,000, and Pennsylvania furnished 925,555 of this amount.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

L. L. G., of Mich., and O. R., of N. Y.—Your criticism of rule for determining the pressure in a boiler when it blows off, published in "Answers to Correspondents" on page 309, current volume, arises from your misunderstanding of our use of the terms "long and short arm "of a lever. We used these terms in preference to "leverage of the forces," because we supposed they would be better understood, premising that when employing them in a formula it would be seen by all that measurement from the fulcrum was meant; so that in a lever of the third order like that of the ordinary safety valve, the long arm would be the entire length of the lever, and the short arm the distance from the valve stem to the fulcrum.

F. W., of Oregon.—The "sett" of a wagon wheel should be such that the spokes should stand perpendicular on a level surface as they stand under the axletree. "Gather" we believe to be a fallacy. If however, any of our correspondents differ from us in opinion, we are open to conviction.

J. F. B., of Ind.—The best way to set a horizontal boiler, is, to have the firebox at least as wide as the boiler, and have as much heating surface as possible, but below the water line. All passages should be made large; so as to allow a free passage to the heated gases, and where they leave the boiler the passage should be made so as to open or close by a damper. The bridge wall, should be high enough to prevent the coal from being thrown over, and the grates should be low enough to allow ample room for combustion. Nothing can be gained by putting the fire near the boiler, or contracting any of the passages; it is better to let the heat diffuse itself fully throughout the entire heating surface. The shorter the steam is cut off in an engine, the more coal is saved; providing the engine is large enough, and runs fast enough, and the cylinder and steam chest are protected by a perfect non-conductor. Cutting off at one-third of the stroke the engine will give twice the power with the same fuel, and so on in the same proportion. There are two kinds of cut-offs, the fixed and the variable which are regulated by the governor. Where the power required is variable, the latter one gives the best result, but where it is constant the fixed cut-off does equally as well. The grate surface for your boiler should be about 14 feet.

J. W., of Kansas.—The specimens sent are not aerolites, but simply chalk flints washed out from chalk beds. The white exterior which you think shows where the surface has been burned, is the hardened chalk, having a scored or indented surface produced by the washing away of the soft chalk. Chalk beds are composed of the calcereous or soft shells of marine animals; the moss agates are also composed of shells of a harder nature, due to the presence of silex. Most chalk beds contain small masses of these silicious shells, which form isolated nodules of flint. They are picked up among the alluvial deposites, and go by the name of moss agates.

J. G., of N. J.—We are satisfied that all things considered, pine is the best timber for pump logs, wooden pumps, etc. Cucumber wood, would not be so likely to give the water a taste at first as pine, but whether this property is combined with power to resist decay to so great a degree as pine under the same circumstances can only be settled by experiment.

J. L., of Pa.—According to Bernoulli, the pressure at which steam becomes water is 8,500 atmospheres, and the temperature 800°C. These figures are considered too small by some more modern investigators. Your last query is too indefinite.

M. E. C., of Wis.—We infer from the piece of boiler you send us, that the iron was of bad quality, too thin, and that it had been overheated, either of which causes, or all combined would account for the explosion of your boiler.

S. R. S., of La.—We have never published the machinery to which you refer for laying down rail, such as was employed on the Central Pacific Railroad.

H. W., of N. Y.—We do not know that dynamite is on sale in this city but you could ascertain by addressing Tal. P. Shaffner, New York city.

J. N. C., of Ind.—A liquid blueing considerably used latterly is the soluble or basic Prussian blue, made by the action of ferrocyanide of potassium on a proto-salt of iron, and subsequent absorption of oxygen. You can get it from druggists.

C. G., of Ind.—The causes for the springing of a shaft are enumerated on page 243, current volume. The obvious remedy is the removal of those causes.

J. W. S., of Me.—The heat of the electric light produced by two of Bunsen's elements, if proper adjustments are made with the apparatus used, ought to melt silver or copper.

J. W. H., of Iowa.—Your query is based on insufficient data. It can not be answered without you state number of strokes per minute, length of stroke, and area of piston, as well as pressure in boiler.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

TRIPLE BEARING FOR AXLES, SHAFTS, ETC.—Reuben Daniels, Woodstock, Vt.—This invention relates to a new axle bearing, which is to be so constructed, that it can be used for a considerable length of time, and that it can, at any time, be readjusted when worn, by merely turning one or more set screws. The invention consists in interposing in an internal groove of one of the pieces constituting the body of the journal box a loose bar or plate of anti-friction metal, which can be forced against the axle or shaft by means of one or more set screws, and which will therefore keep the shaft tight in its bearing, as it can be forced further down when worn.

WINE AND CIDER MILL, AND PRESS.—Jacob Scholer, Burlington, Iowa.—The object of this invention is to construct a mill and press for the purpose of manufacturing cider, wine, etc., having its parts so arranged and adapted to operate together, as to render it much more effective, convenient, and economical of time and labor, than any heretofore brought into public use.

SLIDING DOOR.—Edmond Prud'homme and P. Moses Leprohon, New York city.—This invention relates to a new means for retaining sliding doors between their guides, even if they should shrink or settle irregularly or evenly, and has for its object to overcome the frequent annoyance resulting from the working of the upper dowel pins out of the groove or track provided for them. The invention consists in providing rollers on the upper edges of sliding doors, the rollers being hung in frames or bars that rest on springs provided on, or in the door, so that by means of these springs the rollers are constantly held up against the upper frame, and retained in the groove provided for them.

APPARATUS FOR SUPPLYING AIR TO HYDROCARBON BURNERS.—James Stratton, Philadelphia, Pa.—This invention relates to an improvement in the method of supplying air to hydrocarbon burners, whereby a fan is employed which forces a current of air into a reservoir, partially filled with water, in which are two or more floats which regulate a valve communicating with a pipe of any desired length, which conducts the air to the burner. It also relates to an improved swinging bracket lamp, to be used in connection with the other parts of the invention.

WRINGER.—S. W. Palmer and J. F. Palmer, Auburn, N. Y.—This invention relates to a a new clothes wringer, which is so arranged that the adjustable upper roller can be readily moved up or down, and always remain in gear with the lower roller, and that by simple means considerable spring power will be obtained.

BED BOTTOM.—E. C. Holden and E. L. Brocket, Owatonna, Minn.—This invention consists, first, in a peculiar construction of slats for bed bottoms, in three pieces, whereof two are parallel and the third curved between the other two; and second, in hanging the foundation piece of each slat upon crank shafts, one at each end, said shafts being placed longitudinally of the end pieces of the bed frame.

VENTILATOR FOR RAILROAD CAR, ETC.—T. J. Mell, Macon, Ga.—The present invention relates to a new and useful improvement in the mode of ventilating railroad cars, houses, etc., the object of which is to draw off the heated or foul air from the highest point in the car or building by opening the ventilator, which is so arranged in the roof of the car or building that when open the passengers of the car will not be troubled with cinders, dust, or leakage through the same.

RAILROAD SWITCH.—Thomas Daly, Erie, Pa.—This invention consists in a novel and useful apparatus for simultaneously operating the switch and signal of a railroad, by one and the same movement, so that every time the switch is changed, the signal shall also be changed so as to show the proper color

VENTILATOR.—M. E. Mead, Darien Depot, Conn.—The present invention relates to a new and useful improvement in automatic ventilators, for dwellings, stables, chimneys, etc., the object of which is by so connecting the slats on opposite sides by rods running across between them, that the said slats may be simultaneously operated upon and closed by the force of the wind blowing against them on the windward side and opened on the leeward side, thus enabling the ventilator to be kept open at all times on the leeward side.

SHOE PATTERN.—James A. French, Scenery Hill, Pa.—The object of this invention is to enable the manufacturer to cut the leather to the best advantage, and also to save labor in making the shoe.

MILL FEED.—Martin Weaver, Terra Hill, Pa., has obtained a patent for an improvement in a mill feed the object of which is to prevent clogging in the eye of the stone, to feed regularly, by means of a vessel fitting into the eye of the runner with four tubes in the bottom entering through the angles of the cross ring. There is a stationary cup, provided with side wings and slotted arms, suspended from the case, and made adjustable.

COMBINED PLOW CARRIER AND COTTON CHOPPER.—Fielding L. Kirtley, Cleyborne, Texas.—This invention relates to a frame mounted upon two wheels and arranged for supporting plows while in the act of turning up the earth; and it consists in so attaching the plows to the frame that the former shall not partake of the rising and falling motions of the latter as in passing over rough ground, and that the plows may be easily shifted, so as to substitute one kind of plow for another, and that the plows may be drawn directly by the traces and not through the attachment to the frame.

MACHINE FOR FILLING HORSE COLLARS.—George W. Hobart, Silverton, Oregon.—This invention has for its object to furnish a simple, convenient, and effective machine for filling or stuffing the rims or bails of horse collars, by means of which the work may be done easily, quickly, and well.

SHEARS FOR CUTTING IRON.—John Nichol, New York city.—This invention has for its object to furnish an improved shears for cutting sheet metal of any desired size, and which shall be so constructed and arranged as to hold the metal securely, and cut it smoothly and true, however large the sheet or plate may be.

HAND CORN PLANTER.—L. O. Hayworth, New Cumberland, Ind.—This invention has for its object to furnish an improved hand corn planter, simple in construction, easily operated, reliable and accurate in operation, and not liable to get out of order or to become clogged or choked up.

IRON LASTS.—J. Godfrey, New York city.—This invention has for its object to furnish an improved iron last, which shall be so constructed that the same last may be used for different-sized boots and shoes, avoiding the necessity of having a set of lasts.

WAGON BRAKE.—Anson Peirce, Lake City, Minn.—This invention has for its object to improve the construction of that class of wagon brakes that are operated by the forward pressure of the wagon in descending a hill, so as to make the brakes more satisfactory and reliable in operation.

INSECT TRAP.—B. M. Quint, St. Joseph, Mich.—This invention has for its object to furnish an improved trap for removing curculio, and the wormy and blighted fruit from peach and other fruit trees, which shall be simple in construction, and convenient and effective in use, enabling the work to be done with great rapidity.

PEN HOLDER.—George Harrison, New York city.—This invention relates to a new and improved device for discharging or removing metallic pens from their holders after they have become useless.

GANG PLOW.—J. W. Lewis, Oregon City, Oregon.—This invention relates to a new and improved gang plow, and it consists in a peculiar construction and arrangement of parts.

FASTENING FOR COLLARS.—M. B. Battey, Washington, D. C.—The object of this invention is to provide for public use, a simple, cheap, and convenient fastening for collars, which can be readily and easily applied to any collar, and which will hold the same securely fastened.

COFFEE ROASTER.—Israel Long, Terre Haute, Ind.—This invention comprises a new method of adjusting the hight of the vessel from the fire together with a new and improved construction of stirrer.

HORSE HAY RAKE.—Frederick Ebert, Saxonburg, Pa.—In this invention the penetrating point of the instrument is formed of two opening and closing teeth, operated by a central rod, with a tripping and locking lever of peculiar construction and operation. When the teeth are closed they form a cutting point; when open, they operate as lifting arms, which hold and raise the hay.

BREECH-LOADING FIREARM.—Wm. Bacon, Monticello, Kas.—The object of this invention is to so improve the construction of breech-loading ordnance that the breech can be opened and closed more easily and effectually than heretofore, while the lock or firing apparatus is so improved as to make it more simple, convenient, and certain in operation. The barrel, also, is constructed in a novel manner, whereby its strength is increased and its cost diminished.

REVOLVING SHOW CASE.—O. H. Melendy, Delhi, Iowa.—The object of this invention is to provide for public use, a cheap, convenient, and ornamental show case, in which a rotary box is employed to hold the article, and is divided into several compartments, that are shown through the glass cover of the inclosing case, said box being so constructed that it can be rotated about a vertical axis, so as to bring any one of the compartments under a door or lid near one side of the inclosing case, and allow articles to be inserted or removed through the same.

THILL COUPLING.—Charles E. Sweney, Genesco, Ill.—This invention relates to a new and useful improvement in couplings for thills, shafts, and poles for carriages, and for all descriptions of wheeled vehicles, whereby simplicity, durability, and perfect security are combined.

SAW-FILING MACHINE.—Albert Thompson, Ridgeway, Pa.—This invention relates to a new and useful machine for filing saws, more especially designed for filing circular saws used in sawing boards, and other descriptions of lumber, and it consists in suspending or hanging the machine in such a manner that it may be adjusted to the saw while it is attached to, and suspended from the frame of the mill or from any convenient fixture.

PIANOFORTE.—Edward Bloomfield and Dwight P. Otis, New York city.—The object of this invention is to strengthen the treble section of the bridge in a pianoforte by applying a screw pressure to a leaden bar placed upon the bridge.

THREAD GUARD.—George W. Dalbey, Carrollton, Miss.—This invention relates to a new and useful improvement in an article for female use, and consists in a cylindrical guard for enclosing a spool of thread, the cylinder being parted or cut so as to spring around the spool, and with its edge notched so as to form a cutter for the thread.

SAW-GRINDING MACHINE.—Thos. Gamble, Richmond, Va.—This invention relates to improvements in machines for grinding saws, the object of which is to provide a more convenient method of adjusting the stones as they wear away.

BINDER FOR LIDS OF GAS RETORTS.—Andrew Fulton, Albany, N. Y.—This invention relates to improvements in apparatus for securing the lids of gas retorts, designed to provide a simple and efficient clamping apparatus which may be conveniently operated for opening and closing the retorts It consists in an arrangement of clamping levers, supported in arms projecting from levers formed upon the retort near the mouth.

HEELS FOR BOOTS AND SHOES.—M. H. Prescott, Ottawa, Ill.—This invention relates to improvements in the construction of heels for boots and shoes made of metal, or mostly of metal; and it consists in an arrangement designed to make a more reliable connection of the same to the boot or shoe, and which will permit the heel to be readily removed.

COFFEE POTS.—W. C. C. Erskine, Nether Kinnedder, Dunfermline, Scotland.—This invention relates to improvements in coffee pots designed to provide a better arrangement for extracting the essence of the coffee and separating it from the grain than any now in use. It consists in a filtering or straining device attached to the top of an ordinary coffee pot, for containing the coffee and straining the hot water through it.

HEATING SHOE.—William Rogers, New York city.—This invention relates to a new and useful device for keeping the feet of invalids and others warm, more especially designed to be used by patients in sick rooms and hospitals; and the invention consists in making a shoe, boot, or sock, of any suitable material, as felt or woolen fabric, with a pocket or compartment in its under side or beneath the foot when the shoe is worn, in which pocket or compartment may be placed any heat retaining material, as stone, wood, metal, or composition in the form of a block or blocks, or any heated substance, as salt or bran, or any heated liquid, the pocket or compartment in the latter case being made of rubber or water-tight, with a tight stopper thereto, or the liquid may be contained in a metallic or glass vessel, which may be used instead of the block as first stated, in which case an india-rubber or water-tight compartment would not be required.

TACKLE BLOCK.—H. O. Winsor, Duxbury, Mass.—This invention relates to improvements in tackle blocks, such as are used for supporting pulleys for raising heavy weights, by means of ropes passing through the said blocks over the pulleys, and is designed to provide a means for readily discharging the rope therefrom, or engaging it therewith without the labor and delay of drawing the rope lengthwise through the opening.

HORSE HAY RAKE.—Albert Tschop and Jacob Hartman, East Berlin, Pa.—This invention relates to that class of horse hay rakes, in which a tripping lever is operated by a ratchet attached to the hub of the wheel, and consists first, in the employment of a guide-plate to hold the end of the lever, and prevent it from bending or breaking; secondly, a device for graduating the position and controlling the action of the eccentric, which releases the tripping lever from the ratchet; and thirdly, a strengthening rim or flange for the ratchet.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 18, 1869.

Reported Officially for the Scientific American.

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90,062.—GOLD-LEAF CONDENSER.—John F. Adams, Worcester, Mass.
90,063.—COMBINED COMB AND SHEARS FOR HAIR-CUTTING.—Joseph R. Atkinson, San Francisco, Cal.
90,064.—CLEANSING LIQUID.—E. J. Balcear, Martinez., assignor to Samuel Pillsbury, San Francisco, Cal.
90,065.—POTATO DIGGER.—Osmer W. Baldwin (assignor to himself, and Thomas F. Wright), Greenfield, Ohio.
90,066.—PROCESS OF USING UNMASHED INDIAN CORN IN BREWING BEER, ETC.—Nicholas Baumann (assignor to himself and W. B. Clark), Kalamazoo, Mich.
90,067.—PURIFYING THE WASTE GASES FROM COPPER ROASTING FURNACES.—Artemas Bigelow and James S. Baldwin, Newark, N. J., assignors to Henry Martin, Baltimore, Md.
90,068.—PLOW CLEVIS.—John Adolph Bilz, Pleasanton, Cal.
90,069.—LAMP REFLECTOR.—Edward C. Blakeslee, Waterbury, Conn., assignor to "The Benedict and Burnham Manufacturing Company.
90,070.—ALARM FOR POCKET BOOKS.—Theodore Blodgett, Belchertown, and Warren S. Weatherby, Granby, assignors to themselves and Charles D. Clapp, Amherst, Mass.
90,071.—LOG-SAWING MACHINE.—Hervey C. Boardman, Morrisville, Vt.
90,072.—WASHING MACHINE.—Fredrick W. Born, Cleveland, Ohio.
90,073.—PAINT COMPOUND.—H. W. Bradley (assignor to Chas. M. Dickinson), Binghamton, N. Y.
90,074.—GATE.—C. D. Brewer, Williamsport, Pa. Antedated May 10, 1869.
90,075.—PROCESS OF HARDENING STEEL.—Henry Brooke, Pittsburgh, Pa.
90,076.—BOOT JACK.—Edwin Lee Brown, Chicago, Ill.
90,077.—HAY SPREADER.—William H. Butterworth, Trenton, N. J.
90,078.—SETTEE.—Wesley Chase, Buffalo, N. Y.
90,079.—FEED REGULATOR FOR MILLSTONES.—George W. Clapper, Martinsville, Ind. assignor to himself, Thomas E. Dawson, Joel M. Johnson, and A. S. Greggs.
90,080.—PUMP.—W. H. T. Clark, San Francisco, Cal.
90,081.—MACHINE FOR HANGING WALL PAPER.—Leon Cline, Chicago, Ill.
90,082.—WAGON SEAT.—Theodor De Kimp, Kirksville, Ill.
90,083.—STEAM GENERATOR.—Anthony Demarce, Fairfield, Iowa.
90,084.—COMPOSITION FOR PAVEMENTS, ROOFING, AND FOR OTHER PURPOSES.—Julius Edmund Dotch and Edward Duempelman, Washington, D. C.
90,085.—POWER LOOM.—John C. Duckworth (assignor to Duckworth and Sons), Pittsfield, Mass.
90,086.—HARVESTER CUTTER.—G. L. Dulaney, Mechanicsburg, Pa.
90,087.—MANURE AND HAY FORK.—Geo. B. Flint, Sing Sing, N. Y., assignor to Montgomery Fork Company, New York city.
90,088.—TRUNK.—C. D. Flynt, Philadelphia, Pa.
90,089.—SUBMARINE TELEGRAPH CABLE.—Alfred Faucaut, Orleans, France.
90,090.—STRAW CUTTER.—Warren Gale, Peekskill, N. Y.
90,091.—PRINTING PRESS.—Geo. P. Gordon, Rahway, N. J.
90,092.—WINDOW FASTENER.—L. D. Gould, Newark, N. J.
90,093.—PROCESS OF TEMPERING METALS.—Edwin H. Grant, Washington, D. C.
90,094.—APPARATUS FOR COOLING LIQUIDS.—Charles Greenlee and Wm. H. Redfield, Belvidere, Ill.
90,095.—HOT-AIR FURNACE.—John Gwynn, Tiffin, Ohio.
90,096.—PERMUTATION LOCK.—Wm. Hall, Boston, Mass.
90,097.—APPARATUS FOR PURIFYING, SCREENING, AND COOLING REBURNT BONE BLACK.—Melancthon Hanford, Boston, Mass.
90,098.—HORSE HAY FORK.—Samuel Z. Hawbecker, Upton, and Abraham Thomas, St. Thomas, Pa.
90,099.—ARTIFICIAL LEG AND FOOT.—Moses H. Hawkins, New Haven, Conn.
90,100.—COMPOUND FOR THE MANUFACTURE OF LUBRICATING OILS.—E. E. Hendrick, Carbondale, Pa.
90,101.—OX YOKE.—E. N. Hillsgrove, Concord, N. H.
90,102.—STOVEPIPE SHELF.—N. H. Howard, Beloit, Wis.
90,103.—COAL AND GRAIN BOAT ELEVATOR.—S. K. Hoxsie, Philadelphia, Pa.
90,104.—MEAT BLOCK.—L. H. Ives, Syracuse, N. Y.
90,105.—CARRIAGE PAINTERS' EASEL.—Bruce Irons, Columbus, Wis.
90,106.—COMPOSITION FOR PAVEMENTS, ROOFING, DRAIN PIPES, ETC.—John L. Kidwell, Washington, D. C.
90,107.—CHEESE BOX.—V. P. Kimball, Watertown, N. Y.
90,108.—MACHINE FOR MAKING CUT NAILS.—Jacob B. Kingham, Dorchester, Mass.
90,109.—COMPOSITION DRAWING OR ROVING CAN FOR USE IN THE MANUFACTURE OF YARNS.—Peter Lawson, Lowell, Mass.
90,110.—STEAM ENGINE.—Daniel Lee, Boston, Mass.
90,111.—MODE OF UTILIZING THE SLAG OF A ROLLING MILL FURNACE.—Charles S. Lynch, Boston, Mass.
90,112.—CULTIVATOR.—J. McIlvain, Hancock, Ill.
90,113.—SAIL HANK.—Wm. McKay and Charles E. Bayley, Newburyport, Mass.
90,114.—FLY FRAME FOR PRINTING PRESSES.—Theodore H. Mead, Boston, Mass.
90,115.—GRADUATING PATTERN FOR BOOTS AND SHOES.—Michael Meade, Boston, Mass.
90,116.—GRAIN BIN.—Clark W. Mills, Brooklyn, N. Y.
90,117.—PORTABLE FENCE.—Thomas Nevison, Morgan, Ohio.
90,118.—COMPOUND TO BE APPLIED TO SHOES AND OTHER ARTICLES.—Enoch Osgood, Boston, Mass.
90,119.—BUTTON.—Oscar Paddock, Watertown, N. Y.
90,120.—APPARATUS FOR AGEING SPIRITS.—P. M. Papin, St. Louis, Mo.
90,121.—KEY.—Emery Parker, New Britain, Conn.
90,122.—EAVES-TROUGH SUPPORTER.—A. G. Perry, Clyde, Ohio.
90,123.—FLUID METER.—Townsend Poore, Scranton, Pa.
90,124.—INVALID TABLE AND BOOK HOLDER.—Ph. J. Probeck, and John B. Corlett, Newburg, Ohio.
90,125.—SAW-FILING MACHINE.—George Robinson and Harvey O. Silver, Sodus, N. Y.
90,126.—APPARATUS FOR MOLDING PULLEYS.—George Lamb Scott, Manchester, England.
90,127.—WATER HEATER.—Thomas Shaw, Philadelphia, Pa.
90,128.—HOT-AIR ENGINE.—Philander Shaw (assignor to Shaw's Union Air Engine Company), Boston, Mass.
90,129.—FOLDING FEED TROUGH.—Wm. N. Shellabarger, Union, Ohio.
90,130.—SEWING MACHINE.—S. P. Sleppy, Wilkesbarre, Pa.
90,131.—LAND ROLLER.—William H. Staats and August C Schwanke, La Prairie, and Lucas Stadler, Bowen, Ill.
90,132.—NUT LOCK.—G. Carter Stamper, Osceola, Iowa.
90,133.—LUBRICATING TEMPLE FOR LOOMS.—Edward S. Stimpson (assignor to Datcher Temple Company), Milford, Mass.
90,134.—UMBRELLA FASTENING.—Theodore R. Timby, Saratoga Springs, N. Y.
90,135.—LAMP SHADE.—James S. Travis (assignor to Archer and Pancoast Manufacturing Company), New York City.
90,136.—CUTTING PLIER.—Wm. L. Truland, Waterford, N. Y.
90,137.—DETACHABLE FIXTURE FOR CASTERS.—Alexander C. Twining, New Haven, Conn.
90,138.—FENCE GAGE.—Wm. V. Van Syckel, Joshua, Ill.
90,139.—DRIVING REINS AND BRIDLE.—William H. Wall, Boston, Mass.
90,140.—MANUFACTURE OF CARBONATE OF SODA AND OTHER CHEMICALS.—Isidor Walz and J. M. Pendleton, New York city.
90,141.—COAL STOVE.—David Wells, Lowell, Mass.
90,142.—POTATO DIGGER.—S. H. Wheeler, and L. V. Rouse Dowagiac, Mich.
90,143.—PUMP.—Parker Wineman, Joliet, Ill.
90,144.—CARRIAGE SPRING.—A. E. Wolcott, Chicago, Ill., assignor to himself and Isaac Simmons, Baltimore, Md.
90,145.—CARRIAGE SPRING.—A. E. Wolcott, Chicago, Ill., assignor to himself and Isaac Simmons, Baltimore, Md.
90,146.—CARRIAGE SPRING.—A. E. Wolcott, Chicago, Ill., assignor to himself and Isaac Simmons, Baltimore, Md.
90,147.—WAGON JACK.—John Zeller, Stouchsburg, Pa.
90,148.—RIGGING FOR GAFF-TOPSAILS.—Chas. Anthony, Providence, R. I.
90,149.—HORSE HAY-FORK.—D. S. Bigler, Siddonstown, Pa.
90,150.—PIANOFORTE.—Edward Bloomfield, and D. P. Otis, New York city.
90,151.—SCREW PLATE.—Wm. Bond and John Wroath, Sandy Hill, N. Y.
90,152.—BALING PRESS.—A. P. Boren, Greensborough, N. C.
90,153.—MOP HEAD.—G. E. Brettell, Rochester, N. Y.
90,154.—COMBINING HARD RUBBER WITH JET AND OTHER SUBSTANCES TO PRODUCE USEFUL AND ORNAMENTAL ARTICLES.—Wm. Byron (assignor to himself, and G. S. Rice), New York city.
90,155.—THREAD GUARD.—Geo. W. Dalbey, Carrollton, Miss.
90,156.—BEARING FOR SHAFTS.—Reuben Daniels, Woodstock, Vt.
90,157.—TUBE WELL PUMP.—J. H. Devirs and Dan'l Gravatt, Pleasantville, Pa.
90,158.—APPARATUS AND MACHINERY FOR PUDDLING IRON.—P. A. Dormoy, Vienna, Austria.
90,159.—COFFEE POT.—W. C. C. Erskine, Nether Kinnedder, Dunfermline, Scotland.
90,160.—MANUFACTURE OF GLUE.—Hugo Fleck, Dresden, Saxony, assignor to Wm. A. Fleck, Philadelphia, Pa.
90,161.—RAILWAY CHAIR.—G. P. Fuller, Philadelphia, Pa.
90,162.—BINDER FOR CLOSING GAS RETORTS.—Andrew Fulton, Albany, N. Y.
90,163.—SAW GRINDING MACHINE.—Thos. Gamble, Richmond, Va.
90,164.—HOLLOW PROJECTILE FOR FIREARMS.—T. D. Gibson, Wilmington, Del.
90,165.—IRON LAST.—J. Godfrey, New York city.
90,166.—PESSARY.—C. R. Gorgas, Roughsburg, Ohio.
90,167.—WATER WHEEL.—T. G. Hall, Beach Haven, Pa., assignor to himself and D. F. Leybert, Salem.
90,168.—PEN HOLDER.—Geo. Harrison, New York city.
90,169.—HAND CORN PLANTER.—L. O. Hayworth, New Cumberland, Ind.
90,170.—MACHINE FOR STUFFING HORSE COLLARS.—Geo. W. Hobart, Silverton, Oregon.
90,171.—BED BOTTOM.—E. C. Holden and E. L. Brockett, Owatonna, Minn.
90,172.—HORSE-STALL FLOOR.—Jas. Hollingsworth, Chicago, Ill.
90,173.—ALARM BELL.—Lawrence Holms, Paterson, N. J.
90,174.—NECK YOKE.—Wesley Hull, Fort Wayne, Ind.
90,175.—CORN HUSKER.—W. D. Jones, Hagaman's Mills, N. Y.
90,176.—STEAM HEATER.—J. L. Judge, Milwaukee, Wis.
90,177.—SHUTTER AND AWNING COMBINED.—R. D. King, Brooklyn, N. Y.
90,178.—GANG PLOW.—J. W. Lewis, Oregon City, Oregon.
90,179.—COMPOUND FOR TREATING ASTHMA AND OTHER DISEASES.—J. C. Lewis, Belfast, Me.
90,180.—AUTOMATIC VENTILATOR.—M. E. Mead, Darien Depot, Conn.
90,181.—RAILROAD CAR VENTILATOR.—T. J. Mell, Macon, Ga.
90,182.—HORSE POWER.—Dennis Michaels, and J. H. Croskey, Hopedale, Ohio.
90,183.—FOLDING SEAT.—D. H. Nation, St. Louis, Mo.
90,184.—SHEARS FOR CUTTING IRON.—Jno. Nichol, New York city.
90,185.—CLOTHES WRINGER.—S. W. Palmer and J. F. Palmer (assignors to S. W. Palmer and C. M. Palmer), Auburn, N. Y.
90,186.—WAGON BRAKE.—Anson Peirce, Lake City, Minn.
90,187.—ALARM CASH BOX.—J. D. Perkins, New York city.
90,188.—SASH FASTENING.—Chas. Perley, New York city.
90,189.—ELEVATOR BUCKET.—Jacob Pfitzinger, Buffalo, N. Y.
90,190.—HOLDER FOR SCREW CUTTING DIES.—Ansel Phinney, Bainbridge, N. Y.
90,191.—ABDOMINAL SUPPORTER.—M. F. Potter, Kaneville, Ill.
90,192.—HEEL FOR BOOTS AND SHOES.—M. H. Prescott, Ottawa, Ill.
90,193.—SLIDING DOOR.—Edmond Prud'homme and Pantaleon M. Leprohon, New York city.
90,194.—INSECT TRAP FOR PROTECTING FRUIT WHILE GROWING.—B. M. Quint, St. Joseph, Mich.
90,195.—HOLLOW AUGER.—H. J. Rickard, Rochester, N. Y.
90,196.—FASTENING FOR HORSES.—Philippe Ricord and John R. Scattergood, Newark, N. J.
90,197.—HEATING SHOE.—Wm. Rogers (assignor to himself and O. S. Paine), New York city.
90,198.—FELTED HAT.—Edw'd Sealy, Newark, N. J.
90,199.—BEEHIVE.—Norman B. Sebring, Matamora, Ohio.
90,200.—SEED DRILL.—Hugh Shepherd (assignor to himself and G. W. Scott), Lee's Summit, Mo.
90,201.—METHOD OF CASTING METAL PIPES.—J. J. C. Smith, Philadelphia, Pa., assignor to the Metallic Compression Casting Company, Boston, Mass.
90,202.—HAY KNIFE.—A. N. Staley (assignor to himself and D. B. Russell), Waynesborough, Pa.
90,203.—BEEHIVE.—R. P. Starbuck, Gallatin, Mo.
90,204.—TURBINE WATER WHEEL.—Geo. C. Stevens, West Townsend, and J. F. Stevens, Fitchburg, Mass.
90,205.—ORE CONCENTRATOR.—Geo. W. Strong, and Walter L. Strong, San Francisco, Cal.
90,206.—THILL COUPLING.—C. E. Sweney, Geneseo, Ill.
90,207.—SAW-FILING MACHINE.—Albert Thompson (assignor to himself, and G. T. Wheeler), Ridgeway, Pa.
90,208.—CULTIVATOR.—Hiram Van Meter, Macomb, Ill.
90,209.—ATTACHING ROSES FOR KNOBS TO DOORS.—Lorenzo P. Waterman and C. H. Porter (assignors to themselves, and J. M. Hunt), Bridgeport, Conn.
90,210.—COTTON-GIN.—J. W. Webb, Cotton Valley, Ala.
90,211.—CARPET SWEEPER.—O. H. Weed, Boston, Mass.
90,212.—MACHANISM FOR OPERATING SHUTTLE BOXES IN LOOMS.—Wm. Whiteside, Manayunk, Philadelphia, assignor to Thomas Wood, Philadelphia, Pa.
90,213.—SNATCH BLOCK.—H. O. Winsor, Duxbury, Mass.
90,214.—BREECH-LOADING FIREARM.—Friedrich Wohlgemuth, New York city.
90,215.—SYPHON BOTTLE.—J. B. Alexander, Washington, D. C.
90,216.—RAILWAY CAR CONNECTION.—W. P. Anderson, New York city.
90,217.—VAGINAL SPECULUM.—B. H. Aylworth, Oxford, N. Y.
90,218.—CENTER PLATE FOR COOKING STOVES.—R. Bailey, Cleveland, Ohio.
90,219.—PRISON GRATING.—T. F. Baker, Cincinnati, Ohio.
90,220.—VELOCIPEDE.—A. O. Baldwin and C. H. Miller, Lincoln, Ill.
90,221.—LOCKING CAP FOR BOTTLES.—L. M. Ballard, New York city.

90,222.—REVOLVING HARROW.—G. S. Bartholomew and A. R. Chapman, Reading, Mich.
90,223.—LUBRICATOR.—M. Bergner and Otto Netzow, Baltimore, Md., assignors to themselves and Joseph Lichtenstein.
90,224.—DETACHABLE CALK FOR HORSESHOES.—W. J. Berne, Cincinnati, Ohio.
90,225.—MANUFACTURE OF BOOTS AND SHOES.—L. R. Blake, Boston, Mass.
90,226.—SAFETY VALVE.—Samuel Boden, Louisville, Ky.
90,227.—ORE WASHER.—Rudolph Boehm, Chicago, Ill.
90,228.—SMELTING FURNACE.—Rudolph Boehm, Chicago, Ill.
90,229.—BRACE FOR SPRING BEDS.—H. D. Bolt, Elmira, N. Y.
90,230.—CORN HUSHER.—David Bookwalter, Gardner, Ill.
90,231.—WASHING MACHINE.—Geo. Bradshaw, Sandoval, Ill.
90,232.—PLOW.—T. E. C. Brinley, Louisville, Ky.
90,233.—HORSE HAY FORK.—A. S. Brown, Lebanon, Pa.
90,234.—HARD-METAL BOTTOM FOR TEA AND COFFEE POTS.—Henry Bullard and Robert Holmes, Middletown, Conn.
90,235.—TOOTH BRUSH.—E. F. Burrows, Mystic River, Conn.
90,236.—HOISTING MACHINE.—M. K. Carpenter, Cincinnati, Ohio.
90,237.—GANG PLOW.—G. R. Carter, New York city
90,238.—WATER PURIFIER AND COOLER.—J. A. Casey, Maysville, Ky.
90,239.—SAWDUST BURNER.—E. S. Chase, Eau Claire, Wis.
90,240.—FIREPROOF SKYLIGHT.—J. B. Cornell, New York city.
90,241.—RAILROAD SWITCH AND SIGNAL.—Thos. Daly, Erie, Pa.
90,242.—BEER COOLER.—H. C. Dart, New York city.
90,243.—ICE TONGS.—Augustus Day, Detroit, Mich.
90,244.—BRONZE ORDNANCE.—S. B. Dean, Boston, Mass.
90,245.—HORSE POWER.—J. G. Dillaha, Waco, Texas.
90,246.—PLOW.—H. B. Durfee, Decatur, Ill.
90,247.—HARVESTER.—Philip Dyer, Jr. (assignor to Robt. P. Morden), Unandilla, Mich.
90,248.—GRATE BAR FOR BOILER AND OTHER FURNACES.—G. A. Evans (assignor to W. F. Parker), Meriden, Conn.
90,249.—MACHINE FOR REMOVING THE BURRS FROM RAILROAD CHAIRS.—Day d Eynon, Richmond, Va.
90,250.—WASHING MACHINE.—John Fanning, Detroit, Mich.
90,251.—TURBINE WATER WHEEL.—N. T. Frary and E. T. Sherwin, Adrian, Mich.
90,252.—SHOE PATTERN.—J. A. French (assignor to himself and J. D. Ulery,) Scenery Hill, Pa.
90,253.—PROCESS FOR TREATING CORN, ETC., IN THE MANUFACTURE OF FLOUR AND MEAL.—Wm. Freudenau, St. Louis, Mo.
90,254.—MECHANICAL MOVEMENT.—E. E. Furney, Chicopee, Mass
90,255.—CHURN.—A. O. Gallup, Salem, and E. A. Hewitt, Groton, Ct.
90,256.—HORSE HAY FORK.—J. A. Glenn, West Middlesex, Pa.
90,257.—COMPOSITION FOR MOLDS AND CORES FOR CASTING METALS.—Charles Grasser, Philadelphia, Pa., assignor to Metallic Compression Casting Co., Boston, Mass.
90,258.—COOKING STOVE.—Chas. Green, Vincentown, N. J.
90,259.—GAS MACHINE.—C. C. Hare, Kansas City, Mo.
90,260.—GRAIN SEPARATOR.—G. F. Harlan, Elkton, Md.
90,261.—GATE.—H. P. Haskin, Roscoe, Ill.
90,262.—CLOTH-MEASURING MACHINE.—Wm. Hebdon (assignor to himself, C. H. F. Ahrens, and C. S. Baldwin), New York city.
90,263.—TRUSS BRIDGE.—G. P. Herthel, Jr., St. Louis, Mo.
90,264.—RAILWAY SWITCH.—Arva B. Hitchcock (assignor to himself and Richard Mertz), Juneau, Wis.
90,265.—STEAM ENGINE.—John Houpt, Springfield, Pa.
90,266.—CONDENSING STEAM ENGINE.—John Houpt, Springfield, Pa.
90,267.—STOVE DRUM.—R. A. Hunter, Ionia, Mich.
90,268.—SEEDING MACHINE.—Joseph Ingels, Milton, Ind.
90,269.—MANUFACTURE OF LEAD PENCILS.—F. G. Jenkins, Brooklyn (E. D.), N. Y., assignor to Joseph Reckendorfer, New York city.
90,270.—TELEGRAPH SWITCH BOARD.—C. S. Jones, Albany, N. Y
90,271.—PLOW.—Isaac Kennedy, Binghamton, N. Y.
90,272.—RAILROAD SWITCH.—Matthew Kerr, New Florence, Pa.
90,273.—HARVESTER.—W. A. Kirby (assignor to himself and David M. Osborne), Auburn, N. Y.
90,274.—COMBINED PLOW CARRIER AND COTTON CHOPPER.—F. L. Kirtley, Cleyborne, Texas.
90,275.—COMPUTING TABLET.—Henry Kummer, New York city.
90,276.—SEWING CASE AND POCKETBOOK COMBINED.—P. W. Lambert, New York city.
90,277.—GROUND MARKER.—Silas P. Lionberger, St. Mary's township, Ill.
90,278.—SAFETY VALVE.—James Linnard (assignor to himself, F. D. Worley, and W. S. Hassell), Philadelphia, Pa.
90,279.—SAFETY VALVE.—J. D. Lynde, Philadelphia, Pa.
90,280.—FENCE.—Robert McFarlane, Dane, Wis.
90,281.—MACHINE FOR PUNCHING LEATHER STRAPS FOR FLY NETS.—John Mathels, Ottawa, Ill.
90,282.—REVERSIBLE SKATE RUNNER.—T. T. McGrath, Detroit, Mich.
90,283.—KEY-HOLE GUARD.—Martin Mackenzie, Malden, Mass.
90,284.—MANUFACTURE OF DEODORIZED HEAVY HYDROCARBON OIL.—Joshua Merrill, Boston, Mass.
90,285.—BRICK PRESS.—G. A. Metcalf, Malden, Mass.
90,286.—HORSE RAKE.—S. D. Milam, Leoti, Ind.
90,287.—LAMP SHADE HOLDER.—C. M. Mitchell, Waterbury, Conn.
90,288.—REVERSIBLE LATCH.—W. T. Munger (assignor to P. and F. Corbin), New Britain, Conn.
90,289.—PENCIL SHARPENER.—L. B. Meyers, Elmore, Ohio.
90,290.—CAR COUPLING.—J. F. Nagel, Ligonier, Pa.
90,291.—GRAIN SEPARATOR.—Harrison Ogborn, Richmond, Ind.
90,292.—HAND DRILL.—S. H. Ostrom, Schenectady, N. Y.
90,293.—COOKING STOVE.—Peter Paradis (assignor to Equitable Cooperative Foundery Co.), Rochester, N. Y.
90,294.—STEAM ENGINE GOVERNOR.—James Parlane, Brooklyn, N. Y.
90,295.—STRAW AND FEED CUTTER.—G. Pedersen, Chicago, Ill.
90,296.—POLISHING MACHINE FOR POLISHING WOOD MOLDINGS, ETC.—B. C. Perry, Bridgeport, Conn.
90,297.—RAILWAY CAR SEAT.—G. W. Perry and J. D. Billings, Wilmington, Del.
90,298.—PRIVY SEAT.—Francis Peters and George Clem, Cincinnati, Ohio.
90,299.—GUIDE FOR FITTING LOCKS TO DOORS.—F. P. Pfleghar, New Have , Conn.
90,300.—PORTABLE FENCE.—David Philips, Cordova, Ill.
90,301.—PROCESS OF TREATING TOBACCO.—J. P. Posada, New York city.
90,302.—APPARATUS FOR CONNECTING VELOCIPEDES.—Wm. H. Racey, New York city.
90,303.—BED BOTTOM.—C. D. Read, Burlington, Vt.
90,304.—WEIGHT-LIFTING APPARATUS.—F. W. Reilly, Chicago, Ill.
90,305.—HANDLE FOR WEIGHT-LIFTING APPARATUS.—F. W. Reilly, Chicago, Ill.
90,306.—MACHINE FOR SEPARATING COCKLE FROM WHEAT.—G. B. Rich, Geneva, Ill.
90,307.—PIPE TONGS.—Bernerd Riley, San Francisco, Cal.
90,308.—MEDICAL COMPOUND.—Evans Robinson, Fairport, N. Y.
90,309.—WASHING MACHINE.—J. S. Ross, Bloomington, Ill.
90,310.—APPARATUS FOR OPERATING VELOCIPEDES AND OTHER MACHINES.—Francis Rourk, Erie, Pa.
90,311.—CORN HUSKER.—Jacob Russel, Brooklyn, N. Y., assignor to himself, Eddy, Reynolds, and Company, Milton Holmes, and Jacob Chase.
90,312.—PROCESS OF ORNAMENTING BOOTS AND SHOES.—E. J. Scott, Glasgow, Great Britain.
90,313.—PROCESS OF CONVERTING WROUGHT-IRON WIRE, RIBBONS, AND PLATES INTO STEEL.—W. A. Shaw, New York city.
90,314.—TEMPERING STEEL WIRE.—W. A. Shaw, New York city.
90,315.—JACK FOR THRASHING MACHINE.—Isaac Sherck, Flatrock, Ohio.
90,316.—FIRE ESCAPE.—W. H. Simmons, Skaneateles, N. Y.
90,317.—AXLE.—J. D. Smith, Schuylerville, N. Y.
90,318.—METHOD OF CASTING METALS UNDER PRESSURE.—John Joseph Charles Smith, Philadelphia, Pa., assignor to the Metallic Compression Casting Co., Boston, Mass.
90,319.—GARDEN IMPLEMENT AND WEEDER.—Wm. Somers, Bridgeport, assignor to himself and G. E. Somers, Waterbury, Conn.
90,320.—SAWING MACHINE.—P. H. Turner, Madison, Wis.
90,321.—RAILWAY-CAR AXLE.—John Van Slooten, New Orleans, La.
90,322.—ART OF MAKING METAL TUBES.—Samuel Vanstone (assignor to himself and J. W. Hoard), Providence, R. I.
90,323.—LOCK FOR ORDNANCE.—Josiah Vavasseur, Southwark, England. Patented in England Nov. 2, 1868.
90,324.—POROUS PORCELAIN FOR USE IN FILTERING, ETC.—Antoinette Vidal, Paris, France.
90,325.—STONE CHANNELING MACHINERY.—George J. Wardwell, Rutland, Vt., assignor to Steam Stone Cutter Co. Antedated Jan. 30, 1869.
90,326.—BODY LOOP HEAD FOR CARRIAGES.—Darius Wilcox, Ansonia, Conn.
90,327.—MANUFACTURE OF BLACK PIGMENT FOR MAKING SHOE BLACKING, ETC.—G. F. Wilson, East Providence, R. I.
90,328.—PROCESS OF TREATING OFFAL GELATINE AND SCRAP FOR THE MANUFACTURE OF FERTILIZERS.—George F. Wilson, East Providence, R. I.
90,329.—BEDSTEAD FASTENER.—H. S. Wing, Plattsburgh, N. Y.
90,330.—REVERSIBLE HINGE.—H. J. Walters, Salem, Mass.
90,331.—COOKING STOVE.—A. C. Corse, Troy, N. Y.

REISSUES.

71,837.—TEA AND COFFEEPOT.—Dated Dec. 10, 1867; reissue 3,437.—Alfred Arnold, Tenafly, N. J.
62,807.—CONSTRUCTION OF COAL SCUTTLES.—Dated March 12, 1867; reissue 3,438.—Alfred Bardell and Samuel Smith, New York city.
48,242.—DOOR BELL.—Dated June 13, 1865; reissue 3,439.—P. Corbin and F. Corbin, a joint-stock corporation, New Britain, Conn., assignees of Andrew Turnbull.
85,289.—STEAM ENGINE EXHAUST VALVE.—Dated Dec. 29, 1868; antedated Dec. 23, 1868; reissue 3,440.—Thomas S. Davis, Jersey City, N. J.
85,396.—MACHINE FOR CUTTING VITREOUS SUBSTANCES.—Dated Dec. 29, 1868; reissue 3,441.—W. T. Davis and Austin De Wolf, Greenfield, Mass., assignees of Ozi M. Pike.
64,410.—DEVICE FOR FORMING LETTERS AND FIGURES ON TYPE BLOCKS.—Dated May 7, 1867; reissue 3,442.—Daniel A. Draper, Cambridge, Mass.
41,688.—MACHINE FOR MAKING SPLINTS FOR BARREL HOOPS.—Dated Feb. 23, 1864; reissue 3,443.—Helen Dougherty, Rochester, N. Y., assignee, by mesne assignments, of John B. Dougherty.
48,366.—TREMOLO ATTACHMENT.—Dated June 27, 1865; reissue 3,444.—Alonzo Hitchcock, G. G. Saxe, and J. H. Robertson, New York city, assignees of R. W. Carpenter.
12,956.—MITER MACHINE.—Dated May 29, 1855; reissue 3,445.—G. W. La Baw, Jersey City, N. J.
60,529.—COLLEGE CABINET.—Dated Dec. 18, 1866; reissue 3,446.—W. W. Levering, New York city.
19,442.—HARVESTER.—Dated Feb. 23, 1858; reissue 3,447.—Division C.—C. H. McCormick, Chicago, Ill., assignee, by mesne assignments, of H. A. Parkhurst.
84,838.—BRIDLE.—Dated Dec. 8, 1868; antedated Dec. 1, 1868; reissue 3,448.—John McKibben, Lima, Ohio.
70,038.—APPARATUS FOR CASTING REFRACTORY METAL.—Dated Oct. 22, 1867; reissue 3,449.—Metallic Compression Casting Co., Boston, Mass., assignees of Michael Smith.
51,486.—HORSE RAKE.—Dated Dec. 12, 1865; reissue 3,450.—D. P. Sharp, Ithaca, N. Y.
87,226.—PROCESS AND APPARATUS FOR SEASONING AND IMPREGNATING WOOD WITH PRESERVATIVE MATERIALS.—Dated Feb. 23, 1869; reissue 3,451.—Martin Voorhees, Princeton, and George W. N. Custis, Camden, N. J.
22,681.—COOKING STOVE.—Dated Jan. 18, 1859; reissue 1,684, Dated May 31, 1864; reissue 3,041, dated July 14, 1868; reissue 3,453.—Division B.—Eliza C. Stewart, Troy, N. Y., sole legatee and executrix of the estate of P. P. Stewart, deceased.

DESIGNS.

3,496 to 3,498.—CENTER PIECE.—Henry Berger, New York city. Three Patents.
3,499 and 3,500.—STOCKING FABRIC.—Thomas Dolan, Philadelphia, Pa. Two Patents.
3,501.—CLOTHESLINE HOLDER.—D. F. Dunham, Auburn, N.Y.
3,502.—STOVE.—Conrad Harris and Paul W. Zoiner, Cincinnati, Ohio.
3,503.—FAN LEAF.—Otto R. Nitsch, New York city.
3,504.—EAVES TROUGH FASTENER.—Wm. Wadsworth, Cleveland, Ohio.
3,505.—TRDAE MARK.—Jas. White, Cleveland, Ohio.
3,506.—TRADE MARK.—H. J. Willing (assignor to Marshall Field and Levi Z. Leiter), Chicago, Ill.

EXTENSIONS.

DOUBLE-GEARED HORSE POWER.—Clement Russell, of Massillon, Ohio.—Letters Patent No. 12,782, dated May 1, 1855; reissue No. 1,302, dated April 15, 1862.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,091, dated Dec. 11, 1860.
SEED PLANTER.—G. W. Brown, of Galesburg, Ill.—Letters Patent No. 12,811, dated May 8, 1855; reissue No. 508, dated Nov. 10, 1857; again reissued, No. 1,092, dated Dec. 11, 1860.
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SHUTTLE FOR LOOMS.—Lydia W. Litchfield, of Southbridge, Mass., administratrix of Laroy Litchfield, deceased.—Letters Patent No. 12,780, dated May 1, 1855; reissue No. 3,255, dated March 30, 1869.
BOOT AND SHOE STRETCHER.—Warren Holden, of Philadelphia, Pa.—Letters Patent No. 12,793, dated May 1, 1855.
MACHINE FOR BURNISHING METALS.—Jeremiah Stever, of Bristol, Conn.—Letters Patent No. 12,799, dated May 1, 1855; reissue No. 834, dated Oct. 11, 1859; (whole No. 1,205), again reissued No. 100, dated July 2, 1861.
MACHINE FOR LEATHERING TACKS.—M. M. Rhodes and J. C. Rhodes, of Taunton, Mass.—Letters Patent No. 12,832, dated May 8, 1855.

APPLICATIONS FOR EXTENSION OF PATENTS.

FORMING SCREW THREADS, ETC., IN THE NECKS OF GLASS BOTTLES AND SIMILAR ARTICLES.—Sarah T. Stone, of Philadelphia, Pa., administratrix of the estate of Amasa Stone, deceased, has applied for an extension of the above patent. Day of hearing July 26, 1869.

MANUFACTURE OF ZINC WHITE.—John E. Burrows, of Newark, N. J., has petitioned for the extension of the above patent. Day of hearing, July 26, 1869.

Inventions Patented in England by Americans.

[Compiled from the "Journal of the Commissioners of Patents."]

PROVISIONAL PROTECTION FOR SIX MONTHS.

1,255.—APPARATUS FOR PREVENTING THE BURSTING OF STEAM BOILERS.—J. C. Cochrane, Rochester, N. Y. April 23, 1869.

1,256.—PUDDLING IRON.—Charles Hewitt, Trenton, N. J. April 23, 1869.

1,273.—REAPING AND MOWING MACHINE.—S. C. Ridgaway, Baltimore, Md. April 24, 1869.

1,287.—REVERSIBLE PARASOL.—J. E. Banks, New York city. April 26, 1869.

1,288.—STEAM GENERATORS AND CONDENSERS.—B. T. Babbitt, New York city. April 26, 1869.

1,291.—METHOD OF PREVENTING THE CORROSION OF STEAM BOILERS.—G. Hawxhurst and James Pollack, San Francisco, Cal. April 26, 1869.

1,293.—LOCKS.—James Sargent, Rochester, N. Y. April 27, 1869.

1,315.—RIGGING OF SQUARE-RIGGED VESSELS.—R. B. Forbes, Boston, Mass. April 28, 1869.

1,321.—APPARATUS FOR GENERATING AND CONDENSING STEAM, AND STEAM GENERATORS.—T. T. Prosser, Chicago, Ill. April 28, 1869.

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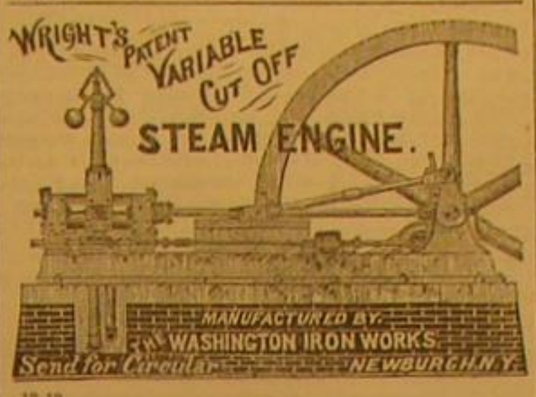

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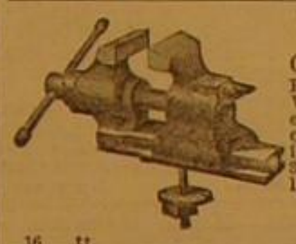

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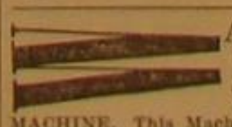

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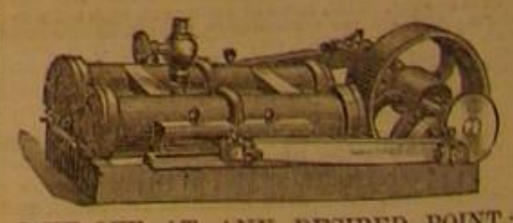

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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XX.—No. 24. (NEW SERIES.) NEW YORK, JUNE 12, 1869. $3 per Annum. (IN ADVANCE.)

Improved Combination Pleasure Velocipede.

A velocipede adapted to the use of all, old or young, large or small of either sex, skilled or unskilled, in which the pleasure of the exercise is enhanced by association, is the one of which we give an engraving. The action and details of this invention are so well delineated by our artist that scarcely any description is necessary. In looking at the picture one is seized with desire to mount and enjoy the exhilarating sport.

This machine is designed for use in private and public pleasure grounds, or to be let by the hour at large fairs and other public gatherings at which we can conceive of nothing more likely to prove remunerative. It combines all the advantages of the circular railway, so popular at Saratoga Springs and other pleasure resorts, with only a small fraction of the cost of such railways.

The way is made of scantlings or planks so arranged as to form a circular course upon which the combined efforts of a party of riders can get up an extraordinary speed. The handles are merely for the purpose of steadying the riders, as the apparatus needs no guidance. Each wheel when manned, either by ladies or gentlemen, is a driving wheel. Brakes can be attached if desired.

The arrangement of the apparatus in a pleasure ground or courtyard may be made very ornamental, and it will afford inexhaustible and healthful merriment to persons of all ages.

It would seem impossible for the most worn-out man of business to mount one of these seats with a party of spirited young people and not forget for the time that he was other than a rollicking lad in his "teens."

It does one's heart good says our enthusiastic informant, to hear children fairly shriek with glee as the maximum speed is attained. It has moreover this advantage that there is less liability to accident than with many other amusements of which children are fond.

Probably no more durable, useful, and attractive application of the principle of the velocipede than this has been brought out. It is capable of enlargement to accommodate more riders, and contains elements of popularity which will doubtless amply remunerate its ingenious inventor.

Patented through the Scientific American Patent Agency, May 4, 1869. Address for further information G. J. Sturdy & Co., 118 Dorance street, Providence, R. I. State and county rights for sale.

STURDY AND YOUNG'S CIRCULAR VELOCIPEDE.

ANTIMONY.

The story goes that a Benedictine monk, named Basil Valentine, who lived about the time of Luther, at Erfurt, and was fond of scientific researches, gave metallic powders to some hogs, the effect of which was to purge them thoroughly and then to fatten them. He wrote a book called the "Triumphant Chariot of Antimony," in which occurs the following curious passage:

"Let men know that antimony not only purgeth gold, cleaneth and frees it from every peregrine matter, and from all other metals, but also (by a power innate in itself) effects the same in man and beasts. If a farmer purpose in himself to keep up and fatten any of his cattle—as for example, a hog—two or three days before let him give to the swine a convenient dose of crude antimony, about half a drachm, mixed with his food, that by it he may be purged; through which purgative he will not only acquire an appetite to his meat, but the sooner increase and be fattened. And if any swine labor with a disease about his liver, antimony causeth it to be dried up and expelled."

In the kindness of his heart, Valentine thought what a good thing it would be to give some of this fattening powder to his fasting brethren. Unfortunately for the success of the theory, all who partook of it died; hereupon the poisonous mineral was called *anti-moine*, or *antimony*—destructive to monks. There is probably more fancy than fact in this narrative; but as it serves to enliven the tedium of a lecture on this metal, it will no doubt retain its place in our books, and be told to all future generations as a capital joke upon Valentine.

The compounds of antimony were known to the most ancient races, and it was used by the women of the East chiefly for staining the upper and under edges of the eyelids, so as to increase the apparent size of the eye. It is said of Jezebel that she "put her eyes in sulphuret of antimony," as the passage literally means, when Jehu came to Jezreel; and the ancient Greeks called the ore *broad eye*, from this custom.

The alchemists entertained great hopes of the new metal. As they called the acid that could dissolve gold *aqua-regia*, or royal water, so they named antimony *regulus*, or little king, because it so easily attacks and renders brittle, and thus destroys gold. It was also called the wolf among metals, on account of this property of devouring the harmless lambs of the flock. Although the compounds were so long known, the metal itself was not prepared until about the same time as Columbus discovered America. There is something interesting in this coincidence, as the narrative of the great navigator's exploits would have reached but a small portion of the inhabitants of the globe, if it had not been for the invention of movable types, made from antimony and lead, with which to print the story. And to cite another freak of invention, we will state that the shafts of the steamships that cross the ocean, rest in bearings largely made of antimony—and thus commerce and letters owe a great debt to this metal.

We sometimes find antimony in a pure state directly upon the surface of the earth, but this would be too good fortune to be lasting, and in actual mining very little is obtained from such a source. We meet with it in combination with arsenic—in fact, the two metals, arsenic and antimony, appear to have a great affection for each other, and are often found together. Their habits are very much alike, and they are mu-

tually enemies of mankind, as they are violent poisons. The principal ore of antimony is a suphide called stibnite, and from this it is chiefly made. The ore is roasted, and afterward fused with potash and charcoal; and sometimes purified by being dissolved in acid, and precipitated by water, and again fused so as to produce what is, even to the present day, called the regulus of antimony.

The metal is very brilliant, highly crystalline, and can be pulverized the same as a mineral; from which it can be inferred that we cannot draw it out into tubes or wires, or hammer it into sheets, as we can copper and many other metals.

It has a specific gravity of 6·7, and a cubic foot of it weighs about four hundred and twenty pounds. It melts at a low temperature, and when it solidifies from fusion, it expands a little, the same as ice, and takes a perfect copy of a mold. This latter property enables us to employ it in the manufacture of type and music metal. We cannot employ antimony alone for this purpose, as it is too brittle, so we sometimes melt lead, and at other times tin with it. In different countries they use different metals to alloy with antimony to make types. Some English types were found to contain about sixty-nine parts of lead, nineteen and a half of antimony, nine of tin, and the balance of copper. Other specimens have recently been made of seventy-five parts of tin and twenty-five parts of antimony. The manufacturers of types have secrets of their own, which they naturally do not wish to divulge, a great point being to have the faces hard, the impression sharp, and then to be able to cast the very smallest type.

There is a peculiar kind of antimony made by means of the galvanic battery, which explodes like gunpowder when it is touched with a red hot iron. It is even not safe to scratch it with a file for fear of serious consequences. Fortunately, this form of the metal is not commonly met with in the arts, or dealers in the article would be exposed to much danger. Compounds of antimony are used in the manufacture of certain kinds of metals without phosphorus, but the explosive metal has no application for this purpose.

Antimony has been employed to impart hardness to iron, but as manganese is preferable, it is not very popular for this purpose. It is also used with copper and zinc to make brass, where a particular quality of that alloy is required. When we wish to make a pure transparent, colorless gloss, we sometimes use a little antimony.

A very curious fact has recently been observed by Parkinson, that when antimony is combined with ten per cent of metallic magnesium, an alloy is formed which will actually deliquesce and melt away to water in the air. No uses have been suggested for this alloy, but it is worthy of note in the behavior of two metals.

An iron-black powder, used for bronzing plaster casts, papier-mache figures, and imparting a steel color to those and other similar objects, is finely divided antimony, produced by precipitation with zinc.

The beauty and permanence of antimony in the air suggests its use as a suitable coating for the protection of other metals, such as iron and copper.

The butter of antimony is dissolved in alcohol, and clarified with a little muriatic acid, and the bright copper surface is plunged into it for half an hour. It becomes coated with a beautiful bright film of antimony, which adheres strongly, and does not alter in the air. Copper-wire coated in this way can be bent without destroying the thin film.

We can make a powerful galvanic battery by employing antimony at one of the poles, instead of gas carbon. Amalgamated zinc in dilute sulphuric acid is used at one end, a massive block of antimony, immersed in a saturated solution of equal parts of common salt and epsom salts, at the other. This forms a simple, cheap, and powerful battery, suitable for electro-plating.

In England, the best Britannia-ware contains antimony, and the English government harden their bullets and shot with it.

As an anti-friction metal, for the bearings of machinery, for the packing of railroad axles, it is now largely employed.

A beautiful carmine red color, and a fine yellow, are prepared from its compounds. In medicine, tartar emetic, which is partly composed of antimony, is well-known, and for a hundred years no substance has been the occasion of greater controversies, or more extravagant expectations as a remedy in all cases of sickness, than antimony. It was even necessary, at one time, for the government of France to prohibit its use, so great was the excess in its prescription.

Notwithstanding the numerous uses to which this metal is applied, there are not more than one thousand tuns of it produced every year.

We have thus sketched a majority of the popular applications of antimony, and may have beguiled our readers into acquiring information which they did not possess before. It is worthy of note, that the cosmetic which was a favorite of the "broad-eyed" woman of ancient Greece, has not ceased to retain its supremacy in modern times, and the medicine that fattened hogs at the time of Valentine, is now prescribed by the veterinary surgeon as a panacea for the ills of horse-flesh. In fact, antimony plays an important *role* in the ordinary affairs of life, for we drink our tea, shoot our enemies, cure our horses, cross the ocean, travel on the railroad, paint our pictures (not to say our faces), sing our songs, strike a light, harden our steel, coat our copper, purify our glass, print our books, telegraph our messages, and use as a medecine this wonderful metal.—*Professor C. A. Joy in the New World.*

Carbolic Acid as a Preservative Agent.

The *American Naturalist* answers several correspondents who have asked questions regarding the use of carbolic acid as a substitute for alcohol, etc., that carbolic acid in water alone will not preserve animals, but pure glycerin, with a very small amount of carbolic acid (say about three or four drops of acid to 2 oz. of glycerin) answers admirably for some delicate animals. But the best thing for preserving most animals is alcohol. The contraction of animals put into alcohol (complained of by some correspondents) is caused by the alcohol being too strong. All animals should be put into weak alcohol at first (not over 25 or 30 per cent), and after remaining a few hours should be transferred to about 75 or 80 per cent alcohol. A very fine article for preserving the tissues of animals, and for soft animals like mollusks, actinias, worms, insects, larvæ, etc., can be made, after a few experiments, of glycerin, a little of the strongest alcohol, and a very small portion of carbolic acid. This preparation will preserve the colors as well as the tissues. A little fine soap (white castile is the best) put into alcohol will prevent most colors from fading, unless exposed to direct sunlight.

Experiments on Heavy Ordnance.

The following conclusions, deduced from experiments on heavy ordnance, are given in the Report of the Ordnance Committee, presented to the Senate February 15, 1869:

1. That no more heavy guns should be purchased for mounting in the fortifications or use on shipboard until such improvements are made in methods of fabrication as will insure more reliable endurance than has heretofore been exhibited.

2. That the Rodman system of gun making, while partially successful in smooth bores and small calibers, has so far failed in rifles of large caliber as to show it to be unworthy of further confidence. Recent improvements in defensive works and armor plating render heavy rifled guns the most efficient means of attack, and no system of fabrication which does not furnish such guns should be adopted or continued. The principle of initial tension, which is the basis of the Rodman system, appears to be of doubtful utility, as applied by General Rodman, especially for rifled guns. This tension, it is admitted, gradually disappears from the gun with age, and in time is entirely lost.

3. That guns cast solid, in the manner practiced in the navy under the direction of Rear-Admiral Dahlgren, while exhibiting satisfactory endurance as smooth bores with small charges and hollow projectiles, have not the requisite strength for rifles of large caliber. This mode of casting seems to be defective in principle, as the tensions inaugurated in cooling have a tendency to aid the powder to rupture the gun.

4. That experiments should be at once conducted for the purpose of ascertaining the real cause of the bursting of heavy guns, and of determining upon some method of fabrication that will secure uniform endurance.

5. That every encouragement should be given to inventors, and a full and fair trial accorded to all devices offered to the Government that promise a solution of the ordnance problem.

6. That more efficient means for harbor defense should be adopted. The late war demonstrated that sand was the best material for defensive works, and that forts of masonry, such as we have now mainly to rely upon for the protection of our seaboard cities, are inefficient to prevent the passage of armored, or even wooden vessels. The destruction of such defenses is only a question of time to ordinary guns of heavy caliber. It was also demonstrated that forts alone, of whatever character, cannot resist the entrance to harbors of powerfully armed ships if the preponderance of guns on the assailing fleet is sufficient. In the opinion of the committee, obstructions must be largely relied upon for harbor defense, in connection with properly constructed fortifications.

7. That no officer of the army or navy should be allowed to receive a patent for any article required, or likely to be required, for use in those branches of the public service, or to be in any way interested in the manufacture or procurement of such articles. It should be the duty of Congress to recognize in suitable rewards the services of such officers as might make inventions of especial value to the Government.

8. That the Ordnance Department of the army can be entirely abolished with great advantage as to economy, and without detriment to the good of the service. The duties now performed by officers of that corps could be performed by officers detailed from the artillery service, under the direction of a chief stationed at Washington. In this manner the whole expense of the ordnance establishment would be saved, and artillery officers, who have not only scientific training, but practical experience, would have a voice in the selection of the guns and ammunition they are required to use.

The committee are of the opinion that, for the reasons shown, the interests of the public service demand a change in the system of procuring ordnance and ordnance stores, and the manner of conducting experiments with a view to determining the value of the same. The present system has failed to answer the purpose for which it was designed, and the United States is in the position to-day of a nation having a vast coast line to defend, and a large navy, without a single rifled gun of large caliber, and a corps of ordnance officers who have thus far failed to discover a remedy for the failure of the guns, or to master the rudiments of the science in which they have been trained at the public expense. The importance of an immediate change is shown by the fact that the Chief of Ordnance of the army asks for appropriations to purchase over 1,900 guns to arm the forts, not of a new and better system to be decided upon after more thorough and careful experiment, but of a kind that experience has shown to be inferior in range and penetration to the guns of foreign powers, and unreliable as to endurance.

It is proposed that 85 of these guns shall be smooth bores of 20-in. caliber, 490 of 15-in. caliber, and 600 of 13-in. caliber. The experience of all nations goes to prove that the most effective way of developing ordnance power is by rifled guns. To return to smooth bores, throwing huge spherical masses of iron with low velocities, is to disregard all modern progress in the science of gunnery, and to go back to the arms in use two centuries ago. Furthermore, the advisability of using guns of such great size is very doubtful, for the slowness with which they be handled and fired makes them less effective than smaller guns delivering a more rapid fire. Two hundred of the guns required it is proposed shall be Rodman 12-in. rifles, notwithstanding all of that class of guns heretofore procured for the army or navy, and subjected to test, have either burst disastrously before the lowest reasonable test has been completed, or have given such indications of failing, after a few rounds, as to be considered unsafe. It is proposed also to purchase 610 10-in. Rodman rifles, although the committee cannot learn that any gun of this class has ever been subjected to test in this country, except the Parrott rifles of that caliber, which are acknowledged failures, having been condemned by both branches of the service.

No progress toward obtaining better guns is likely to be made while the ordnance bureaus are organized as at present; and the committee deem the best way to secure such impartially conducted experiments as will determine with certainty what are the best arms, and to insure greater economy and regard for the public interests in their purchase and adoption, is in the formation of a mixed ordnance commission composed of officers of high character detailed from both the army and navy, who shall have no interest in patents or devices for arms.

How the Florida Keys were Formed.

Just outside the lower extremity of Florida are a number of islands—the easternmost almost touching the main-land, while the western lie a little farther off.

In consequence of this peculiarity in their disposition, the space left between these islands and the Florida coast, marked on the map as mud flats, is broad and open at the western outlet, but almost close toward the east. It is important to remember the form of this broad intervening space, stretching between the keys and the main-land, because the narrower and more shallow end may easily be filled up with sand, mud, etc. If you will look at the map, you will see, by the flats at the eastern end of this once open channel, that such a process is actually going on. In fact, a current sets toward the channel, drifting into it sand, mud, and *débris* of all sorts.

I hope to show you how these flats, gradually consolidated into dry land, will at last make a bridge between the islands and the lower extremity of Florida, uniting them solidly together, so that the former will cease to be islands and will become a part of the main-land.

Indeed, we shall find that Florida, herself, so far as her structure is known, is only a succession of such rows of islands as now lie outside her southern shore, united together by flats exactly like those accumulating at this moment between the present islands and the coast. These islands are called the Keys of Florida, and are distinguished from one another by a variety of appellations, such as Sand Key, Key West, Indian Key, Long Key, and the like. They are of various sizes; some—like Key West, for instance—are large, inhabited islands, planted with fruit and flower gardens, where cocoanuts and other palms, orange trees, and bananas grow in great luxuriance, while others are mere barren rocks, scarcely rising above the surface of the ocean, washed over by the waves, and wholly destitute of verdure.

Suppose now that in fancy we sail out from the keys on their seaward side, choosing a bright, calm day when the surface of the ocean is still. The waters of that region are always remarkably clear; and under such influences of sky and atmosphere they are so transparent that the bottom may be seen at a considerable depth, distinct as a picture under glass.

Sailing southward to a distance of some four or five miles from the keys, we find ourselves in the neighborhood of a rocky wall rising from the ocean bottom. As we approach it, if we look over the side of the boat, we shall see that we are passing over a floating shrubbery, a branching growth, spreading in every direction, its lighter portions swaying gently with the movement of the sea. It is not green, like land shrubbery, but has a variety of soft, bright hues, purple, rosy, amethyst, yellow, brown, and orange. If circumstances are favorable, and the water crystal-clear, as it sometimes is, we shall have glimpses of bright-colored fishes swimming in and out amid this tangled thicket; or here and there we may discern a variety of sea-anemones, their soft feathery fringes fully expanded.

This wonderful growth, over which we have imagined ourselves to be sailing, is the top of a coral wall. Reaching the surface of the water at intevals, it forms little rocky islands here and there, divided from each other by open channels, through some of which vessels of considerable size may pass. This wall is in fact a repetition of the same process as that which has formed the inner row of keys, though in a more incomplete stage; it is built up by coral animals from the sea bottom. Wherever circumstances are most favorable to their development, there they grow most rapidly. In such spots they bring the wall to the sea level sooner than in others.

This done, however, the work of the coral animals ceases, because they cannot live out of water. But in consequence of a certain process of decay and decomposition, such a wall—or coral reef, as it is called—is surrounded by coral sand and fragments worn away from it by the action of the sea.

Materials of this sort, mixed with sea-weed, broken shells, etc., soon gather upon the top of the reef wherever the coral growth has brought it to the sea level. By degrees a soil is collected upon such spots, raising them more and more above the surface of the water. In this way the islands have been

formed which we call the Keys of Florida; and in the same way the little patches now rising highest on the summit of the Reef, will enlarge gradually into more and more extensive islands, though at present many of them are scarcely visible above the water level.—*Mrs. Agassiz in "Our Young Folks" for March.*

FELL'S RAILWAY OVER MONT CENIS.

The railway over Mont Cenis, which is a temporary method of transit only until the tunnel is completed, is called the American railway, its inventor, Mr. Fell, who built the one up Mount Washington, being styled an American; and we were promised a ride in real American cars. The time of starting was 7 A. M. There was a great crowd of all sorts at the station, a lively fight for tickets at the box office (for the perfect French system has not reached the other side of the Alps), and then we waited till half-past 7 before we were let out to the cars. The train ready to go consisted of an engine and two first-class passenger carriages. The carriages were about half the length of ours at home, with seats on each side, so that passengers face each other as in an omnibus, and with windows at the sides from which it is difficult to see out when one is squeezed in tight on the seat with his back to them. The cars are also very narrow, the track being only three feet six or seven inches gage, so that they are not much more comfortable than an omnibus. The fare, first class, was twenty-five, second class, twenty-two francs, from Susa to St. Michel, the time occupied in the passage being from four to five hours.

The locomotives of these trains are small, compact, and powerful; their trucks, as well as those of the carriages, set well in the middle, so that they can turn very short curves. The track has three rails, one elevated in the centre. Beside its ordinary driving wheels, the locomotive has two horizontal wheels which press this third rail on either side, and it is by this strong traction that the train is pulled up. The carriages have corresponding wheels for the center rail, but their only use is to keep the train on the track. Both cars and locomotive have double sets of brakes, one for the ordinary and one for the central rail, so that they can screw the cars to the track with the grip of a vise, and render it almost impossible for the carriages to run away. There is every precaution against accident; and I should only fear the snow storms of winter, and perhaps an avalanche in some places high up, which are not roofed in.

We began to climb the hill directly we left the station, exactly as a carriage drawn by horses would do. In fact, our track ran parallel to the carriage road all the way, was just as steep, and made the short turns of the latter. Our train seemed to be a huge live reptile with legs and claws, that crawled up by its own power; it literally dug right up hill, and we felt ourselves mounting, and, looking back, we could see the steep incline. On the curves, where the wheels got a good grip of the rail, we moved with ease and more rapidly than on a straight pull, where the locomotive evidently labored more, and we rose more slowly. The steepest grade on the road is one foot in nine feet, but this is only for short distances. The rise of one in twelve is more common; and the least (of which any note is taken) is one in twenty-five. The curves are so short as to be startling. We seemed to turn in a space as small as an ordinary wagon could. The shortest curves are on a radius of only 120 feet; that is, our train would run round a circle only 240 feet in diameter. Our track was all the time in sight, behind and before, running along the steep hillsides, and constantly doubling, like a compressed letter S.

You march up with triumphant ease, rising among the grand snow peaks like a conqueror. The valleys open behind you, with their rivers and brown villages, the great panorama expanding with every revolution of the wheels. You skirt precipices and look down upon nestling villages and green fields; you push your way up among the snow regions, the stone huts of the begging, half naked, dirty peasants, and the refuge houses of the road; are whisked round rocky headlands, through tunnels and covered ways, over deep gullies and tracks of avalanches, rising always higher and higher, as by no expenditure of strength, into a purer air, among peaks of virgin snow, among the silent summits of the enduring Alps.

The day was superb, with blue sky and fine air, and it was so warm, even in the snow regions, that I needed no overcoat. Our view was, for the most part, uninterruped and magnificent. The summit level is about 6,400 feet above the sea, and before we reached it we passed into a covered way, built of wood at the sides and arched with iron, and were immured in this, in the ascent, descent, and on the level for four or five miles, I should think; dark, unpleasant passages, made worse by the smoke and fumes of the locomotive. These covered ways are absolutely necessary as a protection against avalanches in many places and against the falls of snow for long distances. Through the chinks of the boards I could see the snow piled up high along the way. The summit station is in one of these long sheds, and is gloomy enough.

We made the descent more rapidly than the ascent, swinging round the short bends with considerable velocity. The brakes were jammed hard down until I could smell the odor caused by the friction. On the descent I saw the frowning forts of Brumont d' Essillon, on peaks high above the abyss through which the Arc foams and roars, connected with the road by a thread of a suspension bridge over the gorge, called the Pont du Diable. The forts are being demolished now, under the agreement between France and Italy. Lower down, and about ten miles up the mountain from St. Michel, we caught sight of the rubbish at the opening of the great tunnel, which enters the mountain at Fourneau. It is to be 8½ miles long, and it is expected to be completed in 1871. It is, no doubt, a great and most interesting bore, but if I desired a pleasure trip, I think I should prefer the raid of Mr. Fell over the mountain to this hole through it.

I talked with a locomotive driver on our train (by the way an Englishman, as they all are on this road), who insisted that Mr. Fell is not an American. He knew him well, lived near him in the north of England, and said he was not an engineer at all, except so far as this invention was concerned, but a dissenting clergyman. He is certainly a dissenter from the ordinary style of railways. The engineer was an excellent specimen of an intelligent, illiterate English mechanic, with a drawl and nasal twang in his speech that a Cape Cod man might envy; and he gave me a great deal of valuable information about the road, which I might here impart, if your readers cared for valuable information, which I suppose they do not. He was takin' a day h'off for pleasure, he said, and goin' down to see the work on the big bore. 'Twas a nasty bit of work this of running twice over the road daily, as he did, and only getting twelve pound a month for the job, especially in the winter, with the snow and beastly wind. There had been only six days in the past winter when they couldn't run on account of snow, and then the passengers had been carried over the break on sledges. He explained to me the construction of the locomotive, the application of its power, the working of the brakes, and the whole thing, so that I think I can build a road out to West Hartford, over Prospect Hill and to the Tower, if anybody desires, when I return. Sealed proposals, inclosing stamp and photograph, can be left on the Probate steps. I said to the engineer that I supposed it impossible for the locomotive, with three rails, to get off the track.

Well, he said, his machine got off once last winter. The fact was, that the t'ing got the upper hand of him, and ran away with him. He spoke of it as if it were a horse. He was running with the locomotive alone, takin' her down the mountain, not mindin' exactly, when he found he had got on so much steam that he couldn't hold her. He was goin' down the one in nine, round them ere nasty curves, when she started. He shut off, and jammed down all the breaks, reserve and all, but she only appeared to go the faster. Away she went, like the —— (so he said), whisking round, and at last bounded off and went slam ag'in a rock. "If she'd a gone over the ravine on t'other side, I wouldn't be here to tell ye of it."

It was nearly one o'clock when we ran into St. Michel, and, passing the humbug of a custom house, took comfortable cars for Lyons. *C. D. W. in Hartford Courant.*

NOTES ON SCIENCE AND ARTS.

When the scientific soirées begin, it is a sign that the scientific season is half gone; and now the Easter holidays are over, and scientific investigators are working the harder to complete their self-imposed tasks before summer comes with alluring smile to entice them to the seaside or the mountains. General Sabine, the President of the Royal Society, has held two soirées, in which, as usual, science and art were exemplified in a very interesting way, and ingenious mechanical models were exhibited. Among them, was Bidder's coal-winning machine, of which we have recently made mention; and Price Williams' switch, which entirely does away with the numerous "points" seen at railway junctions, and keeps the main line of rails always unbroken, whereby a frequent occasion of danger is avoided; and Milroy's excavator, which digs equally well on land and under water, and is very useful in digging out the foundations of bridges, or in sinking cylinders. It may be described as a heavy metal ring suspended by chain and pulley, and carrying a number of hanging flaps. These flaps, when the ring is lowered into place, and agitated, act as spades; and when a sufficient quantity of earth or sand is loosened, they can be so regulated by another chain, that they bring it up to the surface, where it is dropped into a truck and carried away. From these particulars, it will be understood that deep holes can be dug, even under water, without sending men down to do the work.

Well deserving of notice is a much improved safety-lamp for use in mines, invented by Mr. Story Horn of Newcastle-on-Tyne. It has long been known that the Davy lamp does not insure safety under all circumstances; it is liable to become choked, the light is dim, and in some conditions it may occasion an explosion. These defects are remedied in Horn's lamp; the light is good; accumulation of soot cannot take place to render it dim; and whenever explosive gas finds its way in, the construction of the lamp is such that it becomes its own extinguisher, puts out the flame, and thereby prevents an explosion. There are other points in its favor; but these we may omit, as in the foregoing brief sketch the merits of this new lamp are sufficiently set forth, and because it has been tested in the severest manner, and proved trustworthy.

F. N. Gisborne, who has for years past made himself conspicuous by his signals for use on board ship, in mines, factories, or dwelling-houses, has now brought out a method which, for simplicity and efficiency, excels all his previous inventions. First, he used galvano-electricity, then pneumatic tubes, and compressible air-chambers, both costly and liable to derangement. Now, with a balance-weight and a chain, he accomplishes all he desires with his system of signals. A captain standing on the bridge of a steamer can, by touching the indicator, send an order to the steersman or the engineer, and see at once whether they obey without changing his position. And that which can be done in a ship can be done in a house, workshop, or mine, and by a simple mechanical arrangement, which can hardly fail to be received with favor. It has been already adopted in the five leading navies of Europe; and the great Prussian iron-clad *König Wilhelm*, now building on the Thames, is fitted with a set of Gisborne's signals, finished in a style which may truly be described as royal.

A magneto-exploder, constructed by Breguet of Paris, was shown, which will fire a fuse, and consequently a cannon, at any distance from two feet up to two hundred miles.—And Clerk Maxwell exhibited a "Wheel of Life," containing what he calls dynamical diagrams, and these, when the wheel is set agoing, produce many remarkable phenomena of curves and their intersections. Thus, in the hands of a philosopher a toy becomes a means of illustrating the laws of curvilinear motion. Teachers of geometry and natural philosophy would find it useful.—And N. J. Holmes, who is among the foremost of our telegraphists, exhibited his new magneto-alphabetical telegraph, which is one of the cheapest, if not the cheapest and simplest yet constructed. It comprises two circles of buttons, and the operator has only to touch button after button, and spell out his message as rapidly as he pleases. With this and other instruments before them, government will have a sufficient variety to choose from when they assume control of the telegraphs.

Silver and Co. exhibited specimens of their Norwegian Cooking Apparatus, adapted to different purposes and circumstances, and of different dimensions. One was provided with a thermometer to show the slowness of the rate at which the heat is lost. In one of the small boxes, a pint of water locked up boiling hot at eight o'clock in the morning, was still warm at six in the evening. And in like manner, the apparatus can be used as a refrigerator, and for preserving ice a considerable time unmelted.

Mr. Graham, Master of the Mint, by a singularly ingenious experiment, showed the prodigious amount to which the metal palladium will absorb hydrogen: an amount exceeding by some hundreds of times its own bulk. Two ribbons of palladium, attached to the two poles of a battery, were seen loosely coiled in a water-bath. The current was turned on: the ribbons took in so much hydrogen that they expanded, uncoiled, and stretched themselves across the bath, as if alive. The current was reversed, the hydrogen was thrown off, and the ribbons resumed their coil. They might have been compared to a couple of writhing worms. The sight was amusing; but it exemplified the researches by which Mr. Graham has thrown light on an important question in cosmical science, and led him to the discovery of the new metal, to which he has given the name of hydrogenium.

From all this, it may be seen that a scientific conversazione represents a wide range of the progress of science; while, as we proceed to show, it at the same time exemplifies the arts. There was a specimen of the first beet-root sugar manufactured commercially in this country; and specimens of the juice as expressed from the roots, and after defecation, and of the waste pulp which finds a ready sale as cattle-food.—There were two or three simple forms of filter which might be carried in the pocket.—There was a model of the viaduct now building across the Holborn Valley.—A piece of inscribed bullock's hide, showing three capital letters and a rude hieroglyph, brought from the south-east coast of Africa, and supposed to be a message from survivors of ship-wrecked crews, now prisoners in the interior of Somali Land.—There were photographs of Mount Sinai and of the surrounding country, taken by the party now engaged in surveying that remarkable land, and very wild and striking prospects do they represent. By and by, a model in relief, made at the Ordnance Survey Office, Southampton, will be brought out, and then scholars will be able to study and follow the route of the Israelites.—Not less remarkable are a series of photographs of Abyssinia, taken during the march to Magdala by the Royal Engineers. The country therein represented must surely be the most rugged and precipitous in the world. Hannibal's march across the Alps must have been a holiday trip in comparison.—Of quite another aspect were the views in the Antarctic regions, which are now becoming important, because from some part of those regions will the two next transits of Venus have to be observed, and astronomers and others are beginning to inquire as to the best place in those desolate latitudes to establish a temporary observatory, and the preparations to be made for the voyage. It is impossible not to wish success to their endeavors, for the settlement of some of the most important questions in astronomical science depends on good observations of the transits.

It is recorded of some of the early Venetian painters that they laid on their colors with palette knives of different widths, and never used the brush. White Warren has revived the process, and exhibits a number of pictures in oil, all painted with the knife, and with marked effect. Land and water pieces, houses, ruins, Gothic towers, and flower-beds present a sufficient variety to test the capabilities of the art and the artist. At present, he appears to be most successful in clouds, landscapes, and gardens.—*Chambers' Journal.*

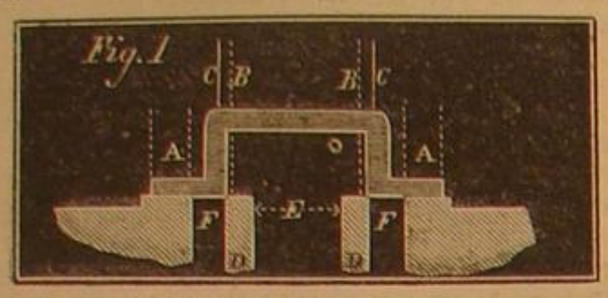
IT is reported that one day, when Lord Brougham had driven to the House in the vehicle of his own invention, which Robinson, the coachmaker had christened after him, he was met in the robing room by the Duke of Wellington, who, after a low bow, accosted him. "I have always hitherto lived under the impression that your lordship will go down to posterity as the great apostle of education, the emancipator of the negro, the restorer of abused charities, the reformer of the law; but no—you will hereafter be known only as the inventor of a carriage." "And I, my lord duke, have always been under the delusion that your grace would be remembered as the hero of a hundred battles, the liberator of Europe, the conqueror of Napoleon; but no—your grace will be known as the inventor of a pair of boots." "Confound the boots," said the Iron Duke, "I had forgotten them. You have the best of it."

SLIDE VALVES.

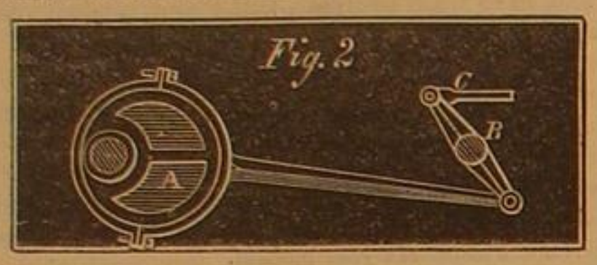
LAP AND LEAD.

A correspondent states that he has derived such great benefit from the use of the following diagrams published in the *English Mechanic*, in 1866, that he asks their reproduction in the pages of the SCIENTIFIC AMERICAN.

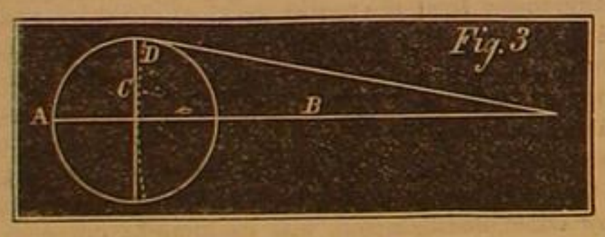
As most of the remarks seem to us to be sound, we reproduce them in our columns, and, as the matter is an important one, we have appended to the notice an addition which will prove serviceable, in a *practical* point of view, to a large number of mechanics. These remarks of ours on the slide valve, will make the subject comprehensible to those who seem to regard its study as too abstruse for ordinary comprehensions, while in reality nothing can be more simple than the working of this most indispensable portion of the modern steam engine:



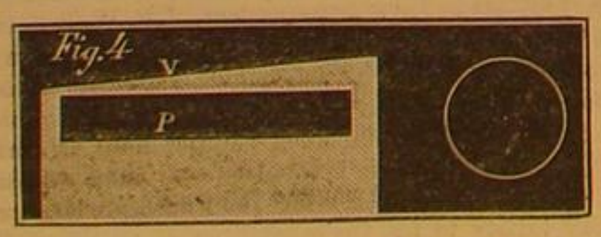
"First, as to the terms 'lap' and 'lead.' On looking at Fig. 1, it will be seen that the valve overlaps the ports at each end. Now, from the outside edge of the ports to the end of the valve, is the outside lap. By the lead of a valve is meant that the port is opened a little in advance of the piston, or the port is open for one stroke before the piston has quite finished the preceding one. This valve, Fig. 1, has neither inside lap nor clearance, and if the inside space was shortened up to the dotted lines, B B, it would have inside lap because it would lap on the bars, D D, and on the other hand if the dark parts were cut away, it would have inside clearance.



"This valve has a lap equal to the port. Therefore if it is set without lead at the beginning of the stroke, the exhaust port will be full open as it ought to be, or very nearly so, more especially when the ports are small. It does not seem to be generally known among drivers, that in a common valve, worked by an ordinary eccentric motion, it is impossible to cut off equal at both ends of the cylinder. This is caused by the angularity of the connecting rod, more or less, as the rod is longer or shorter in proportion to the crank. When the piston is at its half stroke, the crank is short of the vertical line, as shown by the dotted line D in Fig. 3.



"The piston is always before its middle position for the front stroke and behind it for the back stroke; consequently there is always the most steam for the front stroke, which will make the engine 'exhaust fullest at its out center,' as remarked lately by a correspondent. (The front stroke is that made towards the crank.) Some engineers attempt to find a remedy for this by giving the valve more lead for the front stroke, which will allow the valve to reach the end of its travel sooner, thereby shortening the front admission of steam. But this is a very poor remedy; in fact, it is the worst evil of the two, although it may not be told by the beating of the engine. The better way is to have unequal laps or an intermediate lever reversed in action, as shown in Fig. 2. By employing this and fixing it in its proper place, we can get equal admissions for both strokes.



"Fig 4 is a good shape for a valve. The end is beveled about a ¼-inch in a length of 6 inches. This would give the crank a chance to pass the center before the full pressure is applied. I think an eccentric of varying travel would be a good thing for an engine where the loads are more some days than others, so that the steam may be cut off earlier by giving the valve a shorter travel. It might be made like Fig. 5. The conclusions that I come to on the subject are these:

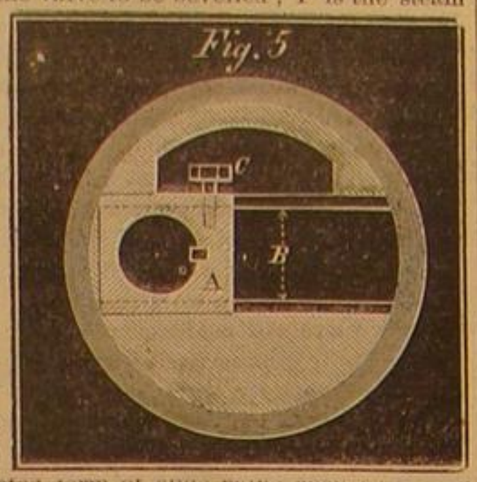
"1. The valve should have a lap equal to the width of port at least.

"2. No lead is required at speeds of less than 400 feet of piston per minute. The back pressure caused by compression is an ample 'cushion' for the piston, and the piston ought to get the pressure gradually after the crank has passed the center by beveling the edge of the valve or other means.

"3. The connecting rod should be as long as possible, never less than five times the length of crank, but seven or eight times the length would be better.

"4. The valve should be a lead for exhaust, in some cases a fully open port.

"In Fig. 1, A A are the outside laps; F F, the ports; E, the exhaust port; D D, the bars. Fig. 2, A, the eccentric; B, a lever with arms of equal length; C is the valve rod. Fig. 3, A, is the center line of cylinder; C is a line at right angles to it; D is the point where the crank pin reaches to when the piston is in the middle of the cylinder. Fig. 4, the dark shaded part V, shows the end of the valve to be bevelled; P is the steam port. Fig. 5, A, is a boss keyed to the crank shaft; the eccentric has a slot cut across it, as seen at B, which allows it to slide on the boss, and is fixed for its proper throw by the screw, C."



We shall limit ourselves, in the following supplementary dissertation, to the description of the most generally accepted form of slide valve, such as is now in daily use in the great majority of our best constructed engines, reserving for some other occasion an account of the many modifications and varieties of such valves, or *cut-offs*, as have at different times been recommended by various engineers.

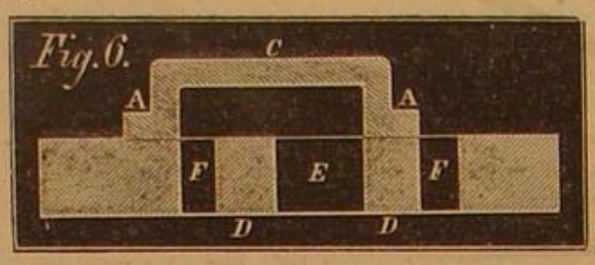


Fig. 6 is a section through such a slide valve, in which C is the slide, A A, the outside laps; F F, the steam ports; E the exhaust port, and D D, the bars.

The slide is best made with an inside lap of $\frac{1}{12}$ of an inch on either side.

The exhaust port must be from 2 to 2½ times as high as the steam ports.

The section of the steam ports must be from $\frac{1}{15}$ to $\frac{1}{20}$ of the area of the piston head for high speed engines, such as locomotives, rolling-mill engines, etc., and from $\frac{1}{20}$ to $\frac{1}{30}$ of the area of the piston for slow speed engines.

The ratio between the width of the steam ports and their hight, ought to be approximately as follows:

4 to 1 for small engines.
5 to 1 for medium sized engines.
6 to 1 for large engines.
7 to 1 for still larger engines.

From what we have just said, it will be seen that the proportions, in inches, of all the parts of a slide valve can be computed when its hight has been determined relatively to the area of the piston, as we have shown above. For this purpose proceed as follows:

1. To find the *hight* of the *exhaust* port, multiply the hight of the steam port by 2½.

2. To find the *thickness* of metal in the *bars*, add $\frac{2}{12}$ of an inch to the hight of the steam ports.

3. To find the clearance of the inner edge of the steam ports, multiply the hight of the steam ports by 4½ and add $\frac{4}{12}$ of an inch.

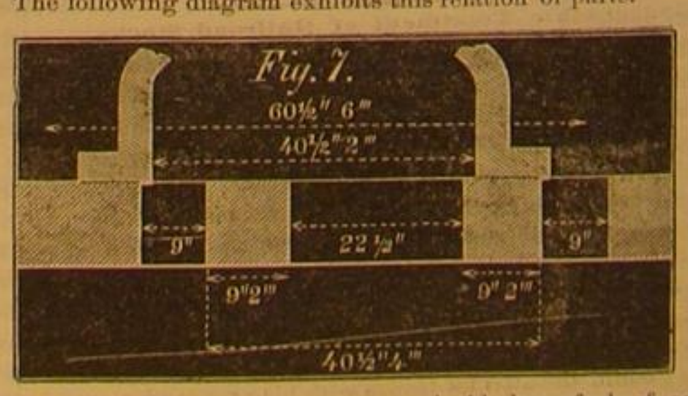
4. To find the clearance of the inner laps, multiply the hight of the steam ports by 4½ and add $\frac{2}{12}$ of an inch.

5. To find the extreme clearance of the outside laps, multiply the hight of the steam ports by 6½ and add $\frac{6}{12}$ of an inch.

6. To find the length of valve stroke, for a full open port, multiply the hight of the steam port by 2 and add $\frac{4}{12}$ of an inch.

Supposing, as an example, a valve with steam ports 9 inches high, as shown in the diagram, Fig. 7, what would be the relative dimensions of the other elements of this valve? They would be:

Steam ports 9″ high.
Thickness of bars 9″ 2‴.
Clearance of inner edge of steam ports 40½″ 4‴
Clearance of inner laps 40½″ 2‴.
Clearance of outer laps 60½″ 6‴.
Stroke for full open valve 18″ 4‴.
The following diagram exhibits this relation of parts.



English builders give an average inside lap of $\frac{1}{10}$ of an inch on either side. For low-pressure engines, working with from 2½ to 3 lbs. over pressure, $\frac{1}{8}$ of an inch is given, while for marine engines, working with from 4½ to 5 lbs. over-pressure, the lap is from 1 to 1¼ inches.

The rule given for lead (relative advance of the slide) is as follows:

Multiply the square of the area of the piston in inches by 0·002, and divide the product by the length of the valve orifice in inches. The quotient gives the width of the open steam ports when the piston has reached either end of its stroke, *i.e.*, is full up or full down. In a 30-inch cylinder, for instance, with 12 inch length of valve orifice, it would be 0·15 inch. The eccentric for communicating motion to the slide must always work at an acute angle to the direction of the slide, and this lead angle must be greatest the greater the degree of expansion used.

Figs. 8 and 9, will make this matter clearer by showing the relative working of slides and piston in an engine where the lap is made to bring on expansion, and which cuts off at ¾ stroke.

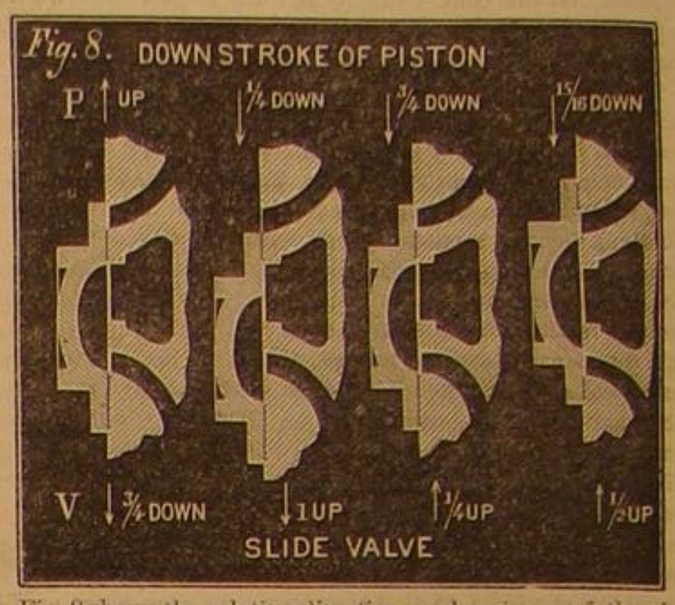
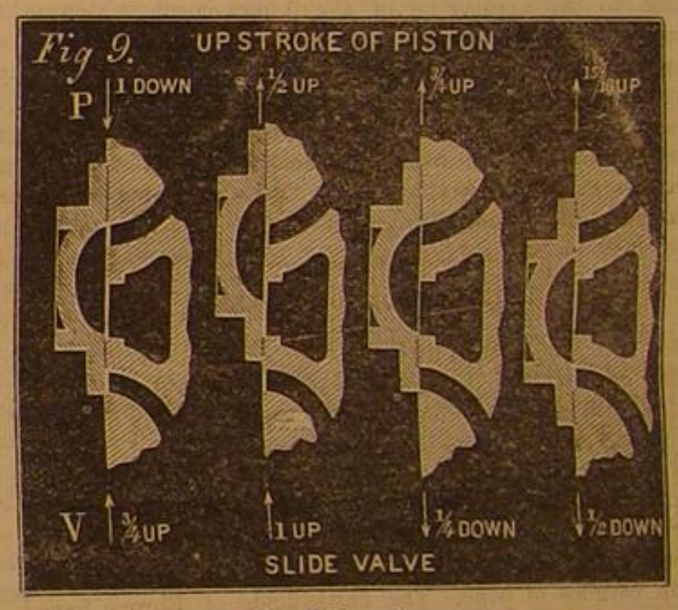


Fig. 8 shows the relative directions and positions of the piston and slide during the whole down stroke of the piston. Starting from the moment the piston has reached its full extent of upward course, we have successively:

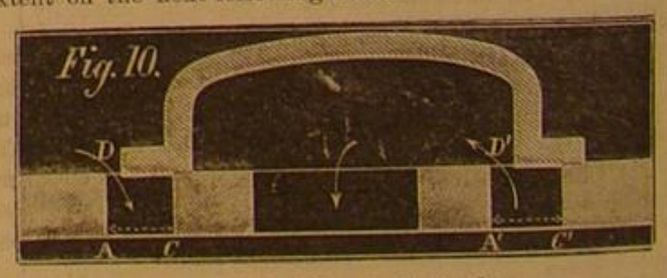
1. Piston up in full. Valve ⅜ down.
2. Piston ¼ down. Valve quite down.
3. Piston ¾ down. Valve ¼ up.
4. Piston $\frac{15}{16}$ down. Valve ½ up.

Fig. 9, exhibits the relative directions and positions during the whole *up* stroke of the piston.



1. Piston, down in full. Valve, ⅜ up.
2. Piston, ¼ up. Valve, quite up.
3. Piston ¾ up. Valve, ¼ down.
4. Piston, $\frac{15}{16}$ up. Valve, ½ down.

In order to obtain this motion the eccentric must in thi case have an "advance" of 30 degrees. As the reader wil notice, the exhaust steam is cut off at $\frac{15}{16}$ of the piston stroke But this is of little moment, as the back pressure of this smal quantity of exhaust steam, as proved by the indicator, is in significant, beside which, it is again utilized to a certain extent on the next following stroke.



The lead at any period of time is obtained:

1. For the entrance steam port, by dividing the hight o the aperture at the entrance port (D, Fig. 10) by the tota l hight of the port (A C, Fig. 10.)

2. For the exit steam port, by dividing the hight of the aperture at the exit port (D' Fig. 10) by the total hight of the port (A' C' Fig. 10).

Black Walnut Polish.

Take asphaltum, pulverize it, place it in a jar or bottle, pour over it about twice its bulk of turpentine or benzole, put it in a warm place, and shake it from time to time. When dissolved, strain it, and apply it to the wood with a cloth or stiff brush. If it should make too dark a stain, thin it with turpentine or benzole. This will dry in a few hours.

If it is desired to bring out the grain still more, apply a mixture of boiled oil and turpentine; this is better than oil alone. Put no oil with the asphaltum mixture, as it will dry very slowly. When the oil is dry, the wood can be polished with the following: Shellac varnish, of the usual consistency two parts; boiled oil, one part. Shake it well before using. Apply it to the wood by putting a few drops on a cloth and rubbing briskly on the wood for a few moments. This polish works well on old varnished furniture.—*Chem. News*

Improvement in Springs for Vehicles.

This improvement consists first, in the substitution of taper longitudinal ribs, A, (see engraving) for the ribs and slots in common use, which prevent lateral slipping of the leaves of carriage springs, and second in the application of India-rubber bearings—one of which is represented at B—to the cast metal seat of the spring, C, whereby much of the jar and concussion, when vehicles are in motion, is prevented from transmission to the spring, and greater play and elasticity also secured.

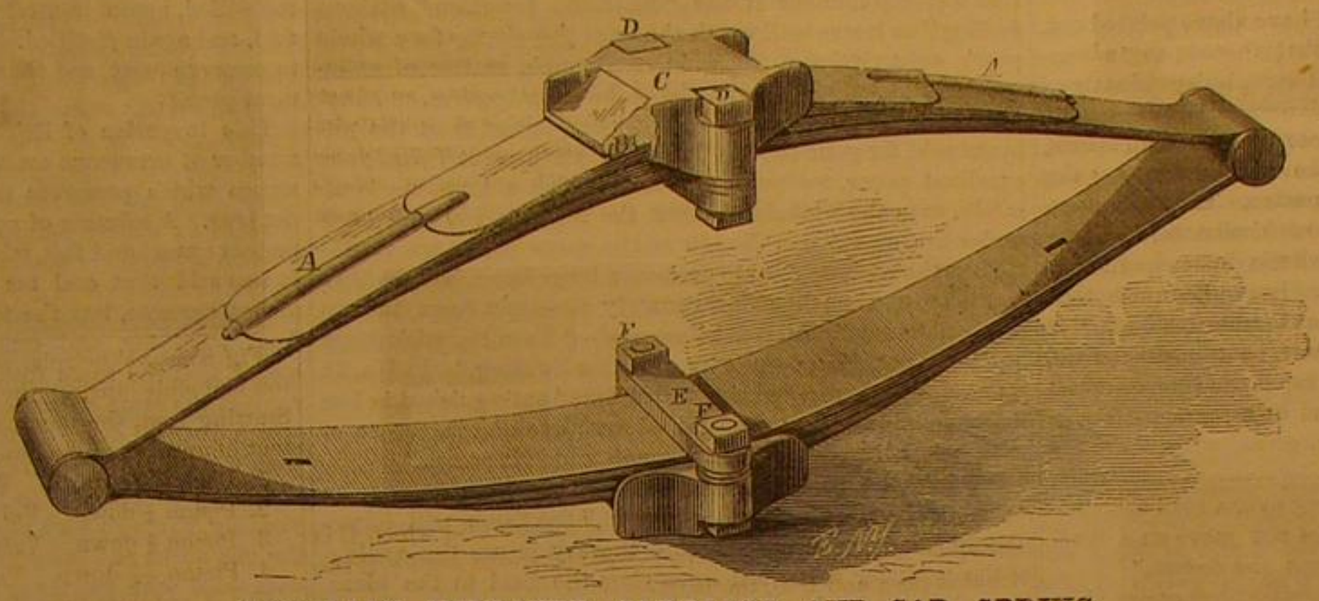
The ribs, A, are formed in the leaves by swaging, and are so made that the convex side of any leaf exactly fits the concave side of the leaf exterior to it, when the leaves are put together.

The cast metal seat, C, is fastened by bolts, D, passing through the bar, E, and held firmly by the nuts, F. The seat is so constructed that the rubber bearing, B, separates the leaf next it slightly from the seat, so as to admit of compression and expansion, corresponding to the motion of the spring. By this means considerable elasticity is gained over that attained by the ordinary method, and the force of violent shocks much weakened.

Beside the gain in elasticity this method is claimed to possess the following advantages over the old method. The form of the ribs gives greater strength to the leaves. Their tapering form limits the amount of the depression when heavily loaded, in consequence of the binding or wedging of the convex surface of each rib in the concave surface of the one lying upon it.

The spring can be made as light and graceful in appearance as those of the old style, and the number of leaves is entirely unessential to the application of the improvement, which is adapted to all springs from those of the heaviest locomotive to springs for the lightest buggy.

This improvement has been made the subject of two patents—the first bearing date, May 26, 1863, and the second June 2, 1868—both of which were obtained through the Scientific American Patent Agency, by George Douglass, whom address for further information, Bridgeport, Conn.



DOUGLASS' IMPROVED CARRIAGE AND CAR SPRING.

UTILIZATION OF BONES.

Not much more than fifty years ago old bones went to the refuse or dirt heap, being thrown away as a valueless substance, with the exception of a very small amount of them which was employed in the manufacture of glue.

In our day, however, the trade in bones has acquired a vast importance. From them are manufactured soap, glue, phosphorus, bone black, and valuable manures.

Many ships sail to distant parts of the world in order to obtain cargoes of bone. The battle-fields of Europe have even, in some instances, been dug up, and their long pent treasures sent to the bone mills to be converted into "superphosphate," which, applied to the wheat and fodder crops, has helped in the shape of bread and meat to support the present generation.

Men have thus actually been made to feed upon the remains of their ancestors through the speculative genius of the manufacturer of artificial fertilizers!

Bones are collected along with old rags in every country in the world, but the largest supplies are obtained from South America, where an immense number of cattle are annually slaughtered for the sake of their hides and fat.

The city of Hull, in England, is the principal depot for bone for the European market, and possesses many large and powerful crushing mills, where they are reduced into fragments of the desired size.

We shall limit ourselves to-day to the manufacture of soap and glue from bones; reserving for a future article the method of utilizing them in the production of phosphorus and of superphosphates.

Practical information being what is needed in this matter, we shall sum up the whole subject as concisely as possible for the benefit of our readers.

1. Place the bones in large baskets, or nets, in running water so as to wash off the adherent dirt.

2. Hang the baskets to dry and drip, or spread the bones on an incline so as to allow the water to run off from them.

3. Carry the bones to a crushing mill or to a stamp mill, and reduce them to the size of a hickory nut. If this be done between revolving, horizontal cylinders, these must have sharp-edged ridges about three-quarters of an inch broad on their outer surfaces.

4. Receive the crushed bones on a bottom formed of parallel rods which will allow fat and marrow to ooze through, without giving passage to the bone.

5. Place the crushed bones in wicker baskets in large vats or tanks, and cover them with water, the temperature of which must be from 120° to 140° Fah., *and no more.*

6. Skim the fat as it forms from the top of the warm water, and it is then ready, after mixing with alkalies to be boiled, into soap. *If the bones had been boiled,* the soap obtained would contain glue, be of inferior quality, dark-colored, and bad scented.

7. Take the baskets and their contained bones from the grease vats, and let them drip, after which suspend them in wooden vessels, into which pour muriatic acid, diluted with water, until it marks 7 degrees of Baumé's arcometer (spec. grav. 1·05.)

7. Leave the bones in this mixture until the upper ones are soft and pliable; this generally takes places is about six or seven days if the proportion of bone and acid has been well regulated.

9. Sink the baskets in a second set of wooden vessels, filled to half their hight with muriatic acid, diluted with water, till it marks 3° on Baumé's arcometer, and leave them in this solution until they are transformed into a soft, malleable, semi-transparent substance, out of which all the lime has disappeared.

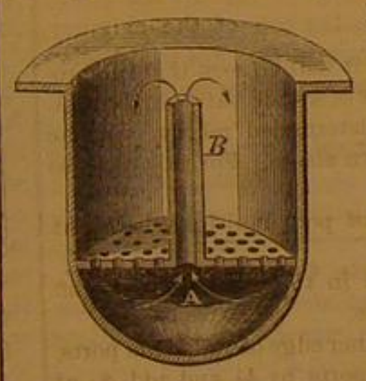
10. Wash the bones by running a stream of cold water over them for one-quarter of an hour.

11. Place the bones in a tank containing lime water to neutralize the acid, and after this, wash them again several successive times with cold water. The lime must be slaked in the water used, and 1 part of lime by weight employed to every 200 parts of water. The whole must be well stirred, covered, and allowed to rest for some hours.

12. The bones, after these last washings are completed, are now in a suitable state for the manufacture of the best quality of glue.

13. The acid, at 3° Baumé, used for the second operation, is suitable for conversion into that of 6° Baumé for the next first maceration.

14. Boil the bones in pans constructed as shown in the following cut. The bottom plate which supports the bones is perforated by small holes, and is surmounted by a pipe which reaches above their surface in the pan, so that when the water in A begins to boil it runs out through the top of the pipe, B, and flows over and through the mass of bones in a perpetually circulating stream. In large works the operation is performed in successive boilers, in each of which the degree of concentration is increased.



15. When boiled down to the proper consistency, run out the glue in flat, wooden molds, three feet long by one foot broad, which must be washed and wetted before the introduction of the glue.

16. Take up the glue sheets from the molds with a knife slipped under them, and cut it crosswise into six or seven lengths by means of a "special" glue cutter.

17. Dry your glue on twine netting, the strands of which must be $\frac{1}{2}$ inch in diameter. The netting is stretched on frames 6 feet long and 1½ feet broad. The temperature of the drying rooms must be maintained at from 59° to 77° Fah. When the outer air has this temperature, it is allowed to freely circulate among the layers of frames, through lattices situated all round the building, and which can be closed or opened at will. When dry it is ready for market.

18. The muriatic acid solutions are separately treated, in a manner we shall describe in a future article, in order to save the valuable phosphoric acid they contain.

Hydropathic Treatment of Railroad Stocks.

The *Merchant's Magazine* publishes the somewhat startling fact that twenty-eight of the leading railroads of the country have, within the short space of two years, increased their combined capital from 287 millions to 400 millions of dollars, showing an average inflation of 40 per cent. The editor argues, what is undoubtedly true, that it is impossible to adduce any really sound justification of the "watering" policy. It is, in most cases, simply a deceptive game played by speculative directors, who, after the inflation has been consummated, will be the first to forsake the bubble, and quietly wait to profit from the ultimate violent revulsion in values; while the attempt to draw out of the consumers of the country high charges for freight, so as to pay dividends on the increased stock, is a direct check to our material progress.

The Game of Croquet.

A counterpart to the railway velocipede, illustrated on another page, for the amusement of young persons, is the game of croquet, one of the out-of-door entertainments which has become very popular within a few years. It has the advantage over the railway velocipede in the matter of expense—the price of a set of croquet implements costing but a fraction of that of the railway; but where parties can afford it we recommend the introduction of both. The game of croquet is healthful, graceful, and social, and for young persons of both sexes we know of no open-air amusement that combines so many beneficial qualities with that of pleasure. The introduction of the game into schools is becoming quite common.

The manufacture of croquet implements has grown into an extensive business at Springfield, Mass., and the firm of Milton Bradley & Co., of that city, has become identified with the manufacture of the finest qualities of these goods.

Explosion of a Gasometer.

The city of Cincinnati felt the rumble and roar of a great explosion on the 24th ult. The *Commercial* says: "A great mass of black smoke rose above the Gas Works, then came a concussion that shook the windows, and immediately the smoke was crowned with a big, red flame-burst that shot up to an amazing hight. The shock was felt all over the city, except in the extreme limits, and probably not less than a third of the population realized immediately that something extraordinary had occurred.

"The gasometer, or holder, which burst, was a mass of boiler-iron of a quarter of an inch thickness, 127 feet in diameter, and 35 feet in height. It was an immense, inverted, circular tank, that rose and fell slowly, according to the amount of gas confined between its top and the surface of the water. Sunk into the ground, with a depth of 35 feet, is the tank proper, circular, of course, of stone, brick, and mortar. There were 375,000 feet of gas in the holder when the explosion occurred. We find it impossible to state the cause of the explosion, and difficult to convey any idea of the appearance of it. It appeared as if the roof of the holder was rent in twain from north to south, that as it rose and fell back the overwhelming sound was heard, and then the great bursts of flame and smoke arose. For an instant, for a square around, the breath of a mighty heat played. The woodwork of doors and windows was blistered and blackened. Men a hundred feet away found their faces, arms, and hands scorched to the flesh, and for many squares around, the close, stifling heat was felt, and then it was all over.

"The explosion is not accounted for by even the best informed gas manufacturers. When it occurred there was no fire near the holder, and no gas had been let into it for six hours. One theory is that of great expansion of the gas by solar heat on the holder, the consequent bursting of the roof, and flame communicated to the escaping contents from the stack of the Globe Rolling Mill. The idea has quite generally prevailed that there is no danger of an explosion to a holder. Several instances refute this. In October, 1865, a gasometer of the London Gaslight Company's works, at Nine Elms, Battersea road, exploded, killing ten men. It was twice the size of this. Not long since, we are informed, there was a similar explosion at Chicago. Both these explosions, however, were accounted for, the fire communicating from the governor in the first instance. How this ever occurred no one seems to know. The officers and employés of the works are puzzled, and cannot solve the mystery. So far as we can learn the only sufferers as to property, by this affair, is the gas company, whose loss is about $100,000, on which there is no iusurance."

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

Large and Small Cart-Wheels.

MESSRS. EDITORS:—Your correspondent, "F. W. B.," in No. 22, current volume, page 342, in his comments upon my communication in No. 20, of same volume, makes an amusing misapplication of a well-known law of friction, to prove that the friction between the axle and the hubs of cart wheels, moving the same distance, in the same time, with a given load, will be the same, whether the wheels are large or small.

The law which he invokes in support of this paradoxical proposition is laid down in the books in these words:

"The friction is entirely independent of the velocity of continuous motion."

All that this law establishes, in relation to the friction between the axle and hub of a cart wheel, is this: In moving the same cart, with the same load, a given distance, you will have the same amount of friction to overcome, whether it moves at a greater or less velocity; because there is the same amount of rubbing between the axle and its "circumscribing box or bearing," in the one case as in the other; and it makes no difference whether that amount of rubbing is performed in a long or a short time.

It is precisely this law that proves the correctness of my proposition; viz., that "by doubling the size of the wheels, you reduce the friction one-half."

To illustrate: Suppose the axle, on which the wheel turns, is six inches in circumference. It is manifest, that at each revolution, every particle of matter in the hub or box, which comes in contact with the axle, must move around the latter a distance of six inches, and with the friction due to the

weight of the load. Now, with wheels 6 feet in circumference in moving sixty feet there will be ten revolutions, and the surface of the hub or box in contact with the axle will travel around it the distance of five feet. But if you substitute wheels 12 feet in circumference, the wheels will make but 5 revolutions in moving 60 feet, and the rubbing surface of the hub or box will travel around the axle only a distance of two and a-half feet. The weight or pressure will be the same in both cases, and, consequently, the friction of each revolution will be the same, whether made in a longer or shorter time.

The law may be expressed in these words: If you move one surface over and in contact with another surface, under a given amount of pressure or weight, the friction to be overcome will be in proportion to the weight or pressure, and the distance which the moving body travels, without reference to the time occupied in traveling that distance.

I respectfully refer your correspondent to "Appleton's Dictionary of Mechanics," Vol. I. page 717, where he will find the law applicable to this subject clearly laid down, and fully sustaining my proposition.

After falling into the error which I have above pointed out, your correspondent goes on to show, that there is an "advantage" in large cart wheels over small ones, independently of any saving of friction; "and this advantage" he says, "depends on the road, whether there are obstructions, like stones, sand, mud, or the settling down of the road bed under the wheels," etc. This is begging the question. In my communication I did not say that the saving of friction was the only advantage gained by using large wheels instead of small ones, in traveling over common roads. My assertion was, that the difference in friction between the axle and the hubs, "is the only reason why a horse can draw, on a level plane, a heavier load, at the same speed, on large wheels than on small ones." I adhere to that assertion, it being understood, of course, that I mean an absolutely level plane, when there are neither obstructions to surmount, nor depressions into which the wheels may sink. But a cart moving over a road obstructed by stones, mud-holes, ruts, etc., does not move on a level plane. It must inevitably have its "ups and downs."

That large wheels will move over obstructions easier than small ones, is a proposition which I have never denied.

Washington, D. C. J. J. C.

Is Machinery Hostile to Mental Culture.

MESSRS. EDITORS:—Civilization always advanced in direct ratio to mechanical development; the remains of ancient Egypt, Greece, Rome, China, Peru, Mexico, and everywhere else, prove it incontrovertibly. As the laws of nature revealed themselves to men, they grew intelligent, and while some used the knowledge obtained for improvements in industries, others made it their aim to further explore the recesses of nature, from which all wisdom flows. In either case as the necessity for improved mechanical means became urgent, ingenuity was taxed to supply the want. Thus we have the progress in civilization through industry by mechanical means, deducted from the laws that rule the universe. Machinery, therefore, is the promoter of human progress, the great lever by which we open the portals that exclude our vista from the formerly unknown, and therefore mysterious regions, enlarges our knowledge, and dispels ignorance and intolerance.

Progress in knowledge is the certain road to perfection, to virtue, to further development of that intelligence in mankind, which only requires encouragement to expand over the immeasurable extent of the universe, finding there revealed the true source of all being; it directs to morality, to rectitude, through justice. On the other hand, the substitution of automatical work for hand labor relieves the mass from a great deal of soul-benumbing drudgery, gives each more time to reflect; and the observation of the numerous devices employed in itself promotes study, reflection, independent reasoning; the real and only source of true liberty, if joined to morality and justice. R. H.

New York city.

Excellent Copying Ink.

MESSRS. EDITORS:—In your issue of May 15th I notice a recipe for a new copying ink. Perhaps it may gratify some of your readers to be acquainted with another recipe which was published by me, in 1862, in *Wieck's Illustrated German Polytechnic Gazette*, and which will be found perfectly reliable.

Take one half of a pound of extract of logwood (Sanford's is best), two ounces of alum, four drachms of blue and as much of green vitriol, and one ounce of sugar; boil these ingredients with four pints of water, filter the decoction through flannel, and add to it a solution of four drachms of yellow chromate of potassa in four ounces of water, and finally two ounces of chemic blue in two ounces of glycerin. The chemic blue, also called "blue dye," is the solution of indigo in oil of vitriol, and otherwise used for dyeing wool.

You will notice that my composition differs from that given by you, in containing alum, instead of carbonate of soda, and sugar instead of gum arabic. Beside the ingredients of your ink, it contains chemic blue, and green and blue vitriol. In using these two salts I intend to effect a combination between them and the tannin of the extract of logwood. Your ink will probably just flow as well with one quarter less glycerin and one half less water of the quantity indicated.

New York city. ADOLPH OTT.

Why Large Wheels are of Lighter Draft than Small Ones.

MESSRS. EDITORS:—Your correspondent "J. J. C.," on page 311 of present volume, in answer to "F. R. P." criticising the latter's manner of explaining the reason why a cart with large wheels is of easier draft than one with small ones, gives an opinion I differ from as well as from that of "F. R. P."

The cause is change in the angle formed on the one side, by the line of draft from the axis of the wheel, and on the other side from the axis of the wheel to the top of any object in front and against the wheel. The axis of the wheel being the apex of the angle, it will be seen that the smaller the wheel the more acute this angle will be, the line of draft being then lowered comes more behind the object to be overcome and increases the draft. If the wheel be so small that the line of draft coincides with the line of resistance the cart cannot be moved at all. "J. J. C." says that a cart with wheels half the size of another will have double the friction at the axis because it moves twice as far in going the same distance as the large wheels, but "J. J. C." must recollect that draft has twice the leverage on the small wheels that it has on the large ones, therefore in this respect they would be equally balanced. G. B.

Princeton, Ind.

Extinguishing Kerosene Lamps.

MESSRS. EDITORS:—For the last ten years, I have hardly ever read a single number of the "Scientific American," without feeling that it was well worth the price you charge for a whole year's subscription. *E.G.*, in the simple matter of extinguishing kerosene lamps; to have the safest, easiest, and best plan, is worth more to any family, using lamps, than the pittance paid for your paper. In No. 8 of the present Vol. of your excellent paper, we read—"To extinguish a kerosene lamp safely, turn the wick down until the flame is low and blow under the glass." In No. 10 of the same paper, we read—"Turn the wick up so as to produce a large flame, but not high enough to smoke; then blow squarely *across* (not down) the top of the chimney." In No. 14 we read—"Turn the wick down until it is out, then turn it up ready for lighting." In No. 21 we read—"A kerosene lamp will be found extinguished in less than one minute from the time of complete disappearance of wick below the edge of tube through which it passes."

I think the above plans objectionable.—First, because by "raising the wick before blowing out," the flame will immediately run down to the tube and thereby injure the quality of the wick for afterward conveying the fluid to the blaze. Second, because "lowering the wick to extinguish the lamp," will produce a kind of gummy substance in the upper part of the tube, which will ere long interfere with the raising of the wick when a new supply is needed. Third because "blowing under the the glass" takes such hard blowing and throws the blaze and smoke against the side of the chimney and soils it.

Fourth because "blowing down the chimney" is unsafe and also tarnishes the glass. Other objections might be given, but let these suffice.

After experimenting in the matter, I *think* I can give an easier, quicker, and safer plan than any of the above, for "extinguishing kerosene lamps."

It is simply this:—Blow across the top of the chimney, without either raising or lowering the wick. Let the blowing be a kind of *puff* and inclined upwards, so that no part of the blast will go down the chimney.

This plan needs no previous or subsequent fixing of the lamp. Try it. GEO. BUCHANAN

Washington, Pa.

Vibration of Metallic Vessels Containing Water.

MESSRS. EDITORS:—On a recent visit to Port Sullivan, Milam county, Texas, my attention was called to a curious fact bearing on this subject.

The college bell had been taken down from the tottering belfry, and placed, with its frame, upon the floor of the portico, where it was still used for college and church calls.

Some of the mischievous students turned it up, and propped it, and then filled it with water. Its diameter is about 18 inches, and its contents some five or six gallons. They then undertook to ring the bell by slight blows of the clapper against its walls. They, however, got little response; and after a few blows it was discovered that the bell was cracked in several directions. In fact, the pieces came asunder after emptying the bell, and showed the bell metal to have been of the most compact quality. The fracture was granular, but each grain clear and glistening.

"What was the cause of the fracture? The bell was accustomed to much more violent blows for years before."

To the professor who asked this question, the writer gave this extemporaneous reply, without being very confident that it was satisfactory.

"Instantaneous vibration against the water inside was probably impossible, and hence the momentum of the blow forced a rupture; or more specially, when the clapper struck the concave rim of the bell, there should have been in the open air, or any elastic medium, an instantaneous yielding of the concave in the direction of the blow, and a corresponding retraction on the opposite end of the diameter, and the circle for the moment would have assumed an ovate form. But as water is practically inelastic, the yield to the blow is not compensated by retraction and change of form; and hence the bell would crack, probably at some point of minimum strength."

Experiments may readily settle the question, but we have a great scarcity of bells in Texas, and cannot afford to make these tests. C. G. FORSHEY.

Galveston, Texas.

Cosmos states that a committee has been formed at Copenhagen with the intention of erecting a suitable monument in honor of the great Danish *savant*, Hans Christian Oersted. A statue, representing the distinguished natural philosopher, is ordered to be made by a Danish sculptor, named Ferichau, and is to be placed in a prominent situation in Copenhagen.

(For the Scientific American.)

COAL TAR AND ITS PRODUCTS AS PRESERVATIVES FOR WOOD.

Ever since the establishment of gas works it has been considered a matter of great importance to find some useful application for their waste products, principally the coal tar The old custom was to use wood tar as a coat for common wood structures exposed to the inclemency of the weather, and it was soon found that coal tar resinifies, dries, and hardens quicker than wood tar. This circumstance led to experiments to ascertain the preservative nature of coal tar.

More than fifty years ago W. H. Hyett and others impregnated wood with gas tar, and reported that such wood, placed in a damp cellar, became moldy sooner than the same wood in its natural state, and that it showed fungi, particularly where the tar abounded.

In 1830, Reichenbach published his experiments, by which he obtained creosote from beech-wood tar. He subjected the tar to a fractional distillation, the heavier products, which distilled over by increased heat, were washed with an alkali, redistilled, again treated with lye, and then with sulphuric acid, and again distilled. The substance so obtained he found to preserve meat, and therefore called it "creosote," meaning meat preserver.

This invention of Reichenbach served as a nucleus for a number of erroneous conclusions. It was alleged that a substance which preserves meat also preserves wood, which is not true. A solution of common salt, for instance, serves to preserve meat and fish, while it accelerates the decay of wood It was said that coal tar is the same as wood tar, and furnishes creosote, but the truth is, coal tar differs materially from wood tar, and contains no creosote. It was further stated, that the mere distillation of coal tar is sufficient to convert the same or part of it into creosote, and the coal tar, which distilled over by increased heat, and was found heavier than water, was deceptively called "creosote," sold as creosote, and used as creosote to "creosotize" wood and preserve it yielding, through such misrepresentations, large revenues to the gas works and inventors of various processes to impregnate wood with gas tar or its products.

The first man whom we find engaged in the creosotizing patent business, and probably the most candid inventor, was Franz Moll in A. D., 1835. He found, by practical experiments, that the so-called "creosote of coal tar" was worthless to protect wood from decay. He ascribed its failure to the presence of other substances therein, with which the "pure creosote" is associated, and strongly recommends its previous purification with alkaline lye, similar to Reichenbach's process described above. When coal tar is heated in a still by gradually increasing heat, the product first obtained, which is lighter than water, is called by him "eupion," the heavier liquid obtained thereafter he calls "creosote." Merely coating wood or timber with coal tar or other tar, he finds of but little advantage.

Moll's British patent was granted in 1836, and is the more interesting, as his process is based on the best principle, so far known, to saturate wood with liquids, and as his specification accounts for the necessity of tedious operations, without which he finds the application of the products of gas tar of no practical advantage. His process is as follows: The wood is placed in a close chamber, which is connected with one or more stills. He begins the operation by heating the inside of the chamber by a steam pipe or elsewise, to about 100° Fah., and then increases the heat gradually till sufficiently warm, to assist in maintaining the vapors of eupion and creosote in a vaporous state. The water from the damp timber is then drawn off, and eupion, previously sufficiently purified, is heated in the still, from which the vapors enter the chamber. When the wood is considered sufficiently impregnated with the eupion vapors, the surplus vapor is drawn off, and vapor from a still containing creosote, also previously purified, is then admitted, and finally boiling liquid creosote is introduced into the chamber by a pipe in a quantity sufficient to cover all the wood therein. After the whole has become cold, the wood is removed from the chamber.

He describes the following experiment, made by him "on a balk of good oak which was rather in a damp condition, the same was fourteen inches square, and about ten feet long, which, on being submitted to the vapors of eupion for about six hours, when cut in two parts, was found to be impregnated proportionately, even to the heart, with eupion, and when the two parts were afterward submitted to the vapor of creosote, and boiling creosote, the same was found to have taken effect within 12 hours. But subsequent experiments have proved that it is better to submit the wood or timber for a comparatively short time to the action of the vapors of eupion and creosote, and depend more on the liquid bath as described, this process being less liable to crack the wood or timber than the vapors."

MOLL'S SIMPLIFIED PROCESS.

"Where it is not thought a matter of importance, whether the timber be chiefly penetrated with creosote or eupion, the former of which I consider the chief agent against dry rot, or where the operation is chiefly performed in order to prevent the effects of penetration of water into the wood, or where it is judged to be immaterial, whether these fluids convey any acidity into the timber, and when the proportion of eupion and creosote contained in the tar is well known, the operation may, of course, be much simplified by letting the vapors or liquid products of tar, or other matter containing eupion or creosote, or both, enter into the timber. But I am bound to state that the above-described method of washing the substances, and applying them separately, will be found far superior in use, as the volatility of the eupion and its fluidity will allow its rapid penetration into the timber more perfectly than when in combination with the cresote, whose entrance

the former will greatly facilitate when once lodged in the pores through the affinity of the two substances, and as by these means the quantity of eupion can be regulated which is to be absorbed by the wood; moreover, the antiseptic power of the creosote will be augmented by the washing and freeing from matters mixed with it."

LOUIS S. ROBBINS' PROCESS.

The process just described by Moll as his simplified operation, was reinvented thirty years thereafter and patented here, A. D., 1866, by Louis S. Robbins, of New York, and the patent was lately purchased by "The National Patent Wood Preserving Company," by whose order a pamphlet was published last year under the title of "Discovery of a Lost Art of the Egyptians."

Robbins, like Moll, uses a chamber, in which the wood is placed; Robbins also uses a retort, or still, in which, like Moll, he heats coal tar and introduces the vapors from the retort into the chamber by a gradually increasing heat, lets off the water from the damp wood, and impregnates the wood with the vapors of coal tar, which he calls "oleaginous vapors," while Moll calls the same "eupion and creosote." Robbins says further, that he does not limit himself to any particular form of apparatus, nor does he intend to limit himself to the removing of the surface moisture from the wood by means of oleaginous vapors, as there are various ways in which the same can be accomplished with the use of heat. "But what I claim as 'new' is the process consisting in first removing the surface moisture from the wood and then charging and saturating the same with hot 'oleaginous' vapors and compounds, also removing the surface moisture from the wood by means of hot oleaginous vapors."

We suppose that Robbins did not know of Moll's process, as he says in his specification: "From the above description it is apparent that by my process I am enabled to more completely saturate the wood with the preservative compound than has been, or can be done by any of the processes heretofore in use, for the reason that I cause the preservative compound to permeate the pores and fibers of the wood in a *vaporized state*, while in the others it is made to enter in a liquid state."

JOHN BETHELL'S PROCESS.

Patented in England in 1849. He applies the "creosote," or coal tar, in its liquid state, without any previous purification. The wood is placed in a pressure tank, from which the air is exhausted previous to the introduction of the "creosote," which is then forced into the pores of the wood by a pressure pump. Bethell's process, being the most simple and quickest in its operation, was extensively used, and of the results we have reliable reports.

David Stevenson, the eminent English engineer, states that although highly recommended to him by Bethell, he found such creosotized wood to be wholly unfit for use on piers or other water structures, as it was soon destroyed, perforated, and eaten off in places where the creosote abounded, though the most favorable location had been selected for trial, and every precaution used by Bethell in the preparation, the wood having been creosotized after being cut into the shape in which it was applied. (*Civil Engineer and Architect's Journal*, vol. 25, page 205. London, 1862.)

Wm. Jerry Walker Heath reports (*ibidem*, vol. 29, page 301. 1866) that square rail ties sent by Bethell for use in South America, even when laid on the best sandy ground, were soon totally destroyed.

John Bethell himself stated (*ibidem*, vol. 29, page 323) at a meeting of the association of the engineers, that he received from Belgium rail ties of the round shape back, which were previously creosotized by him in the best manner, and which were then found to be hollow like a cannon, the heart being all gone, and the outer part representing a black, hard mass.

FAILURE OF COAL TAR OIL FOR THE PRESERVATION OF WOOD.

The causes of the failure are explained by the fact that coal tar does not yield any creosote, even if treated in like manner as wood tar, which often yields as much as 25 per cent of creosote. The substance obtained by the treatment of coal tar is carbolic, or phenic acid, which differs materially in its properties from the real creosote. Being an effective disinfectant, carbolic acid does not prevent fermentation nor putrification; on the contrary, Ilisch, of St. Petersburgh, found that some substances impregnated with a solution of carbolic acid showed the formation of mold within a fortnight. This circumstance, taken in connection with the fact that coal tar resinifies and hardens quicker than wood tar, explains the failures observed by Hyett, Stevenson, Heath, and others, when used in a wet place, where the tar cannot quickly dry and form a hard coating. This also explains why nothing but a hard mass outside remained in the rail tie spoken of by Bethell, where all wood within was gone, leaving the resinified tar as the "hard, black mass." Such is similar to the experience of coachmakers relative to hubs, which, when painted with oil color before being well seasoned, soon rot on the inside. Experience and science seem to teach that the use of coal tar or its products is, in most cases, more detrimental than advantageous for the purpose of preserving wood.

Women as Farmers and Cattle Breeders.

At the annual meeting of the Northwestern Dairymen's Association, held in Elgin, Ill., on the 9th and 10th of February, the Hon. K. A. Willard, of Herkimer county, N. Y., made an address from which we extract the following:

Mr. Willard said he did not mean to advocate female field labor, such as is known among the lower classes in Europe, nor would he abridge one iota any female accomplishment; but he could see no objection to any man's daughter or sister taking her seat occasionally on the mowing machine, the hay tender, the wheel rake, the sulky plow or cultivator, or in the direction of some light farm machinery, where she can gain strength and health in the open air. He was confident women enjoy such things, and are much happier, stronger, and better, if they are taught that such work is not unwomanly, and the knowledge gained would be of immense service in after life, in assisting the father, brother, or husband with suggestions and advice. In their education we do not give our girls a fair chance in the race of life. The majority of American boys and girls do not like to make a choice of farming as a livelihood. The farmer's educated daughters of to-day prefer the town or city, and have little sympathy for the farm; and if they marry a farmer, often urge him to abandon the business for something more genteel. In England they have better tastes, where their women have more fondness for country life than ours. A well-bred English woman seems to take pride in the knowledge of business suitable to her station. Lady Pigott, the wife of Sir Robert Pigott, has one of the most noted herds of short horns in England. She has made it both a source of profit and reputation. A high bred American woman can hardly understand such a taste, and regards it with intolerable disgust. He did not care to discuss this question. He only asked that farmers try in some way to make farming pleasant and interesting to wives and daughters, that the farm may have their sympathy and influence, for without such help it is hard to make farming successful.

The Rubbish in the Patent Office.

"What rubbish!" is frequently in the minds, and not seldom on the lips, of those who daily throng the galleries of the United States Patent Office at Washington. A very little reflection will show to what a limited extent these but too carelessly-conceived thoughts, and these equally carelessly-uttered words, are just.

On the 15th of December, 1836, the General Postoffice Building at Washington was entirely destroyed by fire. In the upper portion of this edifice the United States Patent Office then had its home; its scanty rooms being filled to confusion and repletion with models, drawings, and specifications, coming from the inventive mind of the nation, and deposited there from the time patents were first issued by our Government. These models, drawings, and specifications were all destroyed with the postoffice building; ashes and melted or twisted fragments of copper, brass, iron, and steel being all that was left of that which had often been looked upon with a feeling akin to wonder by the thoughtful—wonder that so much time, thought, and money had been spent in elucidating and preserving plans and schemes (many of them could not be called inventions), never heard of, noticed, or seen outside of the rooms in which they had found a legal home.

Since the disaster of 1836, a new and spacious building, one of the striking ornaments of our national metropolis, has been erected for the use of the patent office; and this building, with a current issue of about three hundred new patents per week, is now filled almost to its utmost capacity with models of nearly every conceivable form and for almost every conceivable purpose.

How comes all this strange medley? this aggregation of odds and ends? and what are their uses? Man might be called a blundering animal, not guided by the unerring instinct that prevents the lower animals from making a mistake; not satisfied to follow the beaten track, he tries different modes of doing the same thing, often blundering most glaringly, but sometimes, in the result, reaping a full reward in fame and fortune by hitting upon and bringing out something invaluable to his fellow-man. Slow, and even obstinately unwilling as we are to change from old to new ways, "Let well enough alone," and, "It is good enough as it is," have been deeply fixed in our natures from the beginning. Hence, innovators have never met with favor, and instead of being helped and encouraged, they are but too often sneered at and hindered even by those who are most likely to be benefited by their labors. Many a really valuable invention or improvement has been persistently resisted and opposed at first by the very persons who, in the end, are to derive the most benefit therefrom; and ere a foothold could be gained, many a battle has been fought for years, against the most unfair odds, with those who should have been doing most to aid and assist in the advancement of the new idea. Even the workmen in charge of dangerous apparatus, and whose lives hang sometimes upon a thread, not only do not seek or care for greater safety, but they often persistently and willfully set themselves against the very thing they should do their utmost to help on as a good to themselves. It is a strange anomaly that it is in cases where life and property are most in jeopardy by defective modes of using some needed but highly dangerous thing, that the greatest apathy is felt; and those who thoroughly understand the question often make great opposition toward even a fair trial of a proposed improvement.

On the contrary, most of what is seen at Washington is the work of men often with little or no experience in the particular branch they have taken in hand. It would seem from this that those most familiar with a subject, may not be best calculated to improve it, simply because they do not care to get out of the old ruts. Hence, the innovator, and sometimes improver, is most likely he who lacks almost all knowledge of what has preceded him. On the other hand, hundreds of patents are rejected upon application, simply because an idea has been hit upon by the applicant quite new to him, and apparently valuable, but which, from some good reason, only learned by experience, has proved fallacious, and consequently has long ago been discarded.

It would be well for those who profit by the real improvements that come from the teeming brains of those who fill the galleries of the Patent Office with their curious labors, to keep back their too-ready shrug and sneer when new inventions are brought to their notice by some poor devil of a patentee, as innovators are but too often termed. Look at least with charity and consideration, upon a class to whom we owe so much. Help them when you can, and be not niggardly in kind words of encouragement, and with money, too, when you can do so out of your own excess. Remember that, since the time when man has needed anything, it is from just such men as these, whom you but too often discard unthinkingly, have come all the comforts we enjoy in our homes, in our business, and in every walk of life. To this ever-restless band we owe all of improvement that so strongly marks this epoch in the world's history. The minds of but few in the grand total of humanity have thus worked incessantly for our good, in the long past as in the present, and they should be treated, individually, and as a class, not as half-witted visionaries, but as the benefactors of our race. They have ever battled on against every discouragement and every hindrance, each, like the soldier in a forlorn hope, trusting that he might be the one to plant the flag on the parapet and reap the wished-for reward.

The work of these men—these martyrs as they may sometimes be called—can never be really known. Its record would take in all the failures, and it would also take in that much larger aggregate of all the brain-worn hours, which have left no mark except that deep one on the weary mind of the thinker, who, after all his labor, finds that he has only succeeded perhaps in, as it were, proving a fallacy. But we can measure the value of the work done—of the wheat winnowed from this large amount of chaff—by what we see of success all around us; and by these fruits we should know them, and with this knowledge we should ever be willing to admit that those who have piled up the rubbish in the Patent Office at Washington, are worthy of more honor and more reward than they usually receive.—*Lippincott's Magazine.*

The American Association for the Advancement of Science.

This Association has issued a circular announcing that the eighteenth meeting will be held at Salem, Mass., commencing on Wednesday, August 18th, 1869, at 10 o'clock, A. M. For the general good of the meeting it is hoped that all who can will be present at the organization.

On the afternoon of the first day of the meeting, the Association will be invited to participate in the dedication of the Museum of the Peabody Academy of Science, followed by a levee in the evening.

It will be the aim of the local committee to make the sojourn of the members of the Association in Salem pleasant, as well as profitable in a scientific point of view. The usual local courtesies will be extended. Special arrangements will be made for members wishing to collect marine animals for their cabinets.

The committee is giving attention to the facilities for coming to and returning from the city over all routes of travel, and it is hoped that arrangements will be made with the railroad companies by which half fare will be secured for those attending the meeting.

As the hotel accommodations in the city are very limited, special arrangements will be made with the proprietors of several boarding houses for the accommodation of members, and many citizens have signified their desire to extend the hospitality to members of the Association; but in order that all may be provided for without confusion or delay, it is requested that persons intending to be present at the meeting, will notify the local secretary at as early a day as practicable, and when possible state the day they will arrive. The committee will engage rooms for those who request such an arrangement to be made on early notice being received.

A prominent feature of the meeting will be the department of microscopy. The local committee, in order to give encouragement to the general and increasing interest in the use of the microscope, have decided to furnish rooms for the display and comparison of microscopes, objectives, accessory apparatus of all kinds, test objects, and objects of scientific and popular interest.

It is intended to have as complete a collection as possible of instruments of both American and foreign manufacture. Those who are possessed of microscopic stands, objectives, or accessory apparatus, in any way remarkable for excellence of performance or design, are requested to bring them to the meeting.

The objects of this exhibition will be to assist the progress of scientific research, by social intercourse and a full comparison and discussion of whatever is new and important in microscopical investigation, and to encourage the manufacture and use of this valuable instrument.

New Process for Manufacturing Beet Root Sugar.

The eminent French chemist, Payen, has recently communicated to the *Société d'Encouragement*, in France, a new and simple process for manufacturing sugar from the beet root, which has been successfully practiced during the last sugar campaign by Mr. Champonnois. It is as follows: The beet root is reduced to pulp by the ordinary process, and treated by the Perrier, Possoz, and Call process of double defecation and carbonatation. After crystallization, the remaining sirups are reduced to a density of 10·40, or about equivalent to that of the original juice. The temperature is then raised to 158° Fah., and this diluted hot sirup added to a second portion of fresh pulp. This is allowed to drip, and treated in the same manner as the first. A repetition of these operations is effected ten times in succession with new bodies of pulp and residual sirups. The sirups obtained each time are clear and limpid.

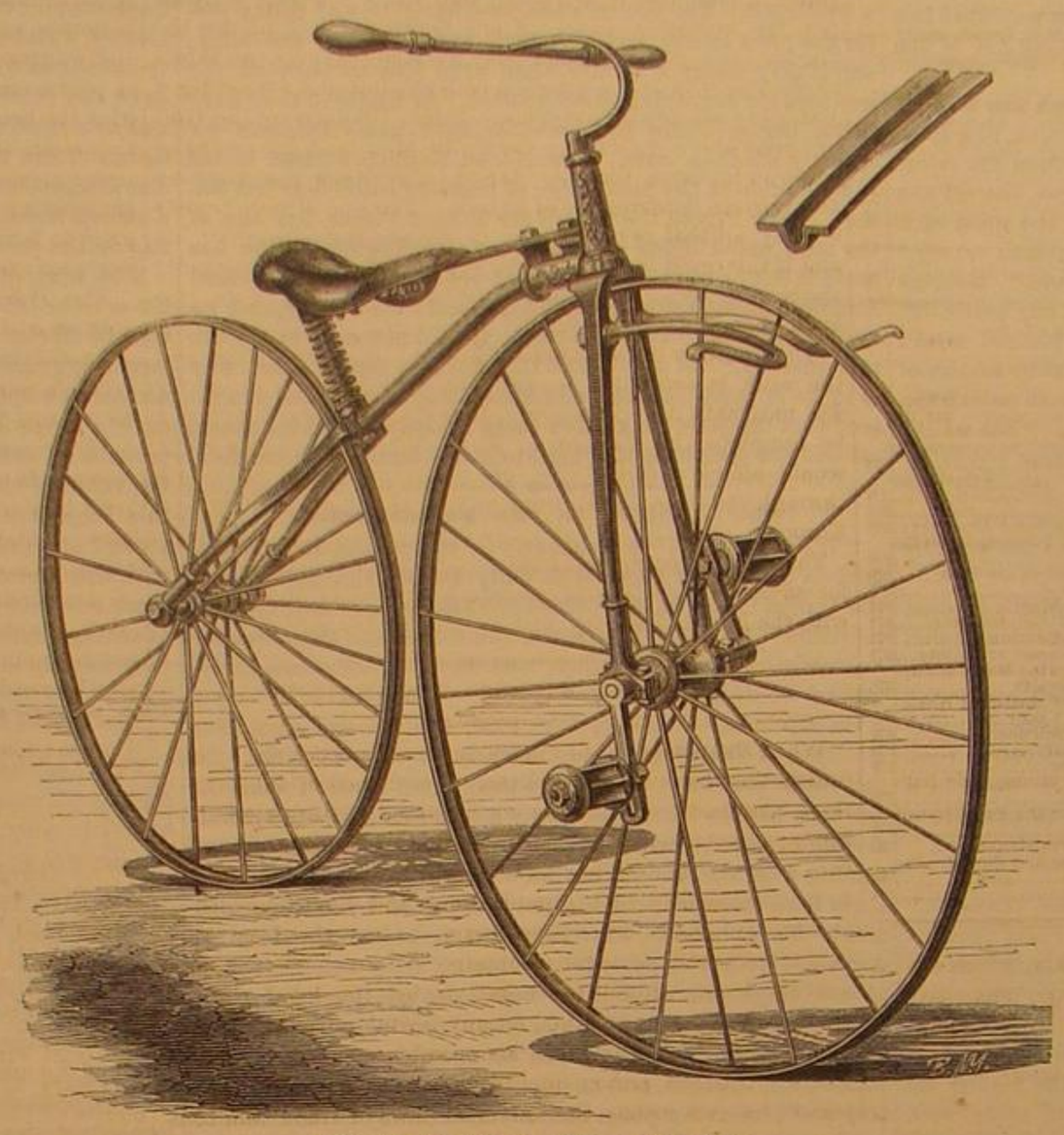
The salts contained in the beet root, and a large portion of the nitrogenized substances are left in the pulp by coagulation and by dialysis during the application of this method.

Improvement in Velocipede Wheels.

Lightness and strength are two essentials in velocipede construction, and many otherwise meritorious inventions have failed to become popular simply because one, or both, of these points were lost sight of in devising them. The improvement which we this week lay before our readers, is one directed especially to securing these vital points, and will become obvious with a very brief description. The rim, a portion of which is shown at the upper right hand corner of the engraving is corrugated as there plainly shown. The spokes are inserted into the rim alternately on opposite sides of the groove in the rim; those inserted into the left lateral portion of the rim connecting with the right end of the hub, and those entering the right lateral portion of the rim joining with the left end of the hub, thereby supporting the rim on both sides, and strengthening the wheel against lateral strains, at the same time admitting the easy attachment of rubber tire if desired. This form of the wheel gives very much greater strength and elasticity with a given weight of metal than could be attained by the old method.

The engraving shows an improved bicycle with the wheels constructed as described. The airiness and grace of the wheels are well delineated, thus illustrating the truth, that beauty of design is always connected with perfect fitness in mechanical construction.

In fact the bicycle from which this engraving was taken, is a marvel of perfect workmanship, and reflects great credit upon the manufacturer and inventor, Mr. Virgil Price, 144 Greene street, New York city, whom address for further information. Patented through the Scientific American Patent Agency, May 4, 1869.



PRICE'S IMPROVED BICYCLE.

THE INDICATOR.

No engineer conversant with the scientific principles of the steam engine denies that the indicator is of immense value. It is to be deplored that the use of this instrument cannot be more general. The comprehension of its principles is within the reach of almost any engineer in charge of stationary or other engines. Why is it that this instrument, so well calculated to add to the perfection of the steam engine, is, among those directly connected with the running of engines, so little known? It is not on account of the difficulty of understanding a card when taken, much less is it the difficulty of attaching the indicator to the engine that hinders its general introduction, but it is the price that is charged or an indicator. Few engineers can afford to pay one hundred dollars for an instrument, and the owners of steam engines are loth to pay the price for a thing, the utility of which they think is at the best but doubtful. The indicator very often is the means of showing the imminent peril at which the engine is working, and this is particularly true where two engines are connected together, for a derangement of one engine affects the other in the highest degree. If the demand for instruments was greater the present styles could be made much cheaper, but, on account of the high prices, the demand is so small that it does not pay to get up machinery for their special construction. The only way we see out of the dilemma is to design a style of instrument which will not be so costly in its construction, and, at the same time, will be as certain and as accurate in its action. This no doubt presents many difficulties—some persons may say that they are insurmountable, but I scarcely think so, the thing is possible and will be accomplished by some enterprising person. The indicator in the hands of the great body of engineers will tend towards a better understanding of the action of the steam and will promote inquiries into the more difficult and complex principles of the steam engine, which will be as beneficial to the owners of the engines as to the engineers themselves. Coal would be saved, and many a break down could be avoided if the engineer in charge had a clear knowledge of those parts of his engine not immediately within his reach. Engineer.

PETROLEUM--IMPORTANT DISCOVERY.

M. Henri Sainte-Claire Deville has recently presented to the French Academy of Science the third portion of his valuable researches on the physical and heating properties of mineral oils. M. Deville, in this memoir, dwells largely on the dangers incident to the use and storage of petroleum, and on the modes of preventing the disasters which are of such frequent occurrence.

Most persons suppose all such cases to be due to one cause only; namely, to the highly inflammable nature of the volatile ingredients contained in these oils, which, by admixture with air, form explosive compounds. This is a cause of real danger, but the above-named chemist calls attention to a hitherto unnoticed reason for many fires and accidents.

This he attributes to the very great expansion in bulk which mineral oils undergo by increase of temperature. If petroleum has been barreled during the cold season, it will expand largely with the first appearance of hot weather, and will then burst the containing vessels, on the same principle that ice ruptures our water conduits and hydrants. The inflammable material then oozes out, often without being noticed, and is a lurking cause of danger. It is well known that the burning of petroleum refineries and storehouses generally takes place in hot weather after a cool period has just elapsed.

Now is the time of the year to look out for petroleum fires, and to see to their prevention. The conclusion to be derived from M. Deville's memoir is, that it is essential to leave sufficient space for expansion by heat in all vessels containing petroleum, and never to fill them to repletion.

When the paper of M. Deville shall have been published, we shall be able to tell our readers the exact extent of space needed for the mean expansion of all mineral oils.

This statement, taken in connection with the very recent and destructive oil-fires at Hunter's Point, L. I., and at Weehawken, N. J., occurring under the precise conditions of temperature described by Mr. Deville, will attract much attention.

THE ADJUSTABLE LOOKING--GLASS REFLECTOR.

How the amount of labor involved in the complicated structures which ladies now wear at the backs of their heads can be accomplished by a pair of hands without eyes, has always been to us an inscrutable mystery. Our own back hair

with its simple parting is a matter of some anxiety, only relieved by consultation with some one of our household, previous to our emergence into the street of a morning; and when the answer is satisfactory there always remains a gloomy doubt on our mind, as to whether the inspection was carefully made and the answer based upon the real state of things. We have been assured the amount of experiment which enables a lady to adjust her hair unaided is something very remarkable; and that it has hitherto been guided only by the sense of feeling, the result of each experiment being determined by aid of a hand mirror. If this be really so, the article herewith illustrated and described must be a boon, which to the science of hairdressing is what the telescope is to astronomy.

This adjustable mirror is attached to the frame of any toilet glass, no matter what size or shape, by means of a flat plate screwed to the back side of the top of the frame, and having a shoulder which also rests on the top of the frame. This plate has a double adjustable joint from which extends forward a hollow rod, movable in any direction and held when adjusted by milled set-screws at the double joint. Within the hollow rod slides a bent rod to which a circular mirror is attached, which may be drawn out, or thrust in as occasion may require, and fixed by a set-screw passing through the side of the hollow rod. The reflector may thus be lowered or elevated, turned to the right or left, and fixed in any position required. The reflector is also fixed to the rod by a movable joint and set screw, so that it can be placed at an any required inclination.

It is finished in superb style, being silver-plated throughout, and makes an elegant and ornamental addition to the toilet glass.

We are informed this article has met with a very favorable reception in Europe, and as its convenience and utility are obvious, its introduction in the United States will probably be an easy matter. The agent for the patentee, is Chas. J. Hartmann, room 46, No. 40, Broadway, New York city, whom address for further information.

How Bronze Statues are Cast.

Among the various branches of fine-art metal work, the casting of bronze statuary, a *chef-d'œuvre* of Elkington's establishment, possesses perhaps as many points of interest as any. A leading process of bronze casting is known, says the *Engineer*, as the *cire perdue*, or wax process. A structure of iron bars, forming the skeleton of the statue, sustains the core. This rough angular outline stands on a kind of platform, having a fire-hole beneath for the purpose of melting the wax when the statue is completed. A mixture of clay, pounded brick, and other material, capable of being easily worked when moist, and very solid when dry, is then used for building up the skeleton, so as to present the general contour of the figure, but less than the proposed statue by just the thickness of the metal to be employed. Over all this is placed an equal layer of wax, on which all the details are expressed by the sculptor. "When," says Mr. Aitkin, our informant, "the work is satisfactory from every point of view, ascending rods of wax representing channels, by which air is to find exit on the metal entering the molds, are placed wherever required. Viewed in this state, the model and its accompaniments strongly suggest the venous and arterial system of the human body, as shown in anatomical works, with the difference that the wax rods are external to the model of the body, which is visible through the intervening mesh-work. The whole model and rods are then painted over with fine loam in a liquid state, the process being repeated until the crust is strong enough to sustain a thick loam plaster. It is then bound with iron hoops, and a fire is lighted beneath the platform. The outer coating of wax, exactly representing the metal to be cast, is melted out, and the mold is intensely heated until dry enough to receive the molten metal from a reverberatory furnace adjacent to the mold. Jets are made for the introduction of the metal, and the apertures left by the melting of the wax rods afford a ready mode of exit for the air. The plug of the furnace is withdrawn, the flowing metal fills the mold, and the statue is completed. This process is somewhat hazardous, seeing that any defect in the casting would completely destroy the long labor of the artist."
—*Mechanics' Magazine.*

Telegraph Verdict.

The case of Henry L. Davis against the Western Union Telegraph Company, which has recently been on trial at Cincinnati, Ohio, resulted in a verdict for three thousand dollars damages, with costs, amounting to over two thousand dollars more, against the company.

This was a very important suit, involving the question of the right of telegraph companies to discriminate in the transmission of dispatches. The plaintiff's telegraphic reports were delayed in order to give the company's reports precedence.

The legal principle on which this decision is founded is, that a telegraph company is a public servant, bound to transact all business confided to it fairly and impartially, and that it has no right to afford exceptional facilities, even for the transmission of its own business, when such business comes into competition with that of the public. The fairness and justice of this principle must be admitted by every unprejudiced person, and we hope that it will be vigorously maintained by courts and legislatures, until the time shall come when a person desiring to make use of telegraphic facilities shall have assurance of fair treatment under any and all circumstances.—*Telegrapher.*

A firm in Oshkosh, Wisconsin, has contracted to make 1,000,000 feet of wooden tubes, to lay down in that city for gas pipes. They are made of timber six inches square, bored in the same way as pump barrels.

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(Illustrated articles are marked with an asterisk.)

The large list of patents now issuing weekly, indicates that the back cases are being rapidly disposed of. This will be good news to inventors whose applications have been long pending. We feel assured that hereafter there will be no such annoying delays in the examination of cases, such as have been experienced for two years past. Inventors will find the present a very favorable time to present their applications. We are prepared to furnish those who contemplate applying for patents, with complete and explicit instructions how to proceed. Our facilities for the prompt transaction of patent business are unequaled.

Patents granted in 1855 can be extended under the general law, but it is requisite that the petition for extension should be filed with the Commissioner of Patents, at least ninety days before the date of the expiring patent. Many patents are now allowed to expire which could be made profitable under an extended term. Applications for extensions can only be made by the patentee, or, in the event of his death, by his legal representative. Parties interested in patents about to expire, can obtain all necessary instructions, free of charge, by writing to this office.

MODERN ENGINEERING.

While Americans justly point with pride to the completion of the Pacific Railroad as one of the greatest feats of engineering accomplished in modern times, and Europeans are congratulating themselves and the rest of the world on the near completion of the great Suez Canal, there are some other works of importance already projected which claim attention. In fact, the principal difficulties in the accomplishment of the two immense works alluded to consisted chiefly in their magnitude. Magnitude alone is not enough to deter modern engineering from attempting any work in this age of enterprise, and very few natural difficulties exist which it has not shown its ability to surmount. Fell's railway over the Alps, with its unparalleled grades, noticed in another column, and the Mont Cenis Tunnel, have demonstrated that the iron horse can overleap or break through almost any natural barrier.

A rival to the latter work in magnitude and difficulty is the Mont St. Gothard Railway, now in a fair way to early commencement. Prussia and Italy have given, through their ambassadors, to the Swiss confederation, assurance of their readiness to aid in the prosecution of the work, and a conference has been held at Lucerne to initiate operations.

At this meeting it was announced, by Dr. Alfred Escher, that the necessary capital would be obtained from the following sources; viz., Italy, £2,500,000; Germany, £2,000,000; Switzerland, £2,000,000; thus making an aggregate capital of £6,500,000.

It is stated that the Italian projection of this road will be principally adhered to. This project includes a perfectly straight and nearly level tunnel of nine and one-fourth miles, which the contractor of the Mont Cenis tunnel has, it is said, offered to construct in eight or nine years, including steel rails, for £2,400,000.

The opening of the St. Gothard route will furnish an easy communication between Western Germany and Northern Italy.

Another work now under consideration by the municipal council of Bordeaux, spoken of by engineering authorities in Europe as the grandest, most important, and economical work that has been proposed for centuries, is the cutting of a ship canal from the Bay of Biscay to the Mediterranean. The *Engineer* describes the route and its possibilities as follows:

"Let any one cast his eye over the map of France, and he will see that if a straight line be drawn from Bordeaux through Toulouse, it will touch the coast of the Gulf of Lyons not far from Perpignan. From Bordeaux to Toulouse the Garonne is a navigable and busy river, so that over two-thirds of the line it is only a question of widening and correcting a waterway already in existence. From Toulouse to the Gulf of Lyons there exists the Canal du Midi, and by means of these an immense traffic is carried on between the southern and western departments of France. The line of water exists already, all that is required is to deepen and straighten it; and if this could be done in half the time mentioned at double the cost, it would be the most economical piece of work perhaps, that was ever executed."

The projector of this work is M. Staal de Magnoncourt, and the work is estimated to cost 442,000,000 francs, or nearly $88,400,000 in American gold. It is also estimated that it can be completed in six years. The completion of this work would afford a direct line of communication with India through the Suez Canal, from any of the northern parts of Europe.

Thus modern engineering goes on, making the paths straight for advancing civilization, startling the wilds of the desert with the hum of industry, and making arid wastes to bloom.

THE COAL MINERS' COMBINATION.

When the power of the trades unions has been felt by capitalists they have not only bitterly complained of the evils of these combinations, but have not hesitated to stigmatize their action, as subversive of good order, and partaking of the nature of conspiracy. They have sought for legal enactments, to tie the hands of such organizations, and have appealed to judicial tribunals for redress upon, to say the least, very doubtful grounds of legal complaint.

This journal, while it has never denied the legal right of combination and association, for any lawful purpose, has constantly maintained that such labor combinations were unwise; that although temporary improvement in wages might be obtained by such means, the universal laws of trade and commerce would ultimately prevail, and thus in the long run, time, which makes all things even, would make wages even. The beginning of the reaction has already come, in decreased demand for labor at the present ruling prices, in the enormous stimulus to immigration imparted by the current rates of labor, and the influx of vast numbers of workmen, skilled and unskilled, from foreign countries to overstock the trades. Nothing but unlawful means can prevent the employment of these workmen at less than union rates, and the result will be that the next step in wages will be a step downward. By demanding too much, the end of these unions will certainly be defeated, and from such over-demand, the leaders of these combinations—though in many cases intelligent and far-seeing—cannot restrain the mass of workmen. In this way these associations always fail to permanently improve the condition of their members. Combination and association are social powers of the greatest magnitude, but they are the most difficult to control of all the forces of society.

Capitalists can hardly complain of such combinations with a good grace when they set the example themselves. Certain coal miners in Pennsylvania, have been doing the very thing which they have so often deprecated in their employés. They have combined to limit the amount of coal which they will take out in order to augment prices. The New York *Evening Post*, has taken the ground that the power to take such action depends on the monopoly given them by the tariff laws, and so reasoning from particulars to generals, demands the repeal of those laws.

Now although we have maintained, and do maintain that the protective policy is what is needed for this country, we never advocated immutability in tariff enactments and are ready to concede that when a tariff intended to protect the labor of this country against the cheap labor of Europe creates a monopoly in any branch of trade or manufacture, that branch has been too much protected and the tariff should be immediately reduced. The free trade teachers would substitute annihilation for reduction in all cases; we say annihilation also, in all cases where it can be clearly shown the life of any industry is not endangered thereby. Not to prohibit importation absolutely, but to so far protect any industry that it can compete on favorable terms with the same industry abroad, is what we deem the extreme limit legislation should go in this matter.

But we are far from believing the coal business to have assumed the proportions of a monopoly in this country, and we have reason to believe that the demands of the employés have been pushed so far that to ensure reasonable profits on their business, proprietors have found it necessary to take some decided stand. The position they have taken as an organization is most unwise, and will eventually react upon themselves.

The same rule applies to coal-mining as to any other branch of industry. As advocates of protection we believe that the importation of coal from Nova Scotia, which the *Post* maintains can be done at the rate of $5 35 per tun, by the removal of present duty on coal, would, if it gave us cheaper coal, cost us dear in the destruction of an important branch of home industry. There is more than one effect which the adoption of the free trade policy would produce in this country. Yet that one effect is the one which is so alluring to the laboring man that it is constantly held up to his vision. Give us free trade and we will give cheap clothing, cheap teas and coffees, cheap sugars, etc., etc., cry the opponents of protection. But in their list of low priced commodities, they always omit the important item of labor. Labor so cheapened by small demand that it will go begging for employment at any price and finally be forced to cultivation of the soil as a last and only resource. Not that there is anything about the noble occupation of agriculture, as such, to be dreaded, but it is easy to see that with the labor of the American people entirely turned into this channel, such enormous depreciation in prices must ensue, as will render farming unremunerative, glut the home market, and compel us to carry our products thousands of miles to sell them. This part of the picture is never presented by the free trade preachers. The word cheap is charming to the ear of the masses, so long as it is not applied to labor; but when everything else is cheap, labor is never an exception.

The *Tribune* has shown, however, that the removal of the duty on coal would not allow the Nova Scotia miners to get it out and bring it to this market at the price which the Pennsylvania miners seek to obtain. That price is, we understand, $5 per tun delivered in New York.

We do not think this price so extravagant as to justify the statements of the *Post*. It is difficult for outsiders to comprehend how with present prices of labor it could be brought here profitably at much lower rates. The *Post*, and its coworkers may perhaps succeed in convincing the workingmen of this country, that in order to secure cheap fuel, they can afford to submit to a large reduction in current rates of wages but our opinion is they will fail in the attempt. If, however, they succeed, the result will be so disastrous to the country that it will be compelled to return to the protective policy. The past history of the country warrants this prediction.

GENERAL DYER'S VINDICATION.

The charges against General Dyer were strongly urged, and have attracted much attention. Many who felt themselves much aggrieved by the treatment they had received from the Ordnance Department, were extremely bitter in their accusations, and vindictive in feeling toward the Chief of Ordnance.

A brief summary of the principal charges preferred may be necessary to give our readers a full understanding of the merits of the case.

It was charged against General Dyer, that he was himself an inventor, and that he took advantage of his position to advance his personal interests, regardless of the interests of the Government or the merits of inventions submitted to the Department.

It was further charged that by intrigue, in which he was assisted by other officers of the Department, he indirectly obtained the removal of Gen. Ramsey, and obtained his own appointment, in order to further the interests of certain contractors in whose transactions he was interested.

He was also charged with sending in an insufficient report, when the Congressional Committee made requisition for it, and willful suppression of important facts.

He was further charged with instituting what has been known as the "Rifle Projectile Branch," entailing thereby a heavy expense upon the Government; that he exposed official matters to subordinates; that he denied the claims of Mr. Wall, the inventor of the "Springfield Alteration," etc., etc.

But the charge which seemed to imply the greatest dereliction of duty on the part of Gen. Dyer was, that he refused to purchase and introduce certain projectiles which it is alleged he ought to have purchased.

A great deal of rancor has been displayed, and the prosecution have said many hard things during the course of the trial, but it has resulted in the entire acquittal of Gen. Dyer and the confirmation by President Grant of the finding of the court.

Notwithstanding there are many throughout the country who will remain unconvinced of the justice of the decision, we think no other could have been expected from the evidence produced, and we should be most loth to assent to the charge of unfairness on the part of the officers who composed the court, which has been made from some sources.

We have not space to give a synopsis of the evidence taken, which was very voluminous, but the opinion of the court upon the charge of not purchasing projectiles, which, as we have intimated, seemed to be the gravest charge preferred, gives a summary of the testimony upon this point.

The court said that "the question, according to the evidence presented, appears to be narrowed down to the inquiry, whether or not he was derelict in his duty in not purchasing, at an earlier date, a supply of the Eureka projectiles for service in the field; for, it appears by the evidence that full supplies were at all times in store for issue, either manufactured at the arsenals or procured through purchase—by General Dyer or his predecessors in office—of the Hotchkiss and Parrott and other projectiles, which previous to that time had been, or afterward were, considered valuable for service.

"Previous to the order of the 27th of February, 1865, the date of the order to Clifford Arrick, for 5,000 Eureka projectiles for experimental purposes in the field, it does not appear to the court that the Eureka had shown itself superior to some others of the most approved projectiles. Therefore, General Dyer, in not purchasing them to the exclusion of others, or in larger quantities than he did, only exercised such latitude of judgment as must always be permitted to officers in such official position. Nor is there any evidence to sustain

a belief that he was governed at any time by improper or corrupt motives in not making earlier or larger purchases of the Eureka projectiles. The court believes that the relative merits of the Eureka, the so-called Taylor-Dyer, the Absterdam of the latest pattern, and possibly others, have not yet been fully established. The Eureka, from the evidence, appears to have qualities which make it the equal of the best, and it is believed that further trials, such as were recommended by the Ordnance Board of 1868 for the Taylor-Dyer and Eureka, will determine which projectile or projectiles of those now most approved should be adopted hereafter for services in the field."

We shall give on another page some of the conclusions of the Joint Committee on Ordnance on experiments with heavy ordnance, of interest to inventors, as showing the views of the Committee upon the requirements of modern ordnance.

It is a fact of great significance that this Committee believes the Ordnance Department of the Army may be entirely abolished without detriment to the good of the service, and with great economy to the Government.

EXCITEMENT A DISEASE OF SOCIETY.

This country is greatly benefited by German immigration. The peculiarly philosophical tendency of German mind, the calm patience with which it investigates all questions of importance, the independence with which it rejects what it considers false, and asserts what it believes to be true, are elements of character and good citizenship anywhere, but are particularly valuable in a mixed population like the American.

In a recent conversation with a German friend upon the state of modern society, he made the following very forcible remark: "Excitement is disease. Man does not need it. He ought not to have it. What a healthy mind most craves is placidity; to do its work in perfect calm, without any stimulus except that afforded by perfect bodily health. Mind and body healthy, each will give all the stimulus the other needs without resort to artificial means."

There is so much meaning in this that it will bear considerable amplification. Mental dissipation and physical debauchery are alike disastrous in their effects; alike breed a fierce appetite for more, an appetite that will not be appeased except by deeper and deeper drafts, which finally ruin body, mind, and soul.

The taste for mental excitement now prevalent through all classes of society, is strongly evinced in the theatrical performances, the prominent literature of the times, the morbid taste for sensational displays, involving danger to human life, the detailed accounts of crimes and executions demanded of the press by the public, and the general personal uneasiness to be observed when people have nothing in particular to do. Few Americans, comparatively, can sit down and content themselves in quiet thought. The sensational novel is one of the mildest stimulants resorted to by a large mass of our people to "kill time," as it is called. A philosophical work would reduce them to the last stages of mental exhaustion. A discussion upon any solid topic is ineffably wearying. Their mental motions are, so to speak, shaky and uncertain till they have had their intellectual grog. They look with wonder upon a man or woman who can do hard mental work, and stand it without recourse to any stimulus, without at all comprehending that it is not work, but worry and excitement which kill.

This state of things is so wide spread that we are justified in calling it a disease of modern society. Its symptoms are erotic suicides, speculative manias, gambling, embezzlement, and crimes of a more henious type.

What is the remedy? This is a question easily asked but terribly hard to answer. Religion, legislative enactments, social philosophy, all seem powerless to effect a cure. We are sometimes disposed to think that the only way is to let the disease run its course like smallpox, producing its unsightly and fœtid erruption, until the poison eliminates itself from the body politic. Society, as at present organized, may die of the disease, or peradventure it may survive to enjoy better health afterward.

The social science conventions do not seem to get at the root of the matter at all. They persist in isolating single symptoms and looking upon them as the disease itself. One member will tell you that the inordinate love of wealth is the matter, taking for a text the familiar but utterly false maxim, "The love of money is the root of all evil," and propose to enact laws that shall prohibit the accumulation of giant fortunes. Another will hold up to view what has been with an unjustifiable shrinking from plain speech, styled "the social evil," and attribute all the evils of society to the morbid influence of illicit desire. Another assigns the evils of society to drunkenness, and so on. These things are results—not causes.

We do not profess ability to prescribe a cure for the universal malady of the age. It will require the sober study of philosophers for years to come, but of one thing we feel very certain; namely, that all systems of ethics which place faith in the emotional nature of mankind, only substitute one form of excitement for another without even approximating a cure.

The world has everything to hope from the men who believe religion and philosophy should go hand in hand, and much to fear from the misguided philanthropists who appeal only to feeling.

THE EFFECT OF SEWING MACHINES UPON FEMALE HEALTH.

There are fortunately some American women left whose constitutions have resisted the effects of wrong living and bad dressing, to such an extent that they can sit bolt upright for a considerable time without an excruciating pain in the small of the back, or walk a mile or two without being sick a day or two to pay for it. Women of this kind can operate a sewing machine at intervals without discomfort, or may follow it as a business without evil consequences. But precisely those who from enfeebled health most need the aid of this invaluable invention, are the ones who are debarred from its use. The effects produced on the latter class of females by the use of the sewing machine have been thoroughly studied, particularly in France, and have been found to comprise a variety of ills peculiar to the sex most employed in such labor, which it is unnecessary to enumerate here. It is estimated that over a million sewing machines are now at work in the United States alone, and it has become a fact recognized both in this country and abroad that the prevalence of pallor, lassitude, pain in the back, and leucorrhœa are more prevalent among those who work with sewing machines than among almost any other class of women.

Since our publication of an article, entitled "The Sewing Machine, its Origin, and Suggestions for its improvement," to be found on page 246, current volume, we notice the subject has been taken up and discussed at length by the press of this city, and a large number of improvements have been suggested to obviate the use of the feet in driving sewing machines; but it should be remembered that it is not the amount but the kind of work performed, that results in injury. A small cheap motor would be very useful, but an application of the power of the body in a manner free from the objections of the treadle motion would be better. The slight swaying of the body from side to side, or a rocking motion might be utilized for this purpose, or the weight of the body raised at intervals might be called in, as a sufficient force for the purpose.

There is a demand for some improvement in the mode of applying power. If motor machines are relied upon for the purpose, they must be of the simplest character, durable and capable of being operated by any one; and both constant and uniform in their action. The latter consideration will for the present exclude electro-motors from competition without taking into account the cost of running such machines by any form of battery now known.

Small portable steam engines, are the next most promising resource, but they cost money to make, and money to run them, take time to get up steam, and are otherwise ill adapted to the purpose. Spring motors are liable to get out of order, and the winding them up is one of many objections against either them or weights. It has been proposed that in large cities small hydraulic engines might be successfully introduced for this purpose, but the impracticability of this will be apparent from the following computation:

The power of the average human frame, is 4,166·6 foot-pounds per minute. Estimating the power required to drive a sewing machine as one-tenth of this, we shall have in round numbers, 466 foot-pounds, amounting per day of ten hours to 279,600 foot-pounds. Allowing the average head in upper and lower stories of buildings to be 30 feet, it will require for a single sewing machine the fall through that head of 9,320 pounds, or in round numbers 148 cubic feet of water per day. If all sewing machines in New York city were to make this extra demand upon the resources of the Croton Board, it would find itself seriously embarrassed to meet it with the present supply.

A small gas engine seems to offer more points of feasibility than anything we can think of, provided the necessity of using an electric discharge to ignite the gas, could be obviated by a cheap and efficient substitute.

The fact remains that a small and reliable motor is very much wanted for this purpose and inventors would do well to grapple at once and vigorously with the problem. "First come first served," is the rule in invention, and he who can bring out the first sewing machine motor, fully adapted to the requirements of the case, is a made man.

Any such machine would also find a wide application for a host of domestic purposes, as well as in the requirements of light manufacturing.

THE RESOURCES OF THE GREAT WEST.---WALLA WALLA VALLEY.

We have had the pleasure of a call from Mr. H. Parker, of Washington Territory, who has given us some interesting information in regard to the resources of the great West, and more especially in regard to Walla Walla Valley, a region of remarkable fertility and mildness of climate, combining advantages for manufacturing with its other attractive features.

This region is one of many of somewhat similar character to be found on the Pacific slope, but has as few drawbacks, perhaps, as can be met with in any region of like extent in the United States.

In the first place its climate is extremely temperate—a fact that may seem to those who have experienced the cold of the northern parts of Washington territory, as being paradoxical, but which is no more so than many other climatic peculiarities to be met with in localities no more widely separated than those in question. But little frost is experienced, and the rich bunch-grass, which abounds throughout the valley, enables farmers to winter their stock with very slender provision for the rare emergencies of cold weather, from which this valley is nearly exempt.

Second, the soil is unexcelled in fertility. Wheat, oats, and barley, are grown in large quantities and of excellent quality, and corn, also, does well. Vegetables and fruits thrive abundantly, and the small labor required to cultivate the soil is amply repaid. Communication with the seaboard is easy through the Columbia River, a distance of some three hundred miles. A branch road, running through the valley, will soon connect it with the Union Pacific road.

There are now a number of thriving flouring mills and saw mills located in the valley, and the water-power is ample to perform all the manufacturing needed for that section. As a future location for Woolen Mills it probably cannot be excelled by any other on this continent. The material is there, the water-power and building materials are there, and cheap Chinese labor, which has been found excellently adapted to such work, is to be had in abundance. The contour of the streams which water the Walla Walla Valley is somewhat peculiar. The tributaries of the Columbia River, which flows nearly parallel through the country like the fingers of a giant skeleton hand, unite, near their influx into the main stream, to form a stream of considerable size. They have not worn deep channels, as is the case with many streams, and gulleys and gorges do not interfere with the full utilization of the fall, which is great, though nowhere abrupt.

The advantages we have named, combined with the great salubrity of the climate, must, at no distant day, make this section one of the most thriving and populous of the fertile regions of the West. It has, at present, a thriving and intelligent white population of seven or eight thousand, with schools, churches, and all the other advantages of older settlements. No trouble is to be apprehended from Indians, they having been all removed to reservations, and peaceful relations firmly established.

Our information in regard to the Walla Walla Valley does not rest wholly upon the statements of Mr. Parker, although that gentleman gave us many new points in regard to it. It was stated to us, years ago, by a gentleman who had thoroughly explored that region, and who has since, for business reasons, settled lower down the river, that, for natural advantages of soil and climate, it would be hard to find, anywhere, a tract of country, of the same size, that could excel it.

The opening of the Union Pacific Railroad, with the projection of the Northern Pacific Road, must give an enormous stimulus to growth throughout the entire northwest, and the capital invested there now will surely be "seed sown in good ground.

METEOROLOGICAL SCIENCE.

The science of meteorology seems to make slower progress, and to have, at present, fewer practical applications than any of the other sciences. A few prominent facts have been discovered, such as the direction of storms, the average velocity with which they progress, the formation of clouds, the effect upon climate of felling large forests, etc.; but such facts scarcely constitute a science. The simple knowledge that certain phenomena of electrical or atmospherical character occur, without the knowledge of the manner of their occurrence, or their physical causes, is practically of small benefit. The causes assigned for most of these phenomena are yet chiefly based on hypothesis. It is true we are aware that winds are caused by heat, and rain is produced by the cooling of moist air; that lightning is a form of electricity, and so forth; but as yet, all researches have failed to detect invariable laws of succession, or relations of cause and effect.

The utmost that can be said by the most skillful meterologist, is, that when certain atmospheric conditions are indicated by his instruments, dry or wet weather is more likely to supervene than when the converse is indicated. He is still obliged to confess that "all signs fail in dry weather," with him as well as with the unlearned.

Our readers are aware that a series of observations are made from different stations in the United States under the direction of the Smithsonian Institute. These observations are confined, we believe, to barometric and thermometric observations, with some meager remarks as to the state of the atmosphere; whether cloudy or otherwise, wet or dry; and if high winds are prevailing, the fact is also recorded, with the direction from which they blow. These observations are, we believe, generally performed in a very imperfect manner, and really amount to almost nothing. In fact, we believe the money invested in instruments and the time expended are nearly or quite thrown away.

The reports are, to our knowledge, in some cases, made complete by interpolation to cover neglect in the observer, and as there is no check upon their accuracy their tendency would be to mislead rather than otherwise.

The Institute is not to blame for these deficiencies, which attend any system of general meteorological observation requiring personal attention of a large number of assistants, who have no reputation to lose by neglect and nothing to gain by accuracy. It requires considerable inducement to make a man confine himself to hours in a gratuitous service.

Science needs improved self-registering meteorological instruments acting automatically, and recording results; requiring attention at wide intervals only. The possibility of constructing such instruments has already been fully demonstrated. It remains only to simplify and cheapen their construction.

The telegraph is an important adjunct to meteorological researches, and its aid should be called in as often as possible. In case the proposed postal telegraph is put into successful operation, central reports at Washington of meteorological conditions at quite frequent intervals, both at day and night, might easily be made from prominent points of the country. These reports, transferred by symbols to a general map, would be the most complete record of the kind ever attempted, and would be likely to throw light upon the subject, if, indeed, anything is to be expected from such observations. It is quite doubtful if any periodical law or laws exist which control atmospheric conditions. We are inclined to look upon them as results of a multiplicity of causes, in their nature variable, and, therefore, indeterminate. However, neither their determinateness, or the contrary, can ever be demonstrated

except by more constant and systematic observation than has ever yet been attempted.

The Smithsonian observers make only three observations per day: viz, at 7 A. M., 2 P. M., and 9 P. M., and even these meager observations are not entirely reliable. Observations ought to be made at least hourly, and at once transmitted to headquarters. The postal telegraph will, upon its establishment, afford facilities for this observation, and with a system of symbols specially adapted to the purpose, it might apparently be done with little trouble.

Editorial Summary.

A BUSINESS FACT.—The mechanical engravings that embellish the weekly issues of the SCIENTIFIC AMERICAN are generally superior to those of any similar publication, either in this country or in Europe. They are prepared by our own artists, who have had long experience in this branch of art, and who work exclusively for us. There is one pertinent fact in connection with the preparation and publication of an illustration in our columns that needs to be better understood by many inventors and manufacturers who pursue a short-sighted policy in bringing their improvements to public notice. They often go to a large expense in printing and circulating handbills, which few care either to read or preserve. Now, we undertake to say that the cost of a first-class engraving, done by our own artists, and printed in one issue of the SCIENTIFIC AMERICAN, will amount to less than one half the sum that would have to be expended on a poorer illustration printed in the same number of circulars, and on a sheet of paper in size equal to one page of our journal. A printed handbill has no permanent value. Thousands of volumes of the SCIENTIFIC AMERICAN are bound and preserved for future reference—beside, we estimate that every issue of our paper is read by no fewer than one hundred thousand persons. Considered, therefore, as a mere advertisement, an illustration in the SCIENTIFIC AMERICAN is a paragon of cheapness.

ACCORDING to the *Tribune*, everything at the approaching Boston Musical Peace Jubilee, promises to be upon a lovely scale of largeness. The big drum to be used upon the occasion has been finished, and O'Baldwin, the Irish giant, has also been engaged to beat it. This mastodonian drum is three feet through from head to head; the heads are about eight feet in diameter; for the skins, two mammoth oxen yielded up their hides, it being found impossible to procure the hide of an elephant, and upon each head is ironically painted "Let Us Have Peace!" Whether this drum will make any more noise than six smaller ones beaten in unison we do not know, but we are sure that it will cut a much larger figure in the advertisements.

A COMFORTABLE CHAIR.—Mr. F. A. Sinclair, of Mottville, N.Y., has sent to this office a specimen of the chairs made at his manufactory, which, he says—and we believe him—meets the requirements of a recent inquirer in the *American Builder* for a good chair. The specimens received are of the same primitive style as those of the days of our grandmother. The seats are of split ash, very capacious in size, and the chair, with its high arms and easy-fitting back, is a perfect embodiment of comfort.

NEW PUBLICATIONS.

STEAM VADE MECUM. A Compendium of Simple Rules and Formulæ, based on Original Investigation for the Solution of all Problems in the Application of Steam, with Examples. By Julien Deby, Civil and Mechanical Engineer. Late Professor at the *Ecole Centrale*, Brussels, and at the Georgia Scientific Institute. New York: Julien Deby, 37 Park Row.

We have been favored by the author with the advance sheets of this publication, which is now in press, and shortly to be issued. We have not yet found time to review the numerous formulæ, based upon the law of steam, which the author claims to have discovered, and an enunciation of which was published on page 246, current volume, of the SCIENTIFIC AMERICAN. The formulæ, of course, stand or fall with this law. If it prove in future to be a fallacy, its truth has not yet been disputed, so far as we have learned. The formulæ seem concise, and are in each case interpreted and expressed in plain language, so as to meet the wants of the practical man as well as the mathematician. A supplement is also added containing useful tables and a short essay on boiler explosions.

THE MISSISSIPPI VALLEY: its Physical Geography, including Sketches of the Typography, Botany, Climate, Geology, and Mineral Resources; and of the Progress of Development in Population and Material Wealth. By J. W. Foster, LL.D. Illustrated by Maps and Sections. Octavo, cloth. Price, $3·50. Chicago: S. C. Grigg & Co. London: Trubner & Co. Sold in New York city by D. Van Nostrand.

This work is the production of an earnest worker in the field of science, and is deserving of a cordial welcome as a valuable addition to our treatises on natural history. Every topic in a range of subjects singularly wide is discussed with such a mastery of its essential features that the reader is always presented with a clear, sharp, and well-defined mental conception of the author's arguments. Possessing, as it does now, so important a bearing, and destined to exercise a still greater influence on the industries, commercial and material, not only of the United States, but of the civilized world, the region of the Mississippi is eminently deserving of careful study. The student, the agriculturist, and the engineer will find in Mr. Foster's book facts and phenomena, as observed by a disciplined mind, of great practical utility; while the physicist and the political economist will discover therein food for much profitable thought, and a key to the solution of not a few problems in their respective spheres of investigation. In order that the work might be adapted to all clases of readers, the learned author dispensed with technicalities so far as was consistent with perspicuity. The typography and binding do credit to the publishers.

HAND-BOOK OF CHEMISTRY FOR SCHOOL AND HOME USE. By W. J. Rolfe and J. A. Gillet. Boston: Woolworth, Ainsworth & Co. New York: A. S. Barnes & Co.

The attempt to reduce the science of chemistry to so elementary a form as to make the science generally available to youth is worthy of praise. This book seems to be as successful an effort to accomplish that desirable object as we have met with. We have always been doubtful, however, whether such facts as may be given in the form adopted by books of this character could not be better taught by familiar lectures, illustrated by such simple experiments as may be necessary, without the employment of text-books at all. Certainly there is no science to which the principles of object teaching can be more successfully applied than this, or one which is more difficult to acquire by the use of books alone.

HAND-BOOK OF NATURAL PHILOSOPHY FOR SCHOOL AND HOME USE. By W. J. Rolfe and J. A. Gillet, Teachers in the High School, Cambridge, Mass. Published by Woolworth, Ainsworth & Co., 117 Washington street, Boston, and 111 State street, Chicago.

A small elementary treatise like the one before us, fully brought up to the latest discoveries in physics, is very much needed in the public schools of the United States. So far as we have found time to examine it, this book seems well calculated to supply this need.

THE ELEMENTS OF THEORETICAL AND DESCRIPTIVE ASTRONOMY FOR THE USE OF COLLEGES AND ACADEMIES. By Charles J. White, A.M., Assistant Professor of Astronomy and Navigation in the United States Naval Academy. Philadelphia: Claxton, Remsen & Haffelfinger, 819 and 821 Market street.

We have carefully examined this work, and regard it as one of the very best elementary text-books we have seen. It is an octavo of moderate thickness, bound and printed in an excellent manner.

GUIDE TO THE STUDY OF INSECTS. By A. S. Packard. Price, 50 cents. Published by the Essex Institute, Salem, Mass.

We have received part of this truly valuable work. It is full of interesting and useful information pertaining to the propagation and habits of all kinds of insects. The number before us contains nearly one hundred illustrations.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Commissioners have reported upon the Central Pacific and Union Pacific Railroads. They compute that, at the date of their examination, in February last, an expenditure of $2,800,000 would be required to bring the Central Road up to a first-class road and equip it for through business with rolling stock, depots, machine shops, engine houses, etc. Two of the Commissioners, Messrs. Warren and Blickersdefer, also think an expenditure of $1,600,000 is required to improve its location. Upon the Union Pacific road they report that at the time of their examination, the sum of $6,700,000 was necessary to complete and equip the 1,035 miles, according to the first-class standard, since which time the Company has been constantly at work completing the road and placing upon it the material necessary fully to equip the same according to the requirements of the Commission and the law. The report states that the haste in which the roads have been constructed has resulted in defects of location and construction, which must be remedied to bring the roads to the standard of efficiency required by law.

An English paper says that much light is thrown on the interesting question, whether railway traveling is injurious to health, by the statistical investigations of Dr. Wiegand, of Halle. His inquiries are based on the reports of thirty-eight companies, and the results for 1868 are as follows: Of 11,125 engine drivers, stokers, and other officials traveling with the train, 119 or 1·972 per cent died; while of the 43,853 other officials employed, only 408 or 0·931 per cent died in the same period. It will be seen that the rate of mortality is somewhat higher in the first than in the second class, but the difference is not great enough to lead us to suppose that the occupation is more than usually dangerous or unhealthy.

The *Omaha Republican* says that moss-agate jewelry is becoming quite fashionable in the West. The delicate moss-like tracery observed in them is exquisitely beautiful, and when properly set in a ring or pin is an ornament that can hardly be surpassed for looks. The opening of the Pacific Railroad has brought these stones from the mountains into the market.

The President of the St. Louis Iron Mountain Company, has received a dispatch from the President of the Memphis Commercial Convention, informing him that the people will subscribe the 1,000,000 acres asked for the extension of the Iron Mountain Railroad to Memphis.

The Commissioner of Mining Statistics estimates, in his report, the bullion product of the whole country at $37,000,000. This is a decrease of $3,000,000 from the total returns of 1867, which showed a falling off of about the same amount as compared with the product of the year before.

The people of the Neosho valley have organized a company to build a railroad from Emporia, Kansas, to Holden, Missouri. This will put Southern Kansas in connection with St. Louis by a route 150 miles shorter than the railroad connection of the same region with Chicago.

The Navy Department continues the reduction of the number of its vessels. It is expected that all the supernumerary war vessels and transports owned by the Government will be disposed of before the end of summer.

The Northern Pacific Railroad Company are making preparations for sending out an exploring party to pass over the entire route from Lake Superior to Puget Sound. The general agent of the company has called on General Sherman to arrange for a military escort for a portion of the distance.

The fastest time between California and Massachusetts has been made by a gentleman who arrived in Boston on Saturday from San Francisco, having accomplished the journey in seven days and eleven hours, including seventeen hours detention on the way.

An effort is to be made to employ capital on the immense water power in the eastern part of Maine, in other manufacturing than that of lumber. Several wealthy companies have recently purchased water powers with the intention of erecting manufacturing establishments.

The feasibility of lighting tunnels by electricity is to be tested. One hundred Bunsen elements, with Serrin's automatic regulator, are about to be used to give light to the workmen employed in the Ste. Catharine tunnel, near Rouen, France.

M. Coudier has been commissioned to construct a bridge over the Nile, at Cairo. The length of this structure will be about 2,000 feet, and the cost will be about $400,000. It is to be completed in two years.

The Hartford and New Haven Railroad Company have been authorized by the legislature to increase its capital stock $3,000,000 by a new issue, one half of which will be expended in repairs.

The miners of Scranton, Pa., held a formal meeting on May 23, on the question of question of suspension. The vote stood—for suspension, 969; against suspension, 40. This is decisive; there will be no suspension there.

A bill has been adopted in the Canadian Parliament for the establishment of a telegraph line from Montreal to England by way of Greenland and Iceland.

A firm in Dalton, Mass., have made three thousand reams of bank-note paper for the Italian government. They have another large order from the Brazilian government.

The Newfoundland seal fishery has been very successful during the past season. The number of seals landed at St. John is nearly 150,000.

There are 80,000 tuns of brimstone used annually in England, and the total amount exported from Sicily is 500,000 tuns a year.

On May 18, Brigham Young broke the first ground for the Utah Central Railroad near Weber river, immediately below Ogden City.

American silver cannot be taken into the Dominion of Canada in larger sums than five dollars without the payment of duty.

Last year, in Madison, Wis., one firm sold $500,000 worth of reapers, and it has orders for six thousand machines for the coming season.

APPLICATIONS FOR EXTENSION OF PATENTS.

DESIGN FOR AN INKSTAND.—Barnet L. Solomon, of New York city, executor of the estate of Myer Phineas, deceased, has applied for an extension of the above patent. Day of hearing August 2, 1869.

MACHINE FOR ELECTROTYPING.—Joseph Alexander Adams, of Brooklyn, N. Y., has petitioned for the extension of the above patent. Day of hearing, August 16, 1869.

REFRIGERATORS.—D. W. C. Sandford, of New Orleans, La., has applied for an extension of the above patent. Day of hearing October 18, 1869.

REAPING AND MOWING MACHINE.—Henry Waterman, of Brooklyn, N. Y., has petitioned for an extension of the above patent. Day of hearing, Aug 9, 1869.

WASHBOARD.—Joseph Keech, of Waterloo, N. Y., has petitioned for the extension of the above patent. Day of hearing, Sept. 27, 1869.

MACHINE FOR TRIMMING BOOKS.—M. Riehl, of Philadelphia, Pa., has petitioned for the extension of the above patent. Day of hearing August 9 1869.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. M., of N. Y.—To ascertain the amount of horse power which is the equivalent of the steam delivered through a pipe into a tank containing water, the best way for you will be first to ascertain the evaporative power of your boiler in relation to the amount of fuel consumed. From this you can ascertain the horse power of your boiler and the amount of fuel it takes per horse power. Then ascertaining the amount of fuel saved by cutting off the tank during a given time, under average circumstances you can compute from that the horse power delivered.

P. D., of Va.—Straw is bleached by simply exposing it in a closed chamber to the fumes of burning sulphur. An old flour barrel is the apparatus most used for the purpose by milliners; a flat stone being laid on the ground, the sulphur ignited thereon, and the barrel containing the articles to be bleached turned over it. There is no English work on chemistry applied to the arts fully up to the times. Muspratt's chemistry is perhaps as good as any.

H. R., of Ill.—The diagram you send us and the explanation accompanying it lead us to suppose that in the construction of your trunk a too common error has been committed. Both the pipes and the wooden trunk are too small, to give you water enough when the level in the dam is low; you should increase their capacity to 400 inches and put a stand pipe in your bulk head as high as the level in your dam when it is full. This will remove the difficulty.

C. E. R., of Ill.—The exact hight of a column of mercury that will be sustained by a pound of pressure per square inch anywhere, is a column that contains one pound of mercury for every square inch of its base, provided the column be of equal size throughout. This hight will vary for all different temperatures, the question you ask us cannot therefore be more definitely answered.

R. J. H., of Mo.—The traveling glass blowers use gas sometimes, but more commonly good sperm or lard oil burned in a lamp with a large wick, perfect combustion being secured by means of a foot blowpipe. The glass used is a peculiar kind of soft glass made specially for that and other purposes. It can be purchased of dealers in chemical apparatus.

E. E. W., of N. B.—We find upon inquiry of practical rubber men that the difficulty you experience in getting your cement, made by dissolving rubber in naphtha, to harden readily, is not met with by them, and they do not use any other substance to accelerate the hardening. The benzine in evaporating leaves pure rubber and of course it possesses the usual elasticity of that material.

W. H. S., of Pa., asks if we can inform him of any substance that will keep insects from destroying an entomologist's collection. According to the *Entomologist*, the insects which do the principal part of destruction in cabinet specimens are small beetles, difficult of extermination. As a preventive none but very tight boxes should be used for the cabinet. Camphor should be always kept in the boxes and the specimens frequently examined. When a collection has been attacked pour a solution of corrosive sublimate on the cottom of the boxes. It will kill all the bugs that touch it.

L. H. H., of Vt.—We see no reason why you should not be able to remove borax, after brazing, with simple hot water. There is no occasion for using nitric acid. Are you not mistaking the film of solder for borax?

J. K., of N. Y.—You must use more tin in your solder to get the required brilliancy, from 1½ to 2 parts tin to 1 of lead, instead of equal parts each.

S. W. R., of Mass.—We understand that the term "monkey" as applied to a hand wrench is merely a nick-name. Its use is entirely meaningless so far as we know.

C. C. R., of Kansas.—Your suggestion to support foot bridges across rivers by means of balloons is not new. It is impracticable.

J. B., of N. J.—Permanent agencies for the general sale of patents have not been very successful. One good invention will usually occupy the undivided attention of the agent until it is sold. Hence the difficulty of keeping a shop full of models.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

MOP HEAD.—Samuel Gantz, Beaver Creek, Md.—The object of this invention is to provide for public use a simple and cheap mop head, which can be conveniently operated, and which will hold the mop securely.

BOOT CRIMPER.—John B. Aikin, Somerton, Ohio.—The object of this invention is to provide for public use a boot crimper which can be very quickly and conveniently operated, and which will crimp the boot without wrinkling the leather at the instep.

WASING MACHINE.—B. Breeden, Lexington, Va.—In this invention a set of vertical beaters are employed, operated by a rotary shaft, and combined with a revolving tub, an apparatus for raising all the beaters at once, and a heater for keeping the water at any desired temperature during the operation.

COOKING RANGE AND STOVE.—H. R. Robbins, Baltimore, Md.—This invention consists in so combining an air chamber with the ovens and fire space of a cooking range or stove that the heat generated in the fire space shall not only serve for the cooking of food, but also for the warming of air during its passage to other apartments in the house.

ICE-CREAM FREEZER.—Joseph Sissons, Town of Horncastle, England.—The object of this invention is to provide for public use an apparatus which will freeze cream in a less time than by the ordinary freezers now in use, while at the same time it produces a finer article of manufactured ice cream than has heretofore been made by machines for a similar purpose.

CHURN.—James S. Huffman, Brownsburg, Va.—This invention is a novel and convenient attachment for operating the common upright churn, so constructed as to be adjustable to the hight of the operator, and to have the means for adjusting the stroke of the dasher so that the latter can be operated with more or less power and velocity, and with different lengths of stroke. It can be used with any upright churn, new or old, without any change therein.

MACHINE FOR BORING POSTS AND POINTING RAILS.—John Young, of C. Fair View, and C. I. Grumbine, Frederick, Md.—This invention relates to the machine patented by John Young, of C, July 10, A.D., 1855, No. 13,343, and consists in making the augers, employed in that machine, adjustable, to adapt them to crooked as well as straight posts; in providing two rotary knives, of peculiar construction, to sharpen the rails and in the novel construction of the device which operates the clamps that hold the rail, whereby it is more easily and effectively managed than in the old machine.

HEATING APPARATUS.—Francis Raith, Calumet, Mich.—The object of this invention is to utilize the heat of the products of combustion in a wood or coal-burning stove, and to thereby economize fuel. The invention consists in a novel arrangement of air passage, by which the air is carried through the stove and through the smoke pipe to become heated.

COMBINED RAKE AND HOE.—N. Harper, Philadelphia, Pa.—This invention relates to a new manner of constructing a combined rake and hoe, by forming the same of one single piece of metal.

COMPOSITION BOWL FOR MANGLES, WASHING MACHINES, ETC.—Thomas Hardcastle, of the Bradshaw Works, near Bolton, England.—This invention consists in manufacturing bowls for starching, and other mangles, washing machines, squeezers, calenders, and other articles, of cocoanut fiber, or coir, or other fibers of palm trees.

AUTOMATIC DOUGH RAISER.—John Stark, Thomasville, Ga.—The object of this invention is to produce an apparatus in which dough can be caused to rise to the requisite hight without requiring to be guarded by an attendant, and without any danger of its rising higher than desired. This apparatus will be very useful, not only to bakers, but also, and chiefly, in households, as the dough can be put in in the evening and can rise during the night, so as to be ready for the oven the next morning.

PLOWS.—E. Wiard, Louisville, Ky.—This invention relates to a new plow, in which the share is composed of three parts, in such manner, that if any one of the parts becomes destroyed by wear or otherwise, it can be readily replaced without requiring the whole share to be renewed. The invention consists chiefly in forming a standard and landside support on the mold board of the plow, so that the landside can, by means of but one bolt, be securely fastened to the same.

VELOCIPEDE.—L. H. Soule, Mount Morris, N. Y.—This invention relates to a new manner of arranging a velocipede, so that the two hand wheels can be readily brought together or apart, in order to produce a two or three-wheeled instrument. The invention consists in attaching the rear wheels to hinged arms, which can be swung more or less together at the pleasure of the operator, to produce the desired effect while the instrument is at rest or in motion.

CORPSE PRESERVER.—John L. Clark, Providence, R. I.—This invention relates to a new corpse preserver, which is so constructed and arranged, that the ice will be prevented from melting rapidly, and that the dead body will be surrounded by constantly circulating cold air. The invention consists in the general arrangement and construction of parts, the main feature being that the body is laid upon a perforated plate, and not into a box, as usually, the box being in this case put over it, when it has been properly placed upon said plate.

TUBULAR STEAM BOILER.—James Howard and Edward Tenney Bousfield, Bedford, England.—The main object of the present invention is to facilitate the removal from boilers of the scum that is thrown up by the water employed in certain localities, to improve the connections between the vertical and horizontal tubes which compose the boiler, and also to facilitate the detachment and removal of any one or more of the vertical tubes when required.

DRAWERS.—Enos B. Johnson, Milwaukee, Wis.—This invention has for its object to improve the construction of bureau drawers, stand drawers, table drawers, sliding doors, etc., so that they cannot bind or stick when being drawn out or pushed in.

TURBINE WATER WHEEL.—V. M. Baker, Preston, Minn.—This invention has for its object to improve the construction of water wheels so as to make them more effective and convenient in use, and enabling them to utilize a larger per cent of the power of the water, and to be more conveniently operated than when constructed in the ordinary manner.

HAY AND COTTON PRESSES.—L. Dederick, New York city.—This invention has for its object to improve the construction of hay, cotton, and other baling presses so as to make them more convenient and effective in operation, the follower being made to move up and down with a uniform movement in all its parts, and with increased power as the bale is compressed more and more.

COMPOSITION FOR CLEANING MARBLE, STONE, ETC.—Alpheus C. Ford, Lynn, Pa.—This invention has for its object to furnish a simple and effective composition for cleaning tombstones, and other marble and stone articles.

MOUNTING THE PORCELAIN ROSE FOR DOOR KNOBS.—Charles L. Bates, New York city.—This invention has for its object to furnish an improvement in mounting the porcelain roses of door knobs, by means of which they may be more securely and durably secured in place, and may not be liable to become loose.

WASHING MACHINE.—Ira A. Newhall, Crooked Creek, Pa.—This invention has for its object to furnish a simple, convenient, and effective washing machine, doing its work quickly and well, and without injuring the articles being washed.

HORSE HAY RAKE.—Steven J. Halstead, Margarettville, N.Y.—This invention relates to certain improvements in the manner of arranging the levers for swinging the rake head, and to a new device for adjusting the teeth at any desired distance from the ground, and also to a new manner of attaching the teeth to the rake head.

SAFETY ATTACHMENT FOR RAILROAD TRUCKS.—Patrick S. Devlan, Jersey City, N. J.—This invention has for its object to furnish an improved attachment for railroad trucks.

CORN SHOCK BINDER.—John E. Hunter, Mechanicsburg, Ohio.—This invention has for its object to furnish a simple and convenient machine for drawing the stalks of a corn shock together to receive the band.

ADJUSTABLE BED AND FRAME FOR DROPS, TRIP-HAMMERS AND DRILLS.—Nathan P. Maker, Providence, R. I.—This invention relates to a new device for adjusting the bed of a power or hand drop, press, trip-hammer, upright drill, or other similar machine, so that said bed may at will be placed into a horizontal or slanting position, as may be desired.

COAL SCUTTLE.—John L. Ellithorp and Peter Sloan, Canajoharie, N. Y.—The object of this invention is to produce a portable coal scuttle, which will not spill coal or other contents when in use, and which can be made at an inconsiderable additional expense above a common scuttle.

STOVE PIPE SHELF AND OVEN.—J. A. Miner and H. J. Torrey, Wellsville, N. Y.—The object of this invention is to provide a stove pipe shelf and oven or cover, for use with cooking stoves for keeping articles warm, and so arranged that the shelf may be readily attached to or detached from the pipe, and be rotated thereon if required.

WAGON JACK.—J. Newton Thatcher, Martinsburg, West Va.—This invention consists in the arrangement upon a suitable stand, of an elevating lever having an adjustable fulcrum on the said stand for vehicles of different hights, and a holding bar for holding the lever when the vehicle has been raised up.

VEGETABLE KNIFE.—Wm. Veber, Jr., Shingle Creek, N. Y.—This invention relates to improvements in knives intended to adapt them for paring vegetables, such as have depressions in their surfaces, especially potatoes.

HAY RAKER AND LOADER.—Albert Clark, Cadiz, Ohio.—This invention consists in an improved raking device applied to the rear of a cart having an elevating chute up which the rake is caused to move when loaded, and deliver the hay to the rear of the rack, behind which the cart is attached.

AUTOMATIC CUT-OFF AND GOVERNOR VALVE.—Charles A. Condé, Indianapolis, Ind.—This invention relates to improvements in valves, for admitting and cutting off, to steam engines, more particularly designed for governor valves, for throttling the steam and for an automatic stop valve to cut off the steam in case of accident. The invention consists in a sliding, sectional, and open cylinder valve operating longitudinally in its chamber, in connection with suitable ports in a properly constructed seat or chamber.

FEATHERING PADDLES.—Wm. C. Rice, Oquawka, Ill.—The object of this invention is to provide a paddle wheel for propelling vessels, in which the floats or buckets are feathered, that is to say, made to remain in a perpendicular position with reference to the plane of the water.

MEASURING FUNNEL.—G. B. Massey, New York city.—This invention relates to a new and improved liquid measuring funnel, and consists in indicating the quantity on a wheel revolved by either a coil spring or weight and by a float which rises with the liquid, and also in a valve on the bottom of the funnel, which is opened and closed from the top of the funnel.

TIRE-SETTING MACHINE.—Francis Mills, Mount Vernon, Ind.—This invention consists of a table for supporting the wheel on which the tie is to be set, so arranged on a suitable frame that when the hot tire has been placed on the wheel, the table may be turned on an axis to present one portion of the wheel into a trough of water, and allow it to be to be turned on a central pin supporting the wheel in its eye, so as to pass the rim of the wheel through the water for cooling it.

WATER WHEEL.—J. C. Smith, Mahanoy, Pa.—This improved wheel is similar in its construction, and the mode of its operation, to the wheels patented by Andrews, Andrews & Kalback, and Haag & Smith. It differs from the wheels just mentioned, as also from any other horizontal wheel with upward discharge, chiefly in the form of its buckets.

WASHING MACHINE.—J. M. Shuck, Oskaloosa, Iowa.—This invention relates to improvements in washing machines, and consists in the arrangement of a pair of vibrating wash boards, operating in conjunction, the one having a surface corrugated horizontally and vertically, and the other composed of vertical bars, arranged at suitable distances apart, the spaces between coinciding with the vertical lines of protuberance on the first-mentioned board.

DEVICE FOR MULTIPLYING MOTION ON A SINGLE SHAFT.—Lemuel Scudder Fithian, Brooklyn, N. Y.—This invention relates to a new and useful combination of cog wheels, whereby motion may be increased on a single shaft, thereby greatly simplifying the methods in common use for that purpose, and it consists in arranging a series of face and pin, or communicating wheels, on a horizontal shaft.

FRICTION CLUTCH AND BRAKE.—Darius Banks, New York city.—This invention relates to improvements in friction devices for connecting or disconnecting a driving pulley, or other wheel fixed loosely on the driving shaft, having constant motion, so as to stop or start the said wheel at will, or to vary the motion thereof. It relates also to a friction brake mechanism, so combined with the clutch devices as to be operated by the same moving power, and to act in conjunction therewith.

FORMING THE EYES OF NEEDLES.—Abel Morrall, Studley, England.—The object of this invention is to form the eyes of all kinds of needles in such manner, that the thread or sewing material may be securely retained in the eye, without stopping, during the time the needle is employed in its work. The invention consists in forming a kind of double eye, or an eye having a double curve, which from its shape forms two separate eyes that are connected together, the upper part being by preference nearly round and smaller than the lower part, which is by preference of an oval or loop shape, so that the double eye is not unlike the sole of a boot or shoe in form.

RAILROAD SCHEDULE, ETC.—Sidney E. Allen, Company Shops, N. C.—This invention relates to a new and useful improvement in facilitating the transaction of business, on railroads, and at railroad stations, whereby much time and trouble is saved, and consists in arranging in a compact manner, a list of stations on any railroad, a passenger and freight tariff and time table, with classification of freight, inclosed in separate compartments in a case of convenient and novel construction.

APPARATUS FOR HOISTING HOSE.—J. J. Lovell, New York city.—This invention relates to an improved device to be used in hoisting hose over buildings for throwing water upon fires, to facilitate the said hoisting and protect the cornices and the hose. It consists in an adjustable pulley support, capable of attachment to any cornice, provided with a grooved pulley, over which the hose may be drawn with much less effort, than when the same is drawn over the edge of the cornice as is commonly done, and without damaging either the cornice or the hose, as now frequently happens.

CRANKED AXLE FOR WAGONS.—T. E. Lutner, Philadelphia, Pa.—This invention relates to improvements in cranked axles for wagons, trucks, etc whereby it is designed to provide such a construction of the same as will admit of more room between the vertical portions of the axle, without increasing the distance between the wheels, than is afforded by the present construction.

WATER-CLOSET VALVE APPARATUS.—John Keane, New York city.—This invention relates to improvements in apparatus for governing the flow to and from, the basins of water closets, whereby the water valve is worked automatically, and regularly by a standing cylinder.

DISTILLING AND CONDENSING APPARATUS.—Albert Gray, New York city.—This invention relates to new and useful improvements in apparatus for producing fresh water for use on shipboard and for other purposes, from salt water and from other impure water, and aerating the same.

NEEDLE SHARPENER.—A. S. Dinsmore, New York city.—This invention has for its object to furnish an improved needle sharpener designed especially for sharpening sewing machine needles whose points have been broken off.

COAL BREAKER AND SEPARATOR.—L. P. Garner, Ashland, Pa.—This invention consists in an improved arrangement of breaking rollers, separating hopper, grate and screw, also certain improvements in attaching the spokes to the breaking wheel or cylinder.

DETACHABLE CALK FOR HORSE SHOES.—Kingston Goddard, Richmond, N. Y.—This invention has for its object to furnish an improved horseshoe calk, which shall be so constructed and arranged that it may be conveniently attached when required for use, and as conveniently detached when no longer required.

ADJUSTABLE BED-BOTTOM.—Elihu Hoag, Coxsackie, N. Y.—This invention has for its object to improve the construction of bed-bottoms in such a way that the part of the bed bottom towards the head of the bedstead may be conveniently and gently raised and lowered, and securely held at any desired angle for convenience in changing the position of invalids.

DUMB WAITERS.—Arnout Cannon, Jr., Poughkeepsie, N. Y.—This invention has for its object to improve the construction of dumb waiters so as to make them stronger, safer, more durable, and more easily controlled, so that they will remain stationary in any position in which they may be placed, both when loaded and when empty.

CARBURETERS.—C. F. Dunderdale, New York city.—This invention has for its object to furnish an improved carbureter for attachment to brackets, chandeliers, pendants, or other gas fixtures, and which shall be so constructed and arranged that the air to be carbureted may be heated by the flame which it is intended to feed.

WAGON SEAT.—Andrew Sheline, Edon, Ohio.—This invention has for its object to furnish an improved seat for wagons, carriages, etc., which shall be so constructed as to ride easier and steadier, be more durable, and less liable to break or injure the clothes of those riding upon it than the spring seats constructed in the ordinary manner.

HOISTING ATTACHMENT TO PORTABLE HORSE POWERS.—Peter Cary, Coeymans, N. Y.—This invention relates to a new and useful improvement in method of loading and unloading portable horse powers, used in thrashing grain, and for other purposes, and it consists it attaching to the rear end of the ordinary endless chain horse power a transverse shaft with ratchet and pawls with ropes or chains connected therewith for hoisting.

REVOLVING CHRISTMAS TREE.—F. A. Geisler, Bristol, R. I.—This invention relates to a new and improved device for exhibiting toys, jewelry, and other articles on Christmas eve, and at other times, and consists in a vertical shaft having shelves attached thereto, with a windwheel on its top end, and made to revolve by rarifying the air beneath the wind wheel.

Official List of Patents.

Issued by the United States Patent Office.

FOR THE WEEK ENDING MAY 25, 1869.

Reported Officially for the Scientific American.

SCHEDULE OF PATENT OFFICE FEES:

each caveat	$15
On filing each application for a Patent (seventeen years)	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Reissue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing a Disclaimer	$10
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On an application for Design (seven years)	$15
On an application for Design (fourteen years)	$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay $500 on application.

For copy of Claim of any Patent issued within 30 years $1

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90,334.—PROCESS OF CURING AND PUTTING UP FISH.—John Atwood, Jr., Provincetown, Mass.

90,335.—MODE OF COLORING AND TINTING RUBBER GOODS.—Jos. Beck, Trenton, N. J.

90,336.—RAILWAY HOSE PROTECTOR.—J. H. Bellamy, Charlestown, assignor to himself and L. M. Faxon, Boston, Mass.

90,337.—ALLOY FOR FORMING EYELETS.—G. B. Brayton (assignor to ("The Novelty Eyelet Company"), Boston, Mass.

90,338.—CHUCK.—G. E. Brettell, Rochester, N. Y.

90,339.—BRICK PRESS.—T. J. Burke, Sandwich, Ill.

90,340.—TUCK CREASER AND GUIDE FOR SEWING MACHINES.—G. F. Clemons, Springfield, Mass.

90,341.—POTATO DIGGER.—Ira Cooper, Middlefield, Ohio.

90,342.—COOKING STOVE.—E. J. Cridge, Troy, N. Y.

90,343.—FAUCET.—Geo. T. Dalton, New York city.

90,344.—BAG HOLDER.—Geo. Dare, Auburn, N. Y.

90,345.—SLIDING DOOR SHEAVE.—M. L. Deering, New York city.

90,346.—FURNACE FOR STEAM AND OTHER PURPOSES.—C. H. De Lamater, New York city.

90,347.—COMPOUND FOR THE CURE OF DIPHTHERIA, ETC.—A. J. Denison, Paris, Mich.

90,348.—FASTENING FOR GLOVES.—Theodore Deschamps, Paris, France.

90,349.—APPARATUS FOR PRESERVING BEER.—Wm. Dietrichsen, Newark, N. J.

90,350.—BANJO.—G. C. Dobson and Wm. McDonnell, Boston, Mass., assignors to G. C. Dobson.

90,351.—CARRIAGE.—J. L. Dolson, Charlotte, Mich.

90,352.—DEVICE FOR ATTACHING AND DETACHING HORSES.—G. L. Du Laney, Mechanicsburg, Pa.

90,353.—CORSET.—D. H. Fanning, Worcester, Mass.

90,354.—SEWING MACHINE FOR QUILTING.—T. O. Foot, Newburg, Ill.

90,355.—ROAD SCRAPER.—Jas. Gorton, Cohocton, N. Y.

90,356.—LAMP POST.—J. W. Graham, Chillicothe, Ohio.

90,357.—BASE BURNING STOVE.—Wm. Hailes, Albany, N. Y.

90,358.—COOKING STOVE.—Wm. Hailes, Albany, N. Y.

90,359.—MANUFACTURE OF COLORS.—Eberhard Harrsch, New York city.

90,360.—ICE PRESERVER AND WATER COOLER.—Rober Heneage, Buffalo, N. Y.

90,361.—FIRE-PROOF BUILDING.—R. M. Hoe, New York city.

90,362.—HORSE-RAKE.—Jas. Hollingsworth, Chicago, Ill.

90,363.—GUIDE FOR MEASURING THE PERSON AND CUTTING OUT LADIES' DRESSES.—Louisa L. Jackson, Richmond, Ind.

90,364.—HEDDLE FOR LOOMS.—E. G. Jelley, Pawtucket, R. I.

90,365.—SAW AND SAW TOOTH.—Jno. M. Johnston, Mayfield, Cal.

90,366.—CURTAIN FIXTURE.—A. H. Knapp, Newton Center, Mass.

90,367.—FERTILIZER.—Wm. Lalor, Utica, N. Y.

90,368.—STUFFING FOR MATTRESSES.—F. A. Lane (assignor to himself and L. S. Lane), Swanzey, N. H.

90,369.—FRUIT DRYER.—Minnie E. Lloyd, New York city, Antedated May 8, 1869.

90,370.—MANNER OF APPLYING ROLLERS TO ROCKING CHAIRS.—A. Lodeman and M. Desenberg, Kalamazoo, Mich.

90,371.—STEAM-ENGINE LUBRICATOR.—J. A. Lynch (assignor to himself R. K. Huntoon, and C. S. Lynch), Boston, Mass.

90,372.—MANUFACTURE OF IRON.—W. M. Lyon, Pittsburgh, Pa.

90,373.—MANUFACTURE OF WROUGHT IRON.—Wm. M. Lyon, Pittsburgh, Pa.

90,374.—HORSE COLLAR FASTENING.—M. F. McIntyre, Girard, Pa.

90,375.—SPRING FOR WAGON SEATS.—G. H. Mittan, Dewitt, Ill.

90,376.—FENDER FOR CULTIVATOR PLOWS.—W. E. Moore, Crawfordsville, Ind.

90,377.—LOCKING NUT.—Wm. Morehouse, Buffalo, N. Y.

90,378.—ROVING FRAME.—E. P. Morgan, Saco, and J. H. McMullan, Biddeford, Me.

90,379.—LEVELING HYDRAULIC GAS MAINS.—Peter Munzinger, Philadelphia, Pa.

90,380.—CHIMNEY CAP.—Elijah Myrick, Harvard, Mass.

90,381.—BREECH-LOADING FIREARM.—J. D. S. Newell, Tensas parish, assignor to himself, A. G. Brice, E. Tomatis, and Thos. Pickles, New Orleans, La.

90,382.—DEVICE FOR SETTING BUTTON HOOKS.—J. S. Palmer, Providence, R. I.

90,383.—FILTER.—G. O. Parkman, Lincolnville, and John M. Trussell, Belfast, assignors to themselves, and Ambrose Strout, Belfast, Me.

90,384.—SPRING BED BOTTOM.—J. F. Peck, Springfield, Mass.

90,385.—WIND WHEEL.—Walter Peck, Rockford, Ill.

90,386.—COFFEE ROASTER.—H. W. Persing, Chicago, Ill.

90,387.—APPARATUS FOR MAKING TEA AND COFFEE.—H. W. Persing, and J. F. Pease, Chicago, Ill.

90,388.—DENTAL INSTRUMENT.—W. R. Pomeroy, Millersburg, Ohio.

90,389.—ABDOMINAL SUPPORTER.—J. L. Porter, Kirksville, Mo.

90,390.—CARPET CLEANING MACHINE.—E. S. Poucher, New York city.

90,391.—WASHING MACHINE.—S. G. Rice, Albany, N. Y.

90,392.—APPARATUS FOR TREATING HYDROCARBON OILS.—L. M. Rice, Hartford, Conn., and S. E. Adams, Charlestown, Mass.

90,393.—MANUFACTURE OF FLEXIBLE HOSE, TUBE, OR PIPE FOR CONVEYING FLUIDS UNDER PRESSURE.—J. P. Rider, Brooklyn, N. Y.

90,394.—HORSESHOE.—David Roberge, Moores, N. Y.

90,395.—PAINT FOR SHIPS' BOTTOMS.—Henry Roundy (assignor to T. M. Cash), San Francisco, Cal.

90,396.—WINDOW.—G. A. Russell, Chicago, Ill.

90,397.—MANUFACTURE OF HOSE, TUBING, AND OTHER RUBBER FABRICS.—Junius Schenck, Brooklyn, N. Y.

90,398.—TREE BOX.—Stephen Scotton, Richmond, Ind.

90,399.—REIN HOLDER.—J. L. Shillito, and W. M. Walker, Wellsville, Pa.

90,400.—METALLIC DOOR STRIP.—A. D. Smith, Grafton, Ohio.

90,401.—FLUE STOPPER.—Henry Smith, Southington, Conn.

90,402.—FLY TRAP.—Warren Smith, Alexandria, Ind.

90,403.—TRUSS ROCKER BEAM.—W. B. Snow, and W. A. Elmendorf, Chicago, Ill.

90,404.—POTATO DIGGER.—Simon Soules, Dowagiac, Mich.

90,405.—FILTER.—Thos. Stewart (assignor to himself and W. C. Stiles), Philadelphia, Pa.

90,406.—NECK YOKE.—Charles E. Sweney, Genesco, Ill.

90,407.—DEVICE FOR SHARPENING THE CUTTERS OF MOWING MACHINES.—Warren Tanner, Chicago Ill., assignor to himself and Oliver Bascom, Whitehall, Vt.

90,408.—TORPEDO FOR OIL WELLS.—Henry H. Thomas, Titusville, Pa.

90,409.—AMALGAMATOR.—James Thompson, Gibsonville, Cal.

90,410.—RAILWAY CAR WHEEL AND AXLE.—Charles D. Tisdale (assignor to himself and Joseph H. Clapp), Boston, Mass.

90,411.—BROOM HOLDER.—L. W. Turner, Yalesville, Conn.

90,412.—ATTACHING HANDLES TO AXES.—T. H. Tyndale, Belleville, Ill.

90,413.—CHURN DASHER.—O. A. White, Norwalk, Ohio.

90,414.—CHURN.—A. G. Wilkins, G. N. Crodle, and F. L. Niner, Cooperstown, Pa.

90,415.—ALE, BEER, AND WATER COOLER.—Lewis John Wolf Port Richmond, Philadelphia, Pa.

90,416.—WASHING MACHINE.—J. B. Woolsey, Bloomfield, Iowa.

90,417.—INK POWDER AND DYE FROM ANILINE COLORS.—John Zengeler, Chicago, Ill.

90,418.—POCKET CASE FOR RAILROAD SCHEDULES.—Sidney E. Allen, Company Shops, N. C.

90,419.—TURBINE WHEEL.—V. M. Baker, Preston, Minn.

90,420.—ROSE FOR DOOR KNOBS.—Charles L. Bates, New York city.

90,421.—GATE.—Francis C. Brown and Cyrus Allen, Palmyra, N. Y.

90,422.—DUMB WAITER.—Arnout Cannon, Jr., Poughkeepsie, N. Y.

90,423.—HOISTING ATTACHMENT FOR PORTABLE HORSE POWER.—Peter Cary, Coeymans, N. Y.

90,424.—CREAM PUMP.—T. A. Case, Ellington, N. Y.

90,425.—HAY RAKER AND LOADER.—Albert Clark, Cadiz, Ohio.

90,426.—CORPSE PRESERVER.—J. L. Clark, Providence, R. I.

90,427.—GOVERNOR STOP-VALVE FOR STEAM ENGINES.—Chas. A. Condé, Indianapolis, Ind.

90,428.—LAMP.—Abel Crook, New York city.

90,429.—VEGETABLE CRUSHER.—Reuben Daniels, Woodstock, Vt.

90,430.—HARNESS BUCKLE.—F. W. Dean, Tremont, Ill.

90,431.—HAY AND COTTON PRESS.—Levi Dederick, New York city.

90,432.—RAILWAY CAR TRUCK.—Patrick S. Devlan, Jersey city, N. J.

90,433.—NEEDLE SHARPENER.—A. S. Dinsmore, New York city.

90,434.—MINER'S LAMP.—W. G. Dowd, Scranton, Pa.

90,435.—KNITTING MACHINE REGISTER.—William V. Dubois (assignor to himself and W. A. and J. G. Sangster), Covington, Ind.

90,436.—CARBURETER.—C. F. Dunderdale, New York city.

90,437.—COAL SCUTTLE.—John L. Ellithorp and Peter Sloan, Canajoharie, N. Y.

90,438.—COMPOSITION FOR CLEANING MARBLE, STONE, ETC.—Alpheus C. Ford, Lynn, assignor to himself and Robert B. Swisher, Springville, Pa., and William C. Larzelair, Blairstown, N. J.

90,439.—COAL BREAKER AND SEPARATOR.—L. P. Garner, Ashland, Pa.

90,440.—APPARATUS FOR COLLECTING AND FORCING GASES FROM BLAST, PUDDLING, AND OTHER FURNACES.—David H. Geiger, St. Clair, Pa.

90,441.—REVOLVING CHRISTMAS TREE.—F. A. Geisler, Bristol, R. I.

90,442.—DETACHABLE CALK FOR HORSESHOES.—Kingston Goddard, Richmond, N. Y.

90,443.—COMPOSITION FOR MAKING IMITATION IVORY, WOOD, HORN, ETC.—Solomon Gradenwitz (assignor to B. Ollendorff), New York city.

90,444.—APPARATUS FOR DISTILLING AND PRODUCING FRESH POTABLE WATER.—William Albert Gray (assignor to J. Howard Wainwright), New York city.

90,445.—GAS MACHINE.—J. W. Groat, Fremont, Ohio.

90,446.—HORSE RAKE.—Stephen J. Halsted, Margarettville, N. Y.

90,447.—COMPOSITION BOWL FOR MANGLES, WASHING MACHINES, ETC.—Thomas Hardcastle, of the Bradshaw Works, near Bolton, England.

90,448.—BLANK FOR RAKE AND HOE COMBINED.—Nathan Harper, Philadelphia, Pa.

90,449.—ADJUSTABLE BED BOTTOM.—Elihu Hoag, Coxsackie, N. Y.

90,450.—STEAM GENERATOR.—James Howard and Edward Tenney Bousfield, Bedford, England.

90,451.—CORN SHOCK BINDER.—John E. Hunter, Mechanicsburg, assignor to himself and T. Martin, Catawba, Ohio.

90,452.—DRAWER FOR FURNITURE, ETC.—Enos B. Johnson, Milwaukee, Wis.

90,453.—WATER CLOSET APPARATUS.—John Keane, New York, assignor to himself and George H. Brown, Millbrook, Washington Hollow, N. Y.

90,454.—EAVES PROTECTOR.—Joseph J. Lovell (assignor to himself and George W. Millar), New York city.

90,455.—CRANK AXLE FOR WAGONS.—Thomas E. Lutner, Philadelphia, Pa.

90,456.—DROP PRESS.—Nathan P. Maker, Providence, R. I.

90,457.—MEASURING FUNNEL.—G. B. Massey, New York city.

90,458.—DEVICE FOR SETTING WAGON TIRES.—Francis Mills, Mount Vernon, Ind.

90,459.—STOVEPIPE SHELF AND OVEN.—J. A. Miner, and H. J. Torrey, Wellsville, N. Y.

90,460.—SEWING NEEDLE.—Abel Morrall, Studley, England.

90,461.—MACHING FOR DRESSING MILLSTONES.—Samuel Prettyman Mumford and John Wallis, Greenwich, England.

90,462.—WASHING MACHINE.—Ira A. Newhall, Crooked Creek, Pa.

90,463.—HAY AND MANURE FORK.—L. D. Pitcher, Pitcherville, Ill.

90,464.—COAL STOVE.—Francis Raith (assigns one-third to Edmund F. Krellwitz), Calumet, Mich.

90,465.—PADDLE WHEEL.—Wm. C. Rice, Oquawka, Ill.

90,466.—WAGON SEAT.—Andrew Sheline, Edon, Ohio.

90,467.—WASHING MACHINE.—J. M. Shuck, Oskaloosa, Iowa.

90,468.—WATER WHEEL.—J. C. Smith, Mahanoy, Pa.

90,469.—WATER WHEEL.—Wm. H. Snyder, Phelps, N. Y.

90,470.—VELOCIPEDE.—L. H. Soule, Mount Morris, N. Y.

90,471.—AUTOMATIC DOUGH-RAISER.—John Stark, Thomasville, Ga.

90,472.—SUBMERGED CENTRIFUGAL PULP-WASHER.—Richard R. Sylands (assignor to himself and John S. Reeve), Millburn, N. J.

90,473.—CARRIAGE JACK.—J. Newton Thatcher, Martinsburg, West Va.

90,474.—KNIFE FOR PARING VEGETABLES, ETC.—William Yeber, Jr., Shingle Creek, N. Y.

90,475.—PLOW.—Edward Wiard, Louisville, Ky.

90,476.—MODE OF MELTING, CASTING AND HARDENING NICKEL.—Isaac Adams, Jr., Boston, Mass.

90,477.—BOOT CRIMPER.—J. B. Aikin, Somerton, Ohio.

90,478.—IRON FRONT FOR BUILDINGS.—John Alexander, Greenpoint, and Nathaniel J. Burchell, New York city.

90,479.—FLUID METER.—C. W. Baldwin, Boston, Mass.

90,480.—STEAM ENGINE.—Edwin P. Ball, Chicopee, Mass.

90,481.—FRICTION CLUTCH.—Darius Banks, New York city.

90,482.—FEED TABLE FOR PRINTING PRESSES.—Henry Barth, Cincinnati, Ohio.

90,483.—AUTOMATIC VALVE.—F. H. Bartholomew, New York city.

90,484.—LAMP CHIMNEY.—J. F. Bartlett, Winstead, Conn.

90,485.—BELT AWL.—S. Y. Beach, Seymour, Conn.

90,486.—HOT CLOSET FOR STOVE PIPES.—Nelson W. Beckwith, McDonough, N. Y.

90,487.—LATHE CHUCK.—Wm. Bellows, Cincinnati, Ohio.

90,488.—PLOW CLEANER.—Andrew C. Black, Kaukauna, Wis.

90,489.—VELOCIPEDE.—P. J. Boris, Boston, Mass.

90,490.—WASHING MACHINE.—Branson Breeden, Lexington, Va.

90,491.—COFFIN.—Webb Broomhall (assignor to himself and Acker King), Circleville, Ohio.

90,492.—MACHINE FOR BENDING METALS EDGEWISE.—Geo. W. Brown, Galesburg, Ill.

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90,494.—MANUFACTURE OF IRON.—John Burt, Detroit, Mich.

90,495.—DITCHING MACHINE.—M. E. Burtless, Seneca Falls N. Y.

90,496.—FARM GATE.—J. W. Byers, Mechanicsburg, Pa.

90,497.—COMPOSITE PAPER FOR HANGINGS AND FOR OTHER PURPOSES.—Wellington Campbell, Millburn, N. J.

90,498.—HANDLE FOR UMBRELLAS AND CANES.—Levi Chapman, New York city.

90,499.—INSOLE FOR BOOTS AND SHOES.—Edwin Chesterman, Tremont, N. Y.

90,500.—BLIND HINGE.—C. B. Clark, Buffalo, N. Y.

90,501.—BELT BUCKLE.—Francis Clausen, San Francisco, Cal.

90,502.—WATER CLOSET.—B. R. Cole, Buffalo, N. Y.

90,503.—SPRING WHIFFLETREE.—G. N. Compton, Canton, O.

90,504.—HINGE AND SPRING COMBINED.—J. J. Cowell, Newark, N. J.

90,505.—PROCESS OF MAKING ORNAMENTAL SIGNS, ETC.—J. H. Crane and C. W. Crane, Charlestown, Mass.

90,506.—STEAM GENERATOR.—Benjamin Crawford, Allegheny City, Pa.

90,507.—SEWING MACHINE FOR MAKING BOOTS AND SHOES.—C. O. Crosby, New Haven, Conn.

90,508.—MACHINE FOR MAKING TATTING.—C. O. Crosby, New Haven, Conn.

90,509.—DOUGH-MIXING MACHINE.—Joseph Davidson, Xenia Ohio.

90,510.—ORE CRUSHER.—M. B. Dodge, Brooklyn, N. Y.

90,511.—SADIRON.—David Donalds, New York city.

90,512.—COMPOUND MOLDBOARD FOR PLOWS.—S. H. Dwight Decatur, Ill., and Calvin Wells, Pittsburgh, Pa.

90,513.—RUNNING GEAR OF STREET CARS.—Zebina Eastman Chicago, Ill.

90,514.—PHOTOGRAPHIC PRINTING.—Ernest Edwards, Fine Willesden, Great Britain.

90,515.—CONSTRUCTION OF REVERBERATORY AND MELTING FURNACES.—Abial Elliott, South Wolfborough, N. H.

90,516.—HORN COMB.—M. H. Fairchild, Newtown, Conn.

90,517.—DITCAING MACHINE.—Henry Felthoff and L. D. Tingley, Prince William, Ind.

90,518.—PRINTERS' SHEARS.—C. E. Fisk, New York city.

90,519.—APPARATUS FOR LIGHTING GAS.—Henry G. Fisk, Springfield, Mass.

90,520.—MOP HEAD.—Samuel Gantz, Beaver Creek, Md.

90,521.—MACHINERY FOR BRONZING PRINTED WORK.—B. G. George, London, England.

90,522.—IMPLEMENT FOR CUTTING GREEN CORN FROM THE COB.—W. L. Gilroy, Philadelphia, Pa.

90,523.—FILTERING FUNNEL.—J. H. Goodfellow, Troy, N. Y.

90,524.—COAL STOVE.—J. H. Goodfellow (assignor to himself and R. S. Goodfellow), Troy, N. Y.

90,525.—METAL PULLEY BLOCK.—G. W. Gregory, Watertown, N. Y.

90,526.—MANURE HOOK OR DRAG.—Henry Gross, Middletown, Pa.

90,527.—MANURE HOOK OR DRAG.—Henry Gross, Middletown, Pa.

90,528.—SEWING MACHINE.—Julius Gutmann, Berlin, Prussia.

90,529.—TIME LOCK.—L. A. Haines, Wakefield, Md.

90,530.—SKATING ROD AND STOOL.—Wm. Hall, Jr., North Adams, Mass.

90,531.—IRON GRINDING PLATE.—Daniel Halladay and B. H Ruggles, Batavia, Ill.

90,532.—ORE CRUSHER.—John Hamilton, L. E. Hanson, G. W. Hamilton, and Joseph Hamilton, Wheeling, W. Va.

90,533.—MECHINE FOR THREADING RODS, BOLTS, ETC.—Wm. Harris, Washington, Mo.

90,534.—SAWING MACHINE.—J. J. Harris, St. Louis, Mo., assignor to himself, Richard Morgan, and John Gayso.

90,535.—WATER METER.—T. C. Hargrave, Boston, Mass.

90,536.—MACHINE FOR FINISHING GALVANIZED TACKS.—Russell Hathaway Jr., and J. D. Stetson (assignors to the American Tack Co.), Fair Haven, Mass.

90,537.—COAL STOVE.—J. H. Helm, Pittsburgh, Pa.

90,538.—SAWSET.—Charles Herrmann, Evansville, Ind.

90,539.—COVER FOR DRINKING VESSEL.—John Heuermann, Davenport, Iowa.

90,540.—FIRE PLUG.—R. A. Hill, Washington, D. C.

90,541.—BRANCH STOP-COCK FOR MAINS.—R. A. Hill, Washington, D. C.

90,542.—STEAM-ENGINE CONDENSER.—John Houpt, Springtown, Pa.

90,543.—RRACKET BASKET FOR RAILROAD CARS.—J. L. Howard, Hartford, Conn.

90,544.—CHURN.—J. S. Huffman, Brownsburg, Va.

90,545.—PROCESS OF DRYING MALT.—W. W. Hughes, Philadelphia, Pa.

90,546.—VELOCIPEDE.—Elon Huntington, New York city.

90,547.—RATCHET DRILL.—Geo. Hutchins, New York city.

90,548.—PROPAGATING TREES AND SHRUBS.—Sullivan Hutchinson, Bristol, N. H.

90,549.—APPARATUS FOR DRYING SUGAR AND COOLING CHARCOAL, etc.—G. A. Jasper, Charlestown, Mass.

90,550.—CASK-WASHING MACHINE.—William Johnson, Milwaukee, Wis.

90,551.—BOOT AND SHOE.—William F. Jobbins, New York city.

90,552.—SEWING MACHINE.—J. T. Jones, New York city.

90,553.—LADIES' WORK BASKET.—R. V. Jones, Canton, Ohio.

90,554.—SMOKING PIPE.—F. J. Kaldenberg, New York city.

90,555.—BRICK MACHINE.—John Keller (assignor to himself, F. J. Fairbank, and J. W. Cole), Paducah, Ky.

90,556.—COMBINED SEED DRILL AND FERTILIZER.—John F. Keller, Hagerstown, assignor to Hagerstown Agricultural Implement Manufacturing Co., Hagerstown, Md.

90,557.—RAILWAY STOCK CAR.—John S. Kendall, Northfield, Minn., assignor to himself, Ralph Emerson, and William A. Talcott Rockford, Ill.

90,558.—SASH LOCK.—Geo. King, Frederick, Md.

90,559.—STAKE PULLER.—Richard Knott, Suisun City, Cal.

90,560.—DOOR FOR GRAIN CARS.—S. E. Knott, Chicago, Ill.

90,561.—MACHINE FOR REAPING AND THRASHING GRAIN.—L. B. Lathrop, San José, Cal.

90,562.—MOP.—Joseph Law, New York city.

90,563.—VELOCIPEDE.—B. S. Lawson, New York.

90,564.—COMPOSITION FOR RENDERING FABRICS WATER REPELLENT, AND FOR FIXING THEIR COLORS.—R. O. Lowrey, Salem, N. Y.

90,565.—PROCESS FOR SEPARATING IRON AND OTHER METALS FROM POTTERS' CLAY.—William John Lynd, Golden City, Colorado Territory.

90,566.—PREPARATION OF PAPER STOCK.—G. E. Marshall, Louisville, Ky.

90,567.—NUT LOCK.—Harvey McCown, Enon Valley, Pa.

90,568.—BEDSTEAD FASTENING.—Peter McIntyre, Norwich, Conn.

90,569.—AUTOMATIC CAR COUPLING.—John McLain and Jared Kelsey (assignors to themselves and Snyder Filson), St. Mary's, Ohio.

90,570.—FANNING MILL.—Ellis Michael, La Porte, Ind.

90,571.—CURTAIN FIXTURE.—Benjamin Moser, Philadelphia, Pa. Antedated May 19, 1869.

90,572.—LAMP EXTINGUISHER.—Carlton Newman, San Francisco, Cal.

90,573.—CAR COUPLING.—W. B. Parsons, Short Tract, N. Y.

90,574.—CORN HUSKER.—O. S. Perkins and L. A. Crandall, New Haven, Conn.

90,575.—SPRING BURGLAR ALARM FOR DOORS.—Geo. W. R. Pollock, Boston, Mass.

90,576.—PUMP.—A. J. Pritchard, Liverpool, Ohio.

90,577.—CAKE MACHINE.—Joseph Repetti, Philadelphia, Pa.

90,578.—LIGHTNING ROD COUPLING.—W. S. Reyburn and E. A. W. Hunter, Philadelphia, Pa.

90,579.—VELOCIPEDE.—James Reynolds, Brooklyn, N. Y., assignor to himself and J. J. Marshall, New York city.

90,580.—VENTILATOR.—M. M. Reily, New Haven, Conn.

90,581.—WASHING MACHINE.—M. W. Riker and D. T. Torrey, Hastings, Mich., assignors, by mesne assignments, to D. T. Torrey.

90,582.—GRAIN DRILL.—J. L. Riter, Brownsville, Ind. Antedated Nov. 25, 1868.

90,583.—COOKING RANGE.—H. R. Robbins (assignor to himself and J. J. Moran), Baltimore, Md.
90,584.—STEP COVER AND WHEEL FENDER FOR CARRIAGES.—John Roberts, Cincinnati, Ohio.
90,585.—VELOCIPEDE.—P. C. Rowe, Boston, Mass.
90,586.—NON-CORROSIVE CAST-IRON PUMP.—J. A. Rumsey, Seneca Falls, N. Y.
90,587.—SKATE.—R. J. Russell, Wheeling, West Va.
90,588.—MEAT CUTTER.—F. S. Rutschman (assignor to himself, John Rutschman, and Wm. Rutschman), Philadelphia, Pa.
90,589.—METALLIC ROOFING.—David Saunderson, St. Louis, assigns one-half his right to A. B. M. Thompson, Webster Groves, Mo.
90,590.—PROPELLER.—Christian Sharps, Philadelphia, Pa.
90,591.—APPARATUS FOR MOLDING PIPE.—Frederick Shickle (assignor to Shickle, Harrison & Co.), St. Louis, Mo.
90,592.—HORSE RAKE.—A. J. Shunk, Millersburg, Ohio.
90,593.—METHOD OF MAKING SERRATED SICKLE SECTIONS.—G. F. Simonds (assignor to the Simonds Manufacturing Co.), Fitchburg, Mass.
90,594.—ICE CREAM FREEZER.—Joseph Sissons, Horncastle, England.
90,595.—VELOCIPEDE.—Joseph Simpson, Newark, Ohio.
90,596.—DIE FOR RAISING AND TRIMMING METAL.—Samuel Simpson, Wallingford, Conn., assignor to Simpson, Hall, Miller & Co.
90,597.—RAILWAY RAIL.—A. F. Smith, Norwich, Conn.
90,598.—WASHING MACHINE.—C. P. Snow, Freeport, Ill.
90,599.—PAPER CUFF.—G. K. Snow, Watertown, Mass.
90,600.—CHIMNEY COWL.—T. S. Speakman, Camden, N. J.
90,601.—VELOCIPEDE.—Charles Spring, Hyde Park, and Andrew Spring, Weston, Mass.
90,602.—MACHINE FOR POINTING BOLTS OR RIVETS.—John Stacker (assignor to Franklin Moore and Edward Clark,) West Winsted, Conn.
90,603.—ROLLER SKATE.—G. K. Stillman, Cincinnati, Ohio.
90,604.—PLOW POINT.—O. O. Storle, Norway, Wis.
90,605.—BAND CUTTER FOR THRASHING MACHINES.—Levi Sumner, Oskaloosa, Iowa.
90,606.—CAP FOR FEEDING BOTTLES FOR INFANTS AND INVALIDS.—John Thompson and J. G. Ingram, London, England; said Ingram assigns his right to John Thompson.
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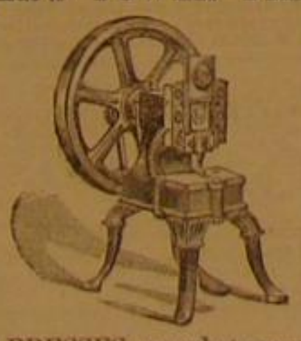

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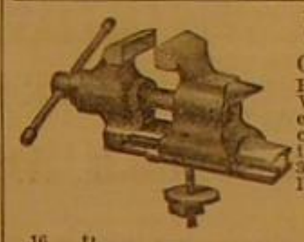

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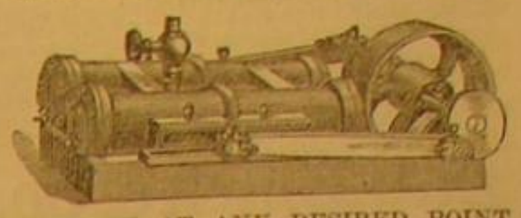

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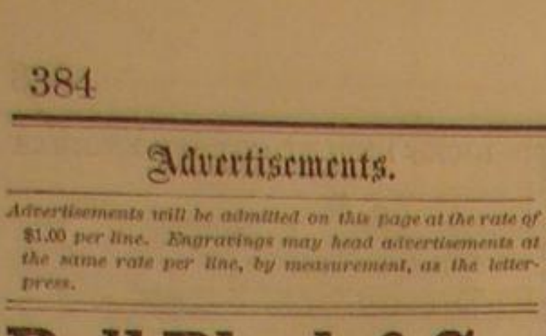

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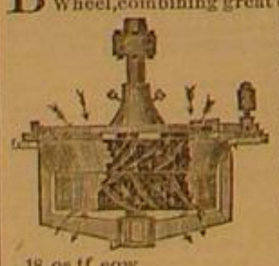

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Vol. XX.—No. 25. [NEW SERIES.]

NEW YORK, JUNE 19, 1869.

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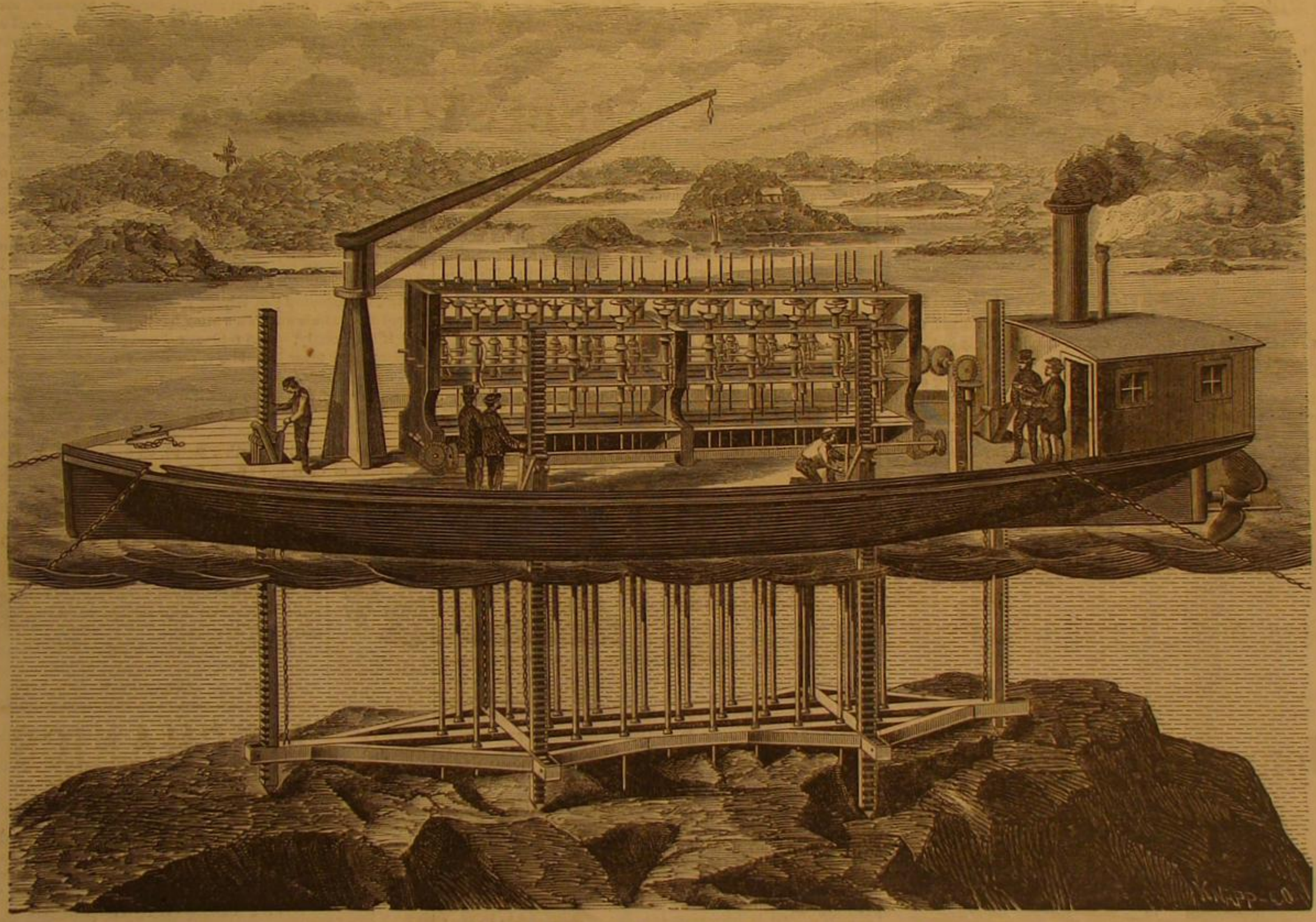
Apparatus for Removing the Obstructions from the Channel at Hell Gate.

The breaking up and removal from the channel at Hell Gate of the rocks which have been the cause of so much disaster, has engaged the attention of engineers for a long period, but has hitherto baffled all efforts. The obstructions still remain,a dread to mariners and a defiance to engineering skill. We illustrate and describe in this article an important attempt to solve the problem by the construction of an apparatus that shall work, unaffected by the violent action of the tides at that point, and will,also, be applicable to the removal of sunken rocks, under all circumstances of difficulty, wherever they may be located.



LEWIS' PATENT SUBMARINE DRILLING MACHINE.

Fig. 1 is a perspective view of this machine as it appears in operation. It consists of a steamboat, with screw propeller, having amidships a gang of vertical drills worked by steam-power, with crane for raising weights and pieces of broken rock, and a device whereby the vessel, when the drills are at work, may be raised entirely above the waves, at which time its weight is supported by six adjustable pillars, placed as shown in the engraving. It also comprises an apparatus whereby, when the vessel is moving from point to point, the whole gang of drills may be raised simultaneously above the bottom of the vessel, and the frame-work at the lower extremities let into a recess in the bottom of the boat so as to be entirely out of the way in going over shallows, sandbars, etc. It includes, also, a device whereby any one of the drills may be withdrawn and entirely taken out, while the others are in active operation, thus avoiding loss of time by stoppages.

The important details of this invention are shown in Figs. 2, 3, 4, and 5, which are respectively a perspective view of the gearing attached to each pillar upon which the boat is elevated when at work ; a detail of the same ; an elevation of a set of three drills, showing the manner of working them, with the instrument employed to take out a drill while the machine is in operation,attached to one of them,and a perspective view of this instrument, showing its mode of operation.

The apparatus for raising the body of the boat is combined with that for elevating the horizontal frame-work through which the lower ends of the drills pass (see Fig. 1), and its details are shown in Figs. 2 and 3. A represents a portion of one of the vertical legs or posts upon which the boat is supported when at work, with a rack driven by a pinion, not shown in the engraving. This pinion is attached to a shaft which receives motion through the spur wheel, B. This wheel is driven by a train of wheel-work connected with a system of longitudinal and transverse shafting, C, placed beneath the deck of the vessel, not shown in the large engraving, but a portion of which is seen in Fig. 2. This train is run into gear or disconnected by means of the lever, D, and a sliding pinion. The boat being adjusted to the required hight, is kept to its place by a toothed dog, operated by a lever eccentric, K. The weight of the boat is then sustained by a system of bars, J, which hold it securely suspended. A section of the dog and eccentric is shown in Fig. 3, which gives a clear idea of this detail. The diagonal bar, shown in the engraving, is so connected with the other bars and with the toothed dog that, when the lever eccentric releases the dog, the latter drops back by its own weight. The boat and the other parts of the machinery may then be lowered as desired. The posts, made of very heavy timber, pass through a cast-iron trunk of great strength, attached to the bottom and top of the vessel and braced laterally by strong iron rods.

Another lever, E, operates a second sliding pinion, which engages with the spur gear, H, thus putting into action,when wanted, a windlass and chain, which lift the frame-work at the lower end of the drills—shown in Fig. 1—to any desired hight, or draws it up into a recess, provided for that purpose, in the bottom of the boat. Each of the posts has this apparatus attached, which may be separately run out of gear, and the post let down until it reaches the bottom, when all may be simultaneously run into gear, so that the boat will commence to rise on an even keel, and continue to do so until the proper elevation is attained. The frame-work or drill rack, which is thus elevated or lowered, according to circumstances, acts, when lowered, as a guide to the points of the drills. In order that it may be elevated, it is necessary that the lower ends of the drills should be disengaged from it. This is accomplished by means of a longitudinal shaft, which, by means of bevel gearing, operates two transverse shafts, upon which screw threads are cut, running in nuts attached to the bottom of the vertical frame-work which supports the entire gang of drills above the deck of the vessel. This frame rests upon ways, so that the rotation of the shafts described causes it and the whole gang of drills to move together laterally, so that the timbers of the drill rack may rise between the drills. The shafting and bevel gearing are shown in Fig. 1, near the deck of the vessel. The lower frame-work or drill rack acts as a lateral bracing to the posts, as well as serving to guide the drills when at work,so that on uneven bottoms those supports which find a foot-hold first, share the lateral strain with such as have not yet reached the bottom.

Fig. 4 is a perspective view of three of the drills drawn to a larger scale, showing the way in which they are worked, and also the method of applying the instrument, illustrated in Fig. 5, for removing a drill. The drills, L, play in slotted sleeves, M,which are firmly attached to the lower ends of solid rods, N. A pin passes at right angles through the upper part of each drill, the ends of which play in the slots of the sleeve, and serve to rotate the drill on its vertical axis, as will be hereafter shown. The rods, N, pass through sleeves, O, each provided at the top with a pair of lever eccentrics, P, and having collars, Q, about midway between their extremities. Motion is applied to lifting the sleeves, O, by means of a re-revolving shaft, R, with double cams, which not only raise the sleeves, O, but also give them a partial revolution as the cams act against the lower surfaces of the collars, Q. Both the upward and rotating motion of the sleeves, O, is imparted to the rods, N, and their attached sleeves, M, through the agency of the lever eccentrics, P, which firmly grip the rods, N, and hold them until the lever eccentrics are brought into contact with the disks. This contact releases the rods, N, and lets them, with the sleeves, M, fall upon the tops of the drills above described ; a cylindrical piece of steel being inserted in the upper part of the sleeve, M, which imparts the force of the blow to the head of the drill. The disks, S, revolve when the lever eccentrics, P, come in contact with them, which

greatly lessens the friction. The drill is slightly elevated from the rock when the rod, N, is raised by the lower end of the slot in the sleeve, M, acting upon the cross pin, and then receives the rotary motion imparted through the cams, while the other parts are lifted. Set screws, T, are provided to hold any particular drill fast while the others are working, should occasion require it, and, also, to hold the drills while the boat is shifting her position. When any of the drills are not at work, the dogs, U, are made to engage with the under sides of the collars, Q, in such a way that they are slightly elevated above the cams; they then remain at rest. The dogs are operated by cords. The parts are so plainly shown in the engraving that they will be understood without further description.

Fig 3

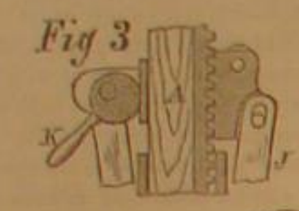
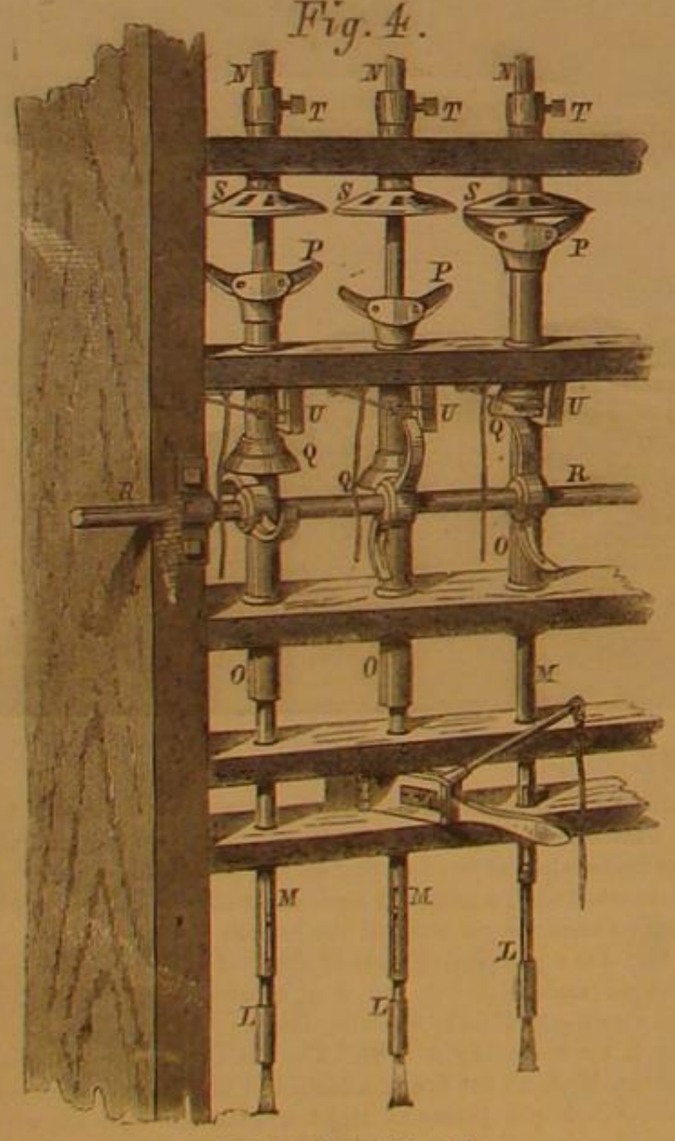


Fig. 2.

VIEW OF ELEVATING APPARATUS.

On the middle drill, represented in Fig. 4, is affixed the instrument by which any drill can be taken entirely out, while the rest continue their action. This is shown clearly in Fig. 5. It consists of a metallic block, with a handle, having a gate in its side, which lets in any of the rods, N, above described after which the gate is closed and fastened with a bolt. Within the block is a grooved pulley, V, the groove being cut to fit the rod, and a lever eccentric, W, working on a pivot, so constructed that

Fig. 4.

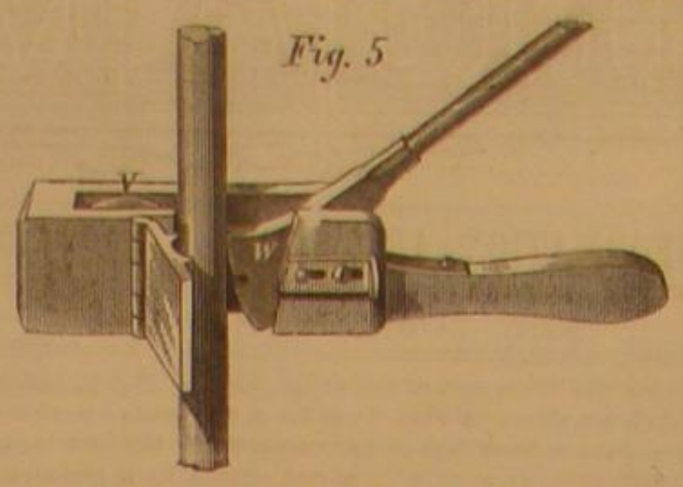


GROUP OF DRILLS.

when it occupies the position shown in the engraving, the drill may rise, but is held from descending. The reverse takes place when the eccentric is placed so that its lower segment presses against the rod. The rod will then slide gently down to its place. This eccentric is provided with a removable handle and a cord by which it may be operated by a person stationed below it.

The advantages which this machine is claimed to possess over other devices which have preceded it are very numerous. Its independence of tidal action; capability of drilling one or many holes at once; power of inserting a bar into each hole after the drill is taken out, so that it may readily be found by a diver; the practicability of lowering cartridges through the tubes after the drills are taken out; the retention of the long-tried and approved hand-drill motion, are features which will at once attract the favorable attention of practical engineers. The inventor seems to have comprehended and provided for all the emergencies of submarine drilling and blasting, and is confident that in one year's time he could clear out and remove all the rocks from the channel at Hell Gate with his improved apparatus. A company is now being organized to build this machine.

Fig. 5



INSTRUMENT FOR TAKING OUT DRILLS.

Address Wm. H. Cammyer, Union Base Ball Grounds, Brooklyn, N. Y., or the inventor, Samuel Lewis, at the same place.

ALUMINUM---ITS MODE OF WORKING, AND ALLOYS.

SOLDERING ALUMINUM.

The peculiar difficulty which was encountered for years in the soldering of aluminum has been a great drawback for its more general application. The common method of brazing with borax is not applicable for this metal, because it corrodes and oxidizes it. At first, tin solder was used, but that afforded little solidity; and riveting was soon found out to be too tedious a process. Happily the difficulty has now been surmounted by Mouray, of Paris. The specimens of articles manufactured by his method were first exhibited at one of the meetings of the famous *Societé d'Encouragement*. Among these were especially noticed a coffeepot with eight solderings, several eagles for the banners of the French army, and a trumpet, consisting of forty-two parts.

Soldered strips of sheet aluminum in being bent to and fro, never gave way at the soldered spot, but always outward of the same, which, as is well known, is not the case with the best silver soldering.

Mouray employs five different solders, which are composed as follows:

No. 1.	No. 2.	No. 3.	No. 4.	No. 5.		
80	85	88	90	94	parts in weight of	zinc.
8	6	5	4	2	" "	copper.
12	9	7	6	4	" "	aluminum.

These ingredients are melted in a crucible. The copper is fused first, and the aluminum is then added in three or four portions. When the whole is liquefied, it is stirred with an iron rod. The crucible is then withdrawn, and the zinc introduced into the mass under constant stirring. It should be free from iron. The liquefied mass is poured in ingot-like molds, which have been wiped out with benzine.

The selection of the solder depends upon the nature of the object. In order to quicken its fusion on the metal, a mixture of three parts of balsam of copaiva and one part of venetian turpentine is made use of; otherwise the operation is performed in exactly the same manner as in the brazing of other metals. The aluminum solder is spread without delay on the previously heated surfaces to be fastened together. In heating, the blue gas flame or the turpenine blast lamp is employed. The more and oftener the solder is spread over the surface the better it is.

ON OTHER MANIPULATIONS IN THE WORKING OF ALUMINUM.

In order to avoid trouble in casting aluminum, the metal should not be put all at once in the crucible, but only in small portions, and new ones should not be added until those previously added are melted. Oxidation is prevented by previously dipping the pieces in benzole, and when it is intended to melt the drippings obtained in the working of this metal, it is necessary to clean them from the solder which may adhere to them, otherwise the casting will be spoiled. By allowing the pieces to remain for some time in nitric acid, the solder is corroded but the aluminum is left untouched.

The annealing of articles made of aluminum is not attended with more difficulties than that of other metals. The operation is performed when the metal commences to glow; in case, however, that fears should be entertained about the striking of the right moment, the object to be heated may be spread over with some fatty matter, which, in disappearing, indicates the time when the object has to be withdrawn from the furnace.

When to be rolled out, it must be annealed oftener than other metals. This is now attained with great ease.

In 1857, the cost of the rolling of one pound of aluminum amounted to 13 1-3 Prussian thalers, while at present it is only one tenth of that price. In burnishing or spinning aluminum in the lathe, it is necessary to make use of a varnish, consisting of four parts of turpentine and one of stearic acid.

One of the many interesting peculiarities of the new metal is its property of resisting the action of the graver, which slides off from its surface as if it were glass. When, however, a mixture of rum and the above-mentioned varnish is employed, the graver penetrates into it as if it were pure copper.

In polishing of aluminum, the substances generally employed for this operation are of no utility. Mouray recommends the use of an emulsion of equal parts of rum and olive oil, made by shaking these liquids together in a bottle. When the stone is used, the peculiar black streaks first appearing should not be a reason of vexation, since they do not injure the metal in the least, and may be removed with a woolen rag. The objects in question may also be brightened in potassa lye, in which case, however, care must be taken in not making use of too strong a lye. For cleaning purposes, benzole has been found best.

Finally, it may be mentioned that objects of aluminum can be electroplated without the least difficulty, and Mouray succeeded in imparting to them a bright, white luster in passing them successively through a weak bath of hydrofluoric acid and aqua-fortis. The effect thus obtained is said to be really surprising.

THE ALLOYS OF ALUMINUM.

We have to distinguish between alloys in which the aluminum predominates and such ones in which the other metals outweigh the latter. Those impart to the aluminum new properties. Iron and copper do not act injuriously if the admixture is not considerable.

In regard to toughness, the union of seven per cent of iron can scarcely be distinguished from pure aluminum. Both metals easily combine with each other. Commercial aluminum mostly contains iron; it remains ductile with as much as ten per cent of copper, and when containing only half as much, it may be worked still easier. If alloyed with small quantities of zinc, tin, gold, or silver, the metal is rendered hard and more brilliant, but remains ductile. Especially recommended is the alloy consisting of ninety-seven per cent of aluminum, and three per cent of zinc. The alloy with seven per cent of tin can be worked well, but does not take a very fine polish, and cannot be cast, since a more fusible alloy with a large proportion of tin is separated.

Aluminum and lead do not unite. The composition with three per cent of silver and ninety-seven of aluminum possesses a beautiful color, and in equal parts they yield an alloy of the hardness of bronze. The union of ninety-nine per cent of aluminum and one of gold is, though hard, still ductile; its color is that of green gold. With ten per cent of gold, the composition is rendered crystalline.

The most important alloy, however, is that composed of ninety per cent of copper and ten per cent of aluminum. It possesses a pale gold color, a hardness surpassing that of bronze, is susceptible of taking a fine polish, and is easier forged than soft iron. This alloy has found a ready market, and if less costly, would replace red and yellow brass. Its hardness and tenacity render it peculiarly adapted for journals and bearings.

Christofle, of Paris, who uses it for a journal for a polishing disk, found that it lasted six times longer than ordinary journals—that is, eighteen months. There were 2,200 revolutions made per minute. It is further stated, on good authority, that a journal of this new bronze which was employed for the axle of a sewing machine, making 240 revolution per minute, did excellent service for one year without indicating the least deficiency. Journals of ordinary bronze do not, as is well known, last over five months.

Percussion Cap Experiments.

Some experiments to demonstrate the safety in the carriage and transportation of percussion caps took place on the 29th of April, at Birmingham, England. The principal railway and canal companies were represented. The experiments took place under the direction of the Chamber of Commerce.

PROGRAMME OF EXPERIMENTS.

1. A tin box, containing 250 caps, to be held in an ordinary fire until all the charges in the caps are burnt up.
2. An iron pot, containing half cwt. of caps, to be put into a red-hot muffle.
3. A wooden packing case, containing 50,000 caps, put up in the ordinary way for transit, to be placed in a furnace.
4. In an iron pot, 10 in. diameter and 10 in. deep, a lump of red-hot iron, weighing 2 lbs., to be placed at the bottom; 20,000 loose caps to be poured on the hot iron; the iron pot to be filled up with cotton wool; the whole to remain until the heat of the iron has exploded all the caps.
5. A brown paper parcel, containing 5,000 caps, to be struck by a mass of iron weighing one cwt. falling from a hight of twelve feet.
6. A box, containing 5,000 caps put up in the usual way to be struck by a mass of iron, weighing one cwt., falling from a hight of twelve feet. The box to be surrounded by cotton wool
7. A parcel, containing 5,000 caps, placed in a box with a quantity of cotton wool, to be struck by a mass of iron, weighing fifteen cwt., falling from a hight of four feet.
8. A bag, containing 20,000 caps, to be placed on a rail under the wheel of a locomotive engine.
9. Two wooden packing cases, containing 50,000 caps each, put up in the ordinary way for transit, to be submitted to any concussion practicable on a railway, by attaching it to the buffer (not a spring buffer) of an engine or otherwise.

The delegates from the different companies expressed themselves as entirely satisfied with the results of the experiments, and were convinced that fears hitherto entertained by some companies are groundless.

Silver Extraction---Electro-Chemical Treatment.

To do away with the tedious and expensive process of amalgamation in the production of pure silver, is a feat which Becquerel, Sen., of the French Academy of Sciences, asserts he has recently accomplished, after having experimented on this subject since the year 1835.

The experiment was tried successfully on 40,000 lbs. of silver ores from Peru, Mexico, and Chili, etc.

A powerful battery, with double liquid voltaic elements, separated by porous diaphragms, was made to act on the prepared ore, from which the pure silver was thus obtained at once in a finely divided state and in a crystalline form.

Messrs. Wolf and Pioche are at present, it is said, preparing for a trial of this system in California. The details we have of the process are too meager for us to venture on an opinion as to the efficiency of this apparently simple and novel metallurgical method of treating the ores of the precious metals.

CHINESE LABOR IN AMERICA.

We condense from a long article in the *Atlantic Monthly* the following facts relating to Chinese labor in America:

"It also happens just now that we are laying down a service-pipe to an immense reservoir brimming over with labor. The Chinese have already found their way to our Pacific coast. They are at work on the railroads, in mines, forests, fields, factories, and the kitchens and chambers of our friends in California. They are in Oregon, Montana, Nevada, and Idaho. When the Pacific Railroad is completed, they will be at Salt Lake City and Omaha, and in time will make their appearance in Chicago and Boston.

"The supply of labor in China is unlimited. We are to think of a territory not larger in area than the United States east of the Rocky Mountains, but containing a population of four hundred millions. One half of the people are only able to gain their daily bread. Two hundred millions in that country have faint hope of ever making any headway, and hence the readiness to seek their fortunes in foreign lands. They are at Singapore, where several hundred thousand have taken possession of the lower end of Malacca, and trade with vessels touching at that port. They are on all the islands of the Indian Archipelago. They swarm in the gold fields of Australia; the Sandwich Islands will soon be in their hands, and they will supply San Francisco with sugar. They are to be found all the way from Chili to Oregon.

"Nearly all those who are thus seeking their fortunes abroad are from southern China, where a remarkable spirit of enterprise and adventure has been lately developed. Companies, like those established in London two and a half centuries ago for the settlement of North America, have been formed at Canton and San Francisco for the encouragement and protection of the Chinese emigrants. The one hundred thousand now in this country are but pioneers of the millions who will follow by and by.

"It is evident that henceforth we are to look westward as well as eastward, for laborers. We are accustomed to think of the Chinese as belonging to a degraded race, ignorant of civilized life, and unable to compete with the skilled labor of Europe. But we have this fact before us, that China as a nation makes the whole world her debtor. We want her tea and silks, and can obtain them only by paying cash. We have also the fact that the Chinese have established themselves in the woolen mills of California, producing cloth which won a prize at the World's Fair.

"The Chinaman works patiently, and will not stipulate for three evenings a week to visit friends. St. Patrick's day is not in his calendar. He wants only a week at New Year.

"The Chinese are not disposed to be aggressors upon the rights of others, neither will they allow any infringement of their own. They wage no war, but, if treated unkindly, quietly go their own ways, seeking business somewhere else. 'I no do for you, you no do for me. I go.' And he is off at once. He fully understands what some Anglo-Saxons as yet have failed to comprehend, that the hiring of servants does not include the privilege to abuse them.

"'I have had a Chinaman,' says a gentleman of San Francisco, 'nine years. When he came into my family he could not speak a word of English. He knew nothing about cooking. My wife went into the kitchen, and showed him how to make a pudding and a pie, and after a few days' observation he mastered the mysteries of the culinary art, and has cooked to our satisfaction from that time to the present. He is faithful and honest. I would intrust every dollar of my property to him as soon as I would to one of my own countrymen.'

"Another gentleman gives this testimony: 'I have had a Chinese servant several years, and when I go into the country I leave my house in John's hands. He hides my silver plate and other valuables, and does not leave the premises a minute. When I return I find everything in perfect order. I do not think he ever took a dollar that did not belong to him, though he has had opportunities to do so. He purchases all my groceries, and invariably makes better bargains than I can myself. I would trust him much quicker than I would many Americans in my employ.'

"It is only the lowest class of Chinese that have thus far reached our shores as servants and laborers; but let these receive kind treatment, let them have the same protection for life and property which is given to all others, and in time a different class will make their appearance. It would be comparatively an easy matter to obtain Chinese labor through the societies already established at San Francisco and Canton. These are not emigration companies, but mutual-aid societies, and they might be used for conveying information to the millions in China concerning the field open here to laborers of every description, but especially to house servants. Although the Chinamen cannot speak a word of our language when they arrive, in a few days they master enough to understand what we want.

"It is to be hoped that, as the Pacific Railroad is now completed, the experiment of bringing to this side of the continent some of the Chinamen now employed as house servants in California will be tried. If they prove to be as good as they have been represented, housekeepers may regain their lost liberty."

POWER CONSUMED BY DRILLS.

Van Nostrand's Engineering Magazine gives some extracts from a report by Captain Clarinoal, Professor in the Artillery and Engineers' School, at Metz, upon the above subject, which we place before our readers for the consideration of practical men. We think exceptions will probably be made to some of the conclusions, and would like the views of practical men upon the subject. We give in a condensed form some of the principal conclusions. The dimensions used are stated in fractions of a meter, which may be reduced to inches by multiplying by 39·37:

In order to ascertain the power required to bore a hole of given diameter in wrought iron, the following points must be considered: The kind of iron, the direction in which the hole is bored, its depth and diameter, the lubricating material, the form of the drill, and its speed. The experiments were conducted with an ordinary drill press, while the power consumed was measured by Morin's dynamometer. The wrought irons used in the experiment were a very hard variety, forged under the steam hammer at the forges at Montigny-les-Metz, and a soft rolled iron from the iron works at Abainville. The drills used were center bits and a flat drill of exactly equal diameter, driven at the same speed, and lubricated with oil and afterwards with soap suds. Cast iron, bronze, and steel, were then similarly experimented on. The conclusions derived from the above experiments were the following:

(1). The amount of power necessary to drill with a center-bit into wrought iron, remains quite constant so long as the depth of the hole does not exceed 0·05 meter; as soon as this limit is passed the required power increases rapidly.

(2.) The power consumed in boring across the fibres is almost independent of the depth of the hole; the original power is, however, somewhat greater than that required to drill in the other direction. Since, however, the power required in boring in the latter direction increases greatly with the depth, the total power required to bore a given hole across is much less than that required to bore it in the direction of the fibers.

(3.) The power required to bore a hole of given diameter increases with the hardness of the iron. The use of oil to lubricate the drill diminished the power required about 0·2, as compared with that required when soap suds were used. This holds good as well in hard as in soft wrought iron.

(4.) The results obtained with center bits hold good also for flat drills; the latter, however, require a greater power than the former, as is shown below.

(*a*.) The power required by a flat drill 0·025 meter in diameter, to bore a hole in the direction of the fiber, is about 1·25 times as great as that required by a center bit of similar diameter operating under similar circumstances.

(*b*.) The power required by a flat drill, 0·025 meter in diameter, to bore across the fibers, is about 1·4 times as much as that required under similar circumstances by a center bit.

(*c*.) When the diameter of the drills is 0·015 meter, the above quantities become 1·6 and 1·8 respectively, which seems to show that small drills require a comparatively greater power than large ones. When the diameter of the drills is 0·008 meter, the above proportion becomes 1·52, which corroborates the above conclusion.

These results agree with practice, since the flat drill is commonly used only for holes 0·008 meter in diameter, and under, which do not permit the use of the center bit or pin drill.

EFFECT OF VELOCITY.—In order to estimate the effect of the velocity of the drill, a drill of 0·025 meter was driven at a speed (on its circumference) of 0·22 meter per second, and also at a speed of 0·125 meter. The power consumed per second is clearly less at a slow speed than at a high one, but the power required to bore a given hole is about the same in each case. For instance, the power required to bore a hole 0·0074 meter deep (in the direction of the fibers) at a speed of 0·22 meter, amounted to 23·49 meter kilogrammes, and to 21·8 at a speed of 0·125 meter; across the fibers, the power required at the high speed was 24·3 meter kilogrammes, and 22·3 at the low speed.

It appears then that the power required to drive the drill at either speed is not very materially different. Hence, the reporter concludes that the speed of the drill should be as great as possible, to diminish the resistance offered by the metal, and that the feed should be heavy, and both so far as possible without destroying the edge or boring too rough a hole.

The average advisable circumference speed of drills is 0·12 meter per second in wrought iron, 0·06 meter in cast iron, and 0·15 to 0·18 in bronze (gun metal). When these velocities are exceeded the drill is apt to become soft, and when they are not reached the work is not economical.

A comparison of results obtained with borers of both kinds of the same diameter (0·25 meter), shows that the power required to drive a flat drill in cast iron is 2·6 times as much as that required to drive a center bit.

Experiments on hard white cast iron, showed that the power required to drill such iron was very nearly double that stated for gray cast iron. It appears from the tables that the power required to drill cast iron is nearly constant, no matter what the depth of the hole may be.

The experiments made on steel showed that, under similar circumstances, more power was required to drill shear or soft steel than to drill hard cast steel, and that flat drills increased the power necessary by at least one third.

Capt. Clarinoal concludes with the following remarks:

1. Nearly the same power is required to drill hard wrought iron and hard cast steel.

2. The power required to bore soft steel is not much greater than that required for hard wrought iron, but the former increases rapidly with the depth of the hole. Thus, at a depth of five or six millimeters, the power consumed in drilling with soap suds in soft steel, a hole fifteen millimeters in diameter, is equal to that consumed in boring one of twenty-five millimeters in diameter in hard wrought iron.

Baron Liebig "On a New Method of Bread-making."

Baron Liebig has just made some important researches on a new method of bread-making. He remarks on the stationary character of this art, which remains much in the state in which it was thousands of years ago. He dwells upon the sanitary importance of the mineral constituents of grain, and the necessity of a sufficiently abundant supply of them in bread. These are best found in certain kinds of black and brown bread, which are, therefore, more wholesome than the white bread that is, nevertheless, preferred by most people (especially by the lower orders), on account of its better appearance and superior palatableness. The problem has hence arisen, how to provide a beautiful white bread which shall contain all the essential mineral constituents of black bread. These mineral constituents (phosphate of potash, lime, magnesia, and iron), are introduced into the bread by the use of the baking-powder invented by Professor Horsford, of Cambridge, in North America. This baking powder consists of two powders—the one acid, the other alkaline. The acid powder is phosphoric acid in combination with lime and magnesia; the alkaline powder is bicarbonate of soda. Two measures, made of tinned iron, the larger one for the acid powder, and the smaller one for the alkali, are employed. When bread is required to be made, every pound of flour is mixed with a measure of the acid powder and a measure of the alkali powder, and sufficient water added to make dough, which is presently made into loaves and baked. In one and a half to two hours, bread may be made by this process. The chemical change which takes place will be easily intelligible; carbonic acid is generated and phosphate of the alkali is formed at the same time. The essential feature in Horsford's invention is the economical getting of phosphoric acid in the shape of a dry, white powder. This is done by taking bones, burning them, and then treating the well-burnt bone-earth which consists of phosphate of lime and magnesia), with a certain quantity of sulphuric acid, so as to remove two-thirds of the lime and leave a soluble superphosphate of lime. The sulphate of lime which results from the action of the sulphuric acid, is separated from the rest by filtration, and the solution subsequently concentrated by evaporation, and, when it becomes very concentrated, mixed with a certain quantity of flour, and dried up. The mixture of flour with the superphosphate admits of being reduced to the finest powder, and constitutes the acid powder just referred to. It will be observed that the alkali powder contains soda, whereas potash is required in order to furnish the right kind of mineral salts. Liebig proposes to rectify this defect by using a certain quantity of chloride of potassium along with the alkali. Chloride of potassium is now tolerably cheap, owing to the finding of immense quantities of it at Strassfurt, in Germany.

Photographs in Quinine.

A salt is well known to pharmaceutists called the "*citrate of iron and quinine*." This is essentially a compound resulting from the combination of per-citrate of iron (containing some proto salt) with citrate of the well-known vegetable alkaloid, quinine. As usually sold it presents the appearance of a mass of fine greenish-yellow scales, which have been long known to be somewhat sensitive, when dry, to the action of light. The compound is so very soluble in water that it cannot be obtained in crystals; hence the solution of the substance is evaporated to dryness, and the residue sold as the citrate of iron and quinine.

But in this part of the manufacture of the compound a peculiarity has been introduced. The solution of the citrate of iron and quinine, after its preparation, is evaporated to a sirupy consistence; and now, instead of carrying the evaporation further in an ordinary dish, the sirupy liquid is painted over glass or porcelain plates, and the remaining moisture driven off in a hot-air chamber. When perfectly dry the compound is removed in greenish-yellow scales by scraping each plate with a knife. This is the general mode of making "scaled" preparations.

Mr. Wood, in preparing some of the citrate of iron and quinine in scales, conducted the final evaporation in the full light of an April sun instead of in the dark hot-air chamber; as the desiccation proceeded the salt decomposed easily under the influence of the solar rays, those parts of the plate crossed by shadows of bottles, &c., placed in a window, not giving evidence of any reduction. The change observed was simply a whitening of those parts which had been acted upon by light. The salt was now placed in water, and it was found that, instead of dissolving very rapidly as usual, a white residue was left on treatment with water, and this white substance subsequently dissolved very slowly.

The question may now be asked—What is the white insoluble substance resulting from the action of light on the double citrate of iron and quinine? Mr. Wood believes that this white substance is *citrate of quinine*, no doubt accompanied by some proto-salt of iron. If this be true, a photograph is, therefore, obtainable, in which a salt of quinine constitutes the lights of the picture; and so the title which we have given to this article is justified.

But our object in drawing attention to the matter here is to point out the curious and interesting fact (if it be so) that the simple destruction of a solvent, *i. e.*, solution of citrate of iron, appears here to be the prime cause of the production of the quinine photograph; thus affording us a more extended view of possible processes than we would otherwise have had, while the experiment alone is interesting as touching the manufacture of a beautiful compound of per-citrate of iron—a substance which has long since attracted attention in consequence of the facility with which it is acted upon by light.—*British Journal of Photography*.

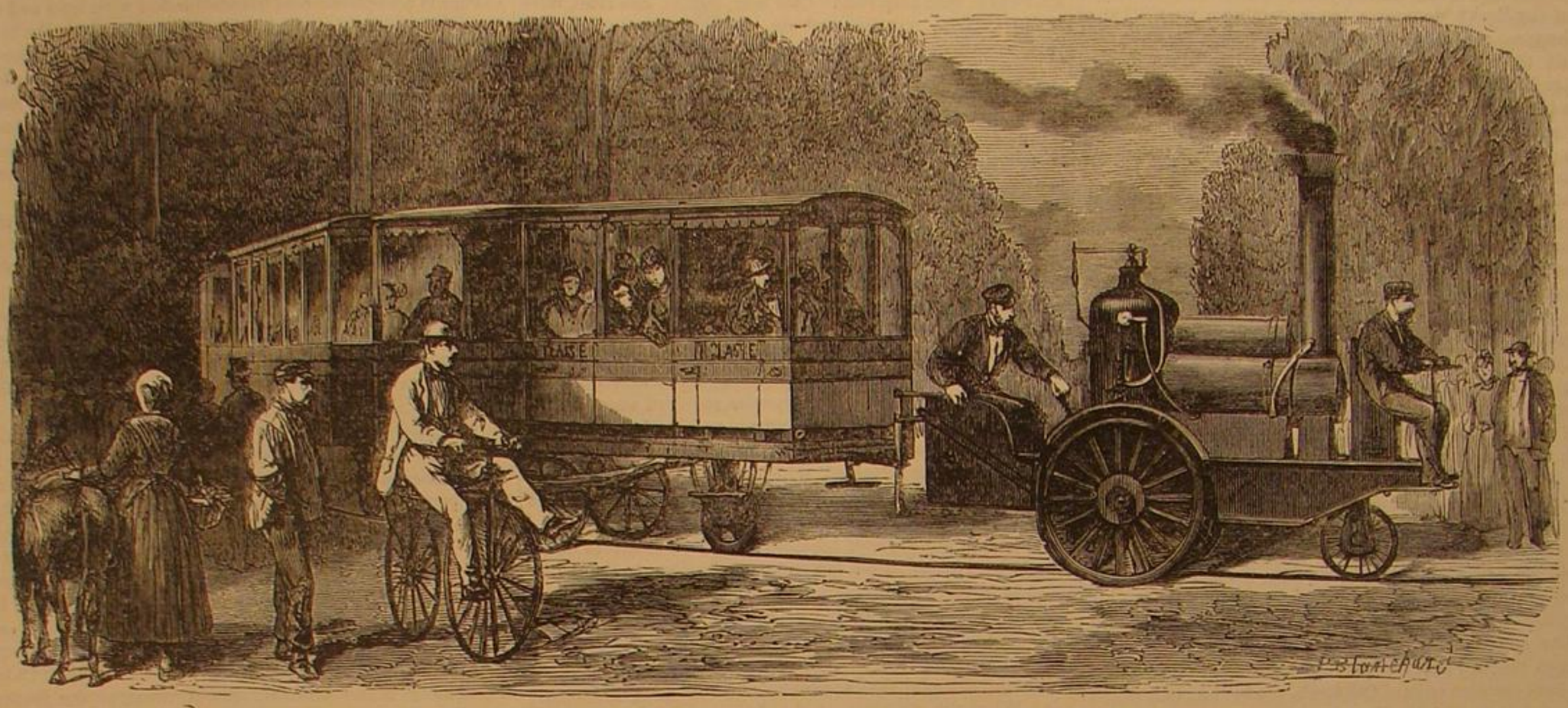
THE name of the thimble is said to have been derived from "thumbell," having been first worn on the thumb as the sailor's thimble still is. It is a Dutch invention, and was introduced into England in 1605 by John Lofting who manufactured it at Islington.

Improvement in Railroads.

In the month of August last, a party of civil engineers, newspaper reporters, and men of science, met at Raincy, near Paris, in order to witness the experiments which were to be made on a new system of railroad invented by M. Larmanjat.

The track had been laid from the village of Raincy to Montfermeil, a distance of about four miles along the public highway. The excursion train, a representation of which we here furnish, was in waiting for the invited guests. A liliputian locomotive, named the "Swallow," stood at its head, and was coupled to a series of elegant little cars, each of which held sixteen persons.

The novel feature of the invention consists of a single rail, like a long ribbon, extending along one side of the road. One wheel placed at the forward part, alone bears on this rail, while the two other wheels rest on the ground. The cars are furnished with two wheels, placed underneath in their long axis, which rest on the rail and support their weight, while two other wheels, destined to preserve their equilibrium, are placed outside.



LARMANJAT'S RAILROAD FOR ORDINARY HIGHWAYS.

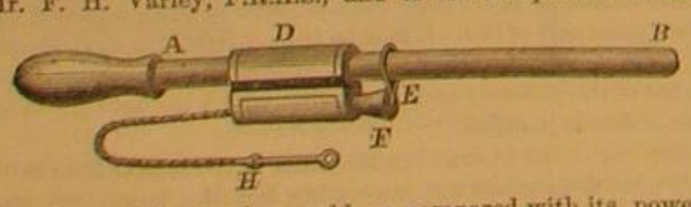
A few minutes after starting, and while the train was running at a speed of ten miles an hour, it reached a grade of 410 feet to the mile, which, to the surprise of all present, it ascended without any apparent slacking of the speed. The first result was conclusive in favor of the system proposed, as it showed, beyond a doubt, the possibility of overcoming the difficulties inherent to the ascent of extraordinary steep grades.

A portion of the road presents a series of very short curves of a radius of only sixty-five feet: these the train followed with marvelous smoothness and regularity. On the return trip the brakes were so perfectly adjusted that the velocity on the rapid descents was kept constant at all times. The train ran to Moutfermeil in twenty minutes and returned in seventeen.

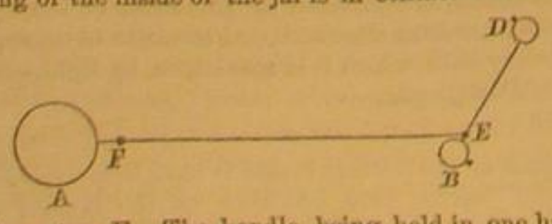
The general result of this trial trip was considered satisfactory in every respect, and M. Larmanjat received the approbation of all present. He had achieved a success, and proved the possibility of establishing cheap and light railroad lines and trains. For local purposes the system seems to be well adapted. The locomotive used on the occasion weighed only three tuns. The estimated cost in France of building such a line, including labor and material, amounts to 289,000 francs for twenty kilometers, or about $57,800 in gold for a length of fifteen miles.

The Electric Wand.

A novelty which in the hands of the London Stereoscopic Company, has deservedly begun to meet with a large sale, is a little instrument called the "Electric Wand," invented by Mr. F. H. Varley, F.R.A.S., and is the simplest frictional



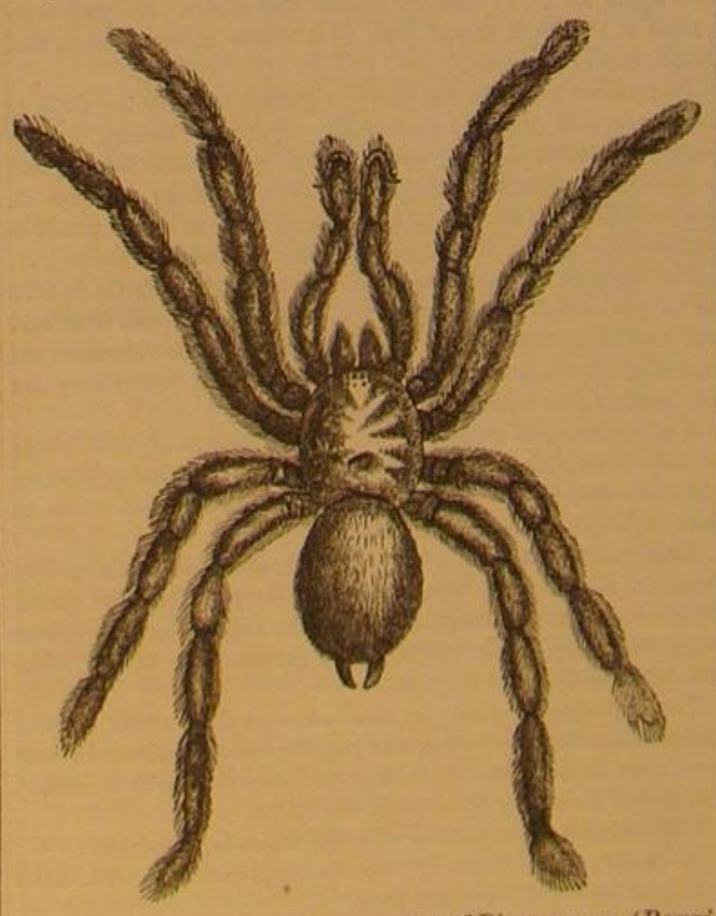
electric machine in the world, as compared with its power. It consists of a glass tube, A, B, fixed at one end in a wooden handle. The rubber with its flap D, carries a little Leyden jar, the end of which is visible at F. This jar is coated inside and out with a resinous insulating compound, and the metallic lining of the inside of the jar is in contact with the brass



collecting ring, E. The handle being held in one hand and the rubber in the other, when the tube is rubbed the little ring and jar rapidly collect plenty of electricity. A half-inch spark and smart shock may be readily obtained from this apparatus, the length of the spark depending upon the amount of rubbing each time before the jar is discharged. The tube may be cold and damp when first taken in hand, but it soon warms into proper working condition. This instrument is also unlike the common frictional machine, in that, when the conductor is once charged, several experiments may be performed with it to show the attractions and repulsions of pith balls, before fresh friction is necessary, for the jar is virtually a condenser of considerable inductive capacity. When it is not desired to take the shock through the arms, the jar may be discharged by means of the metallic cord, H. Among the auxiliary pieces of apparatus made necessary to accompany the wand, is an electrical orrery of great simplicity, and capable of giving three different motions. The orrery is all balanced on a pivot at F. The light hollow brass ball, A, represents the sun, and pith balls, B and D, the earth and moon, rotating round the pivot E. The metallic points projecting from B and D, in opposite direction, of course cause these to rotate round each other; but the leverage of the point D being from its position greater than the leverage of B, it sets the long arm of the orrery in rotation upon the pivot, F.—*The Engineer.*

THE TARANTULA OF TEXAS.

We have lately received, says the *Entomologist*, several specimens of this large ground spider from some of our subscribers in Missouri, and we therefore present herewith a life-size portrait of it. Large and formidable as it appears, it yet



has a deadly enemy in a large species of Digger-wasp (*Pompilus formosus*, Say), which stings and paralyzes it. The *American Naturalist* has the following interesting observations on this wasp which were made by Dr. G. Lincecum:

"This large and conspicuous insect is everywhere in Texas called the Tarantula Killer, and is over two inches in length; the head, thorax, abdomen, and long spiny legs are all black, while the wings are sometimes of a bright brown, with black spots at the tips. It is armed with a formidable sting, which it invariably uses in taking its prey. * * * It takes its prey by stinging, thus instantly paralyzing every limb of its victim. The effect of the introduction of its venom is as sudden as the snap of the electric spark. The wasp then drags it, going backwards, to some suitable place, excavates a hole five inches deep in the earth, places its great spider in it, deposits an egg under one of its legs, near the body, and then covers the hole very securely. A young Tarantula Killer will be produced from this egg, if no accident befalls it, about the first of June of the ensuing year. * * *

"The Tarantula Killers have severe fights with each other. It occasionally happens, when one of them succeeds in capturing a Tarantula, that another one, or more, flying around in that vicinity, and smelling the odor that arises from the Tarantula Killer when she uses her sting, which resembles the odor of the paper-making wasp (Vespa) only much stronger, takes the scent like a dog, tracks the Tarantula following it up closely, and makes a violent effort to get possession of the paralyzed spider. A fight ensues, which occasionally terminates in the death of both parties; at other times the contest lasts but a little while, as the stronger party drives off the weaker, and takes possession of the prey.

"It is surprising to one who has been educated to believe that the faculty of reason belongs alone to man, to contemplate the consumate ingenuity which is displayed by these insects in their efforts to secure their eggs from the observation of their own thieving sisters, and to hide the food they have provided for their young during the period of its existence under ground."

Summer Recreations.

The mechanic and those who are on their feet a great deal, need not go on fishing excursions, or hunting, or boatings, or cricket plays, or base balls; they need muscular rest; they should sleep at night, and lie about in the daytime under the trees, on the grass, looking up into the sky, with several newspapers or other covering under them, to keep out the dampness from their bodies, eating regularly of plain food, with nothing between; with leisure, walking in the woods, beside the streams and along the road-ways; and when they get home in the autumn, they should at first work leisurely, until the new-made particles of flesh and bone gradually harden and become adapted to severe labor.

The student, the clerk, the book-keeper, the professional man, and all who have sedentary occupations, should hie to the mountains, enter no human dwelling day or night, but camp out and "rough it" for a month; this continuous exposure to out-door air, in hunting and fishing and climbing mountains all the time, will certainly work a wonderful revolution for the better, as to the healthfulness of every one who will try it; there will be no danger of colds; pouring, drenching rains will give no "Rheumatics." Except while actually eating and sleeping, be on the move in some way out of doors, in such a manner as to involve steady and varied muscular activities which will bring into exercise every part of the body and brain; the more varied, the more joyous, the better; turn everything into fun if possible; let uproarious laughter rule the hour; let jest and joke and song and loud huzzaing be the order of the day, at least for an hour after meals, and another hour during each repast. Go and spy out the land, taking a different direction every day from your camping grounds. Endeavor in some way to add to the sum total of human knowledge of actual facts. There is no better place in the world for these things than the Adirondack mountains. —*Hall's Journal of Health.*

GEOLOGISTS will be much interested in the reported discovery of Dr. Jenzsch, of Gotha. This *savant*, it is said, has devoted himself for some years to what he calls microscopic lithographic researches, and now announces that in various kinds of crystalline and volcanic rocks he has discovered minute animal forms in prodigious numbers, and in a fossil condition. Some of the creatures he describes as having been petrified in the midst of their "life functions." Among them he finds infusoria and rotiferæ intermingled with algæ, and, he infers their formation in a large expanse of stagnant water.

Improvement in Letter Envelopes.

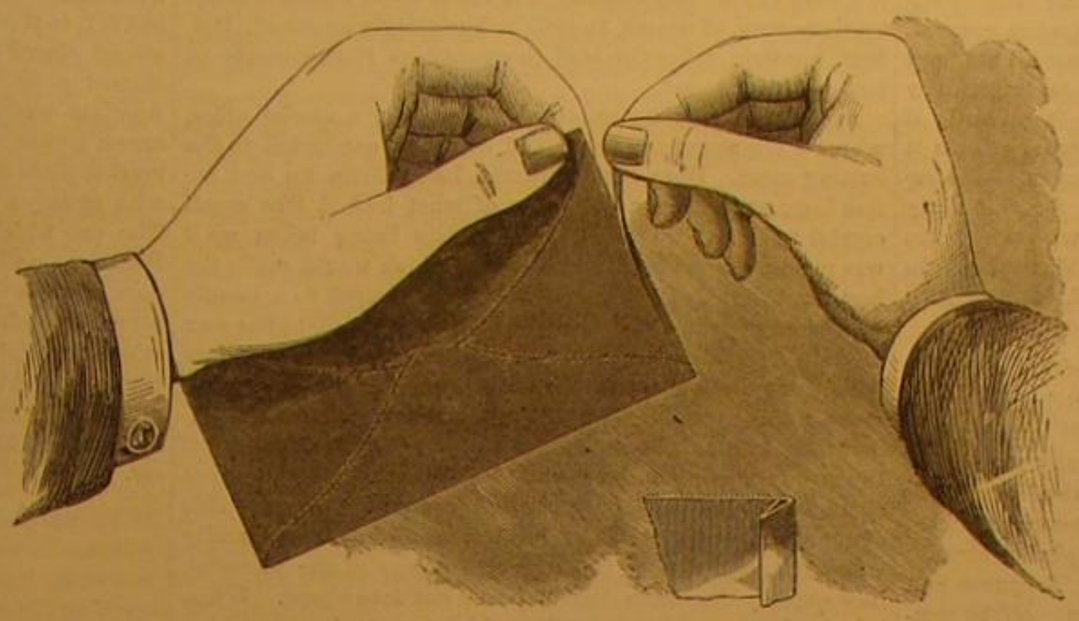
The demand for a speedy and easy method for opening envelopes has led to the invention of a number of cheap implements for the purpose, none of which, so far as we know, have proved very successful in practice.

The device of which we herewith give an illustration, patented by G. P. Hackenberg, enables an envelope to be opened easily and quickly without aid of any cutting instrument. Advantage is taken of the fact that paper will tear along the line of a fold more easily than any where else, and the invention consists in making a narrow double fold along one end of it, in the manner shown by the detail at the bottom of the engraving. The double fold gives strength to the portion to be torn off, so that there is no danger of its breaking.

The letter being seized in the left hand as shown in the engraving, the fold is stripped off, with a single motion of the right hand, without the least danger of mutilating the contents, and in much less time than it can be opened by any other method.

Clerks, and others who have felt the drudgery of opening a large correspondence, will appreciate the great saving in time obviously affected by this improvement, and for departments of the Government service it seems to be a *sine qua non*.

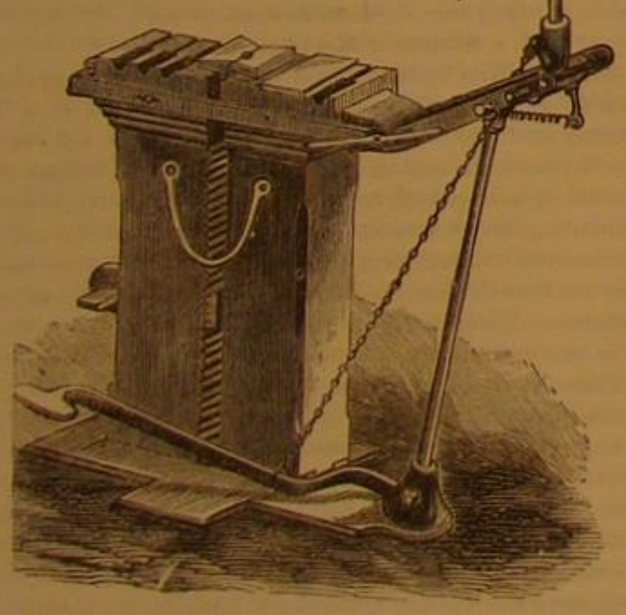
It is rare that we have brought to our notice a device at once so simple and effective as this. For further particulars in regard to rights for manufacturing this improved envelope address Major Joseph Bush, Fort Randall, Dakota Territory.



HACKENBERG'S IMPROVED ENVELOPE.

IMPROVED BOLT MACHINE.

We herewith illustrate a very useful bolt machine for every forging shop. It consists of two upright pillars—one stationary and one movable—the latter having its fulcrum at the base. In the top of these pillars are cast hexagon and round swaging channels, and a thick steel plate for anvil work. The dies are in halves, so arranged that they are brought together firmly and truly by the closing of the pillars, which is effected by means of the cam seen in front of the movable pillar. A sliding head, or "dog," is arranged with teeth, which mesh in a corresponding row of teeth running nearly the entire length of the stationary pillar of the machine. By the simple loosening and re-tightening of a key, the "dog" can be moved and firmly secured in any position, by which the length of the bolt is determined. These teeth will not break off, and have a decided superiority over any form of screw, the threads of which would be constantly upsetting and clogging. In many shops solid iron blocks are drilled for the various sized bolts required, into which pins are slipped to graduate the length of the



bolt. In the use of this machine there is no looking up of missing pins, or making off new ones. It is always ready for this important part of the smith's work. Attached to the upper part of the machine is a sledge, by which the workman can give with his foot any number of instantaneous and powerful blows on the heated iron. Forming dies can be inserted in this sledge, if required. It is a machine for all classes of blacksmiths, no power being required.

The patentees will dispose of the right to manufacture this machine for the Western States. Address L. E. Osborn, New Haven, Conn., who will also furnish machines.

Theory of Auroras.

The Polar light is a light which is frequently seen near the horizon, bearing some resemblance to the morning twilight whence it has received the name of aurora. In the northern hemisphere it is usually termed, "aurora borealis," because it is chiefly seen in the north. A similar phenomenon is also seen in the southern hemisphere, where it is called "Aurora Australis." Each of them may, with greater propriety, be called "Aurora Polaris," or *Polar Light*. They exhibit an endless variety of appearances. In the United States an aurora is uniformly preceded by a hazy or slaty appearance of the sky, particularly in the neighborhood of the Northern horizon. When the auroral display commences, this hazy portion of the sky assumes the form of a dark bank or segment of a circle in the north, rising ordinarily the hight of from five to ten degrees. This dark segment is not a cloud, for the stars are seen through it as through a smoky atmosphere with little diminution of brilliancy. This dark bank is simply a dense haze, and it appears darker from the contrast with a luminous arc which rests upon it. In high northern latitudes, when the aurora covers the entire heavens, the whole sky seems filled with a dense haze; and in still higher latitudes, where the aurora is sometimes seen in the south, this dark segment is observed resting on the southern horizon and bordered by the auroral light.

Auroras are sometimes observed simultaneously over large portions of the globe. The aurora of August 28, 1859, was seen throughout more than 140 degrees of longitude, from Eastern Europe to California; and from Jamaica on the south to an unknown distance in British America on the north. The aurora of September 2, 1859, was seen at the Sandwich Islands; it was seen throughout the whole of North America and Europe: and the disturbance of the magnetic needle indicated its presence throughout all Northern Asia, although the sky was overcast, so that at many places it could not be seen. An aurora was seen at the same time in South America and New Holland. The auroras of September 25, 1841, and November 17, 1848, were almost equally extensive.

The hight of a large number of auroras has been computed, and the average result for the upper limit of the streamers is 450 miles. From a multitude of observations, it is concluded that the aurora seldom appears at an elevation less than 45 miles above the earth's surface, and that it frequently extends upward to an elevation of 500 miles. Auroral arches having a well-defined border are generally less than 100 miles in height.

Auroras are very unequally distributed over the earth's surface. They occur most frequently in the higher latitudes, and are almost unknown within the tropics. At Havana, in latitude 23 degrees, but six auroras have been recorded within a hundred years, and south of Havana auroras are still more unfrequent. As we travel northward from Cuba, auroras increase in frequency and brilliancy; they rise higher in the heavens, and oftener ascend to the zenith. Near the parallel of 40 degrees we find on an average only ten auroras annually. Near the parallel of 42 degrees the average number is twenty annually; near 45 degrees the number is forty; and near the parallel of 50 degrees it amounts to eighty annually. Between this point and the parallel of 62 degrees, auroras, during the winter, are seen almost every night. They appear high in the heavens, and as often to the south as the north. In regions further north they are seldom seen except in the south, and from this point they diminish in frequency and brilliancy as we advance toward the pole. Beyond latitude 62 degrees the average number of auroras is reduced to forty annually. Beyond latitude 67 degrees it is reduced to twenty; and near latitude 78 degrees it is reduced to ten annually.

Auroral exhibitions take place in the upper regions of the atmosphere, since they partake of the earth's rotation. All the celestial bodies have an apparent motion from east to west, arising from the rotation of the earth; but bodies belonging to the earth, including the atmosphere and the clouds which float in it, partake of the earth's rotation, so that their relative position is not affected by it. The same is true of auroral exhibitions. Whenever an auroral corona is formed, it maintains sensibly the same position in the heavens during the whole period of its continuance, although the stars meanwhile revolve at the rate of 15 degrees per hour.

The grosser part of the earth's atmosphere is limited to a moderate distance from the earth. At the hight of a little over four miles, the density of the air is only one half what it is at the earth's surface. At the hight of 50 miles the atmosphere is well-nigh inappreciable in its effect upon twilight.

The phenomena of lunar eclipses indicate an appreciable atmosphere at the hight of 66 miles. The phenomena of shooting stars indicate an atmosphere at the hight of 200 or 300 miles, while the aurora indicates that the atmosphere does not entirely cease at the hight of 500 miles. Auroral exhibitions take place, therefore, in an atmosphere of extreme rarity; so rare indeed that if, in experiments with an air pump, we could exhaust the air as completely, we should say that we had obtained a perfect vacuum.

The auroral beams are simply spaces which are illumined by the flow of electricity through the upper regions of the atmosphere. During the auroras of 1859 these beams were nearly 500 miles in length, and their lower extremities were elevated about 45 miles above the earth's surface. Their tops inclined toward the South, about 17 degrees in the neighborhood of New York, this being the position which the dipping needle there assumes.—*Professor Loomis, in Harper's Magazine.*

Protection for Silver Wares.

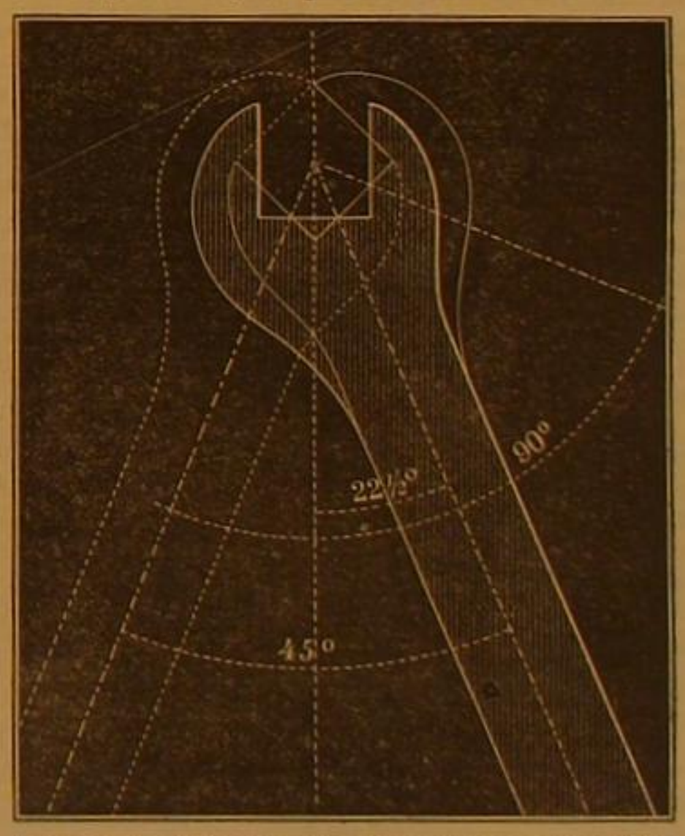
The loss of silver which results from the impregnation of our atmosphere with sulphur compounds, especially where gas is burned, is very great. It has been said that many thousands of pounds' worth go down our sewers annually in the form of dirt from plate cleaning, and the loss of one large house on Cornhill from this source has been described to us as serious. Silversmiths may, then, thank one of their confraternity—Herr Strolberger, of Munich—for a happy thought. He seems to have tried various plans to save his silver, if possible. He covered his goods with a clear white varnish, but found that it soon turned yellow in the window, and spoiled the look of his wares. Then he tried water-glass (solution of silicate of potash), but this did not answer. He tried some other solutions, to no purpose; but at last he hit upon the expedient of doing his goods over with a thin coating of collodion, which he finds to answer perfectly. No more loss of silver, and no longer incessant labor in keeping it clean. The plan he adopts is this: He first warms the articles to be coated, and then pays them carefully over with a thinnish collodion diluted with alcohol, using a wide soft brush for the purpose. Generally, he says, it is not advisable to do them over more than once. Silver goods, he tells us, protected in this way, have been exposed in his window more than a year, and are as bright as ever, while others unprotected have become perfectly black in a few months.—*London Mechanics' Magazine.*

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

How to Make a Wrench.

MESSRS. EDITORS:—I notice that the wrenches used in many shops are made with the lever at an angle of about 45° with the side of the nut. This requires a space of 60°, plus the width of the lever, in order to turn a square nut. If the lever made an angle of 22½° with the side of the nut it would require a space of only 45° plus the width of the lever.



I inclose a sketch showing the positions occupied by a wrench of 22½° while turning a nut a full circle. It will be seen that the wrench only requires a space of 45° plus the width of the lever.

It may be easily tried by cutting a piece of card-board to the proper shape. A. P. MASSEY.

San Francisco, Cal.

The Grindstone and its Uses.

MESSRS. EDITORS:—There is probably no implement in the machine shop or factory which pays better for the care bestowed upon it than the grindstone; and when we consider that nearly every tool, and all edge tools, require it, and before they can be used to advantage, or in fact at all, it is somewhat surprising that more attention has not been bestowed on the proper selection of the grit for the purposes intended.

The writer has visited a considerable number of machine shops lately, and found that a good grindstone, well hung, and in perfect order, was rather the exception than the rule As grindstones in such places are almost constantly in use, their first cost is of little consequence if the quality is calculated to do the work required in the shortest time and in the most perfect manner, as more time can be lost on a poor grindstone, badly hung and out of order, than will pay for a good one every three months. This state of things should not continue, as with the great improvements made in the manner of hanging them, and the endless variety of grits to select from, every machinist and manufacturer should have a grindstone which will not only do its work perfectly, but in

the shortest time. This can be accomplished by sending a small sample of the grit wanted to the dealer to select by.

Grindstones are frequently injured through the carelessness of those having them in charge. The farmers' grindstone, from being exposed to the sun's rays, becomes so hard as to be worthless, and the frame goes to pieces from the same cause. The machinists' grindstone will have a soft place in it, caused by a part of it being allowed to stand in water over night, and the difficulty arising from this cause increases with every revolution of the stone; but as this homely implement is in charge of all the men in the shop in general, and no one in particular, and as the workmen are all too busy to raze it down, double the time is consumed in imperfectly grinding a tool than would be required to do it perfectly if the stone was kept in order by some one, whose business it should be to attend to keeping all the grindstones of the establishment in order. The wages of a man for this duty would be saved in the time and perfection with which the numerous tools of a large establishment could be kept in order for work.

J. E. MITCHELL.

Philadelphia, Pa.

New Method of Constructing Induction Coils.

MESSRS. EDITORS:—It is well known to electricians that to obtain the greatest effect from an electro-magnet with a given amount of wire, the helices should be placed at the poles of the bar. Further, that when we are desirous of producing an induced current, the best situation for the secondary helix is the middle of the magnet. The latter principle has already been applied to the construction of coils by Dr. Ferguson and others. It has been my object, in arranging my coil, to combine both these principles, and to place the various parts so as to produce the best results.

I commence the formation of the coil by inclosing the usual bundle of iron wires in a glass tube thirteen inches long, and one inch and an eighth outside diameter. The secondary wire is No. 35, silk covered, dipped before winding in paraffine. This wire is wound upon three hard-rubber bobbins, each four inches in diameter by one inch in length. Each layer is separated from its neighbor by a single thickness of paraffined paper. The primary consists of about 110 feet of cotton-covered No. 14 copper wire, and is divided into two helices, each about four inches long and containing about four layers. These primaries are placed upon either end of the iron core with the secondary helices in the middle; two empty bobbins being interposed to serve as guards to prevent the sparks from striking into the primaries. This method of construction possesses the obvious advantage of bringing the secondary wire much nearer the inducing magnet, and of course greatly enhancing the effect produced.

The instrument is inclosed in a box with the break—arranged to work either automatically or by means of a hand wheel—attached to the end. The condenser contains about seventy square feet of tin foil separated by sheets of flat-cap paper dipped in paraffine. With four Bunsen cells, seven inches high, this coil has given sparks two inches and a quarter long.

JAMES GALLATIN, JR.

New York city.

Taps Cutting Varying Threads.

MESSRS. EDITORS:—I noticed an article in a recent number of your paper about taps cutting varying threads, a phenomena for which I think I can offer a satisfactory solution.

Just at the time the tap begins to cut the nut, if the nut is crowded on to it faster than the pitch of the thread, the consequence will be, that instead of the cutters following each other according to the pitch of the thread on the tap, each row of cutters will be forced to take the nut at different points, and when once taken the cutters will follow the new pitch thus created, I am confident a little experiment will convince all that these views are correct.

GEORGE W. TINSLEY.

Minneapolis, Minn.

[We have also received a letter from Mr. Jonas Hinkley, of Norwalk, Ohio, which essentially corroborates the above explanation.—EDS.

Fluorescence of Diamonds.

MESSRS. EDITORS:—Having seen a communication in your issue of June 5th, upon the phosphorescence of sugar when rubbed in the dark, I take the liberty to ask whether it is generally known that a diamond will give a phosphorescent light similar to that of sugar, if gently rubbed on a white painted board in the dark. I accidentally discovered this to be the case about a year since, and have vainly sought from numerous sources some allusion to the phenomena.

S. W. C.

Utica.

[It has long been known that some diamonds will become luminous in the dark by friction. Possibly the character of the exciting surface may have something to do with it, but we hardly think its color has any relation to it.—EDS.

Test of Turbine Water Wheels.

We learn that extensive arrangements for testing turbine water wheels have just been completed by the Swain Water Wheel Company, at Lowell, Mass. The power of the wheels to be tested by Emerson's Dynamometer. The amount of water used by a weir constructed after plans furnished by J. B. Francis, Engineer of the Lowell Water Power Company. The Swain wheel to be used is one that was sold before the test was decided upon, and is in no way superior to the average of the wheels furnished by that company. The test of the same wheel will take place on Wednesday, June 16th. All are invited to witness the test, and all turbine wheel builders are invited to compete; liberal arrangements will be made for doing so. For full particulars address James Emerson, Box 502, Lowell, Mass.

[Foreign Correspondence of the Scientific American.]

DIAMONDS AND DIAMOND CUTTING.

After traveling through Germany, a few weeks ago, I made a stop at Amsterdam, the interesting capital of old Holland, and had the curiosity to visit the large diamond-cutting establishments of that city, which give employment to no fewer than 10,000 men (9,000 of whom are Jews) of a total population of 279,000. The diamonds cut there amount in the aggregate to 106,000,000 francs annually. Diamond cutting is a very simple process, and, like many other mechanical operations, may, of course, be well or bunglingly executed. Holland, however, takes the lead in cutting, as Russia excels in setting the diamond.

Accompanied by my *commissaire*, I entered a special office, where I registered my name, and was then conducted to the cutting room. Here each workman had a little tin box before him, containing a collection of what looked like small crystal pebbles. On one of the crystals being taken up it was carefully examined, and the side which would make the best front then decided on. It was next secured to a handle by a piece of wax about the size of a large bullet; the wax held it sufficiently secure, and left exposed only that face which was first to be cut. Then was seen the actual "Diamond cut Diamond." The cutting diamond, which the workman held in his right hand, had a sharp edge (not always of the same shape), ¼ in. long, and was set in a handle like that of a glazier's diamond, only a little larger and stronger. This diamond is generally of the hardest quality. It was really wonderful, considering the obdurate nature of the material, how quickly the rough diamond was cut into shape. When it had a large or heavy portion which was to be removed, a small notch was cut at the place where the fragment was intended to be split off. Picking up a piece of steel about 12 inches long, ¼ inch thick, and 1¾ inches wide, one edge of which was sharp and hard and had a short bevel, the workman placed the edge in the notch, made with the cutting diamond, and striking a light blow on the back the splinter came off. These splinters are saved and worked up into small brilliants or glaziers' points. There is an art in using the cutting diamond so as not to wear it out too fast. The cutting was done lengthwise with the edge of the cutting diamond, commencing at one extremity of the face to be made on the rough diamond, cutting off little by little, as in planing cast iron. The small particles crumbled away from the diamond were saved and sifted for the polishing. When one face was cut the cement was softened, and the diamond turned around far enough to present a fresh face to be treated as the previous one, and in this way the diamond was all prepared for polishing.

I was shown a green diamond, nearly ½ inch square, which was so hard that the ordinary diamond produced no impression upon it, and which, therefore could not be polished. If some means could be devised to finish this stone, it would be very valuable. I was surprised that the same principle of operation employed in polishing other diamonds could not be applied to this one; but I was informed that even the dust of the green diamond could not be made to polish it.

We were next conducted to the polishing room. The polishing wheels were of cast iron, about 24 inches in diameter, and ran horizontally; the polishing being performed upon the upper side of the wheel. The diamond was now embeded in lead and attached to a piece of wood, hinged at the outer end, in order that the workman may raise it to see how the work progresses and apply the polishing paste mixed with diamond dust. The polishing wheel had room for several diamonds undergoing polishing at the same time, and one man could superintend all on a wheel. I had a conversation with the workman who went to London, a year ago, to repolish the celebrated diamond belonging to the Queen of England. He finished the work so well that she made him a present of £100.

I was afterwards led to the sample room where the beautifully polished brilliants were exhibited, and also models of all the largest diamonds in the world. I saw too some specimens of pebbles cemented together containing diamonds as they are found in the mines. Most of the diamonds come from Brazil. The mines of Golconda, formerly proverbial for their wealth, are no longer worked, as they finally did not produce sufficient to pay expenses. Other mines have been abandoned for the same reason. Late accounts of diamond mines in the Orange River Settlements, in South Africa, point out fresh fields for the diamond adventurer. The papers announce that there is one from this territory on the way to Europe valued at £32,000. The discovery of these mines was, as in most other cases, accidental, while searching for gold. It is said that diamonds were first found in Brazil by the natives, when examining the sands washed down from the mountains for grains of gold. The glittering crystals were laid aside as curiosities. A disinterested miner, whose name does not appear on record, arrived from Europe, saw their value, and, instead of quietly buying them up, instructed the people as to the nature of the discovery.

The history of diamonds and diamond hunting is one of great interest. A full account of the diamonds of which I saw models would fill a large volume; but I may give a brief notice of some of the most remarkable. That treasure once the property of the Great Mogul, the *Koh-i-noor*, weighed before cutting 600 carats, and was valued at three quarters of a million sterling. It is now the property of the British Crown and is estimated at £2,000,000. A suspicious Brazilian diamond, which weighed 1,680 carats when rough, belongs to the King of Portugal, and is considered worth £5,644,800. It has been insinuated that it is only a mass of very fine white colored topaz. But imagine a poor diamond hunter going out before breakfast and returning to his tent with a king's ransom—a richer man by about $20,000,000. The finder is not always aware, however, of the value of his discovery. This is well illustrated in the case of the *Cape Koh-i-noor*. We read that it was purchased from a native doctor by a Dutchman, who gave 500 sheep and a few head of cattle for it. The doctor no doubt thought himself a made man when he received so much for the stone; but the trader brought it to the nearest town and there sold it for £11,200; and that again is but about a third of what it is now set downat. The *Regent* or *Pitt* diamond, found in the East, was purchased from a native for £20,400. The Governor of Madras, sold it in 1717, to the Duke of Orleans for £130,000. This jewel, Napoleon placed in the hilt of his sword of state, and it is considered to be the finest and most perfect diamond known. Another well-known diamond, now a part of the Austrian crown jewels, was purchased for a few pence at a stall in a market place in Florence; the vender believing he had to do with merely a bit of rock crystal. Its present value is £153,000. The one which now ornaments the scepter of the Emperor of Russia, is as large as a pigeon's egg, and is said to have been once, the eye of a Hindoo idol. A deserter from the French service got himself installed by a priest in the heathen temple where the idol stood, and made off with it at the earliest opportunity. The Empress Catherine purchased it for £90,000 and £4,000 annuity. Many stories of this kind are told, and of wars and bloodshed for the possession of these coveted jewels.

J. E. EMERSON.

For the Scientific American.

TO WASH FLEECE WOOL.

BY DR. REIMANN.

The washing of wool has always been attended with great inconvenience. The use of decomposing urine has been from time to time replaced by other more convenient methods, but invariably with more or less failure. Some of the methods proposed to supersede the old one were too costly; others again, attacked the fibers of the wool, so that the manufacturer is still obliged to employ the above inconvenient agent.

Notwithstanding a method of washing wool had been discovered so long ago as 1846, which answered every purpose, but, as is often the case, did not meet with due consideration because not published with much noise.

This process is known and advantageously used in a few manufactories, but as a general rule, the manufacturer is still on the lookout for a more convenient method, without any knowledge of the process discovered so long ago. Perhaps it will be rendering a service to these manufacturers if this method is once more published.

As regards the greater number of wools, especially those wools employed in the manufacture of carpets, a single washing with cold water is sufficient to render them fit for all the succeeding operations of oiling, carding, and spinning. But other kinds of wool, such as the Saxon, the finer North and South American which contain a great deal of oil or fat, and the Scottish wool with long hairs, cannot be perfectly cleaned in this way.

The methods of washing fleece wool known until 1848, consisted in treating the wool with soap, or with decomposing urine, or with a mixture of the two. In a few cases the wool was treated with a tepid solution of common salt.

As already stated above, the method with urine is almost invariably resorted to by cloth manufacturers at the present day. Without enlarging upon the extremely disagreeable character of this operation, there is obviously great difficulty in procuring the necessarily large quantity of urine. Moreover the urine is not precisely the same in summer and in winter, so that the result of the washing is not the same at all seasons. These are some of the more important reasons why manufacturers are still wishing to replace the urine by some more convenient agent, unconscious of the fact above mentioned; namely, that a process was discovered twenty years ago which would have advantageously replaced the present inconvenient method.

The discoverer was Herr Schlieper. This chemist was in the years 1843 to 1852, superintendent of one of the largest carpet factories in America. Here it was necessary that some cheaper and more convenient method of washing wool should be resorted to. At first he tried the alkalies. There were great difficulties, however, in their employment, as the quality of the wool was easily impaired. When carbonate of soda was employed, at a slight elevation of temperature, the wool matted together, became rough, and sometimes turned yellow. The general results of his experiments were as follows: Liquid or caustic ammonia and carbonate of ammonia, are the only alkalies which do not injure the wool even at a somewhat high temperature. Having on one occasion to wash a large quantity of wool which had been damaged by sea-water, his attention was drawn to the effect of common salt upon the wool. After this he employed, with better success than with carbonate of soda alone, a mixture of this with common salt. The results thus obtained did not, however, yet entirely satisfy him. At last, after many trials, he discovered that the addition of hydrochlorate of ammonia had an admirable effect upon the wool. The carbonate of soda alone used to have a bad effect. He found out, moreover, that the employment of olein was very advantageous, nor was it a matter of indifference whether olein or simply soap was employed.

Thus, after a series of discoveries, Herr Schlieper was enabled to prepare a mixture which was well adapted for the washing of fleece wool and at the same time had no injurious influence upon it.

The new washing mixture may be obtained by mixing carbonate of soda, hydrochlorate of ammonia, and olein. The proportions found to be most suitable are as follows: Powdered carbonate of soda, 20 parts; powdered hydrochlorate of ammonia, 9 or 10 parts; olein, 9 parts. The amount of hy-

drochlorate of ammonia required is dependent on the quality of the wool which has to be washed. The finer the quality of the wool the greater the amount of hydrochlorate required.

As regards the individual effect of the several constituents of the washing mixture, it is found that, on mixing the different salts, chemical compounds are formed, which are highly advantageous in washing. From the mixture of carbonate of soda and hydrochlorate of ammonia carbonate of ammonia results. The soda of the carbonate is transformed into common salt (chloride of sodium). The olein combines with a portion of the soda, and is converted into oleate of soda or soda soap, and a corresponding amount of bicarbonate of soda is formed. This is the reason why it is not a matter of indifference whether olein or common soap is employed. The bicarbonate of soda thus formed serves with the bicarbonate of ammonia to prevent the carbonate of soda from exerting any injurious influence upon the wool. Hence, manufacturers may employ carbonate of soda, the cheapest alkali for washing wool. In this operation the olein facilitates the production of an emulson with the fat of the wool. The addition of olein is, therefore, a matter of some importance. Herr Schlieper always found that the washing was incomplete without olein. The small quantity of common salt produced by mixing hydrochlorate of ammonia and carbonate of soda, seems also to have some influence, since experiments with the carbonates of soda and ammonia alone did not give the same result. A small quantity of decomposing urine might be used instead of the ammonia, the results in either case being almost the same. The temperature employed in washing is of considerable importance. It depends upon the quality of the wool and the quantity of hydrochlorate of ammonia employed. It can only be found out by practice. Even slight elevations of temperature have very considerable influence in the process of washing. For instance, the wool bears well a temperature of 122° Fah., but is altered at 129° Fah. Another kind of wool withstands a temperature of 115° Fah., but is damaged at 122° Fah.; a third has a different maximum temperature, and so on.

It is therefore obvious that an excellent result may be insured if the mixture is only properly prepared and the process properly carried out. A considerable experience has not only established this fact, but has proved, also, that there is a considerable economy in employing the above method.

How, then, has it happened that this method of washing with its great advantages has been so little employed? Probably the chief reason is that manufacturers dislike the trouble involved in making further trials to find out a washing mixture more suitable than the urine which they now employ.

The author of this paper would be well satisfied if his remarks should induce some manufacturers to try the method described above. When it is once introduced and universally employed, washing wool will no longer be the difficult and expensive process it is in the present day.

UNDERGROUND LIFE.

BY L. SIMONIN.

A visit to a coal mine is always extremely interesting, and even exciting, to a novice. The underground workings are reached by the shaft; in a bucket suspended from a rope in some collieries, but on a well-arranged platform with a cage and shield overhead, the whole traveling in guides, in others. An unpleasant feeling is experienced at starting, in the sensation of vacancy which the going down a shaft always produces. The bucket rubs against the walls; the space is narrow, and appears still more so than it really is, on account of the darkness. It is but dimly lighted by the lamps. Water filters through the rock drop by drop, in a fine rain, and now and then the thought occurs that a stone might fall from the wall and smash your head; that the rope, stretched by the weight it supports, and whose oscillations are perceptible, may also break, or the bottom of the bucket come out. In the middle of the shaft the thought occurs of a collision, or of a possible entanglement; but when the obstacle is escaped you breathe more freely, and soon reach your journey's end, happy to have escaped with so little trouble. Visitors sometimes decline to go down the mine in this way, while others cower down at the bottom of the bucket, where they remain motionless through fear, and on reaching the bottom it is actually necessary to turn the bucket over to get them out, and they only recover their senses with difficulty. The miners, on the contrary, make this journey twice every day without a thought of danger; and they laugh and talk in going down, just as an old soldier goes under fire without shrinking, and gaily faces the shower of grape-shot.

Two or three times every four-and-twenty hours, but usually twice, morning and evening, the fresh turn of hands enters the mine. The sight is a curious one; the men press forward in a body; then, at the sound of the bell, they disappear in crowded groups in the tubs and cages, or down the ladders. They are heard talking on first leaving; but the sound of their voices is soon lost in the shafts, until it becomes merely a hoarse murmur, and only the pale glimmer of their lights is distinguishable.

Prayers are offered up in some Continental mines by the miners before going down; in most mines, however, this is neglected. When they arrive at the bottom of the shaft they separate, and every one goes to his place of work.

In the stalls and working-places where the noise is heard, and where the smell of gunpowder is perceptible, the miners are getting the coal; in the levels the rolley-boys and horses are crowded together, and trains go and come; at the bottom of the shaft it is the noise made in hooking on or unhooking tubs which is heard, and the shouts of the hookers-on to the landers at the pit-mouth. The lamps only shine at certain points, lighting up the faces of the men, the shape of the wagons, and the coal which glistens here and there; the rest is cast in shadow, and yet the whole effect is animated and startling.

The galleries cross each other in all directions, like the streets of a town with many turnings. There are cross-roads and squares; each road has its name and destination, but as there are no sign-posts, a stranger loses his way at first, soon finding it, however, by practice. Some of the galleries, which are long, wide, and well ventilated, form the principal thoroughfares and great streets, constituting the fine quarter of the mine. The others, which are sometimes low, narrow, tortuous, ill supplied with air, kept in bad repair, and liable beside to be only in temporary use, are like the old quarters, which will soon have to disappear. This underground town is inhabited night and day; it is lighted, but with lamps. It has railways, traversed by horses and locomotives. It has streams, canals, and fountains—strong springs of water which, in truth, could be very well dispensed with. There are even certain plants and living creatures which are peculiar to it; and life, as has been said, seems to assume special forms in it. It is the black and deep city, the city of coal, and the lively center of labor. The inhabitants only live in it part of the day or night to do their work; and the crews or shifts relieve each other two or three times in the course of the four-and-twenty hours. There are not, as might be supposed, either promenades, shops, or houses, and still less resident miners who never see daylight again when they have once entered the works. The horses only, in some districts, never leave the mine.

Some authors have spoken of men who spend all their lives underground, who are born and die there, painfully subjected to the labors of the Troglodytes. There are two mines in particular on which the imagination delights to brood—those of Wielliczka and Bochnia, in Austrian Gallicia, where they do not work coal, but a rich mass of rock-salt. At the intersection of the galleries the miners have carved out of the solid rock obelisks, columns, statues, and even a chapel. There was no need to pretend that there were in these salt mines houses several stories high, bazars, theaters, coffee-houses-hotels, springs and streams of fresh water, and even a windmill! It has been stated that the miners never left these dismal abodes, that they were born and died there. All that is pure fiction. It is not the less true that a large mine in active work resembles in some respects in appearance, and by the animation which prevails in the working-places and the levels, an actual town.

The dangers to life in coal mines are varied and numerous, as every Briton well knows. One of the most fatal is fire-damp; but on this we need not here enlarge. In some collieries it used to be the custom, before the safety-lamp was invented, to light the fire-damp every night. The time is still remembered at Rive-de-Gier, in France, when a man came every evening to set fire to the gas in the mine—to provoke the explosion, in order that the working stalls should be accessible again the next day. Wrapped in a covering of wool or leather, the face protected by a mask, and the head enveloped in a hood like a monk's cowl, he crawled on the ground before firing the explosive mixture, to keep himself as much as possible in the layer of respirable air; for the fire-damp, being lighter than the atmosphere, always ascends to the upper parts of the levels. In one hand he held a long stick, with a lighted candle fixed at the end of it, and he went alone, lost in this poisoned maze, causing explosions by advancing his lamp, and thus decomposing the noxious gas. Having fired any mixture of fire-damp, he naturally changed his position and walked upright, since the carbonic acid produced by the explosion rapidly formed the lowest layer of air. He was called the *penitent*, on account of the resemblance of his dress to that of certain religious orders in the Roman Catholic Church. In other mines this brave collier was called the *cannonier*. When the fire-damp killed him on the spot, it was said that the cannonier died at his post on the field of honor, and that was all his funeral oration. The same person in English mines bore the expressive name of *fireman*.

Coal mines are liable to take fire and burn even for years. The ignition of the coal, especially in Staffordshire, England, where, from the peculiar nature of the coal combustion, is not uncommon, has produced surprising effects of alteration in the measures containing the coal. The sandstones have become vitrefied, baked, and dilated by the fire, the banks of plastic clay hardened and changed nearly into porcelain.

In the environs of Dudley there was formerly a coal mine on fire. The snow melted in the gardens as soon as it touched the ground. They gathered three crops in a year, even tropical plants were cultivated, and, as in the Isle of Calypso, an eternal spring prevailed. It is by somewhat similar means that early fruit and vegetables are grown in the depth of winter in some of the gardens round Paris, where the temperature of the soil and the surrounding air is artificially raised by means of currents of hot water made to circulate in pipes underground.

In another Staffordshire colliery, the firing of which dates many years back, and which is called by the inhabitants *Burning Hill*, it was noticed, as at Dudley, that the snow melted on reaching the ground, and that the grass in the meadows was always green. The people of the country conceived the idea of establishing a school of horticulture on the spot. They imported colonial plants at a heavy expense, and cultivated them in this kind of open air conservatory. One fine day the fire went out, the soil gradually resumed its usual temperature, the tropical plants died, and the school of horticulture was under the necessity of transferring their gardens elsewhere.

Subterranean ignitions generally only trouble the miner by the mephitic vapors which they give out, and the high temperature which they cause in the stalls.

Falls of ground may be ranked among the greatest perils which the miner has to guard against. If the shock be direct, the man is crushed on the spot, or if he escape, it is at the cost of a limb. Masses of rock from the roof, bell molds, as lumps of ironstone are called in the figurative language of the colliers, sometimes become suddenly detached without the least warning, from the shales or friable coal forming the roof. These lumps, frequently of great size, falling on the head of the miner, often kills him outright.

In other cases, the wallings and timberings give way under the enormous pressure of the ground.

The danger of underground inundations is as formidable as that of falls of ground. The water accumulates in the mine, in a body, in basins, in actual lakes. The miner keeps it there by dams made of cement or clay—by wooden framework, the different pieces of which are geometrically put together like the stones of a wall or a vault. Equally cleverly devised masonry has been built up in the shafts; and yet the pressure of the water is sometimes so great as to overcome all these obstacles. An old English collier, who believed the earth was alive, compared the veins met with in mines to the veins and arteries of the human body.

It is remarkable that in the confined and sunless atmosphere in which the coal miner lives half his time, he contracts few special maladies; nevertheless, in the course of time the bad air impoverishes his blood and causes anemia, while the dust arising from the coal produces dangerous affections of the chest and lungs. On the other hand, the miner is sheltered from the inclemency of the weather, from cold, wind, and rain, and is more favored in this respect than the out-door laborer. He has, nevertheless, to be careful not to take cold on leaving the mine, and to observe certain precautions when he has to work in water.—*The London Builder.*

Pocket Paper.

The Japanese dignitaries, says the Boston *Journal of Chemistry*, who recently visited this country under the direction of Mr. Burlingame, were observed to use pocket paper instead of pocket handkerchiefs, whenever they had occasion to remove perspiration from the forehead, or "blow the nose." The same piece is never used twice, but is thrown away after it is first taken in hand. We should suppose in time of general catarrh, the whole empire of Japan would be covered with bits of paper blowing about. The paper is quite peculiar, being soft, thin, and very tough. The Japanese use paper for a great variety of purposes. A recent traveler states that he saw it made into materials so closely resembling Russian and Morocco leather and pig-skin, that it was very difficult to detect the difference. With the aid of peculiar varnish and skillful painting, paper made excellent trunks, tobacco-bags, cigar-cases, saddles, telescope-cases, the frames of microscopes; and he even saw and used excellent water-proof coats, made of simple paper, which did keep out the rain, and were as supple as the best india-rubber. The Japanese use neither silk nor cotton handkerchiefs, towels, nor dusters; paper, in their hands, serves as an excellent substitute. It is soft, thin, tough, of a pale-yellowish color, very plentiful, and very cheap. The inner walls of many a Japanese apartment are formed of paper, being nothing more than painted screens; their windows are covered with a fine, translucent description of the same material. It enters largely into the manufacture of nearly everything in a Japanese household; and he saw what seemed to be balls of twine, but which were nothing but long shreds of tough paper rolled up. If a shopkeeper had a parcel to tie up, he would take a strip of paper, roll it quickly between his hands, and use it for the purpose; and it was quite as strong as the ordinary string used at home. In short, without paper, all Japan would come to a dead lock; and, indeed, lest by the arbitrary exercise of his authority, a tyrannical husband should stop his wife's paper, the sage Japanese mothers-in-law invariably stipulate in the marriage settlement, that the bride is to have allowed to her a certain quantity of paper.

National Exhibition of the American Institute.

The American Institute will hold its thirty-eighth Exhibition in the new building, corner of Third Avenue and Sixty-third street, opening for the reception of goods, September 1, 1869, and closing the 30th of October.

The wool industry is to be made a prominent feature of this exhibition.

It would be entirely superfluous on our part to say anything in favor of these exhibitions. Their reputation is world-wide. No better representation of the progress of the country in arts and manufactures can be given than they always afford, and each successive exhibition increases the number of contributors and the interest of the exhibition.

Letters relating to the exhibition should be addressed to "Prof. S. D. Tillman, Corresponding Secretary, American Institute, New York," who will send blanks and give any desired information to parties intending to become exhibitors; he will receive and file all applications for space.

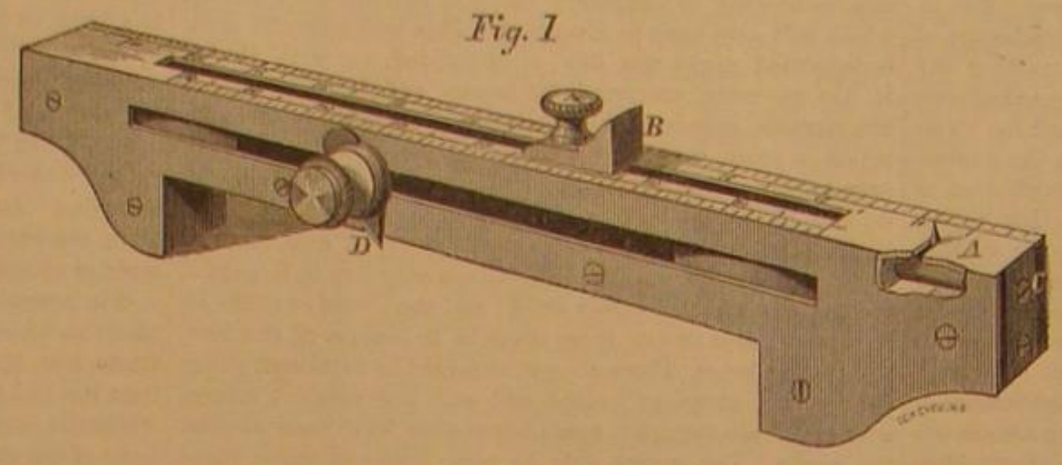
THE Suez Canal appears likely to produce a radical change in the climate of the surrounding country. From a series of meteorolgical observations made during two years at three stations on the Isthmus, we are led to infer the interesting fact that introduction of the waters of the Mediterranean into the lakes has caused an atmospheric moisture in places heretofore noted for their dryness, to such an extent that fogs, equal in intensity to those of some European cities, now occur. This appears to support an important conclusion of Colonel Foster, in his recently published work, with regard to the effect that irrigation would have on our Western deserts.

Improved Weather-Board Hook.

Our engravings exhibit the form and details of Nester's combined carpenters tool for weather-boarding. The form of the hook is well shown in both Figs. 1 and 2. This tool is made of mahogany or rosewood, covered on three sides with smooth brass plates. It is twelve inches long by one inch in thickness.

The plate on the side opposite the shoulders of the hook has two scales, as shown in Fig. 1, one extending from end to end of the tool and constituting a common foot rule. The other extends from the spur, A, to a distance of nine inches on that part of the plate separated from the foot scale, by the longitudinal slot in which plays the slide, B. The slide, B, is held to its place by a milled set screw when adjusted as desired. The spur, A, is attached to a pivot shown in Fig. 1 where a portion of the plate is broken away. A groove is cut in the end of the pivot at C, to admit the point of a screw driver, by means of which the pivot may be made to make a quarter revolution, thus throwing the point of the spur below the plate. The slide, B, is easily removed so that when the spur is turned out of the way the instrument may be used as an ordinary level. When employed for weather-boarding the slide, B, is used in connection with the spur, A, to indicate distance between the several boards, and forms a very neat and perfect working gage, capable of being set to distances between one inch and nine inches including fractions of an inch. The convenience of this feature will be apparent to every practical carpenter.

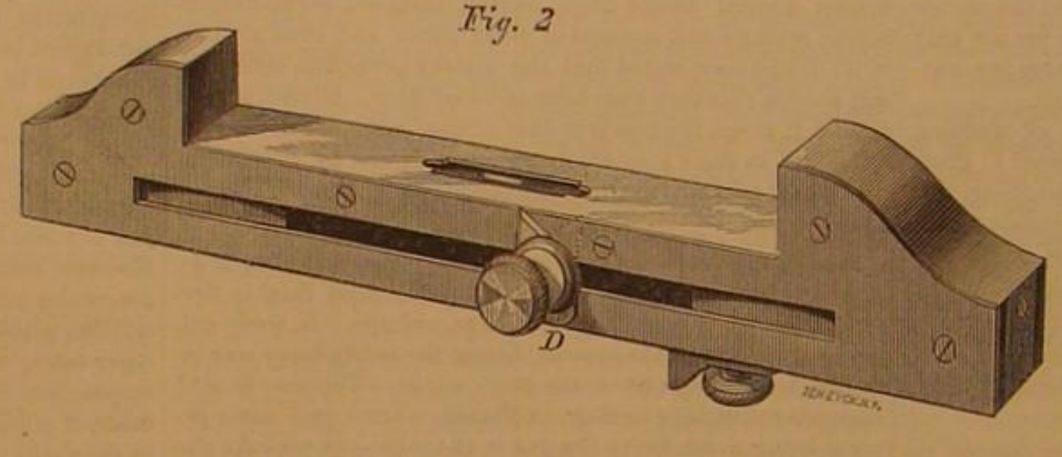
Fig. 1



NESTER'S WEATHER-BOARD HOOK.

In the side plate of the tool is cut a second longitudinal slot of the same length as the one described above, in which plays a second slide, D, Figs. 1 and 2, which carries a blade having a V-shaped point, held to its place by a milled thumb-nut, and used to mark across the board when the instrument is employed in weather-boarding. When the blade is not in use its point may be turned so as not to project beyond the edge of the plate and slid to either end of the slot, where it is held by a spring until it is needed. The edges of the blade being ground beveling on the outside and flat on the side next the plate, are thus shielded from receiving damage. The point of the V-shaped knife when in use, passes by the center of the pivot when slid in either direction, thus giving a smooth cutting stroke instead of a scratch, as would be the case if the point were drawn perpendicularly to the surface of the wood. The slot in which the slide, D, plays, is made wider than the pivot, so that the knife may readily reach the bottom of any depression in the weather-board caused by warping or winding of the boards. The slide, D, also plays so easily in the slot that it readily drops to either end, when the instrument is held vertically, and is held there by one or the other of the springs above described. In use it is always left at the end of the slot when after marking a board the hand leaves the thumb-nut. The method of grinding the blade insures accuracy in the line, as the cutting edge is thus brought into intimate contact with the straight edge of the plate.

Fig. 2



Midway between the shoulders of the hook is placed a spirit level, which adds to the availability of the tool. A straight line joining the outside angles of the shoulders lies exactly parallel to the plane of the back of the instrument. By applying these angles to the lower edge of a weather-board the workman ascertains by a single glance at the bubble whether the board is horizontal or not, employing less than one tenth the time occupied in making the same test by a square and plumb-line.

Placing this tool in his belt or apron, the workman can step upon the staging with no other implements except a saw and a hammer, and proceed rapidly with his work unencumbered by the usual kit of implements. The inventor claims that this implement will pay for itself in one week by the saving of time effected in its use; and is confident that any carpenter using the tool for that time would never thereafter be content to use the old style of hook. As an evidence of the favor it is meeting with, we are informed that the company engaged in its manufacture have recently received a single order for these improved hooks, amounting to fifty thousand dollars.

This tool was patented by John Nester, of this city, December 31, 1867, and additional improvements have been made for which a patent is now pending. Orders addressed to the Patent Weather-board Hook Company, 27 Park Row, New York, will receive prompt attention.

Paddle vs. Screw.

A striking instance of the proper distribution of steam power has been exemplified in a steamer recently altered at the port of Greenock. The vessel in question was a paddle steamer of 350 horse power, with cargo space for 400 tuns of goods. Her consumption of fuel was 24 tuns a day and her speed 7½ knots. She was converted into a screw steamer, and fitted with a twin propeller, and the consequence has been that with engines of 75 horse power she steams at the rate of 10½ knots, and carries 800 tuns of cargo, with a daily consumption of about 8 tuns of coal only.—*The London Artizan.*

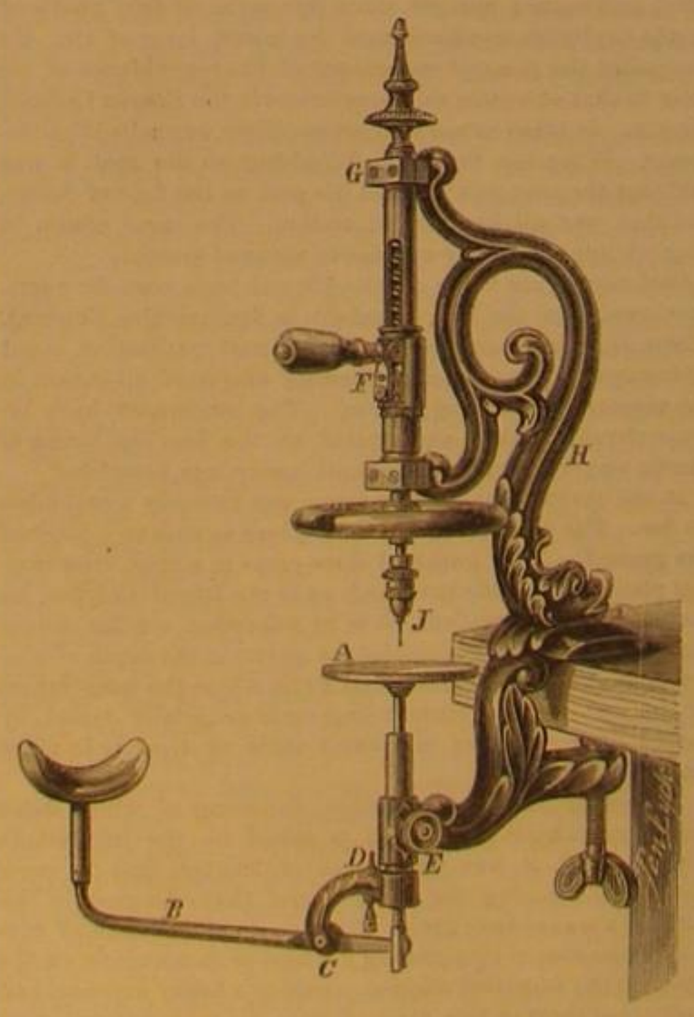
Economy Wanted in Smelting Iron.

At a recent meeting of the Chemical Society, of London, Mr. Bell, an iron master, directed attention to economy of fuel in smelting iron. When it is considered that something like 2½ tuns of coal are consumed in producing 1 tun of pig iron, even when hot blast is used, and that to effect the chemical change of smelting, only 8 cwts. of coal are needed, still leaving one half of the heating power of that coal unapplied, and available for further use, the great importance of devising means of economising fuel in this operation will be obvious. More than four fifths of the coal consumed in producing pig iron is consumed in raising the temperature of the charge to effect fusion, and that is done under the most disadvantageous circumstances as regards production of heat.

The gases escaping from the throat of a blast furnace have not only a large amount of unused heat-generating power, but they have also a temperature and reducing power capable of preparing ore for the subsequent processes of the blast furnace. In the Cleveland district economy in this direction has been carried to a considerable extent by increasing the hight of the furnace, and thus taking off the gas at a lower temperature than is sometimes the case elsewhere. But it is from the higher heating of the blast that greater economy is now to be looked for. The idea that hot blast deteriorates the quality of iron is now pretty well exploded, and there is no reason that some advance should not be made in effecting economy of fuel by this means. Dr. Paul has shown the great influence of hot-blast in reducing the consumption of fuel per tun of iron made; and the subject is one well worth the consideration of ironmasters, especially at the present time, when we are so hardly pressed by foreign competition in the production of cheap iron.

MILLER'S PATENT DRILL.

A want has long been felt for a small portable drilling machine, that could be attached readily and securely to a bench or laboratory table, for jeweler's use, and for any other purpose where a small hand drill is desirable. The tool, which is herewith illustrated, seems every way adapted to supply this want, and is as elegant in design as efficient in use. It is shown in the engraving as attached to a bench by means of a hand screw, after the old method of affixing small vises, etc.



The letter A, in the illustration, represents a circular table, upon which the object to be drilled is placed and held by the fingers or pliers. The left fore arm rests upon the crutch at the top of a bent lever, B, pivoted at C, to a curved support, D. This supporting arm, which forms a fulcrum for B is attached to a vertical sleeve which passes through a collar at E, and is held to its place by a set screw. This arrangement admits of raising or lowering the sleeve and its attachments or changing its position laterally, as occasion may require. Through this sleeve a sliding rod plays, to the top of which the table A is attached, the lever, B, working in the slot at the bottom. The crutch, K, has a horizontal rotation on its bearing. This arrangement of parts permits of adjustment of the table to any required hight by the left arm, while the piece to be drilled is held by the left hand, leaving the right hand free to revolve the drill.

The revolution of the drill is accomplished by means of a screw thread on the arbor, which revolves inside a fixed vertical sleeve extending from G to L. On this sleeve, another sleeve, F, slides up and down, having a handle pivoted to it. From the lower side of this handle, close to the sliding sleeve, a short stud projects. In the lower end of this stud is a small slot, through which a pin passes, the pin also passing through a hole in the sliding sleeve, and also through a longitudinal slot in the inner sleeve. The elevation or depression of the handle causes this pin to be partially drawn out or thrust into the interior of the inner sleeve. This motion is limited by a small adjustable screw passing through a smooth hole in the stud just above the pin. The pin is filed flat at its inner extremity. This end engages, when the drill is in action, with a four-threaded screw on the live arbor of the drill. The screw thread has an abrupt pitch, sufficient to give considerable power to the drill. The drill arbor turns on a pointed bearing at G, and is supported by a collar at L. Below the latter bearing, a fly wheel is attached to the drill arbor, and directly below the fly wheel is shown the chuck, J, which may be of any convenient form, and is screwed to the arbor in the usual way.

The operation of this drill is as follows: The drill having been adjusted, and the piece to be drilled being held by the left hand, and brought up to the point of the drill by bearing with the left arm on the crutch, K, the operator grasps the handle at F with the right hand and raises it. This disengages the inner end of the pin —above described as being attached to the stud projecting from the lower part of the handle at F—from the screw thread. As soon as this is done, the set screw, which limits this movement and which fits into the sliding sleeve to which the handle is pivoted, transmits the motion of the hand to the sliding sleeve and raises it to the top of the slot in the inner sleeve. The depression of the handle now thrusts the pin into the interior of the inner sleeve, where it immediately engages with one of the four threads of the screw, which, retreating from the pressure on its upper surface, gives a rapid and smooth rotation to the drill arbor, which rotation is maintained during the next elevation of the handle, by the fly wheel. The under sides of the screw threads are beveled off, while the upper surfaces are square with the vertical axis of the arbor. The pin in raising the handle is entirely disengaged from the screw threads, so that there is no rattling. The stillness of the machine in working is one of its most attractive features. Rubber washers are placed so as to receive the force of the outside sleeve at the ends of the stroke, and the arrangement of the parts is such as to reduce friction to a minimum quantity.

The whole forms one of the neatest and most convenient table tools we have seen. It is obvious that the method of obtaining rotation is equally applicable to bit stocks and other similar tools. A patent for this improvement was granted through the Scientific American Patent Agency, to Charles Miller, May 26, 1868, and by him assigned to Messrs. S. M. Spencer & Co., Brattleboro, Vt., to whom all letters should be addressed.

Safety Nitro-Glycerin.

We learn from the *London Mining Journal* that a series of interesting experiments for protecting nitro-glycerin were recently made at the Manorfield House. A small quantity of the material was put into a basin, and hot water was poured upon it, the result being that in two minutes the original oil sunk to the bottom, and (the surplus water being poured off) was run into a small phial ready for use. Into this the fuse (pointed with a percussion cap) was inserted, and fired, and the loud explosion testified to the unimpaired force of the nitro-glycerin thus recovered. It is obvious that by this invention, this highly dangerous but very useful compound can be conveyed by rail or ship, and be stored with perfect safety, and that it may be "recovered" in small quantities on the very spot where it is required for use, so as to avoid, in a great measure, the peril to miners or others who have to handle it in their operations.

A BRITISH parliamentary paper has been published, which shows the number of cotton, woolen, shoddy, worsted, flax-hemp, and other factories subject to the Factories Act in each county of the United Kingdom, and giving many other minutiæ respecting factories. In the whole kingdom there are 6,403 factories, in which 854,243 persons are employed.

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VOL. XX., No. 25...[NEW SERIES.]....*Twenty-fourth Year.*

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Contents:

(Illustrated articles are marked with an asterisk.)

WASTE.

The great struggle which now engages the attention of the entire civilized world is economy in production. How to make the same number of acres support an accumulated population; how to make vegetable productions, hitherto regarded as useless, add to the stock of food or clothing; how to make fewer bushels of coal perform the world's work—are some of the most important questions now under consideration by the scientific world. To these may be added the constant endeavor to utilize fragmentary materials, to gather up pieces and remnants, new and old, and make them continue to do duty in the service of mankind.

But while the world, as a whole, is devoted to the study of economy, personal waste and extravagance seem daily increasing, so that it is questionable whether the majority of mankind have fewer necessities now than when the arts were imperfectly developed and science had not begun to exist.

Many things are now necessities that formerly were not even desired. We have forgotten who it was that used to remark to his family when a new article of diet appeared on the table, "Now we are about to create a want." But the remark embodies a sound principle of social philosophy. Most of our wants are artificial creations, but modern society is artificial also, and we may as well doubt the advantages of civilization, as compared with barbarism, as to assert that the accessories of civilization are not necessities of the age.

Now what we wish to show, clearly, is that the cheapening of products by economical methods of manufacture, the increased production of food by the superior methods of modern agriculture and the utilization of waste products, are the very means by which the general diffusion of the luxuries of modern civilization is made possible. The entire inventive genius of this and European nations is concentrated upon the economical appropriation of time for traveling, sending of messages and processes in the arts, and the increase of machinery which shall not only save time and labor, but also material. In other words, the aim is to shorten as much as possible all those transactions which are simply utilitarian, or intermediate between the rough crude materials of nature and the enjoyments afforded by them in their modified and improved forms.

As a nation we have not excelled in the fine arts; we are not yet old enough for that. Our efforts have perforce been directed to subduing the vast wilderness which a century since covered nearly the entire continent. We have had to develop our mineral products and to accumulate wealth, to settle momentous political issues, and to establish a permanent commonwealth.

In the struggle for material supremacy we have been very successful, but there yet remains much to be done, enough to occupy the attention of inventors, engineers, and scientific men for a century to come. Meanwhile we are constantly "creating wants" at a rate that bids fair to outstrip the supply. Liberality and even profuseness in personal expenditure, are on the increase. We want rich and higher-priced clothing and furniture, luxurious diet, more splendid habitations, and increase of all the accessories of refined life. In the increase of personal expenditures we see signs of future trouble for this country. If the production of all the things we use, or a large proportion of them, was domestic, there would at present be no cause for apprehension, but we are sending away our gold and our surplus food, as fast almost as they can be got out of the earth, to foreign countries, for which we obtain a large proportion of the tinsel and gewgaws, which have become—though in their nature essentially luxuries—necessities to us. Could we be at once and wholly debarred from the use of such things we should soon learn to do without them, and they would cease to seem desirable to us; but we do not quarrel with the taste that demands them, it is the natural outgrowth of increasing civilization.

What we object to is the purchase of such things from abroad. If it be an admitted fact that they must be had from some source, we ought to make them for ourselves. There is now room for the introduction into this country of many of the lighter branches of industry, profitably carried on in other lands, and the products of which constitute the largest proportion of the exports of France, toward which nation a constant stream of gold flows from this continent.

The main difficulty is that in products of this kind, where material counts small and labor foots up large, the cheap labor of Europe gives great advantage to foreign producers. We believe the remedy for this is in the hands of our Government, and is that "protection" against which such an outcry is just now being made. But we have already expressed our views fully on that subject.

It would seem, then, that the tendency of modern civilization is to economy in cultivation of the soil, in means of transit, in time and labor applied to industrial pursuits, in the motive forces upon which man depends for the performance of work, and in processes which transform crude materials into useful products. While personal requirements increase, and when a product is cheapened by an improvement, there are more who want it, and more labor is demanded in its production. And it is further evident that while more labor is demanded to supply the wants of the world at large, each individual of the mass has greater scope for the enjoyment of the products of that labor. It is hard to predict where this will end; that its present tendency is to elevate labor no one can doubt.

THE DARWINIAN THEORY.

This celebrated theory is making proselytes rapidly. In fact, it may be said that its advocates no longer admit that it is simply a theory, but hold it to be demonstrated by the scientific researches it has called forth.

The theory has secured a most powerful ally in Dr. Fritz Müller, who as physiologist, anatomist, and shrewd observer of natural phenomena scarcely ranks as an inferior to Darwin himself. That our readers may understand the additional strength the Darwinian system has received by the adhesion of Dr. Müller, we will briefly rehearse the prominent features of the theory as maintained by its numerous disciples.

This theory maintains that the origin of species is attributable to the transmutation of a certain original type or types of living beings, by descent with gradual modifications, attributable to the natural selection of progenitors having certain peculiarities, which give them the power of impressing upon offspring the same peculiarities that the parents possess but in a greater degree; and that these peculiarities finally reach such a point that the individuals possessing them form a distinct species from their first progenitors.

The method adopted by Darwin to demonstrate the truth of this theory, was as simple as it has proved incontrovertible. He undertook to produce species by a process of artificial selection of individuals of kinds of animals which reproduce very rapidly, such as rabbits, pigeons, etc., and found that, by pairing such as exhibited slight variations of form, and selecting from their offspring such as exhibited in the most marked manner the same peculiarities, after a time he obtained so wide variations from the original type that the animals thus obtained might be properly considered as belonging to a distinct species.

Among the most prominent scientific men who have fully embraced this theory is the veteran Sir Charles Lyell whose past record does not indicate a man likely to be led to hasty conclusions, or apt to adopt any theory unsupported by ample evidence of its truth. This celebrated scientist commenced his geological researches with no bias toward any theory and after impartial and candid investigation came out a Darwinian.

In like manner Dr. Müller, set himself to work to devise some test by which he might demonstrate the truth or falsity of the Darwinian system. Having decided that the Crustacea afforded a favorable field for observation, he proceeded to South America for the propose of gaining facilities for observation and study. We can not, of course follow Dr. Müller through all the laborious researches, which he has recorded in his "Facts and Arguments for Darwin," or give in detail the important facts and discoveries which have rewarded his investigations, but the conclusion he arrives at is, that the facts he has observed afford a most striking confirmation of Darwin's views.

Conceding the truth of Darwin's theory, an interesting question arises as to which of the known species is the least removed from the original type or types. Probably this question cannot at present be definitely answered, but Dr. Müller remarks that "the primitive history of a species will be preserved in its developmental history the more perfectly, the longer the series of young states through which it passes by uniform steps; and the more truly, the less the mode of life of the young departs from that of the adults, and the less the peculiarities of the individual young states can be conceived as transferred back from later ones in previous periods of life, or as independently acquired."

THE Royal Geographical Society, of England, has bestowed one of its highest honors upon Mrs. Somerville, whose work on physical geography is the best we have on the subject.

THE RELATION OF CHEMISTRY TO CONSTRUCTIVE SCIENCE.

The relation of chemistry to constructive science is not so generally well understood as it ought to be among inventors. It will be the purpose of this article to attempt an explanation, or rather to furnish some simple illustrations, which will render that relation more conspicuous to mechanics at large, than it seems to be at present.

In the first place it is to be premised that all useful mechanical work is directly performed by the motion of matter in masses. The knowledge of the laws which control these motions, or more philosophically speaking, the manner and order in which mass motion is increased or diminished, and manifests itself in work performed, constitutes the science of mechanics. Chemistry, on the other hand, comprises a knowledge of the laws by which the ultimate particles of matter—atoms, or molecules—move, and combine to form from the elements of compound substances, the substances themselves; and an investigation of the properties of both elementary and compound bodies, so far as these properties do not relate to the motions of bodies as masses.

Now, when it is remembered that molecular motion and mass motion are mutually convertible into each other, it must must be obvious that the boundary line between mechanical and chemical physics must be very dim and undefined, and we need not be surprised to find them, so to speak, overlapping. In fact, it is just about as difficult to say where one leaves off and the other begins as to draw a definite line between the animal and vegetable kingdoms.

As mechanical construction cannot be disconnected from a consideration of the nature of the materials employed, and as it is the chief province of chemistry to inquire into the nature of all the materials of the universe, it is obvious that a perfect mastery of constructive science involves a knowledge of the nature of materials and their chemical reactions when brought together. An extreme case might be supposed of a pump intended to raise dilute sulphuric acid, made of iron, zinc, or other metals upon which that substance acts with great violence. Or, as a further illustration, a dye vat, made of a metal which injures the color desired to be detained.

We could, however, readily give real illustrations culled from the large mass of correspondence which weekly passes through our hands, where want of sufficient chemical knowledge has led to grave error in invention, and subsequent loss in the attempt to put in practice what, so far as mechanical construction was concerned, were well conceived ideas.

These mistakes are more frequently committed in metallurgic inventions. For example, we not long since received a letter stating that the writer had invented an improved method of making steel, which would be an important thing when it made its advent; requesting us to give meanwhile information as to *what is the substance called carbon*. This is of course an extreme case, but attempts to improve processes for making iron and steel without a proper knowledge of the real nature of these metals are often made.

In metallurgy every furnace, squeezer, hammer, roller, or other implement employed, derives, or ought to derive, its form from the recognition of the chemical nature of the materials to be operated upon, as well as their mechanical properties. In the manufacture of textile fabrics and the construction of apparatus therefor, a knowledge of chemical principles is required, to ignore which is to surely work for failure instead of success.

The science of chemistry is so advanced that many processes, formerly accomplished mechanically, are now either in part or wholly performed by chemical action.

Thousands of wet gas meters were destroyed in this country a few years since by the use of crude glycerin as a substitute for water in them, through want of knowledge as to how that substance would act upon the drums, under the circumstances of the case. Now, glycerin being non-volatile, and remaining fluid at very low temperatures would seem to be the very thing needed for the purpose, and in a purer form it perhaps would be the thing needed, but owing to some cause which we have never seen explained, its use corroded the meters so badly that the result was as we have stated.

We will not carry these illustrations further We have said enough to attract the attention of inventors to the importance of chemical knowledge to the mechanical constructor; a knowledge easily obtained, and so interesting in the peculiar character of its phenomena that its fascinations are second to no other department of natural science.

THE PRESENT RAPID IMMIGRATION.

The rate at which immigration to the United States is now progressing is quite unprecedented. On the Atlantic side Europe is pouring in vast numbers of people, of all ages, who, fleeing from the pressure of want, anticipate a life of comparative ease and plenty in the less crowded industries of the American Continent. On the Pacific slope, the Asiatic races are getting to form a large element of the population, and a useful element, too, if report speaks truly.

Many European journals are looking upon this movement with an ill-concealed anxiety, while some more boldly discuss the subject in all its relations. Some are asking the question what America is going to do with this large accession of labor, and augur great depression in current rates of wages in the United States, as its obvious result. Some English journals are endeavoring to turn the current of immigration from this country to Canada, a task, probably, as hopeless as could well be undertaken.

There is a peculiar attraction which our institutions possess for the oppressed laboring class in Europe, and it is a fact beyond dispute that the condition of such of this class as

manage to break away and get over here is greatly improved.

We are of those that think this influx of population will eventually be a benefit to this country, after the proper process of assimilation has been effected; and provided, always, a proper policy on the part of the general Government provides a home market for the increased production, consequent upon the increased number of producers. If, however, these people are to be converted, by a free-trade policy, into consumers of foreign goods, foreign governments may lay aside all fear. The stream of migration will be effectually retarded. Wages will be reduced to the European standard, and the inducement which is now its chief stimulus will be, in a great measure, removed.

We do not share the fear entertained by some, that the mixed population we are acquiring will ultimately prove a disaster. That it may be, at a future time, the cause of dissentions and bickerings, perhaps of more serious troubles, is possible; but the forces are too nearly balanced to produce permanent disruption. There are few nationalities that retain their national peculiarities through more than one or two generations after their arrival in the United States; and the Germans, who, more than all others, do retain them, are a peaceable, order-loving people, governed by the dictates of reason rather than impulse. For the most part, they are educated, industrious, and thrifty citizens, and may well retain their harmless affection for the customs of the Father-Land. The Germans, also, bring with them great mechanical skill, which adds greatly to the resources of the country. Not a few of the most valuable inventions are made by Germans, and many kinds of industry draw largely upon this source for the skilled labor necessary to success.

Other elements of population, which are increasing by immigration, are well adapted to perform the ruder labor necessary to the construction of public works, and to supply the want of agricultural labor created by the recent war. If some of these are likely to prove hard to assimilate into an homogeneous whole, the result will be a quiet but sure extermination. They will share the fate of the native Indian, who, unwilling to accept civilization, has been gradually driven away by its advance.

The great rapidity with which immigrants are coming to this country is important in its bearings upon the great and ever-present labor question, and will render great caution necessary in the action of those who are endeavoring to advance wages and shorten hours of service.

SOMETHING ABOUT EYES.

The eyes have been called "the windows of the soul," an expression more poetical than scientific, unless we accept the belief that all living things, including corporations, have souls, which we are far from doing. We are even inclined to doubt that certain individuals of the *genus homo*—animals, supposed by many to have the exclusive monopoly of souls—really possess any, though they have sharp eyes to the "main chance." But whether a soul looks out of an eye or not, it is physiologically and scientifically an intensely interesting object. Dr. Dick has most justly remarked that "the eye is one of the nicest pieces of mechanism which the human understanding can contemplate."

The ball of the eye consists of three coats, the outer one of which is called the sclerotic coat. This coat is white and opaque, and constitutes what in ordinary parlance is called "the white" of the eye. In front this coat has a circular opening, very much like that in the case of an old-fashioned bull's-eye watch. In this coat is set the cornea, and is continuous with the sclerotic coat, being attached to it at the edge of the circular opening above described. The cornea is as transparent as any substance known to mankind. Inside the cornea is the choroid coat, which immediately surrounds the fluid called the vitreous humor, also a perfectly transparent substance. The choroid coat has a circular opening in front, to which is attached an annular curtain, which has the power of contraction or dilatation to adapt itself to varying intensities of light. This curtain is always colored, and it gives rise to the popular classification of eyes with reference to color, by which they are said to be black, blue, gray, etc. This curtain is opaque, and its contractile power depends upon a set of annular muscular fibers, arranged concentrically around a circular aperture in the middle of the curtain, which aperture is what is called the pupil of the eye. Another set of muscular fibers, arranged transversely to the circular set, pulling in all directions from the center of the pupil enables the latter to become larger when more light is needed for distinct vision. The cornea projects somewhat through the above described opening in the sclerotic coat, making the ball of the eye more convex at that point. Directly underneath it at this point, lies a fluid called the aqueous humor, which is so inclosed by the surrounding tissues that it forms a concavo-convex lens of the form called in optical works a *meniscus*. Directly behind this lens there is another body—the crystalline lens—which is also inclosed in the tissues so as to form a double convex lens, the front surface being less convex than the hindermost one. The mass of the eye ball is filled with the vitreous humor. The optic nerve penetrates the eye-ball on the back side below a point opposite the pupil, and passes obliquely upward, spreading out upon the posterior internal surface of the choroid coat, and forming what is called the retina. The office of the lenses above described is to concentrate the light in a proper manner upon the sensitive retina, from which the impression is transmitted to the brain by means of the optic nerve.

The eye is moved in all directions by means of beautiful muscles attached to the outside of the ball, one of which is an exact counter type of the mechanical element—the rope and pulley. This is the muscle which turns the eye obliquely toward the opposite shoulder, and is always used when we look at an object so placed. It passes through a loop at the top of the socket, and is then attached to the eye ball, when this muscle contracts, the eyeball is rolled inward and forward. This muscle has been considered as one of the most striking evidences of design in creation to be met with in the entire range of natural objects.

Volumes might be written upon the eye and the phenomena of vision, but what we have said will serve as a prelude to some curious facts in regard to eyes of inferior animals as well as those of the human race.

Dr. H. Power, in a recent lecture before the Royal Institution in London, asserted that very few animals are destitute of eyes. The *protozoa* and simplest animal forms seem to have no eyes, and such is the case with the polypi, which throw out arms to catch their food. Animals of the tape-worm class also have no eyes, probably because they live in darkness, and find a plentiful supply of food in the bodies of their patrons. The *radiata*, or star fishes, have only very doubtful organs of vision. Most of the *mollusca* including the oyster and the scallop, have very good organs of vision, and nearly all animals of a higher order than this class are furnished with eyes.

Some sea animals have eyes in their forehead; others have them in the brain. Some have plenty of eyes all along their sides or under their bellies, while others have them on the tips of their tails. The common snail has very good eyes on the tops of its horns, and the dragon-fly has more than 28,000 eyes.

Baer, an eminent German physician and oculist, says that blue eyes are capable of sustaining a much longer and more violent tension than black ones, and that the strength and duration of the sight depend upon the color of the eyes. We do not see any grounds for this statement, and therefore do not give it credence. The same author also remarks that black eyes are more subject to cataracts, which is perhaps the case, although we do not deem it as fully established. According to this writer, not one in twenty possessing black eyes are satisfied with their color. This may be true in Germany but we hardly think it correct for the United States. Our readers will remember that the "Merican frau," who was so extremely fascinating at "Hans Breitmann's Barty" had eyes of "himmel plue," which corroborates the statement of the learned Dr. Baer as to the German preference for eyes of that color.

Lavater esteemed blue eyes as a token of weakness and effeminacy of character, which, considered with reference to Buffon's assertion, that blue and orange-colored eyes are the most predominant, indicates that mankind at large are not to be credited with great strength of character. Buffon also asserts that many eyes supposed to be black are not really so, but if examined with a proper disposition of light will be found to be yellow, deep orange, or brown, which being opposed to the clear whiteness of the sclerotica appears so dark as to be mistaken for black. He further asserts that shades of yellow, orange, blue, and gray are to be found in the same eye; but that where blue is found it is invariably the predominant color. The blue tint is distributed over the iris in radial lines; while the orange is distributed about the pupil in flakes. The blue, however, so far overpowers the orange that such eyes appear entirely blue to ordinary observation. There are some eyes which are almost green, while the eyes of Albinos are either quite red or a bright orange color.

Lavater thought strength and manliness most frequently connected with brown eyes; but when the eyes incline to green, ardor, spirit, and courage were supposed to be indicated. It has been thought by many that dark-colored eyes belong to those most subject to melancholy and choler. Be this as it may, there can be little doubt, that as an index to character the eyes are the most significant feature in the human countenance; but as their expression is liable to rapid and great change as the emotions change, a cursory examination will often mislead.

NEW USES OF ANILINE.

Coal, a substance which we take up with tongs in order not to soil our fingers, is not only concentrated heat and light, but is the producer of the most beautiful coloring substances with which we are acquainted.

It has long been known that the aniline colors extracted from coal are used by the dyer, but it is much less generally known that they are applicable to many other purposes.

Since the year 1862 large quantities of aniline colors have been employed by paper manufacturers for the coloring of their paper pulp, or for the azuring of the surface of the paper after its final manufacture.

Aniline has here replaced ultramarine, metallic oxides, and dye woods. It is introduced in aqueous solution into the pulp or at the period of sizing.

The various kinds of shades for windows, lamps, etc., made to imitate fine porcelain, are colored by aniline. A design is printed on paper by means of an aniline lake, dissolved in a solution of a salt of aniline. This is then laid on damp albuminous paper. The color is taken up and fixed by the albumen, and the whole design is reproduced on the paper in a beautiful manner.

Wafers, sand for drying ink, etc., are colored by means of aniline.

Red and violet writing inks are prepared with salts of rosaniline.

Typographical inks are made by dissolving the colors in alcohol holding a resinous substance in solution, and which are precipitated by the addition of water. The precipitate, when dry, is pulverized and mixed with varnish and with ground barytes, or white zinc. Instead of barytes or zinc, starch colored by aniline may be rubbed into the varnish.

The same aniline colors are utilized for the coloring of hanging papers, aquarelles, photographs, etc. Photographs obtained by this process are very remarkable for their transparency and delicacy of tint.

Refuse of wool, in the shape of dust, colored by aniline, is employed to manufacture the "velvet-coated" papers.

Lakes on wood, with splendid metallic luster, are obtained by steeping the wood in hot concentrated solutions of aniline colors, drying rapidly in a current of heated air, and coating with a transparent varnish of copal dissolved in ether. The same operation applies to the coloring of straw hats, and to the production of artificial leaves.

Beads and false enamels are colored with aniline.

The colored globes used for public illuminations are also stained in the same way. For this purpose they are steeped in a solution of albumen, dried, and thrown into the aniline solution. By this simple process globes are obtained more splendid even than by the use of the solution of gold or Cassius purple.

Artificial stones, mother-of-pearl, and ivory are treated in an identical manner.

Soap, cold cream, pomatum, cosmetic powders, candles, and lucifer matches are colored by aniline.

The aniline blues and violets are at present of great benefit to the micrographer and anatomist for the dyeing of tissues which they color diversely according to the nature of their parts. For this purpose they have advantageously replaced carmine and ammonia, which often corroded and destroyed delicate membranes.

The red, blue, and violet with collodion form the best kind of liquid for the anatomical injection of capillaries and other minute vessels. After being thus injected they may be indefinitely preserved in glycerin.

Aniline colors derived from coal were discovered in 1856, a date which must ever be memorable in the annals of technology.

Accident to Professor Bunsen.

Professor Bunsen, of Heidelberg, recently met with a serious accident. He had received a large quantity of the metals of the platinum group, and was engaged in the preparation of pure rhodium. He had precipitated a large quantity of the finely-divided metal, and had placed it in a water bath to dry. Some one carelessly turned off the water from under the bath, so that when Bunsen went alone into his laboratory at midnight, he found that the heat of the vessel had risen to three hundred degrees Fahrenheit, instead of two hundred and twelve degrees, as it would have stood if water remained in the bath. He approached the vessel, put down his light, and put one finger in, to mark the condition of things. Suddenly there was a fearful explosion; both his eyes were severely burned; both his hands were torn into a mass of open wounds; but he had presence of mind not to drop the platinum capsule containing the rhodium, but put it back upon the furnace before he called for help.

The explosion and the call for assistance were fortunately heard by the servants, and he was immediately carried to his dwelling, which is in the same building with the laboratory. As soon as he had recovered from the unconsciousness following the accident, his first words were: "Let some one scrape up the rhodium from the floor, and save it."

It is known that some years ago Bunsen lost the use of one eye by a similar explosion; it was now feared that the remaining eye had been destroyed, but upon closer examination the physician expressed the hope that the injury was not incurable. Upon hearing this, this hero of science exclaimed: "Thank God! I can now ascertain what was the condition of the metal when it blew up."

But the injury to the noble man is very serious, and it will be a long time before he will be able to resume his scientific labors.

At the same time that the above information reaches us, comes also the sad intelligence of the death of the wife of Professor Kirchoff, the colleague of Professor Bunsen, and his associate in the great discoveries of the spectroscope. Men who enrich our knowledge as much as these two have done, are sure of the sympathy of the whole world when sorrow overtakes them.—*Post.*

Steam Road Roller.

A trial of the new steam road roller, purchased by the Central Park Commissioners to be used on the roads under their charge was made June 4th at the corner of 115th street, and 6th Avenue in this city.

The machine was made by Averill and Porter, Rochester, England, and we are informed, weighs about fifteen tuns. It has four rollers, two front, and two back, so placed that the hinder ones cover the ground not rolled by the front ones.

Two of the rollers, perform the office of drivers; being turned by an endless chain and rag wheel; the others are made to turn like the forewheels of a waggon to guide the machine. The engine runs with a quick stroke and is speeded down so that great tractive power is obtained.

The ground on which the machine was exhibited, was of a very friable kind, being composed mostly of a coarse sand. We think its operation would have been still more satisfactory than it was, had the character of the ground been different. As it was, we believe all present were satisfied of the great efficiency of the machine, though we heard some improvements suggested. These were however made too hastily to be perhaps of much value.

We understand that this roller, has been used largely as a traction engine for moving heavy weights in the iron-works of London, and it seems admirably adapted to that purpose.

Snails as an Article of Food and Trade.

Land snails abound in Italy, Spain, France, and Belgium; they are also found in large quantities in Algeria, and most other points along the shores of the Mediterranean.

In Italy snails anciently were, and are still much used for the table. They are regularly sold in the markets of Switzerland, Spain, France, Belgium, and Algeria, and are exported alive, in barrels, to the French Antilles, and occasionally even to the United States, where they are relished only by the real "*connoisseur*."

In the vineyards of France, the peasants collect, feed, and fatten them, till winter, when the snails seal themselves up in their shells, where they remain torpid for several months. In this state they are purchased by the confectioners, who prepare them in the shell, with butter and herbs, and forward them to Paris. They are then ready for the table, after being heated in an oven for a few minutes.

In Belgium the snails are fed on lettuce, under inverted flower pots, for several months before being sent to market. Their price varies from fifty cents to one dollar a hundred.

In Translyvania, the large wood snail is a favorite dish. The animal is drawn out of the shell, well rubbed in a clean cloth, to take off the slime, cut small, mixed with savory stuffing, replaced in its shell, baked in the stove oven, and served up hot. In some parts of the country, instead of eggs and fowls, the peasants pay their tribute in snails and game. M. Page states one lady's ordinary winter supply as being upward of 5,000 snails.

We have occasionally seen imported snails served up in the shell, at restaurants in New York, and have watched foreign looking customers, who seemed to relish the meal. These snails are brought to this country by the steamers of the Havre line, during the winter months.—*Exchange.*

Editorial Summary.

THE Legislature of the State of New York, at its last session, authorized the construction of a railway station on the Fourth avenue, to be used jointly by all trains arriving in this city from the north. This station will extend from Forty-second to Forty-fifth street, closing Forty-third and Forty-fourth streets, and will occupy an area of about 800 feet in length by 300 feet in width, taking in for this purpose 150 feet on either side of the avenue. The Hudson River road is to be connected with the Harlem and New Haven track, and all the trains of these three roads are to be brought under one roof. The estimated cost of this improvement will amount to $1,000,000, and it is stated that the permanent way of these lines are to be so combined as to permit the freight carried over them to be all delivered at the large depot now occupying what used to be St. John's Park. The advantages, which these arrangements will afford to travelers and the commercial community, over the present disjointed state of city and country intercommunication, are apparent.

CAST-IRON STOVES.—At a recent meeting of the French Academy of Science, a report was presented from the committee appointed to inquire into the alleged insalubrity attending the use of cast-iron stoves. Extensive experiments had been made, and the results arrived at were, first, that all heating apparatus made of metal and all stoves made of cast iron give off, while in use, a large quanity of carbonic acid; second, that the quantity of that gas given off from stoves of plate iron was often insignificantly small; third, that the carbonic acid contained in the air was readily converted into carbonic oxide, by coming into contact with thoroughly red-hot stoves; and, fourth, that the oxide of carbon thus generated may, especially in confined localities, become very injurious to health. To obviate all bad effects, the committee recommend that cast-iron stoves be lined inside with fire-brick, and enveloped outside with a casing of sheet iron, so arranged as to leave space for free circulation of air in communication with a well-drawing chimney.

DIAMONDS were first discovered in Brazil, in 1729, by a Portuguese, Fonseca Lobo, who was not even aware of the importance of his discovery until certain Dutch traders, to whom he showed his pebbles, at once contracted with the Portuguese government for the monopoly of all the raw diamonds they might find in Brazil. From this contract they derived enormous profits. The territory in which this precious article is found is 44 miles in length by 22 in breadth; it is called Terro de Fio, and is surrounded by steep mountains which long concealed it from the Europeans. Since the mines have again become the property of the State of Brazil, the Dutch have not quite lost their monopoly; they being extremely skillful in the art of cutting diamonds, and being possessed of all the requisite machinery for the purpose. The operation causes the stone to lose half its weight, and is performed by means of wheels which make 2,500 revolutions per minute.

A CORRESPONDENT sends us for publication a somewhat lengthy article on "How to Make a Perpetual Motion," which consists of a combination of mechanical elements, so arranged that when a balance wheel is set in motion, and with the assistance of inert water and mercury, the machine will never stop. The whole thing is founded upon an absurdity, and we notice it simply to impress upon the inventor's mind that he had better turn his ingenuity into more promising channels. We repeat, for the hundredth time, that a perpetual motion *i.e.* a machine which, within itself, generates its own power to put and continue itself in motion, and without the application of some motive force, is an impossibility. Such a machine never has been constructed, and never will be.

A CLOCK has been completed for the cathedral of Beauvais, France, which far surpasses all the existing specimens of the clockmaker's art. It contains no less than 90,000 wheels, and indicates, among many other things too numerous to recite, the days of the week, the month, the year, the signs of the zodiac, the equation of time, the course of the planets, the phases of the moon, the time at every capital in the world, the movable feasts for a hundred years, the saints' days, etc. Perhaps the most curious part of the mechanism is that which gives the additional day in leap year, and which consequently is called into action only once in four years. The clock is wound up every eight days. The main dial is twelve feet in diameter, and the total cost exceeds $50,000.

A BUSINESS way of doing things is to let people know what you have to sell, and there is no plan so efficient as a judicious system of advertising in journals of large circulation. As an evidence of the truth of our assertion and of the value of the SCIENTIFIC AMERICAN as an advertising medium, we make the following extract from a letter recently received from J. E. Mitchell, of Philadelphia: "I have derived more benefit from my advertisement in the SCIENTIFIC AMERICAN than from any other paper I ever advertised in, and have daily several applications for my pamphlet noticed under 'Business and Personal.' Please retain the cut as I wish to insert another advertisement."

THE eight-hour question was taken up at the cabinet meeting on May 25, and after an extended discussion it was decided that President Grant should issue a proclamation, or an Executive order, declaratory of the effect of the law upon wages, which is simply that the Act of Congress declares that eight hours' labor for the United States shall be a day's work, instead of ten, *without affecting the rate of wages.* The position taken by the President, stripped of all legal technicalities, is no doubt a correct interpretation of the true intent of the eight-hour law.

OUR esteemed exchange The *English Mechanic and Mirror of Science* must have either lost its spectacles or is laboring under the false impression that we have mislaid ours. In a review of a book recently published in London, entitled "The Modern Velocipede," it credits the the author with a passage on the "Mechanics of Walking," which originally appeared as a leading editorial in No. 13 current volume of the SCIENTIFIC AMERICAN. The paragraph is so unskillfully paraphrased as to make the intentional nature of the fraud only too apparent.

As a rule, food which is best enjoyed is best digested. Just so exercise which is most agreeable is usually the most beneficial. In selecting methods of exercise, every individual should be guided by his own individual tastes. It is better to change frequently from one exercise to another. It is well even to consult our whims and our varying moods. Above all things, we should strive to prevent our exercise from becoming a dry, hard, mechanical routine. The heart should go with the muscles.

AN IMMENSE GASOMETER.—The Manhattan Gas Company are building, at the foot of Eleventh street, in this city, a new gasometer of unusually large dimensions. The basin is 225 feet in diameter and 38 feet deep. The circular wall is 7 feet thick, arranged upon which are sixteen elegant guiding columns, each 72 feet high, of wrought iron, united at the top by ornamental girders. This will be one of the largest gasometers in the country.

ANCIENT medals of great historical value have recently been discovered in excavations made in the vicinity of Tarsus in Asia Minor. These medals were struck about A. D. 230, in honor of Alexander the Great, by order of the Emperor Alexander Severus, and contain portraits and symbolic heads of the conqueror of the ancient world. The Emperor Napoleon has paid $10,000 for four of these medals, and presented them to the Imperial library of Paris.

TO CLEAR A ROOM OF MUSQUETOES.—A writer in a South Carolina paper says: "I have tried the following, and find it works like a charm. Take of gum camphor a piece about one third the size of an egg, and evaporate it by placing it in a tin vessel, and holding it over a lamp or candle, taking care that it does not ignite. The smoke will soon fill the room, and expel the musquetoes."

THE question of the abolition of the Patent Laws was recently discussed in the British Parliament, and the London *Times* supports the measure. That journal has heretofore expressed its opinion very decidedly against the policy of giving patents for new inventions, but we do not remember that the *Times* has ever opposed the policy of conferring an exclusive copyright upon an author for producing a book.

ZINC may receive a fine black color on being submitted to the following process: Clean first the surface with sand and sulphuric acid; immerse for a very short time in a mixture of four parts of ammonia-sulphate of copper in forty parts of water, acidulated with one part of sulphuric acid; and, lastly, wash and dry. When burnished, the black coating assumes a bronze color.

M. FREYCINET, who is preparing a work on the subject of interments in relation to public health, has calculated that the soil of the city of London contains nearly 500,000 tuns of human remains.

OF 13,496 prisoners in the penitentiaries of thirty States, in 1867, according to a report just issued, seventy-seven per cent, more than three quarters, had not learned a trade.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

It is stated in a commercial report from Epirus, that American petroleum is now taking its place among the regular imports of the country. It is taken from England by sailing vessels to Corfu in rectangular tin cases of five gallons each; from Corfu it is sent across in country boats, and it is fetched to Janina from the coast on horseback. The tin cases are packed by eights in wooden boxes, two of which make a horse load. The petroleum is sold at about a dollar a gallon. It is used exclusively for light, and special lamps for it of a cheap kind are imported from Germany. It is said to last half again as long as olive oil, which is a fraction dearer and gives moreover, a clearer and more steady light.

In 1857, forty German families bought twelve hundred acres of what considered the poorest land in Los Angeles county, California. They worked together, however, and by means of a water ditch and a good system of artificial irrigation, soon brought their land to a high state of cultivation. At the end of two years the forty families had accumulated property of the gold value of $56,000, beside very valuable improvements still held in common. This year five hundred thousand gallons of wine will be manufactured by this community.

The government of Austria, has, it is announced, taken a step toward facilitating commercial intercourse. It is contemplated to issue new gold coins, corresponding in value to the French Napoleons and half Napoleons, or twenty franc and ten franc pieces, in United States currency $3·84 and $1·92. The Austrian sovereign is worth $9·75, and the Union crown $9·64, so that the new coin will furnish an exact standard of exchange with France and Western Europe.

General Thorn, of the United States Engineers, has contracted with a New York firm for an excavation across the bar of Portland (Maine) harbor The work is to be completed this season. The contract provides for a channel beginning near Atlantic wharf, to deep water, opposite the breakwater light to be some three hundred feet in width and have at least twenty feet of water at mean low tide. This will give a depth of twenty-eight or twenty-nine feet at average high tide.

A grand union railroad station is proposed to be built at Portland, Maine, at the point where the Portland, Saco and Portsmouth, Portland and Ogdensburgh, and Portland and Kennebec roads must shortly center, if the first road makes the extensive improvements now contemplated, and the second enters the city at the point proposed.

A Missouri paper says that a locomotive engineer named Young has been awarded $9,000 by the United States Court of Kansas, for crushing his hand while coupling a train of cars, which made amputation necessary. The same court gave judgment against Platte county for $10,000 unpaid railroad bonds.

They have organized an Agricultural and Mechanical Institute in Kansas City. The general objects of the corporation, says the North Missouri *Courier*, are the encouragement and promotion of agriculture and the mechanic arts, and the improvement of farm stock and domestic animals by means of annual or more frequent fairs.

The *North American* says that this country has 7,104 square miles to each mile of rail and 87,615 inhabitants. Mexico brings 1,025·14 miles of area and 40,665 inhabitants to meet each of her 202 miles of road.

The movement at the port of Suez for 1868 is represented by the arrival of 435 vessels of 296,211 tuns and carrying 33,347 passengers. The difference over 1867 is 65 craft, of 77 281 tuns, and with 7,668 passengers. These figures show the value of the Suez Ship Canal.

Bills have been presented in the Massachusetts House of Representatives to loan the credit of the State to the Massachusetts Central Railroad Company, to the amount of $3,000,000 and to the Boston, Hartford, and Erie Company to the amount of $2,000,000.

The capital of the Paris, Lyons, and Mediterranean Railway Company now amounts to $475 000,000. It is expending $16,000,000 of this on two lines in Africa—one from Algiers to Oran, the other from Pellippeville to Constantine.

One steamer, the *Manhattan*, recently brought over to this country 1,400 passengers. Among these were 300 English and Welsh mechanics. The Welsh were, however, chiefly miners, and they went immediately to Pennsylvania.

Manufacturers of strawberry boxes have manifestly anticipated a considerable demand for their wares. Winchendon has turned out 3,000 gross and Hingham a large number. The supply, counting those left over from last season, will probably be about 570,000. These boxes sell at $6 a gross.

An engineer resigned his position on a Western railroad in disgust, because, as he said, it consisted of nothing but the right of way and two streaks of rust.

Work on the hotel and station of the Mount Washington Railway has commenced. Only 300 feet of the road remain to be built, and by July it is expected cars will run from the foot to the summit.

The new wrought iron bridge on the Boston, Hartford, and Erie Road, at Middletown, Conn., has been contracted for. It will be 1,200 feet span and will cost $176,000.

Of the 17,000 tuns of steel rails, which the Erie Railroad Company have laid, not one has been reported as broken.

The gas which leaks from London mains is said to be worth three-quarters of a million a year.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1·00 a line, under the head of "Business and Personal."

☞ All reference to back numbers should be by volume and page.

J. C. C., of Pa.—The term "chronometer balance," is not strictly correct. It should be "compensation balance," or "expansion balance." The former term came into use from the circumstance that compensation balances have always been applied to "chronometers What is popularly known as a "chronometer balance" is one which is composed of two metals of greatly different degree of expansiveness or dilatability, in such proportions as science and practice have shown will compensate for the effect produced by variations of temperature. It should be added that in the rim or circumference of the balance, screws of the two metals are always inserted. These have heavy heads and they are turned in or out, as the case may require, in adjusting the compensations of the balance.

R. B., of Pa.—We do not believe a positive rule can be given for the lead of a steam valve unless the weight and speed of the reciprocating parts and the steam pressure are taken into account. The object of lead being to take up the momentum of the moving parts by an elastic steam cushion, and as these parts would possess the same momentum on an engine running expansively or otherwise, with the same number of revolutions, the amount of lead ought to be the same in either case.

E. B. J., of Chicago.—The evil effects caused by the accumulation of oil and grease used in the lubrication of valves and piston, is one of the greatest drawbacks to the use of surface condensers. No adequate remedy for these evils has yet been discovered. We recommend you to get Appleton's Dictionary of Mechanics, and Miller's Chemistry.

E. S., of Iowa.—We estimate the horse power of your boiler to be 145. A twenty inch belt will not drive more than 80-horse power. It is impossible to say from the data you give what is the reason for the slipping of your belt, but the presumption is that it is too small for the work.

J. W., of Mich.—You can prevent the slipping of a rubber belt running on wood pulleys, to some extent, by chalking the pulleys. If however, slipping occurs, the presumption is that the belt is too narrow to do the work demanded of it or it is running too loosely.

M. S., of La.—You can undoubtedly raise water to the hight of 34 feet by the centrifugal pump you describe, the amount of horse power required depends upon the amount to be raised and the condition of your pump.

W. W. S., of Ind.—There is little doubt that general protection from lightning can be afforded to a town by a proper number of well constructed lightning rods properly put up. We do not, however, think your scheme practicable.

L. Y., of N. Y.—The undulating motion of vessels at sea has often been employed as a motive power for pumps, etc. We have doubts however of its practicability as a means of propulsion for the vessel itself.

H. S., of Ohio.—The ordinary solder, two parts tin to one of lead will flow smoothly on tin when dipped, by previously putting sal-ammoniac on the surface to be covered.

J. B., of Tenn.—A good cement for holding labels upon a metallic surface is a thickish varnish of gum shellac dissolved in alcohol.

W. F., of Mass.—Your proposition to make the exhaust steam, smoke, and ashes discharge into a receiver or tank placed in front of a locomotive is in our opinion impracticable.

A. C., of N. Y.—The sponge is generally recognized as belonging to the animal kingdom. You could have settled your bet by reference to Webster's dictionary.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

COTTON SEED PLANTER.—Nathan Breed, Jeffersonville, Ind.—This invention has for its object to furnish an improved cotton seed planter, which shall be simple in construction and effective in operation.

TUG BUCKLES.—D. S. Butler, Otterville, Mo.—This invention has for its object to furnish an improved tug buckle, strong, durable, simple in construction, reliable in use, and easily buckled and unbuckled, while at the same time holding the tug securely and receiving the draft strain squarely.

MEDICAL COMPOUND.—W. H. H. Peters, Tuskegee, Ala.—This invention provides an efficient remedy for treating rheumatism, neuralgia, gout, and diseases of nervous origin.

WELL PIPE DRIVER.—L. M. Rumsey and W. P. Smith, St. Louis, Mo.—This invention relates to important improvements in machines for driving pipe in the process of constructing "drive wells" for obtaining water, and for other purposes of a similar nature.

BUCKET.—James H. Tomlinson, Chicago, Ill.—This invention relates to a new and useful improvement in buckets and pails, and all bailed vessels of a similar nature.

HOT BLAST OVEN.—Samuel Thomas and John Thomas, Hokendaugua, Pa.—This invention relates to a new and useful improvement in ovens or apparatus for heating air for smelting iron in blast furnaces.

APPARATUS FOR CUTTING GLASS.—Frank Bowly, of Winchester, Va., has recently taken out a patent for a convenient apparatus for cutting panes of glass to the exact size required, which is designed for glaziers' use, and for country stores where glass is retailed. It consists, in general terms, of a ruled board having a row of pins arranged along each lateral margin, any two of which are employed to hold a movable rest gage, against the edge of the latter one edge of the glass pane is placed, while the opposite end is trimmed or cut. The pins are separated by inch spaces, and a stationary rule of straight edge is used to guide the diamond. It is a simple and useful device.

ROTARY STEAM ENGINE.—Alfred Bailey, Oswego, N. Y.—This invention consists in the novel arrangement of steam and exhaust ports, whereby the steam from the boiler is constantly entering the cylinder, and constantly exhausting therefrom. It also consists in the novel construction of the abutment slides, and in the mechanism provided for reversing the motion of the engine.

CORN PLANTER.—M. M. Sprinkle, Rochell, Va.—The object of this invention is to construct the seed-distributing device in such a manner that it shall operate more perfectly than heretofore.

SIFTER FOR FLOUR, ETC.—E. C. Hickman, Washington, D. C.—The object of this invention is to provide for public use a cheap and convenient device for sifting flour, etc.

REGULATING CLEVIS.—Elias Evans, Montgomery, Ala.—The object of this invention is to provide for public use a clevis of novel form and construction which can be easily adjusted so as to make the plow cut a furrow of any desired depth, and which will be light, strong, and durable.

STOVE.—Margaret Armstrong, West Alexander, Pa.—The object of this invention is to provide, in connection with a cooking stove of a certain pattern, an ornamental attachment adapted, when in position, to conceal the griddles and change the outward appearance of the stove, making it a handsome parlor stove.

BUCKLE.—Wm. Mac Lean and James H. Harris, Vermont, Ill.—This invention has for its object the connecting of buckles with straps without the use of stitching; and to this end, it consists in providing a buckle, with two loops at its rear end, one above another, the lower loop being for the retention of the fixed end of the strap, and the upper loop for the reception of the end after passing the tongue of the buckle through the strap.

BOILERS AND FURNACES.—I. C. Pennington, Paterson, N. J.—This invention has for its object to economize the use of fuel used in heating steam boilers, and reverberating and other furnaces, by using the heat escaping with the products of combustion for heating the air to support combustion before it is introduced into the fire box.

DRAWBRIDGE ALARM.—Thomas S. Hall, Stamford, Conn.—The object of this invention is to so construct and arrange the fastening device of a drawbridge, that the same when closed will interrupt the current through the wires of a battery, while, when open it will cause a connection between the same to be established, and a circuit produced. Thereby an automatic signal is produced for warning railroad trains approaching the bridge from either side when the bridge is open, while, when it is closed, the signal of danger will not be displayed.

SELF-ADJUSTING RAILROAD SWITCHES.—William L. Yantis, Brownsville, Mo.—This invention has for its object to improve the construction of switches or turnouts, so that they may be self-operating, not requiring the service of a switchman, and at the same time may be safe and reliable, being always in proper position.

TOY.—Daniel Willis, Jersey City, N. J.—This invention relates to a new toy of that class in which figures of animals, such as horses, etc., are arranged in front of a toy cart or wagon, the object of the invention being to impart to such figures a motion similar to that of living animals, so that when the toy vehicle is drawn ahead, the animals in front will move in a life-like manner.

COMPOSITION FOR CLEANING GRANITE, FREESTONE, AND MARBLE.—M. L. Ivers, Oneco, and G. L. Cooley, Plainfield, Conn.—This invention relates to a new composition for cleaning the surfaces of granite, freestone, marble, and all other kinds of stone employed in buildings, graveyards, monuments, and for other purposes, to free them from vegetable impurities, and to remove all blemishes.

ANTI-FRICTION METAL.—A. B. Cook, Manchester, Tenn.—This invention relates to a new metal to be used in journals, bearings, and boxes of all kinds, and has for its object to be less expensive and more effective than any other metal or metallic compound now in use.

FILE-CUTTING MACHINE.—F. Schultz, Hoboken, N. J., and C. Renne, New York city.—This invention relates to a new machine for cutting files, which is of such simple construction and arrangement that it cannot readily get out of repair, and that it can be manufactured at a cost much less than that for which file-cutting machines can now be made.

CONNECTION FOR SWITCH ALARMS AND SIGNALS.—Thomas S. Hall, Stamford, Conn.—This invention relates to a new mechanism and action of the switch connection, and to a new manner of protecting the connecting lever.

DESULPHURIZING BITUMINOUS COAL.—David Morgan, Hammondsville, Ohio.—This invention relates to an improvement in separating sulphur from bituminous coal, and thereby rendering it more suitable for the purposes for which it is used.

DRILL.—L. M. Rumsey and W. P. Smith, St. Louis, Mo.—This invention relates to a new and useful improvement in drills for penetrating earth or rock for obtaining water or for other purposes.

COMBINATION BRUSH.—Joseph Marshall, New York city.—This invention relates to a new and useful improvement in brushes for cleansing purposes, more especially designed for flesh brushes, but applicable to other uses, and consists in the combination of bristles or hair (or their equivalents) with sponge.

COTTON CULTIVATOR.—Samuel C. Darden, Connersville, Miss.—This invention relates to a new and improved machine for cultivating cotton, whereby much manual labor is saved, and it consists in a machine so constructed that it may be changed in its parts to adapt it for different purposes or for cultivating the cotton plant during the different stages of its growth.

SLUG BALL FOR FIREARMS.—James Curtis, Chicago, Ill.—This invention relates to an improvement in musket balls, whereby they are made more effective in battle at close quarters than balls of ordinary construction.

PAPER POLISHER.—H. T. Cushman, North Bennington, Vt.—This invention is intended to remove a difficulty experienced by all who require to make erasures of letters, words, or marks made on paper with ink, in polishing or restoring the surface of the paper to permit re-writing thereon without blotting.

SOLDERING-IRON HEATER.—Josiah Burgess, Zanesville, Ohio.—This invention consists in the combination with a naphtha burner of a furnace for heating soldering irons, so arranged as to control the heat generated to the best advantage for accomplishing the purpose.

REFLECTING ATTACHMENT FOR MIRRORS.—Charles J. Hartmann, London, England.—This invention relates to improvements in reflecting attachments for mirrors; and it consists in connecting the extension tubes employed for suspending a reflector for throwing the image of the back part of the head or other part of the person upon the mirror to the top of the said mirror by a universally jointed connection; also in connecting the reflector to the said tubes by a similarly jointed connection, whereby the said reflector may be readily adjusted to any required position, or be turned around to one side out of the way when not required for use.

MUSICAL INSTRUMENT.—Frederick Suter, Williamsburgh, N. Y.—This invention relates to a new musical apparatus, which is operated by means of keys on a fingerboard like the pianoforte. The invention consists in the employment of metallic disks, or plates, for the purpose of producing sounds in the requisite succession said disks or plates being secured to a suitable framework, so that they can be struck by hammers at the will of the operator.

MANUFACTURE OF SUGAR.—Louis J. F. Margueritte, Paris, France.—This invention relates to a new process for extracting sugar and increasing its produce in manufacture, refining, and forming it into loaves by means of alcohol. This process is based on the decomposition of the molasses by an energetic acid amidst the alcohol, to such a diluted degree that the sugar may be held in dissolution, but instead of obtaining the precipitation through the aceton (or pyro-acetic spirit), ether, etc., it is proposed to obtain it by more simple and direct crystillization.

HULLING MACHINE.—S. R. Hockman, Urbana, Ohio.—This invention relates to improvements in hulling machines, such as are used for hulling corn, barley, rice, and other grains, the object of which is to provide a more simple and economical machine than those now in use.

MACHINE FOR FORMING BITS FOR AXES.—Luke Chapman, Collinsville, Conn.—This invention relates to improvements in machines for shaping the steel bits for axes, and other similar tools, to facilitate fitting and welding them to the polls.

BEDSTEAD FASTENING.—Thomas O'Keefe, Appleton, Wis.—This invention consists of metal plates for screwing on to the face of the posts, or side rails, having two or more hooks projecting at right angles from the face at one edge, to be used in pairs, one on the post with the hooks facing upward, and the other on the side rail with the hook facing downward, and so arranged that the hooks of the plate on the rail will engage with and be supported by those on the post.

SPRING HINGE.—H. B. Middaugh, Mansfield, Pa.—This invention relates to improvements in spring hinges, designed to hold the door either in an open or closed position. It consists in the application to the back of the leaf to be screwed to the joint, of a coiled spring under suitable tension, which may be adjusted, the face end of the said spring being engaged with the edge of the other leaf of the hinge.

METHOD OF COLORING THREADS, FABRICS, ETC.—Carl Gunther, Berlin, Prussia.—The object of this invention is to provide means by which metallic foil can be secured to the fabrics or around threads and fibers, that it will not be removable by wear or water, and that its luster and brilliancy will not be destroyed. It has been a subject of considerable research to detect a means of gilding and silvering fabrics and threads, so that the metal applied would not wear off and destroy or injure the flexibility of the material. By this improved process the threads are left as flexible as they were before, and they can be folded at will, without breaking or injuring the metallic covering.

VELOCIPEDE.—Henry Thompson, Mobile, Ala.—This invention relates to improvements in velocipedes, designed to provide a simple and efficient arrangement for obtaining the motive power, by a rising and falling movement of the operator applied to an operating lever, similar to the motion of riding on horseback, and for imparting the same to the front wheel of a machine preferably having three or more wheels.

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90,623.—STRAP FOR SAWS.—Emanuel Andrews, Williamsport, Pa. Antedated May 21, 1869.

90,624.—PAPER BAG MACHINE.—Charles F. Annan (assignor to B. S. Binney), Boston, Mass.

90,625.—BLIND FASTENER.—Franklin Babcock and Frederick Babcock, Middletown, Conn.

90,626.—APPARATUS FOR LIGHTING GAS BY ELECTRICITY.—Arthur Barbarin, New Orleans, La.

90,627.—STOP-MOTION FOR LOOMS.—A. A. Barker, Lewiston, Me.

90,628.—REVOLVING HARROW.—Caleb Bates, Kingston, Mass.

90,629.—APPARATUS FOR LIGHTING AND EXTINGUISHING GAS BY ELECTRICITY.—Edwin E. Bean, Boston, Mass.

90,630.—HOT-AIR FURNACE.—P. D. Beckwith, Owagiac, Mich.

90,631.—BUTTON FASTENING.—Jos. F. Blood, Providence, R. I.

90,632.—SAFETY ATTACHMENT FOR POCKETS.—Claudius V. Boughton, Titusville, Pa.

90,633.—FELTING MACHINE.—Harvey Brisco and Job W. Blackham (assignors to themselves and James H. Prentice), Brooklyn, N. Y.

90,634.—GUN CAPPER.—Herbert Buffington, South Coventry, Conn.

90,635.—STEAM ENGINE SLIDE VALVE.—Wm. K. Cavett (assigns one-third to James L. Anderson), Allegheny City, Pa.

90,636.—BURGLAR ALARM.—H. D. Chance, Allentown, Pa.

90,637.—CHEMICAL FIRE ENGINE.—Isaac H. Clark (assignor to Paul P. Todd), Boston, Mass.

90,638.—SAW SET.—Hymen Clendenen, Washington county, Ohio.

90,639.—HAND CULTIVATOR AND WEEDER.—Wm. G. Comstock, East Hartford, Conn.

90,640.—CORN PLANTER.—Abel Lee Crow, Pennville, Ind.

90,641.—TRACE BUCKLE.—E. A. Crownhart, Bridgeport, N. Y.

90,642.—FORGING HAMMER.—Samuel B. Dodge, Roslyn, assignor to himself and Daniel D. Winant), Brooklyn, N. Y.

90,643.—STEAM ENGINE CUT-OFF.—Samuel Dunbar, New York city.

90,644.—APPARATUS FOR GENERATING AND CARBURETING GAS.—Cleaveland F. Dunderdale, New York city.

90,645.—GRATE.—B. W. Dunklee, Boston, Mass.

90,646.—ELECTROGRAPHIC VOTE RECORDER.—Thos. A. Edison (assignor to himself and Dewitt C. Roberts), Boston, Mass.

90,647.—ATTACHING HANDS TO WATCHES.—Julius Elson, Boston, Mass.

90,648.—BOOT-CRIMPING MACHINE.—Bernhard Esch, Sandusky, Ohio.

90,649.—BEEHIVE.—I. B. Farquhar, Bloody Run, assignor to himself and J. W. Lingenfelter, Bedford, Pa.

90,650.—HAND-NAILER FOR LASTING BOOTS AND SHOES.—William E. Fischer (assignor to himself and G. H. Johnson), Boston, Mass.

90,651.—TOE-PIECE FOR LASTING MACHINE.—Wm. E. Fischer (assignor to American Lasting Machine Company), Boston, Mass.

90,652.—ROTARY HARROW.—Cyrus P. Fisher, Leesville, Ohio.

90,653.—GUANO ATTACHMENT FOR SEED DRILLS.—John F. Fisher, Greencastle, Pa., assignor to himself and Daniel Breed, Washington, D. C.

90,654.—BELL.—Wm. Fletcher, New York city.

90,655.—APPARATUS FOR ADJUSTING ECCENTRICS TO CONNECTING RODS.—George Fowler, Philmont, N. Y.

90,656.—VELOCIPEDE.—Wm. Frankel, Springfield, Ohio.

90,657.—AIR-SPRING FOR RAILROAD CARS.—Perry G. Gardiner, New York city.

90,658.—DEVICE FOR APPLYING GILDING PREPARATIONS TO OVAL FRAMES.—David Garrison (assignor to Hall and Garrison), Philadelphia, Pa.

90,659.—VAPOR BURNER.—Thomas S. Gates and Alexander H. Fritchey, Franklin county, assignors to themselves and Thomas Ward, Columbus, Ohio.

90,660.—COAL STOVE.—A. F. Graves and T. J. Clark, Red Wing, Minn.

90,661.—BOLT MACHINE.—James L. Hall, Abingdon, Mass.

90,662.—WATER METER.—T. C. Hargrave, Boston, Mass.

90,663.—ENVELOPE.—Bertrand Joseph Hoffacker, Melrose, N. Y.

90,664.—MACHINE FOR SCOURING AND SETTING OUT LEATHER.—Charles Holmes (assignor to Chester Guild, Jr.), Boston, Mass.

90,665.—CHURN.—Gaylord Jones (assignor to himself and James C. Stewart), Grand Rapids, Mich.

90,666.—HARVESTER.—J. Herva Jones, Rockford, Ill.

90,667.—METALLIC ROOFING.—John W. Kingman, North Bridgewater, Mass.

90,668.—BRAD-SETTER FOR GLAZIERS' USE.—Moses Kleeman, Columbus, Ohio.

90,669.—APPLIANCE TO HAMES AND MEANS OF HITCHING HORSES TO VEHICLES.—John L. Kreider, Chestnut Level, Pa.

90,670.—DRILLING APPARATUS.—Samuel Lauchli (assignor to himself and Frederick Shickle), St. Louis, Mo.

90,671.—HORSE POWER.—Jacob E. Lutz, East Cocalico township, Pa.

90,672.—CIDER PRESS.—Jacob Maerhoffer, Boonvillle, Mo.

90,673.—HOOP SKIRT.—Joseph Mayer, Brooklyn, N. Y., assignor to himself and Julius Waterman, New York city.

90,674.—CHURN.—Walter S. McManus and Robert S. Merryman, Brunswick, Me.

90,675.—COMPOSITION FOR THE PRODUCTION OF WAX FLOWERS, FRUIT, ETC.—Emily W. Meyers, Lincoln, Ill.

90,676.—COFFEEPOT, BOILER, DIGESTER, OVEN, AND LAMP.—James Montgomery, New York city.

90,677.—REDUCING SULPHUR ORE.—Charles W. Moore, San Francisco, Cal.

90,678.—GAS AND WATER METER.—George Rodney Moore, Philadelphia, Pa.

90,679.—BARREL STAVE.—Charles Murdock, Hartford, Conn.

90,680.—WAGON SEAT.—John H. Nale (assignor to himself and John O. Sloan), Decatur, Ill.

90,681.—MACHINE FOR MAKING BUTTON HOOKS.—John S. Palmer, Providence, R. I.

90,682.—COMBINATION LOCK.—Oliver E. Pillard (assignor to Frederick H. North), New Britain, Conn.

90,683.—PERMUTATION LOCK.—Oliver E. Pillard (assignor to Frederick H. North), New Britain, Conn.

90,684.—CHIMNEY COWL.—Jos. F. Pond, Cleveland, Ohio.

90,685.—NUT LOCK.—William P. Potter, Pittsburgh, Pa., assignor to "Pittsburgh Forge and Iron Company."

90,686.—SPRING BUT.—Lewis Preston, Elizabeth Port, N. J.

90,687.—VELOCIPEDE.—Henry Rathmann and George H. Johnson, Buffalo, N. Y.

90,688.—DRY EARTH WATER CLOSET.—H. O. Reed and Joseph W. Fowle, Boston, Mass.

90,689.—SPOKE LATHE.—Isaac S. Roland, Reading, Pa.

90,690.—MANUFACTURE OF BUNGS.—Benjamin D. Sanders, Wellsburg, West Va.

90,691.—COMBINED HOE AND RAKE.—F. Le Roy Senour, Eaton, Ohio

90,692.—ALARM LOCK.—Nicholas Seubert, Syracuse, N. Y.

90,693.—RIVETING MACHINE.—Thomas Shaw, Philadelphia, Pa., assignor to himself and Philip S. Justice.

90,694.—WASH BOILER.—Joel Shedd, Waltham, Mass.

90,695.—PAPER AND PRINT ROLLER.—H. Julius Smith, Boston, Mass., assignor to himself and Richard Smith.

90,696.—STEAM ENGINE GOVERNOR.—Wm. Smith, Philadelphia, Pa.

90,697.—MOWING MACHINE.—Aivin Soule, Yarmouth, Me.

90,698.—CORN PLANTER AND FERTILIZER.—M. M. Sprinkle (assignor to himself and Robert C. Garnett), Rochelle, Va.

90,699.—LOCKING BURR.—J. J. Steward, Big Prairie, Ohio.

90,700.—AUTOMATON HOOP.—Luke W. Taylor, Weathersfield, Vt. Antedated May 28, 1869.

90,701.—SPRING ROCKING CHAIR.—Daniel E. Teal, Norwich, N. Y. Antedated May 19, 1869.

90,702.—LITHOGRAPHIC INKING ROLLER.—S. D. Tucker, New York city.

90,703.—HEDGE PLANTER.—J. J. Tucker, Eugene, Ill.

90,704.—COMBINED PUNCH AND SCREW DRIVER.—S. D. Tuttle, Eaton, Ohio.

90,705.—DENTAL MOUTH METER.—C. Von Bonhorst, Lancaster, Ohio. Antedated May 15, 1869.

90,706.—DENTAL ARTICULATING CUP.—C. Von Bonhorst, Lancaster, Ohio. Antedated May 15, 1869.

90,707.—COFFEEPOT.—A. B. Walters, Philadelphia, Pa.

90,708.—RAILWAY GATE.—D. J. Waltz, H. A. Soliday, and Wm. Hamsher, Doylestown, Ohio.

90,709.—DEODORIZING WATER CLOSETS.—G. E. Waring, Jr., Newport, R. I., assignor to the Earth-closet Co., Hartford, Conn.

90,710.—FERRULE FOR SHOE STRINGS.—G. H. White, Huntington, N. Y. Antedated May 20, 1869.

90,711.—MACHINE FOR MANUFACTURING WEBBING FOR LADIES' FANS.—J. W. White, Weymouth, Mass.

90,712.—STOVE SHELF.—D. D. Whitney, Leominster, Mass.

90,713.—HARROW.—J. P. Wile, Nashville, Mich.

90,714.—CARRIAGE WHEEL.—Elbridge G. Woodside, San Francisco, Cal.

90,715.—MEDICAL COMPOUND.—Henry Adolph, Clinton, Kansas.

90,716.—BEER COOLER.—John Agate, Pittsford, N. Y.

90,717.—WATER METER.—R. N. Allen, Pittsford, Vt.

90,718.—PUMPING LEVER.—J. S. Appel, Kulpsville, Pa.

90,719.—COOKING STOVE.—Margaret Armstrong, West Alexander, Pa.

90,720.—STEAM HEATER.—A. C. Bacon, Bergen, N. J.

90,721.—ROTARY STEAM ENGINE.—Alfred Bailey, Oswego, N. Y.

90,722.—COTTON-SEED PLANTER.—Nathan Breed, Jeffersonville, Ind.

90,723.—VELOCIPEDE.—G. C. Buell, New Haven, Conn.

90,724.—PORTABLE SOLDERING FURNACE.—Josiah Burgess, Zanesville, ohio.

90,725.—TUG BUCKLE.—D. S. Butler, Otterville, Mo.

90,726.—MACHINE FOR FORMING BITS FOR AXES.—Luke Chapman, Collinsville, Conn.

90,727.—MODE OF PREVENTING CANALS, ETC., FROM BEING CLOSED BY ICE.—R. A. Chesebrough, New York city.

90,728.—STEAM-ENGINE LUBRICATOR.—Isaac Church, Jr., Norwalk, Conn.

90,729.—ANTI-FRICTION METAL.—A. B. Cook (assignor to W. S. Huggins), Manchester, Tenn.

90,730.—CAR COUPLING.—J. W. Currier, Springfield, Mass.

90,731.—DEVICE FOR HOLDING INTERFERING BANDS IN PLACE.—J. W. Currier, Springfield, Mass.

90,732.—PROJECTILE.—Jas. Curtis, Chicago, Ill.

90,733.—COMPOSITION PAPER POLISHER.—H. T. Cushman, North Bennington, Vt.

90,734.—COTTON CULTIVATOR.—Samuel C. Darden, Connersnersville, Miss.

90,735.—BEEHIVE.—Millington Easley, Rush, Ill.

90,736.—CLEVIS.—Elias Evans, Montgomery, Ala.

90,737.—MEAT CHOPPER.—C. H. Finson (assignor to himself and Joseph Semple), Bangor, Me.

90,738.—BOAT-DETACHING APPARATUS.—Jas. Foster, Jr., (assignor to himself and Noah Hand), Camden, N. J.

90,739.—MACHINE FOR FORMING SHIRT BOSOMS FROM PAPER AND CLOTH COMBINED.—E. P. Furlong, Portland, Me.

90,740.—MODE OF COATING THREADS WITH METALS.—Carl Günther, Berlin, Prussia, assignor to Frederick Volkman, Hoboken, N.J.

90,741.—FIRE-ARM.—J. W. Goodale, Amherst, Mass.

90,742.—ATTACHING PICKS TO THEIR HANDLES.—R. C. Grover and C. W. Randall, Newton, Mass.

90,743.—CONNECTION FOR DRAW-BRIDGE SIGNALS.—Thos. S. Hall, Stamford, assignor to Hall's Electric Railway Switch and Drawbridge Signal Co., New Haven, Conn.

90,744.—SWITCH-ALARM CONNECTION.—Thos. S. Hall, Stamford, assignor to Hall's Electric Railway Switch and Drawbridge Signal Co., New Haven, Conn.

90,745.—RAILWAY CHAIR.—C. A. Harris, Owego, N. Y.

90,746.—LOOKINGGLASS ATTACHMENT.—C. J. Hartmann, London, England.

90,747.—PLOW.—C. Hartzell, St. Joseph, Mo.

90,748.—FAN.—T. W. Hawkins, New Haven, Conn.

90,749.—AIR GUN AND PISTOL.—E. H. Hawley, Kalamazoo, Mich.

90,750.—FLOUR SIFTER.—E. C. Hickman, Washington, D. C.

90,751.—PORTABLE FENCE.—C. R. Hight, Geneva, Ill.

90,752.—HULLING MACHINE.—S. R. Hockman, Urbana, Ohio.

90,753.—BOOT AND SHOE-TOP.—John Honecker, Columbus, Ohio.

90,754.—COMPOUND FOR CLEANING STONE, ETC.—M. L. Ivers, Oneco, and G. L. Cooley, Plainfield, Conn.

90,755.—AUGER BIT.—W. A. Ives, New Haven, Conn.

90,756.—COOKING STOVE.—W. J. Keep, Troy, N. Y.

90,757.—SHAFT COUPLING.—A. J. Langworthy, Milwaukee, Wis.

90,758.—CHURN.—Survetus Leach, Wilbraham, Mass.

90,759.—AUGER BIT.—H. C. Lewis, Essex, Conn.

90,760.—HORTICULTURAL BUILDING.—Francis Ludlow, Lake View, Ill.

90,761.—COTTON-BALE TIE.—Edward Thomas Mainwaring, Tipton, England.

90,762.—EXTRACTING, REFINING, AND CRYSTALLIZING SUGAR.—L. J. F. Marguerite, Paris, France.

90,763.—BATH BRUSH.—Joseph Marshall, New York city.

90,764.—REVOLVING CLOTHES DRYER.—John McCaskey, Jr., Orville, Ohio.

90,765.—DENTAL PLATE.—J. A. McClelland, Louisville, Ky.

90,766.—MACHINE FOR TREATING COLLODION AND ITS COMPOUNDS.—J. A. McClelland, Louisville, Ky.

90,767.—BRIDGE.—John A. McKay, Auburn, Ind.

90,768.—ADJUSTABLE CLAMP.—C. S. Meeker (assignor to himself and T. B. Carpenter), New Haven, Conn.

90,769.—SPRING HINGE.—H. B. Middaugh, Mansfield, Pa.

90,770.—ROLLER GRAIN DRILL.—Oliver F. Momany, Dowagiac, Mich.

90,771.—BAKE OVEN.—Daniel Moore, Davenport, Iowa.

90,772.—MACHINE FOR DESULPHURIZING BITUMINOUS COAL.—David Morgan, Hammondsville, Ohio.

90,773.—FENCE POST.—E. G. Nichols, Beaufort, S. C.

90,774.—VELOCIPEDE.—Alfred Nielsen, Williamsburg, N. Y.

90,775.—TIRE-HEATING OVEN.—C. G. Nye, Onondaga, N. Y.

90,776.—BEDSTEAD FASTENING.—Thomas O'Keefe, Appleton, Wis.

90,777.—ELECTRO-MAGNETIC AMALGAMATOR FOR GOLD AND SILVER.—A. B. Paul, San Francisco, Cal.

90,778.—STEAM-GENERATOR FURNACE.—I. C. Pennington, Paterson, N. J.

90,779.—MEDICAL COMPOUND.—W. H. H. Peters, Tuskegee, Ala.

90,780.—BEDSTEAD FASTENING.—C. D. Purdy, La Porte, Ind.

90,781.—BEARING FOR SPINDLES AND SHAFTS.—S. W. Putnam, Jr., Fitchburg, Mass.

90,782.—VELOCIPEDE.—G. P. Reed, Boston, Mass.

90,783.—AUXILIARY JAW FOR PLANER CHUCK.—C. H. Riggs, Windsor Locks, Conn.

90,784.—SAW FILE.—Wm. Roberts, Blue Hill, Me.

90,785.—STOVEPIPE SHELF.—Obed Ruggles, Franklin, Mass.

90,786.—PIPE DRIVER.—L. M. Rumsey and W. P. Smith, St. Louis, Mo.

90,787.—DRILL FOR ROCK AND EARTH WITH ATTACHED TUBE.—L. M. Rumsey and W. P. Smith, St. Louis, Mo.

90,788.—MACHINE FOR CUTTING FILES.—F. Schultz, Hoboken N. J., and C. Renne, New York city.

90,789.—MACHINE FOR WIRING BLIND SLATS.—J. M. Seymour and Daniel Whitlock, Newark, N. J.

90,790.—TEA AND COFFEEPOT.—Samuel Simpson (assignor to Simpson, Hall, Miller & Co.,) Wallingford, Conn.

90,791.—SAW GUIDE AND JOINTER.—G. A. Smith, Bleeker N. Y.

90,792.—BREECH-LOADING FIRE-ARM.—W. S. Smoot, Washington, D. C., assignor to Thos. Poultney, Baltimore, Md.

90,793.—MUSICAL INSTRUMENT.—Frederick Suter, Williamsburgh, N. Y.

90,794.—STEAM-GENERATOR SAFETY VALVE.—Henry Taylor and J. M. Coale, Baltimore, Md.

90,795.—RAILWAY CAR TRUCK.—H. Thielsen, Burlington Iowa.

90,796.—HOT-BLAST OVEN FOR IRON FURNACES.—S. Thomas and J. Thomas, Hokendaugau, Pa.

90,797.—VELOCIPEDE.—Henry Thompson, Mobile, Ala.

90,798.—BUCKET.—J. H. Tomlinson, Chicago, Ill.

90,799.—STEAM PLOW.—S. B. Wilkins, Milton, Pa.

90,800.—VISE.—J. B. Willett, West Meriden, Conn.

90,801.—TOY.—Daniel Willis, Jersey City, N. J.

90,802.—IMPRESSION DENTAL CUP.—C. L. Wuestenberg, Pittsburgh, Pa.

90,803.—SELF-ADJUSTING SWITCH FOR STREET CARS.—W. L. Yantis, Brownsville, Mo.

90,804.—TRUNK LOCK.—Hermann Ahrend, Brooklyn, N. Y.

90,805.—LOCK FOR PIANOS, ETC.—Hermann Ahrend, Brooklyn, N. Y.

90,806.—AUTOMATIC FIRE ALARM APPARATUS.—Alex. Allen, Rochester, N. Y.

90,807.—GRAIN BINDER.—J. F. Appleby (assignor to himself and Wm. Thompson), Mazo Manie, Wis.

90,808.—HINGING TEA-KETTLE COVERS.—E. S. Atwood (assignor to "Pratt & Wentworth"), Boston Highlands, Mass.

90,809.—BURGLAR ALARM.—Henry Bergstein, San Francisco, Cal.

90,810.—HOISTING APPARATUS.—Eugene H. Bernier, Paris, France.

90,811.—BELL.—A. G. Bevin, East Hampton, Conn.

90,812.—HALTER HITCH.—A. T. Boon and Lucien Mills, Galesburg, Ill.

90,813.—COMPOSITION FOR DRESSING HARNESS AND OTHER ARTICLES MADE OF LEATHER.—M. T. Boyd, Buffalo, N. Y.

90,814.—GUN CARRIAGE.—L. W. Broadwell, New Orleans, La.

90,815.—PYROMETER.—Edward Brown, Philadelphia, Pa.

90,816.—COMB.—Haydn Brown and S. N. Noyes (assignors to S. C. Noyes & Co.), West Newbury, Mass.

90,817.—WASHING MACHINE.—Frank Buckelew, San Rafael, Cal.

90,818.—HAY RAKER AND LOADER.—H. P. Burdick, Buffalo, N. Y.

90,819.—CONSTRUCTION OF RETORTS FOR THE MANUFACTURE OF COAL GAS.—W. J. Cochran, Baltimore, Md.

90,820.—SPRING BED BOTTOM.—J. L. Cooper and E. A. Monroe, Elmira, N. Y.

90,821.—AUTOMATIC RAILWAY GATE.—R. P. Crane, Beloit, Wis., and Ellery B. Crane, Worcester, Mass.

90,822.—STONE-DRESSING MACHINE.—J. T. Cree, Worcester, Mass.

90,823.—HOISTING APPARATUS.—Lewis Cutting, San Francisco, Cal.

90,824.—PREPARATION OF MINERAL CARBON FOR USE IN THE ARTS.—John Dickenson, Bay Ridge, N. Y.

90,825.—COMPOSITION FOR PAVING, ROOFING, AND FOR OTHER PURPOSES.—J. E. Dotch and Edward Duempelmann, Washington, D. C

90,826.—TURBINE WATER WHEEL.—Robert Dunbar, Buffalo, N. Y.

90,827.—TREATMENT OF GRAIN MASHES, WORTS, AND BEER, AFTER FERMENTATION.—Nathan Eisendrath, Chicago, Ill.

90,828.—BOOT CRIMPING MACHINE.—J. A. Eldridge, Milford, Mass.

90,829.—WAGON BRAKE.—W. R. English and Stephen Roggers, English Center, Pa.

90,830.—COMBINED VAPOR BURNER AND LAMP-POST.—B. D. Evans, Columbus, Ohio.

90,831.—GANG PLOW.—C. A. Fargo, Soquel, Cal., assignor to himself and Barber Darling.

90,832.—CASTANET.—G. F. Fessenden, Arlington, Mass.

90,833.—LIFE BOAT.—C. D. Flynt, Philadelphia, Pa.

90,834.—APPARATUS FOR FELLING TREES.—M. R. Fory, New York city.

90,835.—TEA AND COFFEEPOT.—T. F. Frank, Buffalo, N. Y.

90,836.—GREEN CORN FORK.—W. L. Gilroy, Philadelphia, Pa.

90,837.—VELOCIPEDE.—Joseph Guild, Buffalo, N. Y.

90,838.—LOOM PICKER SHOE.—E. J. Hall, Cambridge, Mass., assignor to Orville Peckham, trustee, and said trustee assigns to E. J Hall and Edwin A. Hall.

90,839.—FARM GATE.—T. F. Hall, Circleville, Ohio.

90,840.—SPRING BED BOTTOM.—William Haworth, Canton, Ohio.

90,841.—ELECTRIC CLOCK.—M. Hipp, Neufchatel, Switzerland.

90,842.—PORTABLE SCAFFOLD.—A. E. Herrington and J. D. Richards, Schoolcraft, Mich.

90,843.—CIDER MILL AND PRESS.—Francis Hovey and G. F. Hovey, New York city.

90,844.—GRAIN SEPARATOR.—Andrew Hunter, San Francisco, Cal.

90,845.—ADJUSTABLE WINDOW SCREEN.—D. N. Hurlbut, Chicago, Ill.

90,846.—GAS-HEATING AND COOKING APPARATUS.—F. A. Jacquet, Paris, France.

90,847.—GRAIN DRYER.—G. H. Johnson and George Milsom, Buffalo, N. Y.

90,848.—APPARATUS FOR MAKING EXTRACTS FROM TAN BARK.—T. W. Johnson, New York city, assignor to himself and R. C. Johnson, Jr. Antedated May 25, 1869.

90,849.—BUCKLE.—W. V. Kay, Chicago, Ill., assignor to S. S. Sargeant, Newark, N. J.

90,850.—COOKING STOVE.—W. J. Keep, Troy, N. Y.

90,851.—RAILWAY STOCK CAR.—J. S. Kendall, Northfield, Minn., assignor to himself, Ralph Emerson, and W. A. Talcott, Rockford, Ill.

90,852.—COAL STOVE.—Nathaniel Keyser, Newton, Iowa.

90,853.—LOW-WATER INDICATOR FOR BOILERS.—Hiram Kimball, Randolph, Vt.

90,854.—MODE OF TREATING WOOD TO RESEMBLE CARVED WORK.—Wm. Copp and Wm. Wrampelmeier, Louisville, Ky.

90,855.—TOOTHPICK.—Alphons Krizek (assignor to himself, Thomas Richardson, and John Neath), Philadelphia, Pa.

90,856.—RAILWAY STOCK CAR.—Hugh Lee, Beloit, Wis.

90,857.—BRIDLE BIT.—Josiah Letchworth, Buffalo, N. Y.

90,858.—PRINTING PRESS.—J. C. Macdonald, Waddon, and Joseph Calverley, Albany Road, Camberwell, England. Patented in England December 6, 1866.

90,859.—BUCKLE.—Wm. Maclean and J. H. Harris, of Vermont, Ill.

90,860.—BASE-BURNING STOVE.—H. C. March, Limerick Station, Pa.

90,861.—WAGON SPRING.—E. P. McCarthy, San Francisco, Cal., assignor to himself and John Grant.

90,862.—ATTACHING COLLARS FOR STOVEPIPES.—F. H. Merrill, Cape Elizabeth, Me.

90,863.—LAMP BURNER.—R. S. Merrill and Wm. Carleton Boston, Mass.

90,864.—DOOR LOCK.—J. F. Milligan, St. Louis, Mo.

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90,908.—CORN MARKER.—S. J. Woland, Lincoln, Ill.
90,909.—HARVESTER.—G. W. N. Yost, Corry, Pa.
90,910.—FIREPLACE STOVE.—David Stuart and Lewis Bridge, Philadelphia, Pa.

REISSUES.

87,925.—COOKING STOVE.—Dated March 16, 1869; reissue 3,469.—Jas. Greer and R. J. King, Dayton, Ohio.
69,238.—PRESERVING DEAD BODIES.—Dated Sept. 24, 1867; reissue 3,470.—J. D. Nietsche, Somerset, Ohio.
71,431.—HEAD-LIGHT FOR LOCOMOTIVES.—Dated Nov. 26, 1867; reissue 3,471.—A. C. Vaughan, Philadelphia, Pa.
56,87.—FLOUR BOLT.—Dated Aug. 7, 1866; reissue 3,472.—J. C. Blythe, Mark Johnson, J. S. Nobles, and Chas. W. G. Nobles, Perry, N. Y., assignees of J. C. Blythe.
57,467.—RAILROAD RAIL.—Dated August 28, 1866; reissue 3,473.—J. L. Booth, Rochester, N.Y.
29,374.—MACHINE FOR THRASHING AND CLEANING GRAIN.—Dated July 31, 1860; reissue 3,474.—Cornelius Aultman, Mansfield, Ohio, assignee by mesne assignments, of Ira Hart.
18,205.—MACHINE FOR MAKING TAPERED WIRE BLANKS.—Dated Sept. 15, 1857; reissue 3,475.—Division A.—C. Jillson, Worcester, Mass.
18,205.—METHOD OF FORMING CONICAL POINTS ON WIRES, RODS, ETC.—Dated Sept. 15, 1857; reissue 3,476.—Division B.—C. Jillson, Worcester, Mass.
14,254.—CULTIVATOR TOOTH.—Dated Feb. 12, 1856; reissue 3,477.—C. H. Sayre, for himself and the Remington Agricultural Works, Utica, N. Y., assignees, by mesne assignments, of C. H. Sayre and Geo. Klinck.
33,496.—HARVESTER.—Dated Oct. 15, 1861; reissue 1,701, dated June 14, 1864; reissue 3,478.—J. F. Seiberling, Akron, Ohio.
12,077.—PROCESS OF TREATING THE MOTHER-WATER OF SALINES TO OBTAIN USEFUL PRODUCTS.—Dated Dec. 12, 1854; extended seven years; reissue 3,479.—Division A.—Amalie Stieren, Natrona, Pa., assignee, by mesne assignments, of Edward Stieren, deceased.
13,077.—APPARATUS FOR OBTAINING BROMINE AND OTHER PRODUCTS FROM THE MOTHER WATER OF SALINES.—Dated Dec. 12, 1854; extended seven years; reissue 3,480.—Division B.—Amalie Stieren Natrona, Pa., assignee, by mesne assignments, of Edward Stieren, deceased.
24,588.—HAY SPREADER.—Dated June 28, 1859; reissue 3,481.—J. C. Stoddard, Worcester, Mass.
79,024.—FABRIC FOR COVERING HORSE COLLARS.—Dated June 16, 1868; reissue 3,482.—Eugene Sullivan (assignor to the American Horse Collar Company), Boston, Mass.
40,590.—WRENCH.—Dated Nov. 10, 1863; reissue 3,483.—Loring Coes, Worcester, Mass., assignee, by mesne assignments, of George C. Taft.
12,215.—HARVESTER.—Dated Jan. 9, 1855; extended seven years; reissue 3,484.—Division 1.—J. F. Seiberling, Akron, Ohio, assignee of Fanny Holmes, executrix of the estate of J. E. Newcomb, deceased.
12,215.—HARVESTER DROPPER.—Dated Jan. 9, 1855; extended seven years; reissue 3,485.—Division 2.—J. F. Seiberling, Akron, Ohio, assignee of Fanny Holmes, executrix of the estate of John E. Newcomb, deceased.

DESIGNS.

3,508.—NAME PLATE.—S. S. Bent, Port Chester, N. Y.
3,509, and 3,510.—SODA FOUNTAIN.—Edmund Bigelow, Springfield, Mass. Two Patents.
3,511.—DRAWER PULL.—F. W. Brocksieper (assignor to Sargent and Company), New Haven, Conn.
3,512.—BLACK-BOARD BRUSH.—Daniel Carpenter, San Francisco, Cal.
3,513, and 3,514.—FLOOR OIL-CLOTH PATTERN.—Hugh Christie, Morrisania, N. Y. Two Patents.
3,515.—ORNAMENTATION OF GLASS WARE.—Annie W. Henderson, Pittsburgh, Pa.
3,516.—PRINTER'S TYPE.—Julius Herriet (assignor to D. W. Bruce), New York city.
3,517.—STATUETTE.—Otto Kornemann and Julius Jungbluth, New York city.
3,518.—COMB-BACK.—G. T. Lincoln, Providence, R. I.
3,519.—TRADE MARK.—Wm. Maddox, Ripley, Ohio.
3,520.—CLOCK CASE.—G. B. Owen, Winsted, Conn.
3,521.—TRADE MARK.—J. S. Pemberton, Atlanta, Ga.
3,522, and 3,523.—CAR BRACKET.—John Protin, New York city, assignor to J. L. Howard and Company, Hartford, Conn. Two Patents.
3,524.—FLOOR OIL-CLOTH PATTERN.—Jos. Robley, Brooklyn, N. Y.
3,525, and 3,526.—GENTLEMAN'S SCARF.—Conrad Roder (assignor to himself, W. S. Well, and Jacob Lowenstein), Philadelphia, Pa. Two Patents.
3,527.—STOCKING FABRIC.—C. H. Salmon (assignor to Thos. Dolan), Philadelphia, Pa.
3,528.—PLOW.—Christopher Smith, Warsaw, Ind.
3,529.—LAMP POST.—H. B. Scholes, New York city.
3,530.—SOLE OF A BOOT OR SHOE.—Michael Thornton, Philadelphia, Pa.
3,531.—TRADE MARK.—C. H. Warren, Toledo, Ohio.

EXTENSIONS.

SEWING MACHINES.—C. A. Durgin, New York city.—Letters Patent No. 12,902, dated May 22, 1855; reissue No. 567, dated June 15, 1858.

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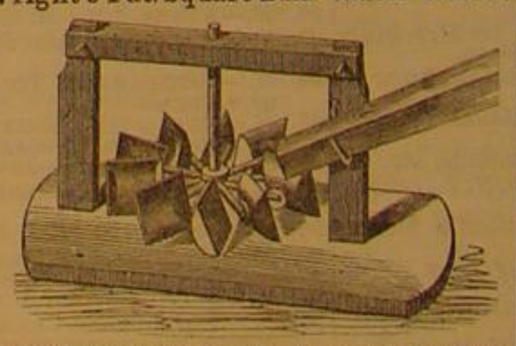

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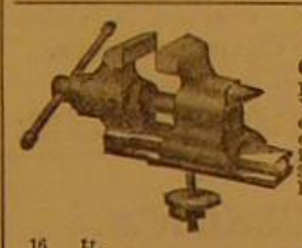

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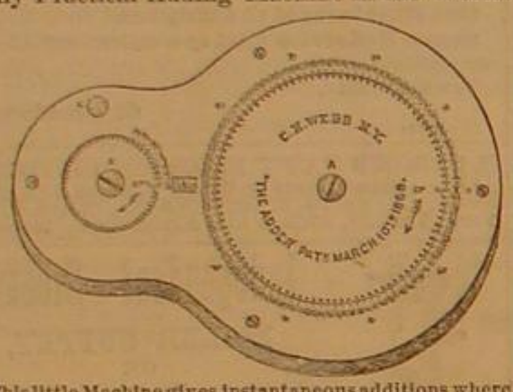

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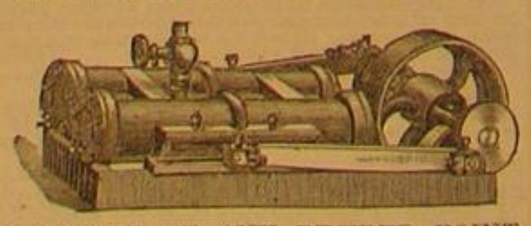

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SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XX.—No. 26. [NEW SERIES.] NEW YORK, JUNE 26, 1869. $3 per Annum [IN ADVANCE.]

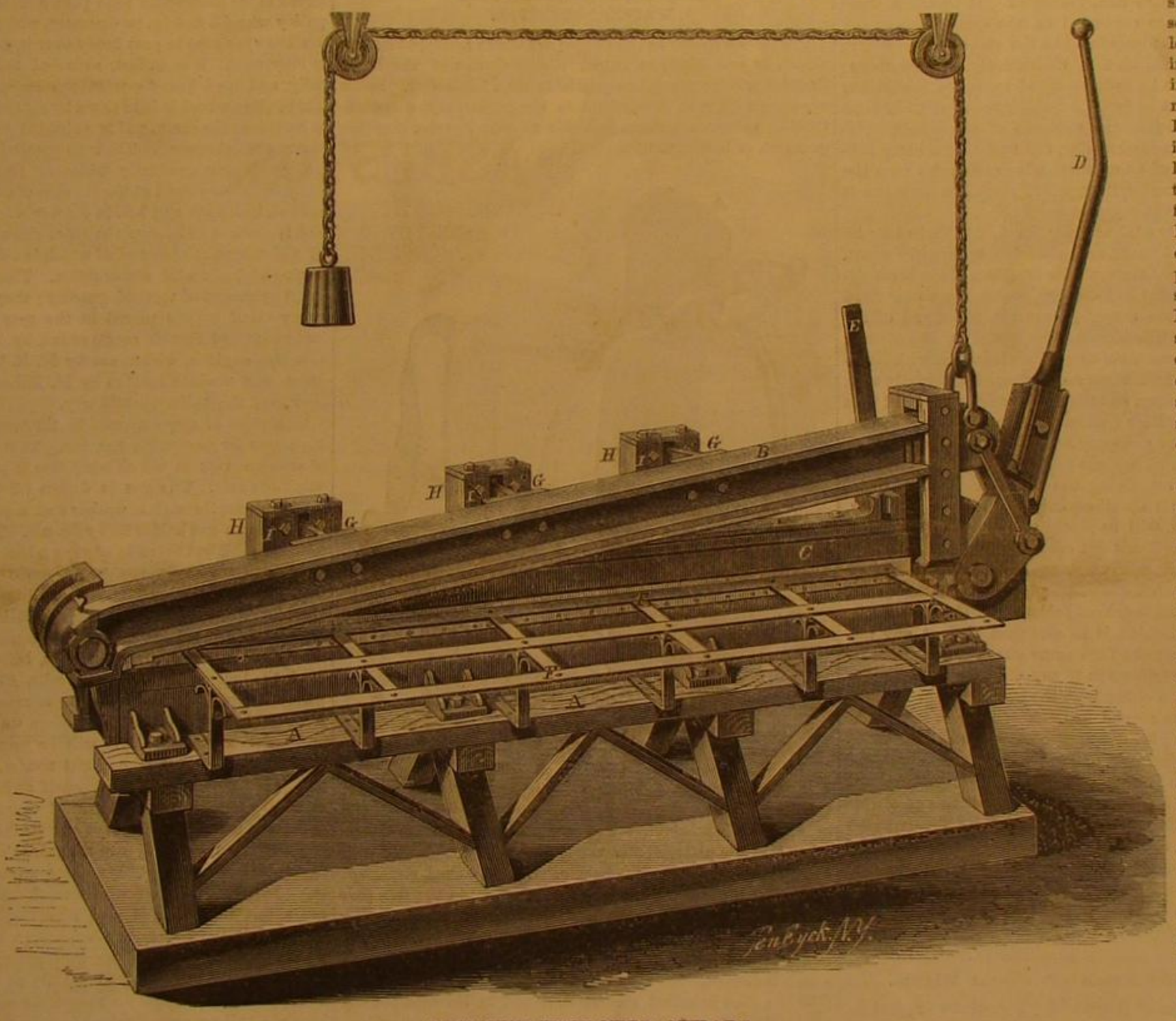
The Qualities Required in a Good Shears for Cutting Iron or other Metals.

The qualities requisite to a good shears for cutting metals are that the power required to do the work shall be distributed equally throughout the stroke; that the rate of cutting shall be uniform throughout the stroke; that the piece to be cut shall be held firmly in such a manner that all wrinkles or bends shall be removed from the part to be cut; that the edges of the blades shall pass each other at an equal distance throughout the stroke, and as near to each other as possible without mutual abrasion; and that the parts of the machine shall be so proportioned and adjusted as not to spring or to give any approximation to a drawing stroke in the blades. These, with the minor details of adjustment for different kinds of work, constitute the essentials of a good shears.

The principle of action in the shears and the punch is identical. The punch is only a modification of the shears.

The points above enumerated are not always easy to secure by simple means, where the blades of a shears are required to be of great length. As near an approach to their perfect attainment as we have ever met with has been secured in the invention we herewith illustrate. Having personally witnessed its operation we are prepared to testify to the very superior character of the work it performs.

Born of a necessity this invention admirably illustrates the old adage. The firm of Nichol & Billerwell, of New York city, manufacturers of ironwork—iron shutters and other architectural work—having taken a heavy contract at rates which subsequent circumstances threatened to make ruinously losing, the senior partner, Mr. Nichol, set himself to work like an able general, to turn defeat into victory. The result was the invention of this shears, the use of which enabled the firm to save themselves a large loss, and to realize a fair profit instead.



NICHOL'S IMPROVED SHEARS.

In the engraving, A represents the framework of wood upon which the machine rests, B the movable cutter-bar, and C the clamp which holds the work. The movable cutter-bar is worked with a lever, D, so connected with the cutter-bar by pivoted bars, that as the leverage of the shear blade is diminished, during the progress of the stroke, the leverage of D is increased to compensate for the loss, thus rendering the power required to work the shears uniform throughout the stroke. The clamp, C, consists of a straight square bar held by set-screws and attached by them to an angular casting, the cross section of which would be shaped like the letter L inverted. This casting extends over the whole length of the square bar, and with it forms the body of the clamp, the set screws passing at equal intervals through it, serving to adjust the clamp for different thicknesses. This clamp is worked by a lever, E, so arranged that the clamp is thrown uniformly down upon the work, or rather falls by its own weight by raising the lever. To the lever is attached an arm which, when the lever is depressed, raises the clamp and holds it during the adjustment of the work. A metallic rack, F, serves to hold the plate to be cut, which is slid in to meet a system of gages not shown in the engraving.

To the back side of the cutter bar, B, are bolted arms, G, which have friction rollers at the ends remote from the cutter bar, rolling against the back of the plates, I, attached to the standards, H. The plates, I, are slotted to admit the motion of the arms, G, and are adjusted by set screws so that the edges of the shear blades can be brought and held closely together. This arrangement also prevents any lateral spring.

In order to secure a uniform rate of cutting, the movable blade has a curved or bellying edge, so calculated that the latter end of the stroke cuts no faster than the first. The cutter bar, B, is raised by a chain and weight running over pulleys, as shown in the engraving.

There is little doubt that for cutting sheets this shears is not excelled. It cuts perfectly clean, and leaves no burr. Before its use in the establishment of Messrs. Nichol & Billerwell, all the slats cut by them needed to have the edges dressed by the file. Slats cut by these shears are not touched with the file at all. Sheets of metal ten feet in length may be placed in these shears, and a mere shaving of uniform thickness and perfectly unbroken, taken from the edge the entire length, and what is still more astonishing, such a cut—a mere thread—is not curled or twisted. This could never be accomplished by a shears having any lateral spring to the blade. The cut is made for the ten feet as rapidly as it could be done for ten inches. When working the average number of cuts made per day is 2,400, requiring a force of two ordinary laborers and two boys. It is perfectly easy to apply steam or water power to the operation of this shears by means that will suggest themselves to any mechanic. We are informed by the inventor that its use saves half the labor of any other machine now in use for cutting iron, a result which we can readily credit, having seen the machine at work, and noted the excellent character of the work performed.

The patentee will sell rights for all States except New York. The patent for this invention was obtained through the office of the Scientific American Patent Agency, May 18, 1869, by John Nichol of the above-named firm.

The machine may be seen in operation at the works of Nichol & Billerwell, 220, 222, and 224 West Houston street, New York, to whom all communications may be addressed.

A NEW illuminating mixture consists of two parts rapeseed oil and one of petroleum oil.

SEA CABLES.

The cables to be submerged in the Black Sea are, by this time, completed, and in a few weeks will be on their way to their submarine destination. In order to avoid the mountainous range of the Caucasus, the Indo-European Telegraph Company (the progress of whose works we lately alluded to), determined to lay a cable from the Crimea to a point on the Asiatic shores of the Black Sea, considering that the difficulties of the submarine would be far less than those of the mountainous route, the probability of interruption in the former being much less. The original cable route was not adhered to, but a shorter route finally settled upon, the length of cable being 100 miles, starting from a point near Djulfa, on the Black Sea, and landing at Suchum Kalé. The second section of cable is that for the Straits of Kertch, a three-wire cable of heavy proportions. The insulated core of the Black Sea cable is similar to that of the cables that are generally known—a stranded conductor surrounded by coats of gutta-percha.

The insulated conductors in this cable are three, each of them weighing 273 lbs. per nautical mile (copper, 107 lbs. per mile; gutta-percha, 166 lbs. per mile). It is in the materials specially used for strengthening and preserving the core that this cable so essentially differs from all others. Its construction is similar in every respect to some small cables made by Messrs Siemens Brothers, for the French Government, some few years ago, and laid in the Mediterranean, on the place designed and specially advocated by Mr. C. W. Siemens. The present cable has been manufactured at the works at Charlton. In the ordinary system of cable making, the core is protected with a serving of hemp, and sheathed externally for extra protection, and for strength, with a helical covering of iron wires; the number and size of which depending upon the size of the core and the locality for which the cable is intended. In Siemens' cable, however, the main strength rests in a large serving of best Italian hemp, giving it the character of a rope; this serving is protected (adding, at the same time, some strength to the cable) by a sheathing, laid helically, of strips of flat copper of about ⅛in. in diameter.

The copper selected is of the best quality, and arrives in the shape of long broad sheets. These sheets are first passed through the shearing machine, where, by means of knives placed above and below, the entire sheet, as it passes through, is divided throughout its breadth into equal narrow strips of the breadth required for sheathing the cable. On coming away from the shearing machine the strips are wound on small bobbins. If a strip of metal or anything be attempted to be wound around a long cylinder, it will infallibly bulge up and tend toward the trumpet form, and in order to prevent such a result happening to the copper strip in the cable, it undergoes a process termed "rabitting." Each strip, before going to the sheathing machine, passes through this operation, which consists in slightly bending its edge and grooving its centre. The bobbins, of prepared copper, are then taken to the closing machine, for the final process, but we must first describe the ordinary covering with hemp.

The three insulated wires of the Black Sea cable are served

together and wormed, the worming consisting of a number of strands of best Italian hemp. In compound cables some difficulty is experienced (unless special marking be adopted), of knowing one wire from another. In the present cable, Mr. Siemens adopts the simple but excellent plan of passing along with one of the hemp wormings, a white tape, which serves as a zero line. After being twisted together and wormed, the core receives its strengthening protection by being served with two servings of best Italian hemp. Each serving consists of about twenty compound strands of hemp, served under tension, and with a very short lay. The second serving is in the reverse direction to the first. After this serving, the cable receives its external protection of copper sheathing, which consists of four strips of the prepared copper, laid helically, one strip overlapping the other for one half its breadth. In consequence of the strip being previously prepared, the cable comes out nice and smooth, and coils most readily, being exceedingly flexible and easily managed. The strips of copper are soldered into continuous lengths, care being taken that no two joints be allowed within a certain distance of each other.

In the manufacture of these cables, the whole process goes on at the same time, and really in the same machine. By the application of the same power, the wires are stranded and wormed, served, and finally sheathed in one continuous machine. Usually, these operations are separate and distinct; the core is commonly stranded, wormed, and served in one machine, and afterward finally sheated. At Charlton, these several operations are conducted on the same machine (or, rather, combination of machines), at the same time. Where space is an object, this plan is, undoubtedly, advantageous; but otherwise, where there is plenty of room, we cannot but think that time must be lost. Anything required to be done to any one part, necessitates a stoppage of the whole. The jointing of the gutta-percha wire, the replacing a hemp bobbin, or the jointing of an external wire, each must stop the whole machine; whereas, in separate machines, only one is stopped at a time.

The specific gravity of the copper sheathed cable in 1·6; its weight a little over 2 tuns; and, although apparently showing but slight signs of strength, its breaking strain is considerably more than would be imagined, amounting to nearly 5 tuns. The shore ends are of heavy iron wires, and of the usual construction. The Kertch cable is also an iron covered cable, but the core consists of three wires insulated with Hooper's material. The iron wires are protected externally with a serving of tarred hemp, and the whole weighs about 12 tuns to the mile. The steamer *Hull* has been engaged for the work, and fitted up with the necessary watertight iron tanks, which are three in number. They are placed in the fore and main holds, the forward containing the Kertch cable; the main, the Black Sea (copper sheathed) cable. Over the fore tank, when the cable is in, will be placed a second tank to receive the shore ends of the Black Sea cable. The paying out and picking up machinery, with engines, have been constructed by Messrs. Easton & Amos, and are placed at the stem of the vessel, the paying-out machine being used, if required, for picking up. This machine is so arranged that at any moment it can be stopped and the engine attached to it, in order that the cable may be drawn in to any distance. The engine is supplied with steam either from the main boiler or the donkey. There are some special features of interest relative to the friction brake and the dynamometer, which call for attention, but we regret that want of space compels us to postpone our notice of them to a future occasion.

It is expected that the vessel will leave at the end of this month or the beginning of the next. Mr. C. W. Siemens goes out with the vessel, and will superintend the operations in connection with laying the cable; and we trust that the expedition will meet with all success—completing successfully an important section in the system of the Indo-European Telegraph.—*Mechanic's Magazine.*

Threatened Extinction of Patent Rights.

To the brainworkers of England we appeal for support in resisting the attempt now commencing in the House of Commons to deprive them of all prospects of reward for their labors. The assault is to be made in the basest spirit of ingratitude by one of our commercial men, who himself has already profited, as have all his class, by the efforts of inventors. To those of our legislators who profess to regard as of the highest moment, the interests and welfare of the working classes, we need scarcely urge that here is a crucial test for their sincerity. To both, we say, rally round your flag and do not permit this suicidal folly to be perpetrated,even though a few narrow-minded manufacturers may be found so devoid of common sense as not to perceive that they would but unedge the tools with which alone they can hope to work effectively, and maintain the supremacy of this country in the mechanical and chemical arts, if indeed they have failed to discover that competition with our foreign rivals cannot be met except by cheapened productions. Yet cheapened production can only be effected by inventive genius, which merely asks for and is entitled to its fair reward, and no manufacturer has any right to demand exceptional legislation in order to rob others that he may be profited.

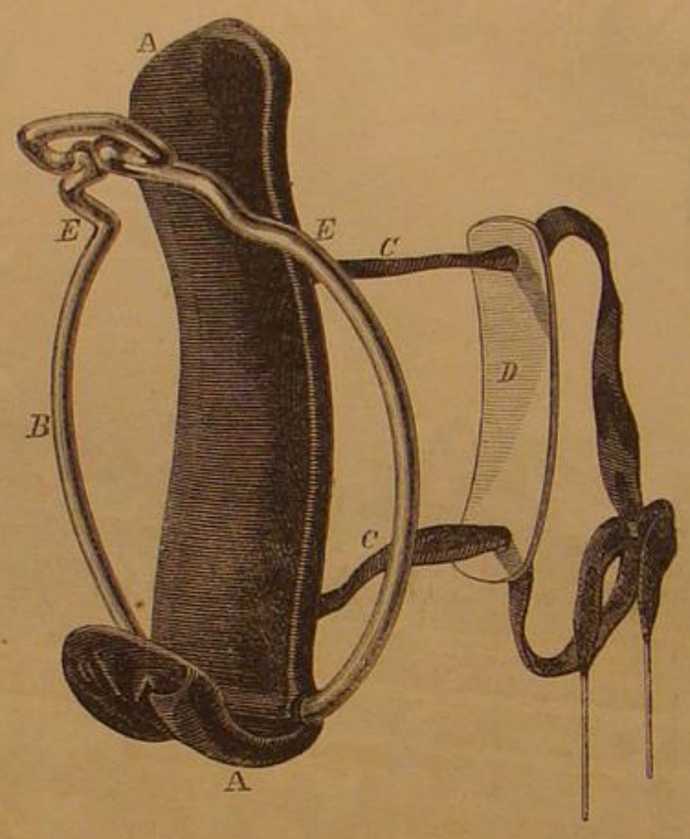
Were the blow simply aimed at the existing patent laws, so that a more sensible procedure, a more complete protection, and cheapened charges, might be exchanged for the perverted system we have so long and persistently condemned, the change would have commanded our heartiest support, as it has now our firmest opposition. But such is not the object of Mr. Macfie, M.P., who has long been known as the ringleader of those who expect inventors, without fee or reward from them, to work for their benefit. He is also one of the ablest exponents of a theory, fallacious in its assumptions, savoring of the wildest socialism and the most despicable selfishness, a theory which, if put in practice, would bring ruin and destruction upon all our industries.

Now, if ever, is the time for all who have at heart the interests of invention, of science, of industrial progress, and who desire to maintain for this country that proud position which it has acquired among the nations as the initiator of the steam engine, the railway, and the electric telegraph, to join, as one man, not only in converting this audacious attack into a triumphant vindication of popular right and justice, but to stand forth as the liberators of the inventive genius of England from its final shackles, by obtaining for the poorest inventor a property in the fruits of his labor as simple and perfect as that which the law already confers on books or works of art.

Had an M. P.—a publisher for instance—given notice that he would move in the House of Commons a similar resolution affecting the existence of the law of copyright, there is not a thinker or writer in the land who would not join heart and hand in denouncing so revolutionary and infamous a proposition. On our part, no effort shall be wanting to show Mr. Macfie that he shall not with impunity enter upon his course of spoliation; and we cannot more appropriately conclude this appeal than by quoting the soul-stirring words of the immortal Nelson—"England expects every man to do his duty."—*Scientific Review.*

WATCH PROTECTOR.

The device shown in the engraving which accompanies this sketch is one likely to render the profession of the light-fingered gentry much less profitable than heretofore. By its use the watch is so firmly held in the pocket, that a snatch-thief or pickpocket, must, in order to take it, take also the garment, or least a portion of it.



In the engraving, A represents a plate of brass swaged to the proper form and covered with velvet. To the lower end of A, which is recurved, is attached a ring of smooth wire, so made that the plate, A, and the ring, B, spring together with considerable force. To the back of A, are attached strings or cords, C, which, when the protector is placed in the fob, pass through eyelets made in the back of the fob, and after being passed through holes in the plate, D, are firmly tied, thus fastening the instrument firmly to the garment in which the watch is carried.

When thus attached the watch is slid in between the top of the ring, B, and the plate, A, and the lower part of the case rests upon the recurved portion of A. The plate, A, and the ring, B, then close by their elasticity, which brings the shoulders, E, directly over the top of the case, while the stem of the guard ring passes through between them. When thus closed no amount of pulling will remove the watch, until the ring, B, is made to open away from the plate, A. This is accomplished with an easy manipulation by the wearer of the watch, but one which if attempted by a pick-pocket would infallibly lead to his detection.

This device was patented by E. R. Pease, April 14, 1868, whom address for territorial rights, at Poughkeesie, N. Y.

Geo. E. Ranous, 35 Maiden Lane, New York city, is agent for the sale of the article.

The Captive Balloon.

Those who visited Paris during the last Great Exhibition will, doubtless, remember M. Giffard's captive balloon, and the machinery by which the ascents and descents were regulated. This machinery has now been brought to London, together with a balloon 23ft. larger in diameter than the Paris balloon, and a rope of much greater length. On entering the Ashburnham Park, the visitor finds himself in a circus 246ft in diameter, encircled by a screen of timber framing, 80ft in hight, and covered with canvas. In the center of this arena is a well about 15ft deep, over which the balloon, when not on a journey, is held in place by numerous guy ropes. This balloon is 93ft in diameter, and when inflated contains 421,161 cubic feet of gas, pure hydrogen being the gas used. The material of which the balloon is constructed is composed of one layer of linen interior, united to another layer of the same material, by means of a solution of india-rubber. Outside of this is a layer of Cretonne linen, the attachment being formed by a vulcanized india-rubber composition. The exterior is finished with two coats of gum shellac varnish, over which again are laid fine coats of boiled linseed oil. From the balloon is suspended a circular car, having the center open for the passage of the rope, which is attached directly to the body of the balloon. The car will accomodate about twenty-five persons; this was, in fact, the number that made the ascent to which we have referred. The rope is made fast to a pressure gage, having a horizontal dial, upon which a pointer indicates the strain pnt upon the rope at any moment. The balloon weighs 6,000 lbs; the core netting, with which it is covered, and the necessary guy ropes, etc., which are very numerous, are stated to weigh 4,000 lbs.

The main rope by which the balloon is held captive, weighs 4,350 lbs., is 2,150 feet in length, and is 2¾ in. in diameter at the end next the balloon, gradually tapering to 2 in. diameter at the end next the winding drum. The object of thus tapering the rope, is that its weakest part may be nearest the ground, at which point it would first give way, if it broke at all—which is hardly probable. By this means, if such an event should take place, there would be no danger to those below, from a heavy mass of rope falling upon them. It would also act somewhat as a brake upon the balloon, which would otherwise shoot upwards at a terrific rate, when suddenly relieved of its load. The rope passes from the balloon over a pulley wheel 5 ft. 6 in. in diameter, which is so arranged that it allows the rope to pass freely over it, no matter what angle it may take. It is, in fact, swiveled horizontally and vertically, and has a heavy counter-balance weight attached to it. This pulley wheel is held down by a strong framework, which is built into the earth, and is weighted with 50 tuns of brick, iron, and timberwork. The rope passes horizontally from the pulley along a gradually widening tunnel to the winding drum which is placed at the far side of the circus. This drum is 23 ft. in length and 7 ft. in diameter. It is cast in lengths, and is grooved to receive the rope. The drum is surrounded by a platform, at each end of which is a double-cylinder steam engine of horizontal construction. These engines drive the drum by means of toothed gearing; they receive steam from two vertical boilers placed in the rear of the circus. The boilers are of French construction, by M. Duresnes, as are also the engines, which are by M. H. Flaud. The winding drum was made in London by M. Babeaud, the engineer in charge of the balloon machinery.

On a piece of spare ground in the rear of the circus is the apparatus for producing the gas. This consists of a series of wooden vats in which scrap iron is placed in a solution of sulphuric acid. The gas is drawn off to a receiver, and is made to pass through a washer and a purifier, after which it is stored in a gas holder ready for use. The balloon is always kept inflated, but there is always a loss going on from condensation, the deficiency being made good every evening. The cost of the balloon and apparatus has been something considerable, as will be seen from the following items: Cost of balloon, £2,000; netting,guy,and other necessary ropes, £2,000; main holding rope, £220; engines, boilers, and machinery to work the balloon, £4,000; gas works, £1,200. These items—which are not all that could be enumerated—represent the respectable sum of £9,420, and when we add that the gas for one inflation costs £600, it will be seen that M. Giffard has made an investment of no light nature, but which we trust will prove as satisfactory to himself as his balloon will prove attractive to the public. A careful examination of the whole apparatus has satisfied us that everything is as safe as human ingenuity and foresight can make it. Two experienced aeronauts, MM. Godard and Aymo, accompany each ascent, while the manager is M. Yon, who manufactured the whole of the ropes and netting, and also constructed the balloon for M. Giffard. We can but wish success to this novel enterprise, which we are sure will be well patronized by the public, whenever the weather will permit of ascents being made. There is now no excuse for the public not enjoying the privilege of a balloon ascent, which luxury has hitherto only been allowed to a select few.—*Mechanics' Magazine.*

THE London *Court Journal* contains the following notice of the apparatus employed in printing the *Times*. "The *Times* is now printed by new machinery so perfect and so simple, that it takes but one engineer and three laborers to print off the whole edition of the *Times*. The principle of the machine is that the paper is not cut into sheets before it is printed, but is brought to the machine in a long roll. It passes through the machine, is printed on both sides, and is divided as it passes out, the whole process being automatic. The idea has long been worked at by engineers, but has only lately been practically carried out, under the superintendence of Mr. Macdonald, the engineer, who has charge of the whole *Times* machinery." Four of these machines are in the printing department of that paper. This machine appears to be the same as the Bullock Press now used to print some of the newspapers of this city.

THE *Press* says: "A new era in scientific education has been inaugurated by the management of Lafayette College, Easton, Pa. The scientific classes of that institution will make a tour of the State during this month. They will be under control of one of the leading professors, and will visit points of mining and manufacturing interest. When nature is made the class-room, American youth must needs acquire the highest order of education. Perfection in this respect is not perfect unless it is practical, and practicability is the result of the system introduced by Lafayette."

Treatment of Disease by Inhalation.

The treatment of certain diseases by inhalation, has advantages that do not pertain to any other method of administering drugs. In lung and throat diseases the parts may by this method be treated by direct application of the remedial agent to the diseased part, and in diseases of the uterus and vagina, the application of medicated vapors insures intimate contact of the remedies with the parts affected, when a proper apparatus is used for the purpose.

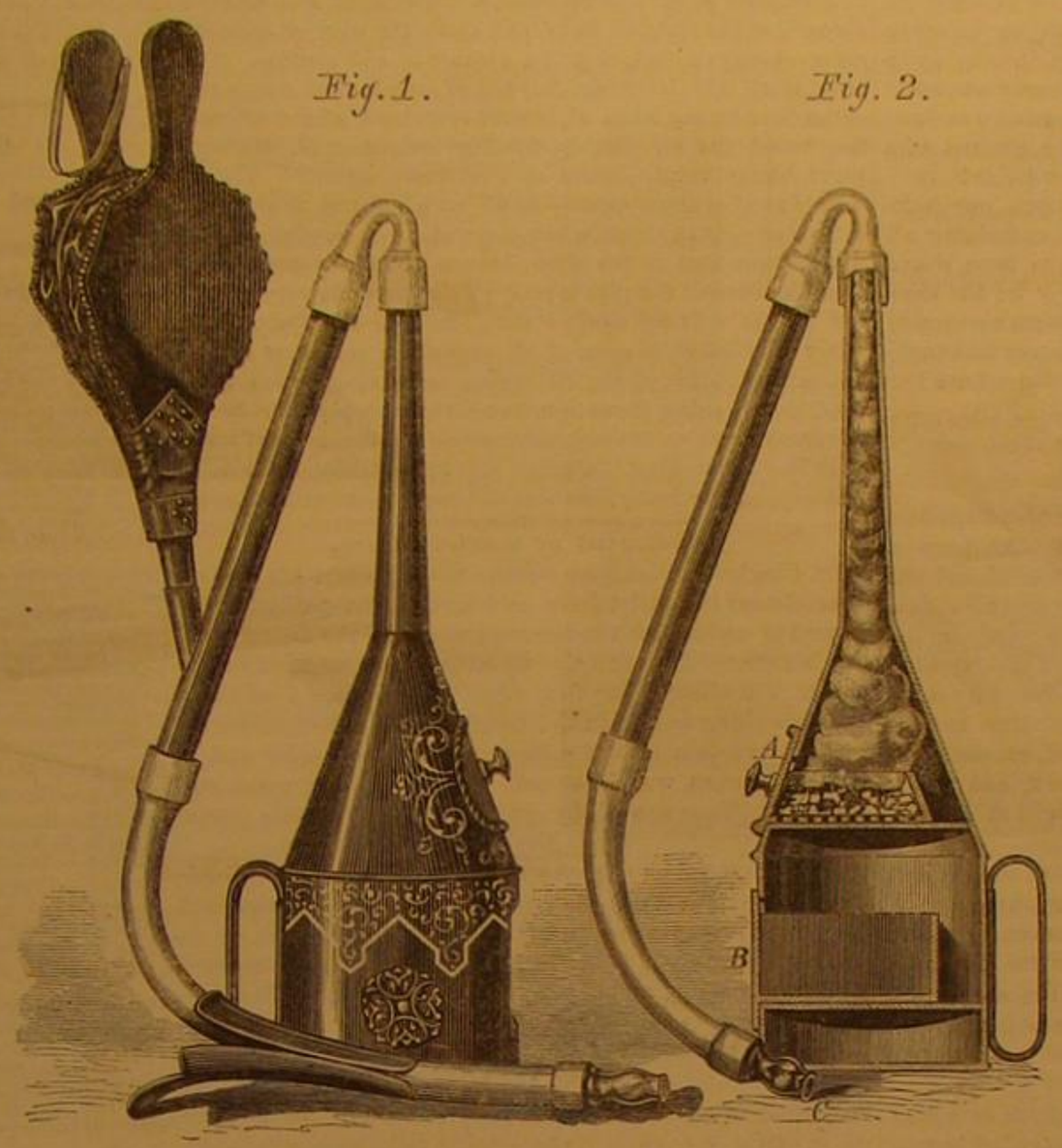
The inhaler, patented December 26, 1868, by G. H. Tichenor, M.D., of Canton, Mississippi, is designed to facilitate the process of inhalation and to enable it to be performed in a more perfect manner, than can be done by any of the means previously employed. Its construction is simple and will be easily understood by reference to the engraving which accompanies the description of the improvement.

Fig. 1, is an elevation of the complete apparatus, and Fig. 2 is a vertical section showing the interior construction. The apparatus may be made of tin, sheet iron, or other suitable material, and the general form is that of a cylinder surmounted by an inverted funnel. It contains an upper drawer, A, with a perforated bottom, and a lower drawer B. In the upper drawer is placed the drug or compound, of which the vapors are desired to be inhaled. In the bottom drawer is placed the coals, or preferably a piece of heated iron. The heat radiating against the bottom of the drawer, A, volatilizes or ignites the substances placed in A, and thus the vapors are formed. The drawer, B, is left partially open while the vapor is generating and admits atmospheric air which becoming heated rises and passes through the perforations in the bottom of the drawer, thus diluting the vapor. The amount of dilution is regulated of course by the amount of opening of the drawer, B. From the top of the inverted funnel passes a tube composed at each end of vulcanized rubber, to give flexibility and terminating in a mouth-piece, C. The medicated vapors rising through the funnel, as shown in the engraving, pass through this tube with considerable force, on account of the draft occasioned by the heat, and are then inhaled by the patient.

When the uterus or vagina are under treatment, the drawer B, is closed and an artificial draft is created by means of a hand bellows attached to the tube as shown in Fig. 1, and the manner of using the instrument will be obvious to medical men.

Dr. Tichenor may be addressed for further information at 363 Broadway, New York.

Fig. 1. *Fig. 2.*



TICHENOR'S IMPROVED INHALER.

Disposition of Gas Burners.

Much of the economy and effect of gaslight, says the *Gaslight Journal*, depends upon the arrangement of gas burners in relation to each other, to the surroundings of furniture, hight of ceilings, distance, and angles of walls, hangings, etc.

The general practice in this country and in Europe, of disposing burners in chandeliers in the center of rooms, although pleasing to the eye in its artistic effect, simply as an ornament to the room, is far from being the most philosophical manner to obtain the best effect from the light.

The diffusion of light, in its effects, is materially modified by the laws of reflection and refraction.

Light decreases in intensity in proportion to the square of the distance from the burner or point of illumination. This is a general rule, but in a room with four white walls and a ceiling, the reflection of the light upon itself, as it were, will apparently modify the rule.

Shadows have much to do in the effective and satisfactory lighting of any hall or room. Hence it is a single light, or a center piece, or nucleus of lights as represented by a chandelier, is objectionable, because your shadow will appear in any part of the room opposite to the light, and is more or less inconvenient in proportion as it differs in that respect from daylight, which is so diffused as to avoid this evil except in peculiar conditions.

Now, in view of these suggestions, is it not apparent that the proper and most efficient position for gas burners is at the different sides, or better, the different angles of a room? Then the intensity of light will be more uniform in every part of the room, no shadows will be formed, and the reflective action of the walls will be most effective. These *reflections* will show the folly of using bracket lights at one side only of a room; where shadows fall in every direction it is possible to move from it, and with increased intensity as you go, until the gloom of the opposite side brings you back like a moth, to be blinded by the glare of the immediate proximity of a single luminary. If brackets are to be employed, let there be at least two in a room, and these disposed *vis a vis*, or as nearly so as possible.

Reflectors.—The value of reflectors is not appreciated as it should be, and the reason is principally because few people, even those whose business is to make apparatus for artificial light and attend to the introduction of gas fixtures, etc., are sufficiently acquainted with the laws that govern reflected light, and when so, they fail in the mechanical ability to properly arrange reflectors so as to obtain the proper effect. Reflectors should be made of a material that will not tarnish by the action of the atmosphere or the temperature they may be exposed to. A very slight film of dust, moisture, or smoke on a reflector will almost entirely destroy its value as a reflector. The surface of the reflectors should be perfectly smooth and free from scratches and abrasions. Hence, it is apparent that metallic reflectors are not the best in that respect.

Glass reflectors are superior, inasmuch as they do not become tarnished, abraided, or scratched, but their action is impaired if the glass is too thick, owing to the absorption of light. The late American invention of a mica reflector is advantageous on that account, because the plates or lamina are very thin. It has also the advantage of not being fragile or liable to fracture.

Reflectors are better placed overhead. A reflector which throws the light in a horizontal direction, unless neutralized by another opposite, will be very disagreeable, owing to the dazzling glare. As a rule, reflectors should be so placed that the reflective rays shall never reach the eye in a straight line. This will avoid the evil effects of glare. As a rule, all the direct rays of a lamp or burner thrown upward may be thrown downward by reflectors, producing a great economy of light and an effectiveness of illumination very pleasant and satisfactory.

Apple Worms.—"Carpocapsa pomonella."

Almost every one who is in the habit of eating raw apples must have repeatedly noticed the little whitish worm, which is so often found burrowing at the core of the fruit, and filling it with its disgusting excrement. But probably not one fruit-grower out of a hundred has ever seen the little moth which is produced from this worm, and which, in in its turn, gives birth to a fresh generation of such worms. In the annexed

figure, *a* shows the burrowings of this worm-like larva, *b* the point where it effects its entrance, *c* the larva itself, of the natural size when full grown, *h* the front part of its body magnified, *d* the pupa, *i* the cocoon, and *f* and *g* the perfect moth, which is distinguishable from all other moths by a patch of burnished coppery scales at the tip of its front wings. In English this moth is variously known as the apple-worm moth, or the codling-worm moth, but there is only one scientific or Latin name for it. Like most of our worst insect foes, it was originally a denizen of the Old World, having been introduced into this country only about the beginning of the present century. Twenty years ago it was unknown in Illinois; and it is only within the last eight or ten years that it has penetrated into Iowa.

The apple-worm moth makes its first appearance in North Illinois from the last of May to the forepart of June, and a little earlier or later according to the season or the latitude. Usually, at the time it appears, the young apples are already set, and beginning to be about as large as a hazel-nut. After coupling in the usual manner, the female moth then proceeds to deposit a single egg in the blossom end (*b*) of the fruit, flying from fruit to fruit until her stock of eggs (amounting to probably two or three hundred) is exhausted. Not long after accomplishing this process she dies of old age and exhaustion. In a very few cases the egg is deposited in the hollow at the stalk end of the fruit, or simply glued on to the smooth surface of its cheek. In a short time afterwards the egg, no matter where it is located, hatches out, and the young larva forthwith proceeds to burrow into the flesh of the apple, feeding as he goes, but making his head-quarters in the core. In three or four weeks time it is full grown, and shortly before this the infested apple generally falls to the ground. The larva then crawls out of the fruit through a large hole in the cheek, which it has bored several days beforehand for that express purpose (as shown in the figure), and usually makes for the trunk of the tree, up which it climbs, and spins around itself a silken cocoon of a dirty white color, in any convenient crevice it can find, the crotch of the tree being a favorite spot. Here it transforms into the pupa state; and, towards the latter end of July or the forepart of August, bursts forth in the moth state. We have noticed that a larva will occasionally spin its cocoon on the under surface of some board lying flat on the ground, instead of climbing the tree in the usual manner.

The whole of the above process is now repeated by this second generation of moths; but, the apples being now very much larger, not near so many of them fall to the ground through the internal injury inflicted by the insidious little apple-worms. A large part of them, in fact, hang on the trees till they are ready to be harvested, and in many of them the worms may still be found even up to the beginning of the winter. Those larvæ that leave the apples before they are harvested dispose of themselves in the same manner as the larvæ belonging to the first or spring brood. Those that remain in the apples until they are barreled up almost invariably make their way out in the course of the autumn, and spin their cocoons under the hoops of the barrel, or in any suitable cracks they can find in the staves. In a single apple-barrel, which we broke up in the spring for this express purpose, we once found about two hundred such cocoons. But wherever this second brood of larvæ spins its cocoon—whether on the tree, under some loose board, or under the hoops of a barrel—it always lies in its cocoon, in the larva state, all through the winter without eating anything, and never transforms into the pupa state till the beginning or middle of the following May. It is from this generation of pupæ that the early brood of moths takes its origin, which lay their eggs upon the young apples when they are about the size of hazel-nuts, as already explained.

It has long been known that, by placing an old cloth, or anything of that nature, in the crotch of an apple tree, the apple-worms may be decoyed into building their cocoons underneath it, and thus be destroyed wholesale. Dr. Trimble's method—which amounts to the same thing, and has been found to be practically very beneficial—is to fasten two or three turns of a hay band round the trunk of the apple tree, and every few days, from the middle of July to the middle of September, to slip the hay band up and destroy the cocoons that have from time to time been formed on the bark underneath it.

All authors are agreed as to the practical importance of picking up and destroying the wormy apples as soon as they fall, either by hog-power, or, when that is inconvenient and impracticable, by man-power. When we consider that every female moth that hatches out in July or August, from the first brood of apple worms, will probably deposit an egg in some two or three hundred nearly matured apples, thereby rendering them more or less unsalable, the importance of destroying the wormy windfalls—in the forepart of the season at all events—becomes at once apparant. The larvæ that leave these early windfalls lie so short a time in the cocoon before they come out in the moth state, that there is not much chance for birds, and other insect-devouring animals, to get hold of them, more particularly as insects of various other kinds are always to be met with abundantly in the summer time. But with the second brood of larvæ, which have to lie for six months in a torpid state, all through the long and dreary winter, when woodpeckers, and such other birds as do not migrate to warmer climates in the cold season, are often hard put to it for food, we are satisfied that the case is very different. From the careful inspection of several large orchards in the early spring months, we are convinced that almost all the cocoons of the apple-worm moth, that have been constructed in the autumn on the trunks and limbs of apple trees, are gutted of their living tenants by hungry birds, long before the spring opens. How then is the breed propagated in the ensuing spring? Partly, perhaps, from such few cocoons as have been placed under boards lying flat on the ground, under logs, etc., but in a great measure, as we

believe, from the cocoons contained in such vast numbers, as has been already shown, in empty apple barrels. To these, situated as they generally are in cellars, or in barns or other out buildings, birds have no access, consequently, as the spring opens, the moths mature from them in great flocks, without let or hindrance, and, flying forth into the apple orchards, immediately commence their evil works. We have ourselves noticed the moth in early spring, in the windows of a house in the cellar of which a few bushels of apples had been stored through the winter. Suppose that from one such infested barrel there are generated one hundred female apple-worm moths, and that each moth, on escaping into the orchard, lays only two hundred eggs, thereby spoiling two hundred apples; it follows that twenty thousand apples, or, allowing a hundred apples to the bushel, two hundred bushels of fruit may be ruined by the product of a single old barrel, worth perhaps a quarter of a dollar!

We would, therefore, earnestly impress upon our fruit-growing readers the practical importance of examining all barrels or other vessels, in which apples have been stored through the winter; and if, as will generally be the case, they are found to be swarming with apple-worm cocoons in the spring, let them be either burnt up at once, or thoroughly scalded by immersing them in boiling-hot water for a few minutes.—*American Entomologist.*

VELOCIPEDE NOTES.

An important meeting of the manufacturers of velocipedes was held in this city on Monday, the 7th inst. All parts of the country except New England were represented, and the action was unanimous. It was determined to resist all claims under the Lallemont and Smith patents, and to recognize the Hanlon patents alone. A fund for the purpose of the expected litigation will be provided by a contribution of from fifty cents to a dollar upon each machine made. A committee to take charge of the future proceedings was appointed, consisting of Messrs. T. R. Pickering, Cornelius Van Horn, and G. H. Mercer; Mr. Van Horn as Treasurer. They will at once retain suitable counsel, and prepare for the contest.

The newspapers from Amsterdam, the capital of the Netherlands, mention a new steam velocipede invented by a certain Mr. J. Loeff. It has three wheels, is compact, easily governed, runs very fast, and may be easily stopped. One has been made so as to accomodate two persons, having a steam engine of 1½-horse power, making about twenty miles an hour. Another is in course of construction, of 2-horse power, with seats for four persons.

The success of these vehicles is said to have been such that the practicability of using such velocipedes, instead of horses, to propel the boats on the Dutch canals, is under discussion. To carry out this plan, a company has already been formed.

The French papers contain the description of a peculiar velocipede invented by M. Guillermin, of which we give an extract:

It has three wheels, and is partially covered by the figure of a horse made of india rubber. In the sides of this horse is wheelwork driven by springs, made of thin steel strips, thirty yards long, which are wound up as spirals. These springs are so connected, by means of a series of cog wheels, with the wheels of the velocipede, that, when once wound up, they cause these wheels to make two thousand revolutions, and as their diameter is 3 feet, they may run more than 3 miles when once wound up.

The handle, with which to wind up, is at the side of the horse, within reach of the rider, who can turn it without stopping the machine. The india-rubber horse has its fore legs on the axis of the front wheel; serving in fact only as envelopes for covering the legs of the rider, who apparently makes no motion, but he uses his feet and hands for steering and propelling. It is expected that one may make 15 miles per hour with this machine without fatigue. The ears of the horse are handles by which the rider opens the head, in which is a box containing provisions and refreshments; while behind him, another receptacle in the horse contains his valise and other property.

It is reported that Frenchmen regard this ridiculous machine as one of the most elegant things which has yet appeared since the velocipede sensation first commenced.

Titusville, Pa.

About a mile below Titusville, the first oil-well derrick that was ever built, in this or any other country, is still to be seen. In the light which petroleum has thrown upon the world since, the history of this primitive enterprise stands out like a romance, the interest of which is hightened not a little by the fact that the man who first bored for oil, and by his pluck and perseverance, not only flooded a community with sudden riches, but increased the wealth of the world, is to-day himself a poor man.

That man is Mr. E. L. Drake, commonly called "Colonel Drake" in the oil region. He first made his appearance here in 1857. Previous to that time he had been a conductor on a railroad in Connecticut.

Before the first oil well was sunk Titusville (named after a family of Tituses) was a small backwoods village, with a population of raftsmen and lumbermen numbering about two hundred. Oil flowed from that well, and in five years Titusville became the fourth post-office town in the State. It had forty hotels, and a fixed or floating population of I know not how many thousands—speculators, shop-keepers, well-diggers, and teamsters. The army of teamsters alone numbered at one time not less than four thousand.

Very different is Titusville, to-day.—The brick blocks that sprang up in that period of excitement still remain; and I am told that it has now a permanent population of seven thousand. But comparative quiet reigns here. The forty hotels have been reduced to four or five. This change has not been brought about simply by the failure of wells in this vicinity and the continuation of the railroad down the creek. Oil enough still comes here to keep up the old excitement, if teams were any longer of use in conveying it. Teamsters supported the hotels, the shops, the smithies, and kept various branches of business alive; bat the time came for a revolution in this cumbersome and costly method of transportation.

Teamsters were to be superseded. The right man stepped forward at the right moment, and spoke the word of common sense—always a danger and a menace to old routine. "Instead of all this clatter and hubbub of wagons and whips and oaths, in carrying loads of barrels over land, why not," said he, "send the oil silently flowing underground, through pipes, like so much Croton or Cochituate water?" The reform was of course opposed—as all such reforms must be at the outset—by the class whose interests were assailed. Mobs of teamsters tore up the pipes, burned the tanks, and threatened the lives of the pipe-layers. This was done repeatedly; but it was striving against fate. In 1865 the system was fairly established, in spite of all opposition, and now almost the entire product of the oil region, amounting to ten thousand barrels a day, flows or is forced through pipes, from the scattered farms, to the railroad centers, and the army of teamsters has disappeared. A great saving in transportation, in whiskey, and profanity, has been the result.—*Atlantic Monthly.*

Treatment of Scarlet Fever.

Dr. Charles T. Thompson reports in the *Lancet* his manner of treatment in scarlet fever as follows: The patient is immersed in a warm bath in the early stage of the disease, and this is repeated frequently, or as often as the strength of the patient will allow. The first effect is to produce a soothing and refreshing feeling in the patient, to be followed soon by such an eruption on the surface, of so vivid a color, and in such amount as would astonish those who have never witnessed it. Thus one of the greatest dangers of this fearful disease—the suppression of the eruption—is escaped.

The appetite generally returns after the first or second bath, and the strength of the patient is kept up by nutritious food. The bath prevents the dissemination of the disease, by removing the excreta from the skin as soon as it is deposited. This treatment promotes cuticular desquamation. The body should be gently dried by soft linen cloths after the bath.

By this procedure the various secretions are deprived of their noxious properties, and the irritation of internal organs is quickly relieved, thus dissipating infection. Another benefit is that a very serious case is soon reduced to a mild one, and the patient recovers in less than half the usual time. Since Dr. Thompson has pursued this practice—during the last fifteen years—he has never lost a patient from scarlet fever.

Correspondence.

The Editors are no responsible for the Opinions expressed by their Correspondents.

Crank vs. Pulley.

MESSRS. EDITORS:—The subject of the crank and pulley have at various times received attention in the columns of your journal, and always to the disadvantage of the pulley. Not I think because of the intrinsic advantage of the crank over the pulley, but from the manner in which the subject has been presented by the advocates of the pulley. These advocates have always laid their great stress on the pulley by the advantage in leverage, which they affirm it has over the crank, while every mechanician will see at once that they are mistaken; but instead of meeting the crankites with argument and facts to sustain their side of the question, they call hard names and endeavor to ridicule the crankites out of their true position. Now while I am not certain that I am right, not because I am not positive in the correctness of my position, but because I find no one who agrees with me on the subject, I will, with your permission, endeavor to show wherein the crank loses power in its operation, and wherein it would be saved by the pulley, or some other device, could one be found that would work as practically as the crank.

In the first place, there is a difference in the travel of the piston from the center of the cylinder, to the ends of the cylinder, according to the length of the pitman; with a short pitman more and with a long pitman less. When the piston is at the outer end of the cylinder and moving in toward the crank at half stroke, the crank has not made a quarter revolution; and when it travels the other half of the stroke, or comes to the other end of the cylinder, it makes just as much more of the quarter revolution as it fell short of in the first half of the stroke; and when it turns the corner and returns, the first half of the stroke makes more than a quarter of a revolution, and the last half of a stroke less than a quarter revolution; so that there is a constant antagonism between the travel of the piston in the first and last half of the stroke; and not uniform either, for the first half of the outgoing stroke is the longest, and the first half of the ingoing stroke is the shortest. Now this being the case, just as much steam is used in one end of the cylinder as the other; either the piston must make unequal time in its travel, or the crank and fly wheel must make unequal time in its motion—and there is a constant antagonism between them, and it seems to me an effort of power to keep up an equilibrium. But it may be said, which is true, there is just an equal amount of leverage, in the two halves of the stroke, and consequently, an equal amount of power exerted, on the crank, the whole stroke. That is all true, but it does not help the matter any, it does not change the time taken to pass through, or over a given space, for the leverage on the short travel of the crank being just the same as that on the long travel, it has a tendency to make the crank travel faster over the short part of the stroke than it does over the long, while the requirement to keep up steady and uniform travel of the crank and fly wheel, would require the quickest amount of travel over the long part of the stroke. And that is the reason in my opinion, why a large and heavy fly wheel, is required for an engine. It is to give regularity of motion and not to pass the centers.

Milwaukee, Wis. J. B. SMITH.

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Issued by the United States Patent Office.

FOR THE WEEK ENDING JUNE 8, 1869.

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90,911.—SEED PLANTER.—Moses Adams, Chilmark, Mass.

90,912.—STOVEPIPE DAMPER.—Thos. K. Anderson, Hornellsville, N. Y.

90,913.—SASH LOCK.—H. G. Arnold, Rochester, N. Y.

90,914.—CONVEYER TO TRANSFER BLANKS FROM A PUNCHING PRESS.—J. H. Baird, Oakville, Conn.

90,915.—THREE-HORSE EQUALIZER.—F. E. Barr, Albion, assignor to himself and J. J. Barr, Elba, N. Y.

90,916.—MEASURING CAN FOR LIQUIDS.—Wm. Barry, Carthage, N. Y.

90,917.—MODE OF FORMING THE CONNECTIONS OF GAS PURIFIERS.—Robert Briggs, Philadelphia, Pa.

90,918.—CENTER VALVE OF GAS WORKS.—Robert Briggs and Peter Muntzinger, Philadelphia, Pa.

90,919.—ATTACHING AUGERS TO HANDLES.—Elisha Broad, St. Anthony, Minn. Antedated June 5, 1869.

90,920.—CORSET SKIRT SUPPORTER.—J. W. Brooks, Boston, Mass.

90,921.—MACHINE FOR PLOWING AND BREAKING UP GROUND.—John Bryan, Lebanon, Ill.

90,922.—CORD-TIGHTENER FOR CURTAIN FIXTURES.—Albert Carter (assignor to himself and G. K. Ryan), New York city.

90,923.—BOSOM PAD.—Benj. Carter, Middletown, Conn.

90,924.—FURNACE FOR THE MANUFACTURE OF IRON AND STEEL.—T. J. Chubb, Williamsburgh, N. Y.

90,925.—MODE OF MAKING CAST-STEEL CASTINGS.—Thos. J. Chubb, Williamsburgh, N. Y.

90,926.—PROCESS OF MAKING CAST STEEL.—T. J. Chubb, Williamsburgh, N. Y.

90,927.—PROCESS OF MELTING AND REFINING IRON FOR MALLEABLE IRON CASTINGS.—T. J. Chubb, Williamsburgh, N. Y.

90,928.—MAKING BLOOMS OF STEEL AND WROUGHT IRON.—T. J. Chubb, Williamsburgh, N. Y.

90,929.—BRICK AND TILE KILN.—S. H. Clapp, Malden, Mass.

90,930.—STEAM-OPERATED WATER EJECTOR.—Hugh Coll Millville Borough, Pa.

90,931.—MACHINERY FOR CUTTING CARDS.—Edwin Cowles, Cleveland, Ohio.

90,932.—GRAIN SEPARATOR AND MIXER.—J. J. Crowley, San Francisco, Cal.

90,933.—ROLLING APPARATUS.—E. M. Davis (assignor to G.R. Duncan), Pittsburgh, Pa.

90,934.—DRAFT REGULATOR FOR HEATING APPARATUS.—Royal E. Deane, Brooklyn, N. Y.

90,935.—COUPLING FOR PUMP RODS.—I. A. Dewar, D. S. Smith, and R. A. Brashear, Franklin, Pa.

90,936.—FANNING MILL.—E. P. Dickey, Racine, Wis.

90,937.—HANGER FOR SHAFTING.—James Duff (assignor to himself and E. B. Pierce), Peoria, Ill.

90,938.—TUG HOOK.—John Eck, Medora, Ind.

90,939.—HARROW.—Joseph Foltz, Valley Mills, Ind.

90,940.—PUMP.—I. N. Forrester, Bridgeport, Conn.

90,941.—BEDSTEAD, SEAT, ETC.—C. T. Frost, Medfield, Mass.

90,942.—WASH BOILER.—G. M. Granger, Memphis, Miss.

90,943.—PINKING MACHINE.—F. L. Hagadorn, Baltimore, Md.

90,944.—PROCESS OF PRESERVING MEAT, FOWL, FISH, ETC.—Charles Havard and M. X. Harmony, London, England.

90,945.—KEY FASTENER.—J. E. Hills, Orange, Mass.

90,946.—MACHINE FOR SCUTCHING AND THRASHING FLAX.—Moses Jerome, Dixon, Ill.

90,947.—VELOCIPEDE.—E. A. Jones, Sturgis, Mich.

90,948.—STUD.—J. G. Kenyon, Providence, R. I.

90,949.—LIGHTNING ROD.—T. T. Kinsey, deceased, Philadelphia, Pa. (M. H. Kinsey and James Gilkyson, administrators).

90,950.—CORSET.—H. E. Marchand (assignor to R. E. Cross), Louisville, Ky.

90,951.—METALLIC CARTRIDGE.—J. V. Meigs, Washington, D. C.

90,952.—SHIFTING CLEATS, OR RING BOLTS, ETC.—J. E. Murray, Provincetown, assignor to himself, Z. D. Rich, Somerville, and Jos. Hall, Cambridge, Mass.

90,953.—SEEDER AND FERTILIZER.—J. J. Naylor, Brighton, Mich.

90,954.—SEWING MACHINE.—James Neale and Peter Beck, Bridgeport, Conn.

90,955.—PROCESS OF COLLECTING GOLD AND SILVER FROM ORES.—A. F. W. Partz, Oakland, Cal.

90,956.—RING FOR SPINNING MACHINE.—H. L. Peirce, Taunton, Mass.

90,957.—FIRE-PLACE HEATER.—D. S. Quimby, Jr., (assignor to D. S. Quimby), Brooklyn, N. Y.

90,958.—STEP AND BEARING FOR VERTICAL SHAFTS.—George Richardson, Lowell, Mass.

90,959.—DEVICE FOR TURNING SAW LOGS.—Warren Richardson, Colfax, Cal.

90,960.—MITER BOX.—Ezekiel Root, Parma, Mich.

90,961.—COMBINED LAND ROLLER, MARKER, AND HARROW.—Roger Sandiford, Joliet, Ill.

90,962.—MEDICAL COMPOUND.—Oscar Scidmore, Albany, N. Y.

90,963.—MINER'S LAMP.—William Seybold (assignor to himself and S. H. Hoffman), Mc Keesport, Pa.

90,964.—SNAP HOOK.—W. W. Sly, South Haven, Mich.

90,965.—BUGGY-TOP BOW SETTER.—Obediah Smith (assignor to himself, M. T. Givler, and W. H. Roser), Bloomington, Ill.

90,966.—IRONING TABLE.—Henry Soggs, Columbus, Pa.

90,967.—MINER'S LAMP.—J. S. Sommerville, Snow Shoe, Pa.

90,968.—CARRIAGE AXLE.—Thomas Spurrier, Sharon, Pa.

90,969.—STONE SAWING MACHINE.—T. H. Stevens, Dover, N. Y.

90,970.—HAY AND COTTON PRESS.—Enoch Thomas, Craigsville, Va.
90,971.—FARM GATE.—C. W. Todd, Spring Arbor, Mich.
90,972.—SAW FILING MACHINE.—William Tucker, Philadelphia, assignor to himself and P. A. Snell, Pittsburg, Pa.
90,973.—STEP LADDER.—C. G. Udell, Chicago, Ill.
90,974.—SHOULDER BRACE.—G. W. Walker, Lowell, Mass.
90,975.—FIRE ESCAPE LADDER.—Carl Weidling, New York city.
90,976.—VENTILATOR.—Henry White (assignor to himself and W. F. Whitehouse), Chicago, Ill.
90,977.—RAILWAY CAR COUPLING.—O. D. Woodruff, Southington, Conn.
90,978.—GRINDING MILL.—Henry Albright, Cranesville, West Va.
90,979.—CLOTHES RACK.—James Alcorn (assignor to J. N. Melvin for one third, and Thomas Quinn for one third), Charlestown, Mass.
90,980.—HARROW.—A. W. Ball, Delaware Grove, Pa.
90,981.—GRAIN SEPARATOR.—Stephen Ballard, Sr., Sullivan, Ind.
90,982.—FRICTION CLUTCH AND BRAKE.—Darius Banks, Jr., New York city.
90,983.—STOVE COVER.—O. B. Bartlett, Lewiston, Me.
90,984.—BEEHIVE.—J. H. Bassler, Pine Grove, Pa.
90,985.—BABY JUMPER.—William Berg and Mathias Stephan, Canton, Ohio.
90,986.—STALL FLOOR.—W. M. Bleakley, Verplanck, N. Y.
90,987.—SOLDERING FURNACE.—J. G. Borden and Walter Power, Brewster Station, N. Y.
90,988.—COMBINED STEAM AND VACUUM GAGE.—Charles Bourgeois, Buffalo, N. Y.
90,989.—COUPLING FOR WHIFFLETREES.—D. J. Brady, Greenwich township, Ohio.
90,990.—SPRING SADDLE-TREE.—J. R. Bragg, Williamsburg, Mo.
90,991.—FORK FOR HAY SPREADERS.—G. E. Burt and E. A. Hildreth, Harvard, Mass.
90,992.—FRICTION CLUTCH.—C. W. Cardot, Jamestown, N.Y.
90,993.—CARRIAGE WHEEL.—C. F. Carman, Hamburg, Iowa.
90,994.—MEAT CHOPPER.—Paul Clareton, New York city.
90,995.—TEAPOT HANDLE.—L. C. Clark, Plantsville, Conn.
90,996.—LET-OFF MECHANISM FOR LOOMS.—Wm. R. Clark, North Adams, Mass.
90,997.—POCKETBOOK.—S. C. Currie, New York city.
90,998.—CORD HOLDER FOR PICTURE FRAMES, ETC.—R. d'Heureuse, New York city.
90,999.—BED BOTTOM.—Samuel Dunlap, Rome, Ga.
91,000.—LUBRICATING CUSHION FOR RAILWAY CAR JOURNALS.—P. S. Devlan, Jersey City, N. J., assignor to himself and W. H. Jewell, New York city.
91,001.—HAY SPREADER.—W. H. Elliot, New York, assignor of one half to M. D. Myers, Frankfort, N. Y.
91,002.—SEED PLANTER.—F. E. A. Engelman, Cheektowaga, N. Y.
91,003.—CORN SHELLER.—F. Fanning, Atchison, Kansas.
91,004.—BAG HOLDER.—E. A. Fisher, Morganville, N. Y.
91,005.—CORN HARVESTER.—Amander Ford, Toledo, Ohio.
91,006.—WEATHER STRIP.—E. P. Ford, Shipman, Ill.
91,007.—PACKING IN CYLINDERS FOR DRYING PAPER.—W. B. Fowler, Lawrence, Mass.
91,008.—MANUFACTURE OF CORES.—Samuel Fulton, Conshohocken, Pa.
91,009.—NUT AND COFFEE ROASTER.—D. A. T. Gale, Poughkeepsie, N. Y.
91,010.—STEAM ENGINE PISTON PACKING.—John Gates, Portland, Oregon.
91,011.—KNIFE SCOURER.—S. R. Goodsell and J. Q. Adams, Brooklyn, N. Y.
91,012.—TOILET AND NURSERY TABLE.—Henry Havekorst, Leavenworth City, Kansas.
91,013.—FEED BOX.—Joseph Hawse, Wolcott, Vt.
91,014.—GUN LOCK.—R. D. Hay and J. M. Hill, Crooked Creek, N. C.
91,015.—CENTER BEARING FOR LOCOMOTIVES.—B.W. Healey, Providence, R. I.
91,016.—CHURN.—Eaton Hitchcock, Sturbridge, Mass.
91,017.—WATER WHEEL.—J. B. Holmes, Lawrence, Kansas.
91,018.—VELOCIPEDE.—W. F. Holske and B. T. Babbitt, New York city.
91 019.—BELL LEVER BOX.—B. W. Hopper, Astoria, N. Y.
91,020.—SHADE FOR GAS AND LAMP BURNERS.—John Horton, New York city.
91,021.—REFRIGERATOR.—David Howarth, Portland, Me.
91,022.—APPARATUS FOR PARLOR GAMES.—Chas. N. Hoyt, Providence, R. I.
91,023.—WATER ELEVATOR.—David Jones, Machen, Newport, Wales.
91,024.—HARROW.—S. G. Jones, Niantic, Ill.
91,025.—MACHINE FOR MAKING PAPER BOXES.—J. M. D. Keating and T. V. Waymouth, New York city.
91,026.—SHUTTER WORKER.—Daniel Kidder, Franklin, N. H.
91,027.—RAKE.—J. C. Klein, Birmingham, Pa.
91,028.—CAR COUPLING.—Charles Layton, Matawan, N. J.
91,029.—VIOLIN.—Jacob Lenhard, New York city.
91,030.—MOSQUITO NET SUPPORT.—B. M. Leroy and Albert Strasser, Montgomery, Ala.
91,031.—CULTIVATOR PLOW.—A. J. Lewis, Pittsburgh, Pa.
91,032.—FLY FRAME.—J. G. Luscomb, Taunton, Mass.
91,033.—IRONING BOARD.—Andrew Matson, Elizabeth, N. J.
91,034.—COTTON BALE TIE.—G. B. McDonald, Louisville, Ky.
91,035.—VELOCIPEDE.—J. W. McMillan, Greenville, Ala.
91,036.—POTATO DIGGER.—F. A. Morley, Syracuse, N. Y.
91,037.—COMBINED HORSE HAY RAKE AND HAY SPREADER.—F. E. Nearing, Brookfield, assignor to himself and Wm. H. Hubbell, Danbury, Conn.
91,038.—BLACK PIGMENT FROM MINERAL CARBON.—Philip O'Reilly, Hartford, Conn.
91,039.—STEP LADDER.—W. G. Philips, Newport, Del.
91,040.—TOOL FOR TRIMMING BOLT HEADS.—A. P. Plant, Plantsville, Conn.
91,041.—BRICK AND SAND DRYER.—S. D. Rader, Williamsport, Pa.
91,042.—ANCHOR FOR ANIMALS.—P. H. Raiford, Houston, Texas.
91,043.—FASTENING FOR FIREPROOF SHUTTERS.—Thomas Reese and W. L. Reese, St. Louis, Mo.
91,044.—NAIL CLINCHER FOR HORSESHOES.—Nicholas Repp, Waterloo, Iowa.
91,045.—OPERATING SHIPS' PUMPS.—Almon Roff, Southport, Conn.
91,046.—VEGETABLE GATHERER.—J. Schermerhorn, Daysville N Y.
91,047.—TOOL FOR SPLITTING WHALEBONE.—Jas. A. Sevey, Boston, Mass.
91,048.—MECHANICAL MOVEMENT.—Henry Shutts, Oregon, Mo.
91,049.—STUMP EXTRACTOR.—William Smith, Pine Hill, Wis.
91,050.—MECHANISM FOR STOPPING THE LOOM WHEN A WARP BREAKS.—J. J. Switzer, Chelsea, assignor to himself and E. H. Fitts, Northborough, Mass.
91,051.—FURNACE FOR EXTRACTING ZINC FROM ITS ORES.—Alois Thoma (assignor to the American Zinc Company), New York city.
91,052.—ZINC FURNACE.—A. Thoma (assignor to the American Zinc Company), New York city.
91,053.—SAD-IRON HEATER.—P. W. Thomas, Waterbury, Vt.
91,054.—DOUGH KNEADER.—Friend Thrall (assignor to himself and A. B. Thrall), Oshkosk, Wis.
91,055.—MACHINE FOR DOUBLE-SEAMING SHEET METAL.—Archibald Trolan, Norwich, Conn.
91,056.—PEN.—J. W. Truman, Macon, Ga.
91,057.—BALING SHORT-CUT HAY AND STRAW.—S.W. Adwen, Rochester, N. Y.
91,058.—CARTRIDGE CASE CLEANER.—F. H. Aiken, Franklin, N. H.
91,059.—FIRE PLACE.—T. C. Aldridge, St. Louis, Mo.
91,060.—VALVE GEAR.—A. M. Allen, New York city.
91,061.—VELOCIPEDE.—A. M. Allen, New York city.
91,062.—VELOCIPEDE SADDLE.—Geo. B. Ambler, Bridgeport, Conn.
91,063.—HATCHWAY FOR BUILDINGS.—Israel Amies, Philadelphia, Pa.
91,064.—TOOL HANDLE.—E. J. Amor (assignor to himself and H. E. Donor), New York city.
91,065.—VISE.—A. G. Andren, Gottenburg, Sweden.
91,066.—GAS WORKS FOR MAKING COAL GAS.—Avery Babbett and W. W. Binney, Auburn, N. Y.
91,067.—GRAIN SEPARATOR—C. F. Babcock, Chicago, Ill.
91,068.—VISE.—Q. S. Backus, Winchendon, Mass.
91,069.—COMBINED STEAM GENERATOR AND STOVE.—L. F. Bancroft, Worcester, Mass.
91,070.—POLISHING AND CLEANSING POWDER.—J. W. Bates, St. Paul, Minn.
91,071.—SHIELD FOR TUNNELING.—A. Ely Beach, Stratford, Conn.
91,072.—RATCHET FEED.—A. B. Bean, New Haven, Conn.
91,073.—STOVE DRUM.—H. E. Blemker, Evansville, Ind.
91,074.—MACHINE FOR TURNING WAGON AXLES.—Albert Booth, Springfield, Ill.
91,075.—MAIL-BAG.—Fred. C. Borst and Philander Wonsey, Spencerport, N. Y.
91,076.—COOKING STOVE.—G. S. Bosworth, Troy, N. Y.
91,077.—CUTTING HAT-TIPS.—T. W. Bracher, New York city. Antedated May 28, 1869.
91,078.—HORSE HAY-FORK.—Joseph Bradley, Racine, Wis.
91,079.—DEVICE FOR OPERATING THROTTLE-VALVES.—H. L. Brevoort, Brooklyn, N. Y.
91,080.—FASTENING FOR TOP-MASTS AND TOP-GALLANT MASTS.—Leverett Brown, New York city.
91,081.—MANUFACTURE OF BRACELETS.—Geo. Burch, Newark, N. J.
91,082.—MACHINE FOR MILLING THE BODY OF KEYS.—Francis Caffrey and J. L. Nettleton, West Cheshire, Conn.
91,083.—SECURING BUTTONS TO FABRICS.—Geo. J. Capewell, West Cheshire, Conn., assignor to "Porter Brothers," New York city.
91,084.—CULTIVATOR.—D. F. Carr, East Union township, Ohio.
91,085.—MACHINE FOR DISINTEGRATING FERTILIZERS AND OTHER ARTICLES OF MANUFACTURE.—Thos. Carr, Bristol, Great Britain. Patented in England, Oct. 2, 1863.
91,086.—FURNITURE CASTER.—Stephen Chandler, New York city.
91,087.—HARNESS.—S. G. Cheever, Boston, Mass.
91,088.—SASH BALANCE.—Peter Christiansen, Rochester, Minn.
91,089.—HAIR-DYEING BRUSH.—W. B. Coates (assignor to Edwin Clinton and W. H. Eisenbrey, for three fourths of the invention), Philadelphia, Pa.
91,090.—COMPOSITION CRAYON.—William Compton, New York city.
91,091.—COTTON BALE TIE.—Jos. Crookes (assignor to himself and J. W. Branch), St. Louis, Mo.
91,092.—DEVICE TO PREVENT INJURY TO LIQUOR ON TAP.—J. G. Cullmann, Cincinnati, Ohio.
91,093.—APPARATUS FOR RAISING AND DUMPING COAL.—Jos. Delaney, Ashland, Pa.
91,094.—COMPOSITION FOR DESTROYING ANTS.—J. D. Dennis, Gilroy, Cal.
91,095.—CLOTHES MANGLE.—F. A. Desloge, St. Louis, Mo.
91,096.—PAPER BOX.—H. A. Devendorf, Port Jackson, N. Y.
91,097.—COMBINED SAW-SET, GUMMER, PUNCH, AND WIRE-CUTTER.—J. L. Devol, Parkersburg, West Va.
91,098.—PEANUT OVEN.—Dexter Dill, New Haven, Conn.
91,099.—EXTENSION TABLE.—Jacob Dourson, Columbus, Ohio.
91,100.—PROCESS FOR REDUCING THE SIZE OF PLASTER MOLDS.—Nancy A. Downer, Canandaigua, assignor to herself and David C. Chase, Clayton, Mich.
91,101.—SEWING MACHINE FOR SEWING TURNED SHOES.—Wm. Duchemin (assignor to Geo. B. Bigelow, trustee), Boston, Mass.
91,102.—HARVESTER-CUTTER.—G. L. Du Laney, Mechanicsburg, Pa.
91,103.—STEAM-GENERATOR SMOKE-STACK.—W. W. Dungan (assignor to Mary D. Dungan), Baltimore, Md.
91,104.—TEA AND COFFEE-POT.—John E. Earle, New Haven, Conn.
91,105.—STREET CAR.—Zebina Eastman, Chicago, Ill.
91,106.—CORN PLANTER.—J. H. Ernest, Millerstown, Pa.
91,107.—TRAVELING-BAG FRAME.—F. Fischbeck, Chicago, Ill.
91,108.—POSTAGE STAMP, ETC.—Addison C. Fletcher, New York city.
91,109.—PLOW.—F. M. Franklin (assignor to himself and E. M. Doty), Springfield, Ohio. Antedated May 24, 1869.
91,110.—MACHINE FOR CLEANING OATS.—Wm. D. Freeman, Tomales, Cal.
91,111.—CARPET FASTENER.—S. N. French, Fitchburg, Mass.
91,112.—CORSET FASTENING.—Maggie E. Frentz, New Albany, Ind.
91,113.—GLOVE.—Sigmond Goge, Brooklyn, N. Y.
91,114.—COMPOUND FOR MAKING FRICTION MATCHES.—O. C. Green, Copenhagen, Denmark.
91,115.—AXLE-BOX COVER.—Fred. Grinnell, Meadville, Pa., assignor to N. C. Miller and S. R. Dummer, New York city. Antedated Dec. 8, 1868.
91,116.—GUARD FOR DOOR KNOBS.—W. W. Guild, Walpole, N. H., administrator of the estate of J. W. Mellish, deceased.
91,117.—MACHINE FOR THREADING SCREWS.—N. B. Hadlay, Providence, R. I.
91,118.—SECTIONAL MOLD FOR GLASS-WARE.—R. D. Haines, Cambridge, assignor to the "Boston Silver Glass Company," Boston, Mass.
91,119.—SOLID GLASS-WARE MOLD.—Robert D. Haines, Cambridge, assignor to the "Boston Silver-Glass Company," Boston, Mass.
91,120.—STEAM PACKING.—A. H. Hall and H. T. Lee, Marysville, Cal.
91,121.—SAWING MACHINE.—E. R. Hall (assignor to himself Wm. H. Town, and C. E. Candee) Syracuse, N. Y.
91,122.—ELASTIC HEEL GUARD FOR HORSES.—Wm. H. Hall, New Gloucester, Me., assignor to himself and John R. Clifford, Chelsea, Mass.
91,123.—HOMOMOTIVE.—William Smith Hall, Quincy, Mass.
91,124.—IRON TRUSS-BRIDGE.—Geo. Halstead, Buffalo, N. Y.
91,125.—MANUFACTURE OF WROUGHT-IRON COLUMNS.—Geo. Halstead, Buffalo, N. Y.
91,126.—CURRENT-CHANGING APPARATUS.—C. C. Hare, Kansas City, Mo.
91,127.—HARNESS.—John K. Harris, Springfield, Ohio.
91,128.—SEPARATOR FOR MEAL, ETC.—Wm. Hawkins (assignor to himself, and F. W. Barnhart), Brooklyn, N. Y.
91,129.—PLOW.—Jacob Heckendorn, Reading, Pa.
91,130.—LAMP SHADE.—A. B. Hendryx, Ansonia, Conn.
91,131.—ANIMAL TRAP.—J. Herr, Carbondale, Ill.
91,132.—GLASS-WARE PRESS.—C. H. Hersey and W. E. Hawes (assignors to themselves, and F. C. Hersey), Boston, Mass.
91,133.—PAPER FOR ROOFING.—James Howard, West Manchester, Pa.
91,134.—REGULATOR FOR VULCANIZING APPARATUS.—G. H. Hurd, Memphis, Tenn.
91,135.—CHANDELIER.—Charles F. Jacobsen, New York city.
91,136.—MACHINE FOR CUTTING DOWN HEELS OF BOOTS AND SHOES.—J. L. Joyce, New Haven, Conn.
91,137.—TWEER.—Jos. Kay, New Haven, Conn.
91,138.—MACHINE FOR POLISHING SHIRT BOSOMS.—J. J. Kenna, San Francisco, Cal.
91,139.—PERMUTATION LOCK.—L. W. Langdon, Northampton, (assignor to himself and J. G. Clark, Springfield, Mass.
91,140.—CAR COUPLING.—A. Z. Long (assignor to himself and W. G. Dowd, Scranton, Pa.
91,141.—LAMP BURNER.—J. C. Love, Philadelphia, Pa.
91,142.—HARDENING STEEL.—Obadiah Marland, Boston, Mass.
91,143.—SEED PLANTER.—E. G. Matthews, Newton, assignor to F. F. Holbrook, Dorchester, Mass.
91,144.—HAND CULTIVATOR.—E. G. Matthews, Newton, Mass.
91,145.—SWEEPING MACHINE.—I. W. McGaffey, Chicago, Ill.
91,146.—SWIVEL COCK EYE.—R. A. McKanna, Young America, Ill.
91,147.—HAY LOADER.—A. J. McKee and S. D. McKee, Beaver Dam, Ohio.
91,148.—CAR HEATER AND VENTILATOR.—Wm. S. McNeil, Springfield, Mass., assignor to American Car-Heating Company, New York city.
91,149.—SEWING MACHINE.—Stephen W. Miller, Dundee, N. Y.
91,150.—TOOL FOR CUTTING GLASS.—S. G. Monce, Bristol, Conn.
91,151.—PUMP.—James A. Morrell, New York city.
91,152.—SIRUP COCK.—Andrew J. Morse, Boston, Mass.
91,153.—NECK-TIE RETAINER.—Porter C. Moulton, New Haven, Conn.
91,154.—ATTACHING HANDLES TO PICKS.—Thomas H. Neal, Alleghany Pa.
91,155.—STONE-CUTTING AND DRESSING SAW.—Isaac E. Newton, Waterbury, Conn.
91,156.—FAN.—O. R. Nitsch, New York city.
91,157.—PLOW.—Wm. O'Neill, Pine Level, Ala. Antedated May 28, 1869.
91,158.—WOOD PAVEMENT.—Joseph F. Paul, Boston, Mass.
91,159.—LIFTING DEVICE FOR DROP PRESSES AND HAMMERS.—Charles Peck, New Haven, Conn.
91,160.—HORSE HAY FORK.—George C. Perry, Ortonville, Mich.
91,161.—COMBINED SEEDER AND CULTIVATOR.—O. M. Pond, Independence, Iowa.
91,162.—BOOT CRIMPER.—Josiah M. Read, Boston, Mass.
91,163.—DOOR PULLEY.—John Reiser, Trenton, N. J.
91,164.—SHOVEL PLOW.—Sanford Riley, Northcutt's Store, Ky.
91,165.—MACHINE FOR MAKING HORSESHOES.—William D. Rhinehart, Pittsburgh, Pa.
91,166.—ATTACHING PEN RACKS TO INKSTANDS.—C. A. Roberts, West Meriden, Conn. Antedated May 27, 1869.
91,167.—GATE HINGE.—Ira J. Ryerson, Pierceton, Ind.
91,168.—DINNER PAIL.—Moritz Saulson, Troy, N. Y.
91,169.—VELOCIPEDE.—Friedrich Schmitt, Springfield, Ill.
91,170.—COFFEE BOILER.—C. H. Scholle, Cincinnati, Ohio.
91,171.—BOLT-HEADING MACHINE.—Francis Schweizer, Greenpoint, N. Y.
91,172.—HARVESTER.—John F. Seiberling, Akron, Ohio.
91,173.—STEAM GENERATOR.—E. B. Sintzenich, Rochester, N. Y.
91,174.—KNOB LATCH.—Thomas Slaight, Newark, N. J.
91,175.—MACHINERY FOR SEWING BOOKS.—David McConnell Smyth, Orange, N. J., assignor to Henry G. Thompson, New York city, and Reune Martin, Orange, N. J.
91,176.—METHOD OF PREPARING BEEF, ETC.—Benj. F. Stephens, Brooklyn, N. Y.
91,177.—COMBINED SEEDER AND SOWER.—Orrin Stone, Ionia, Mich.
91,178.—MACHINE FOR WELDING AND CUTTING RAILROAD RAILS.—Joseph Stone (assignor to himself, C. S. Baum, M. T. Conro, E. W. Reynolds, and G. T. Thomas), Keeseville, N. Y.
91,179.—CARPET STRETCHER.—Thomas B. Stout, Keyport, N. J.
91 180.—DOOR BOLT.—Levi B. Swartz and James M. Opdycke, Lumberville, Pa.
91,181.—RAILWAY CAR BRAKE.—Benjamin Tatham and Joseph Steger, New York city.
91,182.—POTATO DIGGER.—DeWitt C. Thomas, Easton, N. Y.
91,183.—YOKE.—J. L. W. Townsend, Mount Blanco, Ohio.
91,184.—DOOR SPRING.—John L. Tucker, Laconia, N. H.
91,185.—SAWING MACHINE.—William P. Uhlinger, Philadelphia, Pa.
91,186.—COAL STOVE.—R. B. Varden, Uniontown, Md.
91,187.—ROCKER FOR CHAIRS AND CRADLES.—Charles Wetterhan, Fond Du Lac, Wis.
91,188.—LOCK NUT.—R. White, Mechanicsburg, Pa.
91,189.—HAT.—David Wilcox (assignor to himself, W. H. Slocum, and W. A. Brown), Boston, Mass.
91,190.—FIREPLACE.—Alfred Wilkin, Lucas county, Ohio.
91,191.—PRINTING PRESS.—J. K. Wright, Philadelphia, Pa.
91,192.—LANTERN.—Henry C. Yerby, Leslie, Mich.
91,193.—ELEVATOR.—James Yost, White Deer township, Pa.
91,194.—CAR COUPLING.—J. C. Young, Bloomington, Ind.
91,195.—LAMP.—Charles Zaiser, Newark, N. J.
91,196.—PROPELLING APPARATUS.—Anthony Zink, Lancaster, Ohio.

REISSUES.

33,085.—MACHINE FOR THRASHING AND SEPARATING GRAIN.—Dated April 16, 1861; reissue 3,486.—Cornelius Aultman, Mansfield, Ohio, assignee, by mesne assignments, of Cyrus Roberts.
48,214.—CASTER FOR TRUNKS.—Dated June 13, 1865; reissue 3,487.—John A. Lieb, Newark, N. J., for himself, and assignee of John Schamadel.
82,858.—PLOW.—Dated October 6, 1868; reissue 3,488.—Daniel Mater, Bellmore, Ind.
18,661.—MACHINE FOR TURNING PILLARS FOR CLOCK MOVEMENTS.—Dated November 17, 1857; reissue 3,489.—W. H. Nettleton, Bristol, Conn., assignee of Wilford H. Nettleton, Charles Raymond, and Anson Hatch.
46,025.—COMBINED CULTIVATOR AND HARROW.—Dated January 24, 1865; reissue 3,490.—Edmund D. Reynolds and O. Bradford Reynolds, North Bridgewater, Mass.
65,141.—TUCK-CREASING ATTACHMENT FOR SEWING MACHINE.—Dated May 28, 1867; reissue 3,491.—Anna Weissenborn, New York city.
50,351.—SUSPENDER.—Dated October 10, 1865; reissue 3,492.—Benjamin J. Greely, Boston, Mass.
11,249.—HARVESTER.—Dated July 11, 1854; extended seven years; reissue 3,493.—Division A.—J. H. Myers, Philadelphia, Pa., assignee of Collins B. Brown.
11,249.—HARVEST RAKE.—Dated July 11, 1854; extended seven years; reissue 3,494.—Division B.—J. H. Myers, Philadelphia, Pa., assignee of Collins B. Brown.
46,488.—HARVESTER.—Dated February 21, 1865; reissue No. 3,495.—Division A.—Frederick Nishwitz, Brooklyn, N. Y.
46,488.—HARVESTER.—Dated February 21, 1865; reissue 3,496.—Division B.—Frederick Nishwitz, Brooklyn, N. Y.
46,488.—HARVESTER.—Dated February 21, 1865; reissue 3,497.—Division C.—Frederick Nishwitz, Brooklyn, N. Y.
61,867.—REGULATOR FOR TIME PIECES.—Dated February 5, 1867; reissue 3,498.—George P. Reed, Boston, Mass.
71,418.—TELEGRAPH INSULATOR.—Dated November 26, 1867; reissue 3,499.—W. Edgar Simonds, Hartford, Conn.
12,568.—PRINTING PRESS.—Dated March 20, 1855; reissue 3,500.—Lemuel T. Wells, St. Louis, Mo.
58,098.—MACHINE FOR GRANULATING AND DRYING SUGAR.—Dated September 18, 1866; reissue 3,501.—Jesse Hanford, Lexington, Mass.

DESIGNS.

3,532.—COOK STOVE.—Daniel E. Conklin (assignor to Harbeck, Conklin, and Willis), Baltimore, Md.
3,533.—HINGE.—William Gorman (assignor to the Russell and Erwin Manufacturing Company), New Britain, Conn.
3,534.—FACE-PLATE OF A HINGE.—Emery Parker (assignor to the Russel and Erwin Manufacturing Company), New Britain, Conn.
3,535.—VELOCIPEDE FRAME.—S. F. Pratt, Boston, Mass.
3,536.—CLOCK CASE.—Solomon C. Spring (assignor to "Welch, Spring & Co."), Bristol, Conn.

EXTENSIONS.

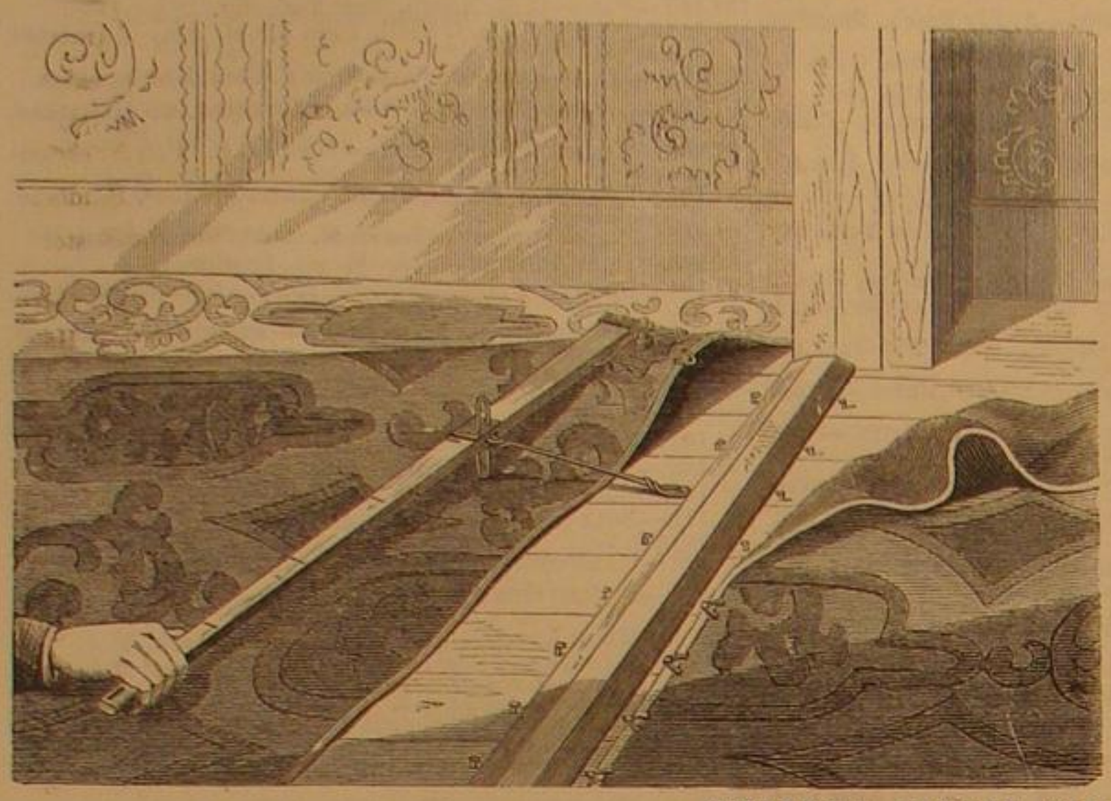
WATER WHEEL.—John Tyler, West Lebanon, N. H.—Letters Patent No. 12,927, dated May 22, 1855.
GROOVING MOLDINGS.—Rebecca A. Marcher, New York city, executrix of Robert I. Marcher, deceased. Letters Patent of No. 12,916, dated May 22, 1855.
MACHINE FOR MAKING PAPER BAGS.—E. W. Goodale, Clinton, Iowa.—Letters Patent No. 12,945, dated May 29, 1855; reissue No. 1,035, dated September 4, 1860.
MACHINE FOR PEGGING BOOTS AND SHOES.—An act for the relief of Alpheus C. Gallahue, New York city.—Letters Patent No. 9,947, dated August 16, 1853; antedated February 18, 1853.

Improved Carpet Fastener and Stretcher.

One of the most trying tasks to tidy housekeepers, is that of putting down carpets. It is not merely the labor required, though that is very severe, but to get a carpet uniformly stretched, so that the figures shall not be distorted, was, by the old method, a difficult if not a wholly impossible attainment.

The invention which forms the subject of the present article discards the old method of fastening carpets with tacks, and employs a stretcher of light and portable form, and of great efficiency.

The method of applying this stretcher to work is shown in Fig 1. It will be seen that instead of being obliged to stand

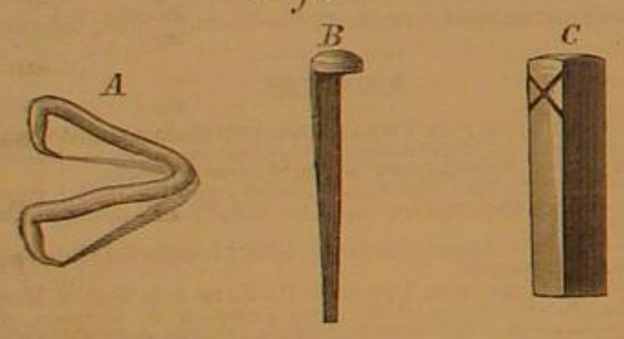


WEAVER'S CARPET STRETCHER AND FASTENER.

upon the portion of carpet which it is desired to stretch, as in the old method, this stretcher permits the placing of the body to one side of the work, and the raising of the carpet from the floor while being extended, thus stretching the carpet entirely across the floor unobstructed by friction upon the boards.

The carpet is held by double-hooked wire loops, A, Figs. 2 and 3. The hooks are inserted in the carpet just inside the hem, or through the margin on the unhemmed sides, and are looped over nails headed only on one side, the form of which and their manner of insertion into the floor is shown at B in Figs. 2 and 3. A metallic gage, C, Figs. 2 and 3, being placed between the nails and the washboard in driving serves to secure a uniform distance from the washboard, and hight from the floor. The hook, nail, and gage are shown full sized in the engravings.

Fig. 2



The construction of the stretcher and its application are well shown in Figs. 1 and 4. D, Fig. 4, is a portion of the wooden bar, or lever, which is made about three feet in length. E is a flat plate of cast iron, with double wire hooks inserted to engage with the fabric when in use. This plate is pivoted to a clip passing around the end of the lever, D, and from which it may be removed by depressing a spring, and put in from the opposite side so that the lever may be worked either with the right or left hand, as may be desired. F is a looped wire, which, when placed over the head of one of the nails forms a fulcrum for the lever, D. A strong bent wire, G, forms a fulcrum on the top and the bottom sides of the lever, D, so that as the carpet is stretched by pulling back the lever, it may at the same time be raised from the floor by pressing the end grasped by the hand toward the floor.

Thus the nails may all be uniformly driven first, and the carpet neatly and expeditiously extended and fastened to them by the aid of the stretcher and the hooks.

It is entirely superfluous to dwell upon the superiority of this method of laying carpets, or the saving of time and backache and temper effected by it. These facts will at once become evident to even the most unpractical reader.

The hook and nail fastening was patented by Willis Weaver, of Salem, Ohio, October 13, 1866, and that on the carpet stretcher April 13th, 1867, by the same. Both patents were obtained through the Scientific American Patent Agency.

Communications may be addressed to the inventor as above.

WE presume that none of our readers will fail to notice the somewhat conspicuous advertisement of the American Saw Company, which appears in this number. We tried to persuade this enterprising company that a less prominent advertisement would answer their purpose just as well, but they would not listen to our advice, therefore we felt obliged to surrender to their exorbitant demands. It is a costly advertisement, but it pays to advertise a good article.

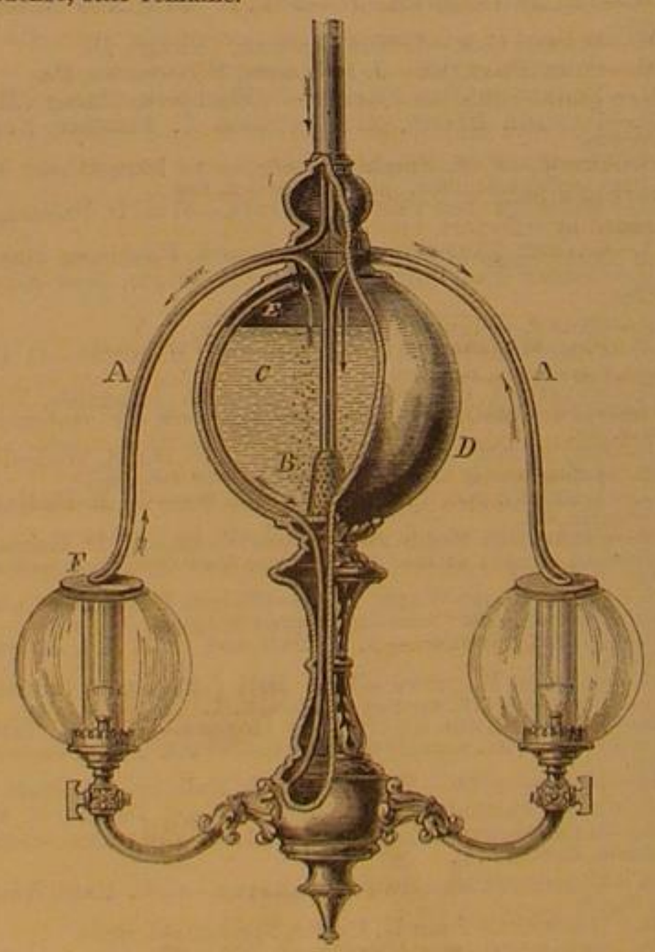
The Attorney General's Decision upon Patent Fees.

Attorney General Hoar has given a decision which reverses the action of the Patent Office, under Commissioner Foote, in relation to appeals taken from the decision of the Commissioner to the Judges of the Supreme Court of the District. Under the eleventh section of the act of March 3, 1839, a fee of $25 was fixed to be paid into the Patent Office Fund, and by the office to the court when the appeal was carried there.

By the act of March 2, 1862, all laws fixing the rate of Patent Office fees to be paid were repealed, and a new list of rates was established. In this list no mention was made of this $25 charge for an appeal to court, and Commissioner Foote held that the law was consequently repealed, and refused to receive any fee upon such appeals. The Attorney General decides that the fee is properly chargeable on the general ground that it is a court fee, and that the Patent Office is simply the temporary custodian of the money.

IMPROVED AIR CARBURETER OR GAS CHANDELIER APPARATUS.

The obstacles which have hitherto prevented large success in many of the numerous devices for charging air with the vapors of light fluid hydrocarbons have chiefly arisen from the liability of such vapors to condense at low temperatures and obstruct the pipes used to convey the mixed air and vapors to the burners, and also the small amount of such vapors absorbed by air in cold weather. To obviate the latter difficulty, heaters have been employed, but the liability to condense, still remains.



The invention we now are called upon to describe, seems to have surmounted both the above named obstacles. Although the engraving which illustrates the device is that of a chandelier, the invention is equally applicable to a bracket, or any other style in which the ordinary gas burners are mounted. The principle of its operation is exceedingly simple.

A is a pipe through which pure air is forced by means of the reversed motion of a common wet gas-meter impelled by a weight and the necessary gearing. This pipe is so formed that the air in its passage is brought directly over the burner at the bend of the pipe and heated thereby. It then passes on and issues in small streams through the perforations at B, and rises thus finely divided through a stratum, C, of fluid hydrocarbon contained in an air-tight vessel, D. Thus volatilizing the fluid and becoming charged with its vapor, it passes into the open mouth of another tube, E, rising above the level of the fluid in D, and so on to the burner.

When argand burners are used, disks of mica, F, are attached to the tube, A, at the bend directly over the burner and brought down to about one eighth of an inch from the tops of the chimneys. The inventor claims that this arrangement stops the rapid draft of air in the chimney, and enables the incandescent carbon which is the light giving agent in all flames, to remain longer in a state of incandescence, thereby rendering the flame larger and increasing its luminosity. In the ordinary bracket these disks are not used. Instead, the pipes are formed into an ornamental knot at the point where they turn over the burner. The pipes are furnished with wire gauze between the liquid and the burner to prevent any chance of the flame running back.

The inventor assures us that gas can be made by this process at a cost of 75 cents per 1,000 cubic feet and of a light giving quality far superior to coal gas, and as the liquid is confined completely from contact with surrounding atmosphere in the process is perfectly safe.

Country houses can, by having their chandeliers constructed on this principle, make their own gas and without the use of an expensive gas machine.

The same method seems equally applicable to the enriching or

Fig. 3

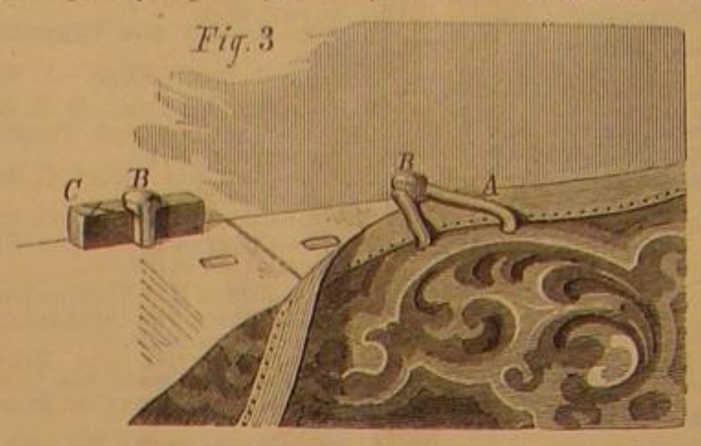
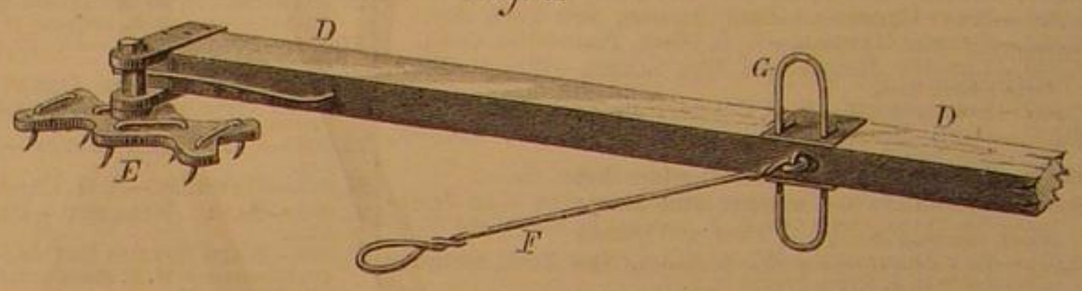


Fig. 4



ordinary gas; and probably a considerable saving might be made by its use in rural towns where gas works are small the price high, and the quality of the gas furnished none of the best. Patented through the Scientific American Patent Agency May 25, 1869.

Further information may be had by addressing C. F. Dunderdale, 90 Wall street, N. Y., from whom County and State rights may be obtained.

Pacific Railroad Time Table.

The following statement of time and distances is given by the *Western Railroad Gazette:*

	Miles.	Hours.
New York to Chicago, Ill.	911	36½
Chicago to Omaha, Nebraska	491	24½
Omaha to Bryan	858	43
Bryan to Ogden, Utah	293	10½
Ogden to Elko, Nevada, via Central Pacific R. R.	378	12¾
Elko to Sacramento, Cal., via Central Pacific R. R.	465	31
Sacramento to San Francisco, via Western Pacific R. R.	117	3½
	3,353	161½

Thus a total distance of 3,353 miles is made, according to the present schedule time, in 6 days and 17½ hours, actual time, by a traveler's watch, from which we deduct 3½ hours, difference of time, when going West, leaving the apparent time consumed in making the trip 6 days and 14 hours.

At San Francisco the mails will connect with the various steamship lines running on the Pacific, and may be landed at Honolulu in 9 days from that city, or 15½ days from New York. They can reach Japan in 19 days from San Francisco, or 25½ days from New York, or 33 to 34 days from Great Britain—thus beating the British mails sent via Suez, three to four weeks. The trip between Yokohama, Japan, and either Hong Kong or Shanghai, is readily accomplished by the Pacific Mail steamships in from five to six days, which, added to the time in reaching Japan, will give the through time necessary to reach either of the above-named ports of China.

The mails for Australia, it is thought, will hereafter go via San Francisco, as the Australian and New Zealand Steamship Company intend transferring the terminus of their line, which has been running from Sydney to Panama, so as hereafter to run from Australia to Taluti, thence to Honolulu, and thence to San Francisco, making 28 days schedule time, which will give us monthly mail to Australia in 34 or 35 days through time.

Important Decision about Patents--Rejected Cases.

The Commissioner of Patents, Hon. S. S. Fisher, has made an important decision, involving a point of much interest to a large class of inventors, as well as to the public generally. Prior to the act of March 2, 1861, rejected applicants were permitted by law to withdraw their applications, and receive back two thirds of the fee. This practice was abolished by the act referred to. Many inventors now seek to revive these applications, claiming that the rejection was through the faulty or imperfect consideration of the Bureau, and hoping for better success under a changed administration. In many cases numerous patents touching these same inventions, or points therein, have since been granted, which could only be regarded as infringements, if the rejected application was to be reopened and granted as an original case. The Commissioner has heretofore decided that when an application is not renewed within two years after withdrawal, its continuity is broken. The decision, which is a very able one, is printed in full in another column.

A STUFFED cat, placed upon strawberry beds, is said to effectually drive away birds.

Scientific American.

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VOL. XX., No. 26...[NEW SERIES.]....*Twenty-fourth Year.*

NEW YORK, SATURDAY, JUNE 26, 1869.

Contents:

(Illustrated articles are marked with an asterisk.)

A WORD TO NEW FRIENDS AND OLD.

The present number closes the twentieth volume—new series—of the SCIENTIFIC AMERICAN. In it we have striven to fulfill the promises made at the close of the last volume, and assurances have reached us from all parts of the country that our labors have been appreciated by our numerous readers.

In this effort we have adhered as much as possible to our former policy of popularizing science, and making it available to the masses. The great developments which are now making in all departments have each received their due share of attention, and progress in the mechanic arts has found a careful and impartial record in our columns.

We are glad to learn that the valuable series of articles on the manufacture of beet root sugar which have found a prominent place in this volume, have largely attracted the attention of capitalists and agriculturists, and that there is a strong probability that this industry will soon be attempted on a larger scale than ever before in this country.

Our subscription list has steadily increased, and the value of the SCIENTIFIC AMERICAN as a medium for advertising has been recognized by appreciative patrons of that department.

We are glad to learn also that many employers have acted on the hint we gave them at the close of our last volume, and are furnishing our paper to their employés, and, in other cases, inducing them to subscribe for it. Surely the information to be gathered from our pages is of the highest value to any young man who has any ambition to be other than a mere hewer of wood and drawer of water in this busy world.

Our correspondents ask us many questions which are patiently answered. The information thus given forms a valuable department in our paper. We also receive much information of general value from esteemed correspondents. We trust that any reader who has practical information which he deems of value will not be deterred by modesty or fancied lack of acquirements, from communicating with us. Valuable facts, though clothed in ungrammatical language, are always acceptable to us. Give us the facts and we will attend to the grammar and orthography.

It is encouraging to feel that we have the hearty co-operation of all our readers in making the SCIENTIFIC AMERICAN, *par excellence, the* mechanics' paper of the United States, but while we constantly bear in mind the requirements of this large and useful class of our population, we shall also endeavor to make our paper one which no intelligent reader, be he mechanic or farmer, or a professional, can afford to do without.

Heartily thanking our subscribers for their liberal support which alone enables us to make and sustain as good a paper as we give them, we assure them that we shall not remit our efforts to furnish them weekly an intellectual repast which, we are confident, cannot be obtained for the same money anywhere else in the world.

ON THE IMPORTANCE OF PROPER ARRANGEMENT IN SHOPS.

Our attention was called recently to a defect altogether too common in small manufacturing establishments; namely, the want of proper arrangement in machines employed to do the work. The occasion referred to was a visit to one of the many smaller manufacturing establishments to be found in this city.

We found in this establishment a company of orderly and conscientious operatives, intent upon their work, a foreman who managed them with admirable tact; everything about the establishment cleanly; plenty of light and air; but the arrangement of the tools and fixtures was very bad.

The nature of the work required the employment of several kinds of workmen, each performing his portion of the work, and then leaving it to be further perfected by subsequent operations. The articles made were of a small and cheap kind, and as fast as each workman finished his part of the work they were carried, by a set of boys employed for that purpose, to the next operative.

Now the whole of this carrying was necessitated by want of foresight in the arrangement of the machines. We pointed out to the foreman that everything could be arranged so that one workman could, without any appreciable addition to his work, pass his work directly on to the one whose service was next required, thus abolishing the necessity of carriers, and making a saving of perhaps some sixty dollars per week to the establishment. This saving would, in a few weeks, reimburse the trouble and expense of the change.

The fault we allude to is most frequently to be found in establishments devoted to the manufacture of new lines of goods, in which the arrangement of the implements required has not been settled by practical experience. Such manufactories are most frequently conducted and owned by men who have either had little experience in manufacturing, or whose attention has been given to work of a very different character.

The perfection of arrangement is to be found in cotton, woolen, and silk manufactories, where to disregard it would be utterly fatal to success. It has also been thoroughly studied in all manufacturing of long standing and of extensive character. Many inventors, who have devised an article of general demand, engage in the manufacture themselves, thinking that all will be plain sailing, forgetting that everything requires two inventions. It is not enough to invent an improvement; the inventor must also invent the best method of making it, if he would succeed.

This collateral invention comprises not only the tools, machines and appurtenances necessary to perfect the original device in a cheap and elegant manner, but also includes the proper adjustment and arrangement of all these details so as to reduce the amount of help, shop-room, fuel, and other expenses, to the minimum quantity.

We have in mind an invention which cost only a hundred dollars or so to perfect and patent, but which has cost the inventor some eighteen thousand dollars in devising how the article could be made at a handsome profit to the company engaged in producing it. A patent railroad spike cost its projectors one hundred thousand dollars in experiments on machinery to make it cheap enough to compete with other spikes already in market. Many inventors fail to take this into consideration in time. When their device is perfected, they should immediately turn their attention to modes of manufacture, so as to be ready, when the time comes, with the necessary resources to meet such exigencies as are likely to arise. In doing this they will often be able to make patentable improvements in existing machines, of great value to other branches of mechanical work.

POWER REQUIRED TO DRIVE A SEWING MACHINE.

In our article on the "Effect of Sewing Machines upon Female Health," published on page 378, current volume, we made a statement in regard to the power required to drive a sewing machine, estimating it as being one tenth the power of the average human frame. The total power of the human body was estimated at 4,166·66 foot-pounds per minute, which would give for the power required to drive average sewing machines, according to our estimate, in round numbers, 416 foot-pounds per minute.

In some inexplicable manner a blunder was made in the first division by ten, the quotient of which was put down as 466—instead of 416—foot-pounds. The final result was, of course, vitiated by this error. It should have been 249,600 foot-pounds per day of ten hours, instead of 279,600 foot-pounds, as stated, equal to 132 cubic feet of water falling 30 feet instead of 148 cubic feet.

Our estimate has been criticized as being evidently too large. It was based upon some rude experiments with an improvised apparatus, with which, however, we obtained results which assured us the amount of power we stated was sufficiently within bounds.

As our estimate was questioned, we took the trouble to call upon several manufacturers, every one of whom assured us that our statement must be nearly correct. It was, however, only at one establishment we could find any positive information. By the courtesy of Mr. J. M'Call, the gentlemanly manager of the Elliptical Sewing Machine Company, we were able to gain the following important facts, which will be of use to all interested in sewing machine motors.

First, it takes on an average, one eighth of a horse power, furnished by steam or other motive power, to run one sewing machine; three fourths of the power being lost or wasted in stoppages, in checking the motion of the machine, in running slow and fast, etc., etc. It is from not appreciating the great loss of power arising from the above causes that most of the motors invented for this purpose have proved failures.

When the ordinary treadle motion is used, if proper adjustments are made, one thirty-second of a horse-power will do the work or a little more than one thousand foot-pounds per minute. This makes the average power required about one fourth of the power of the human frame. But as many machines run much lighter than the average, we are assured that our estimate intended for the power required for domestic machines and light sewing, is not far out of the way, and that it is certainly within bounds. The figures obtained from Mr. M'Call are based upon actual experiment.

It is a common error to estimate the power required to drive small machines entirely too low. We venture to say that were the generality of mechanics to estimate without test the number of watches that could be driven by one horse-power, they would be more likely to make the number double what would be correct, than to make it less. The cause for this arises from the want of a proper appreciation of the difference between the total power of a motor, whether animal, man, or steam engine, that can be exerted for a short time in case of an emergency, and that which it can do continuously.

A man can run for a short space almost as fast as an average horse. Without doubt many men can run at the rate of a mile in four minutes for a short space; but few men can accomplish four miles an hour for ten hours. An average man could probably raise, under favorable circumstances, twelve thousand pounds one foot high per minute for one or two, or perhaps five minutes, but put him at continuous lifting and he cannot do half that.

It takes but little power to move the treadles of a sewing machine once; but to do it one hundred times a minute, or even sixty times, is another matter; allowing a small quantity of force only to each half stroke, a computation will show the aggregate for ten hours to be something considerable.

THREATENED EXTINCTION OF PATENT RIGHTS.

In our last issue we briefly noticed that a motion had been introduced into the English House of Commons to abolish the patent system. We have since received files of the English scientific journals, which uniformly oppose the proposition as unjust and not likely to receive the sanction of the government.

In another column we print a spirited article upon the subject from the *Scientific Review. Engineering* also denounces the scheme in an able editorial article, and while recognizing certain evils connected with the English patent system, it characterizes the proposition to abolish as "cutting off the head of a patient in order to get rid of a tumor or wen." The *Mechanics' Magazine*, a journal which has long sustained the rights of inventors, gives an account of the proceedings of a committee delegated on behalf of the "Inventor's Institute," to wait upon the Attorney General, for the purpose of presenting to that officer their views of the importance of the patent laws to all the industrial interests of the nation.

The Attorney General expressed himself as opposed to the motion which had been introduced by Mr. Macfie, who seems to be a very insignificant personage, but nevertheless capable of doing some mischief.

The Committee submitted to the Attorney General the following cogent reasons why the motion of Mr. Macfie should not prevail:

1. It is the duty of the state to encourage invention by every legitimate means, in order to enable this country to maintain its supremacy in mechanical and chemical arts.
2. That the inventor is entitled to reasonable remuneration for his labor, expenditure, and skill, equally as much as the author or the artist is entitled to copyright for his book or work of art.
3. That the patent system, though defective, is the best practical method of remunerating inventors yet devised, inasmuch as under it those persons only who use inventions, and to whom, therefore, they may be assumed to be of service, pay for their use.
4. Experience shows that no system of rewards from the state could ever be made to work satisfactorily, either in the interests of inventors or the public.
5. The inventor, as distinct from the manufacturer, has a right to be heard before the patent laws are abolished or materially altered.
6. Inventors—and specially those belonging to the working classes, to which classes the great majority of inventors belong—are entirely opposed to the abolition of the patent laws, though they earnestly desire their amendment.
7. That by a good system of patent law the progress of the trade and industry of the country would be largely benefited, as the whole inventive talent of the nation will be thereby incited to strenuous and continued efforts to maintain our industrial position against the very active pressure of foreign competition now affecting our commercial prosperity.
8. That working men, who are largely represented by the present deputation, are especially anxious to find themselves in a position, under an amended patent law, in which they can not only safely exhibit their inventions in public, but be enabled to reap the fruits of improved education and increased application of invention.

RENEWED VIGOR AT THE PATENT OFFICE.

Commissioner Fisher is infusing life and energy into the Patent Office, such as it has not experienced since the days of Mason and Holt. Applications which have been allowed to accumulate under recent Commissioners are being examined and disposed of very rapidly, and we hope soon to be able to announce that the files in the Examiners' rooms are clear of pending cases. On a single day—Friday June 11th—we received circulars of allowance of THIRTY-NINE patents, on applications made through our Home Office, exclusive of those prepared at our Washington Branch Office. If the new Commissioner continues thus energetic in his management, he will secure and deserve an enduring popularity.

Now that the Commissioner has his hands well hold of the plow, we trust that he will neither hesitate nor turn back.

CORRECTION.—Mr. Gallatin, in his communication on a "New Method of Constructing Induction Coils," page 390, current volume, omitted to state the following important facts regarding the wire wound upon the three hard-rubber bobbins: "The center bobbin contains 3,000 feet and the two others together 4,500, in all 7,500 feet of wire, weighing 25 ounces avoirdupois."

HENRY CAREY BAIRD of Philadelphia, the veteran publisher of practical and scientific books, has just published a new and enlarged catalogue which contains a complete list of his valuable industrial publications. This catalogue is forwarded free by mail on application.

IMPORTANT DECISION ABOUT REJECTED CASES.

In the matter of the application of John W. Cochran for letters patent for Improvement in Breech-loading Guns.—The question presented for decision in this case is one of great importance. I have considered it with care, for, I am advised, that there are many cases pending and constantly arising in the office, the determination of which may be affected by my decision.

Cochran filed this application January 11, 1859. It was rejected February 8, 1859. On February 20, 1860, he filed the following paper, and received $30 of his original fee:

To the Commissioner of Patents:

SIR: I hereby withdraw my application for a patent, for firearms, now in your office, and request that twenty dollars may be refunded to me, agreeably to an act of Congress in such cases made and provided.

J. W. COCHRAN.

Washington, February 20, 1860.

Applicant did nothing further until May 6, 1868, or more than eight years afterward, when he filed a new application, now under consideration. It contained three claims, all of which were rejected by the primary examiner. Upon appeal to the Board of Examiners-in-Chief the case was remanded to the primary examiner for inquiry, and report as to the number of patents granted after the withdrawal, and before the second application in which the same invention, in other combinations, or as part of the descriptive matter.

Upon his report, it appeared that the devices specified in the first and second claims were found in some eighteen different patents, granted within the period named, but that no patent was found showing the devices specified in the third claim; the board affirmed the decision of the primary examiner in rejecting the first and second claims, and reversed his decision as to the third claim, which they allowed.

An appeal has been taken to me from the decision of the board in refusing to allow the first and second claims. The question before me may be thus stated: Can an inventor withdraw his application, make no effort to renew it for eight years, during which time the subject-matter of the invention has been incorporated into the substance of many subsequent inventions, and then file a new application and obtain a patent, which, to support the novelty of the invention, shall relate back to the first application?

Many conflicting opinions have been entertained upon this question. The practice of the office has not always been consistent. Patents may be found, doubtless, that have been granted under circumstances similar to those of the present application, and similar cases may also be found where patents have been refused. This is in part owing to the fact that, of twenty examiners, any one may pass a patent for issue, and the decision, if favorable to the patentee, is not the subject of appeal.

The decision of the appellate judges and of the courts upon this subject have not been more uniform than those of the office. Authorities upon this question, relating to patent law, may readily be obtained upon both sides.

Prima facie, it would seem, that an application, deliberately withdrawn, was abandoned, and could no longer form a foundation for a second application; and that, if such second application was made, it must be entirely independent, and could derive no support from the first. That, if public use intervened between the withdrawal and the second application, and for more than two years before the filing of the latter, the patent, if granted, must be void.

This was the opinion of the judge who tried the case of Godfrey *vs.* Eames on circuit. In this case the first application was withdrawn and the second filed upon the same day.

Upon the trial, it appeared that the invention had been in public use for more than two years before the second application, but for less than two years before the first.

The Court charged the jury that the continuity of the application was broken by the withdrawal, and that the public use must date back from the second application.

The Supreme Court (Godfrey *vs.* Eames, 1. Wall, 317) held that this was error; but it is important to note the grounds of this decision. The Court says: "In our judgment, if a party choose to withdraw his application for a patent, and pay the forfeit, intending, at the time of such withdrawal, to file a new petition, and he accordingly does so, the two petitioners are to be considered as parts of the same transaction, and both as constituting one continuous application, within the meaning of the law.

"The question of the continuity of the application should have been submitted to the jury."

It is obvious that the courts do not mean to declare that the two petitions constitute one continuous application, no matter what may be the interval between them, and that the fact of the filing of the second petition is evidence that the intention to do so existed when the first was withdrawn; for, they say that there is still a question of continuity to be submitted to the jury; and this obviously means, that the jury are to judge of the question of the intention of the patentee in withdrawing the first application, and whether the interval is so long between the applications as to destroy the continuity; or to rebut the presumption that upon withdrawing the first application, the patentee intended to file the second.

The case of Godfrey *vs.* Eames, was a suit at law. If it had been in equity, the question of intention and of continuity would have been submitted to the judge to be determined like any other question of fact.

On an application for the issue of a patent, it is the duty of the Commissioner to decide all questions both of law and fact, which go to establish the right or the absence of right in the application to a patent, Marcy *vs.* Trotter, Dunlap J. 1860.

The questions of the intention of the applicant and of the continuity of the application are therefore submitted to the commissioner for his judgment, precisely as they could be submitted to a Court of Equity. The foundation of this judgement is, I think well set forth by Judge Dunlap in Simpson *ex parte*, in 1861. He says: "a rejected applicant who has withdrawn his application may renew it, provided the renewed application is made within a reasonable time after the withdrawal of the fee.

Nothing is more common than to submit the question of reasonable time or reasonable diligence as a question of fact or adjudication. The difficulty of coming to a conclusion, does not obviate the necessity of a decision, and no judge is justified in evading the responsibility of deciding any point which properly arises.

Among the analogies which might be referred to, is the ordinary case of the failure to present a draft for payment within a reasonable time after it becomes due. The drawee fails and the drawer is discharged from ability, no time is fixed for the presentation of the draft, but the law declares that it must be presented within a reasonable time, and submits to a court or jury the question as to what is or what is not reasonable.

I am satisfied that, in every case like the present, the Commissioner must judge whether or not the application is continuous, or whether the continuity is broken by a failure to file the second petition within a reasonable time after the withdrawal of the first.

As to what constitutes a reasonable time, I am not without the light of authority. In the case of Simpson *ex parte*, above cited, the learned judge says: "Section 7, of the act of 1839, fixes what is a reasonable time. There is no reason why a renewed application should have more than two years allowed it, computing the time from the date of the withdrawal. Both classes of applications, original and renewed, are applications for patents, and come within the letter and spirit of the statute."

This view is enforced by the fact that, by the act of March 3, 1861, the applicant is required to complete and prepare his application for examination within two years after the filing of the petition, and that, in default, of such preparation, the application shall be regarded as abandoned.

These provisions of the patent law seems to establish a *quasi* statute of limitations, which may safely form a guide for the Commissioner in determining the question of reasonable diligence.

It must be remembered that withdrawn applications were those which had been but once rejected. The inventor might have insisted upon a second examination—might have appealed to the Commissioner, to one of the Justices of the Circuit Court. He did none of these things; while claiming to have been rejected by the fault of the Office he took no single step to correct the action of which he complained. He withdrew his application, waited eight years, and now applies again. Meanwhile his device has been copied in various forms in no less than eighteen subsequent patents. If his application takes date from the filing of the new petition, he is clearly anticipated by these patents. If it is to date back to the filing of the first petition, these subsequent patentees will be infringers. It is not a sufficient answer to say that the first rejection was improperly made, and that therefore all the evils which may follow the granting of his patent at the present time, are the fault of the Office and must be charged to the Commissioner. This is a fallacy. If the Office was in fault in the original rejection, the law provided a mode of correcting the fault, which it was as much the duty of the applicant to pursue, as it was to file his original application. The law neither points out nor recognizes such a mode of correction as a withdrawal of the application for the purpose of endeavoring, under some new Commissioner, to obtain a reversal of the sentence. If the patentee refuses to adopt the remedy given by the law, and substitutes one of his own making, he does so at his peril; and, when he applies again, it is as much the duty of the Commissioner to protect subsequent *bona fide* inventors and the innocent public against his *laches*, as to protect him against the errors of former examiners. The remarks of Chief Justice Carter, in Goodyear and Bacon *vs.* Hills, 3 Fisher, 134, in commenting upon the Cummings patent, are strongly in point. It is to be noted that although in this case the second application had been made eight years after the first, yet, that the first had never been withdrawn. Judge Carter says: "The law makers have admonished inventors and the public, that if before an application they suffer more than two years to elapse in the use of the invention, they shall absolutely forfeit all right and title thereto. It is true the legislative admonition relates to the period preceding the application. But, it appears to me, as far as the Court can be guided by its own judgment, that the inventor is left under the dominion of common law principles, in regard to any *laches* by which the application may be followed. Is it the law because an inventor files his application, which is refused by the Office, he may sleep upon his rights indefinitely, and that at any period in his lifetime, or that of his representatives, the application may be revived, as against the public? I think not. *Prima facie*, I think he would have to show a reason why he should be so permitted. The judgment of condemnation by the Office advertises to the country, at least, that he stands in no better position than before the application was made. The country is advised by the deliberation of the only tribunal provided by law for the ascertainment, at that stage of the invention, of his right, that he has none. More especially is he himself advised of that fact, for he is a party to the proceedings, and more immediately damnified by the rejection of the application. That rejection would at least be regarded in the logic of equity as a notice to him to proceed with diligence to traverse and reverse the judgment of the Office."

In Rich *vs.* Lippincott, 2 Fisher, 1, Mr. Justice Grier says, in his charge to the jury: "If you find that the application of 1836, renewed in 1837, was for this same subject-matter now patented, and if such application was not withdrawn by Fitzgerald, but the delay was caused by the conduct of the Commissioner of Patents in refusing to grant the patent for the same invention since patented, then Fitzgerald should not be considered to have abandoned his invention to the public. On the contrary, if you believe that the application of 1836 and 1837 was not for the same invention with that patented, and, was therefore, refused by the Commissioner, or was withdrawn and abandoned by the applicant, and continued so until Enos Wilder got up an application for the present patent, and, in the meanwhile, the invention had gone into public use for more than two years, then you will find this point for the defendants."

See, also, Bell *vs.* Daniels, 1 Fisher, 372. Mr. Justice Fisher, who now sits in appeals from this Office to the Supreme Court of this District, has, in the late case of Rowley *vs.* Mason, made a decision, the reasoning of which logically leads to the conclusion which I have arrived in the present case. If the applicant had been put into interference with one of the eighteen inventors who have shown his device in their patents, and had attempted to prove an invention made eight years before and dropped, he would, under the authority of that case, be held to have abandoned his invention. *A fortiori* must this be so, when we find that instead of using diligence to obtain a patent, he deliberately and formally withdrew his application from the Office and gave no sign of life for eight years, while eighteen patents were granted more or less affecting his rights. While it need not be asserted that the present applicant was setting a trap for these subsequent patents, it is obvious that, to sustain the present application, would be to offer strong inducements to others to set such traps hereafter.

The decision of the Board of Examiners in Chief is affirmed.

June 9, 1869 (Signed) S. S. FISHER, Commissioner

HOOP SKIRT LITIGATION.

BEFORE JUDGE BLATCHFORD.

Samuel H. Doughty vs. Joseph J. West et al.—This was a suit in equity to restrain the infringement of a reissued patent, granted to the plaintiff on August 1, 1865, for an "improvement in skeleton skirts." The patent was originally issued October 4, 1859, to the plaintiff, James H. Draper, who was the inventor, and it was reissued on December 27, 1859, and the plaintiff, by assignment, became the owner of the entire interest in it. He brought a suit on it against two of the defendants in this suit, the decision in which is to be found in 2. Fisher's Patent Cases, 553, in which the Court held that the plaintiff could not recover what was claimed by him without a reissue. That decision was made in June, 1865, and the present reissue was granted in August, 1865.

The bill charges as an infringement of the patent the making and selling of skeleton skirts by the defendants. One of the principal defenses set up to the bill is that Draper was not the original and first inventor of what is covered by the last reissue, and much testimony has been introduced by the defendants for the purpose of establishing the existence, before the time of the invention of Draper, of skeleton skirts similarly constructed. The main questions discussed on the hearing were, whether Draper was an original, and, if so, the first inventor of the improvement claimed in the last reissue, and whether he made such invention before the time when he applied for his original patent.

A good deal of testimony was submitted by defendant, but Judge Blatchford decided that the plaintiff had made out his case clearly, and to his (the Judge's) entire satisfaction, and decreed a perpetual injunction and an account, with reference to a master, and for costs of suits.

PATENT FOR STRETCHING CHAINS---NOVELTY.

BEFORE JUDGE BLATCHFORD.

Charles Hall vs. James Bird.—This was an action for an infringement of a patent granted to the plaintiff on May 30, 1864, for a machine for stretching chains so as to make the links of uniform length. The defense set up was that in 1852 the defendant's father had a machine built for him for stretching chains, which he placed in his cellar and used, but which he kept concealed from persons in general; that this machine, after a while, was no longer used, his father having died in 1862; but in 1865 he removed the machine from that cellar into his shop, where it was fitted up, used to stretch chains, and that this was the infringement complained of. It appeared, however, that in 1864, the plaintiff's machine was described to the defendant by a workman in his employ who had seen it, and that till the removal of the old machine, the defendant had stretched chain links by hand, with the hammer and anvil.

Held by the Court.—That on the facts of the case, the knowledge of the defendant's machine was as effectually lost as if it had not been constructed, and the plaintiff's invention was new and unknown, and patentable, notwithstanding the existance of the defendant's machine. (Gaylor *vs.* Wilder, 10, How., 477). That the defendant has failed to establish the identity of the old machine with the machine now used by him in one important particular; namely, in the provision in the jaws of the tongs for grasping the links of the chains, so as not to injure it or any other link. That on the evidence the plaintiff is entitled to recover, but as he has failed to establish any specific amount of damages, the amount awarded will be only six cents.

MANUFACTURING, MINING, AND RAILROAD ITEMS.

The impracticability of so connecting the waters of Lake Superior with the Mississippi to obviate the difficulties arising from low water in that river during the dry season, is thus shown in a letter to the *Press* by a St. Paul engineer: "The surface of Lake Superior is variously estimated to be from 600 to 650 feet higher than the ocean level; Lake St. Croix from 686 to 694 feet above the ocean level; the Mississippi river at St. Paul about 14 feet higher than Lake St. Croix; the mouth of Chippewa river about 30 feet lower than St. Croix lake, and therefore Lake Pepin must be about 40 feet higher than Lake Superior."

Last year 296,660 persons were employed in coal mining in England and Wales, and 59,160 in Scotland. The quantity of coal raised in Great Britain was 104,566,959 tuns. There were 860 separate fatal accidents, and 1,011 lives lost, the proportion of persons employed for separate fatal accidents being 403, and 343 employed to every life lost. Every 103,429 tuns of coal raised appears to have cost a life. These operations were carried on in 3,262 collieries. There were also 69 lives lost in ironstone mines.

In the United States Court at Cincinnati, in the case of the Government against five cases of imported reprints of American copyright books, part of seventy-eight cases seized for non-payment of Government duties, Judge Leavitt has decided that these books reverted to the copyright owner upon the payment of Government tax by him.

Every lumber yard in Hannibal, Mo., has a switch from the railroad into the yard. The cars are pushed into the yard by a "pony engine" and there loaded, when they start on their destinations, whether along the Hannibal and St. Joseph Railroad, the Cameron, or crossing the Missouri at Kansas City and thence into the State of Kansas.

On Saturday, June 5, two colored carpenters, formerly slaves, commenced work in the Washington Navy Yard. This is the first time, says the *Herald*, that colored mechanics of this class have ever been employed in the Washington Navy Yard upon an equal footing with white workmen.

At San Francisco the Chinamen have been set to work at making cheap shoes, and imported goods of that class are driven out of the market. They now talk of giving them similar employment in Brigham Young's dominions.

A petition has been presented to the Common Council or Newark, for assistance to build a ship canal from Newark to this city. It is proposed to make the canal 200 feet wide with 10 feet depth of water at low tide.

The four spool factories at Weld, Belgrade, Farmington Falls, and Greenwood (Lock Mills), Maine, furnish two-thirds of the spools for the whole country.

A company has been formed at Ridgefield, Conn., with a capital of $200,000 to build a railway from that place to Port Chester, New York.

The work on the rolling mill to be erected by the Baltimore and Ohio Railroad Company has been commenced.

Twenty-four thousand acres of mineral land in Missouri were recently sold for $540,000.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the more prominent home and foreign patents.

EXTENSION AND CHANGEABLE LADDER.—Wm. G. Phillips, Newport, Del.—This invention relates to a new sectional ladder which is so arranged, that it can be extended to any desired length, or that it can be transformed into a ladder or scaffold.

FURNACE FOR EXTRACTING ZINC FROM ORE.—Alois Thoma, New York city.—The object of this invention is to remove the inconveniences heretofore existing in the production of zinc and to simplify the labor connected therewith.

STOP MOTION FOR LOOMS.—John J. Switzer, Chelsea, Mass.—This invention relates to a new thread detector and stop motion for looms, whereby the injury to fabrics, produced by the breaking of threads is instantly prevented by the stopping of the machinery.

PACKING BOX FOR ROTARY STEAM DRYERS.—W. B. Fowler, Lawrence, Mass.—This invention relates to a new box for packing the fixed pipe in the end of a hollow rotating steam cylinder, and on drying apparatus of paper machines. The object of the invention is to so construct all parts, that the steam will serve to make a light joint.

APPARATUS FOR ROASTING COFFEE, NUTS, ETC.—D. A. T. Gale, Poughkeepsie, N. Y.—This invention has for its object to provide an effective system of arranging the gas pipe and burner, an automatic power, and a device for allowing the wasting process to be carried on in a cylinder without revolving the same.

NAIL CLINCHER FOR HORSESHOES.—Nicholas Repp, Waterloo, Iowa.—This invention relates to a new instrument for cutting and clinching horseshoe nails, and for filing the hoof under the clinched parts of the nails, said instrument being intended as a substitute for the four tools heretofore used for the same object; namely, a nail cutter, a nail head holder, a rasp, and a hammer for clinching.

SEED PLANTER.—F. E. A. Engelman, Cheektowaga, N. Y.—This invention relates to a new machine for planting seed to any suitable depth and in rows of suitable width, with or without fertilizing matter, and the invention consists in the general arrangement of parts, whereby the desired result is obtained, also in a new manner of making the seed cap adjustable, and in a novel arrangement for adjusting the apparatus to plant in rows at suitable distances apart.

BEEHIVES.—J. H. Bassler, Pine Grove, Pa.—This invention relates to a new manner of making the sides of beehives, and to the application of certain ingredients, used for that purpose, and it consists in a novel manner of arranging and constructing straw sides for the hives and of a novel cement used in connection with the straw sides.

FLY FRAMES FOR ROVING MACHINES.—J. G. Luscomb, Taunton, Mass.—This invention has for its object the production of a new apparatus for adjusting the belt on the cones of a fly frame, for regulating the velocity of the bobbins. The invention consists in a novel arrangement of devices for connecting the rack by which the belt is adjusted with the contact shaft and with a clutch gear whereby certainty of action and a suitable degree of decrease of motion are obtained.

SPRING BED.—Samuel Dunlap, Rome, Ga.—This invention consists in an arrangement of vulcanized India-rubber springs upon tension rollers at each end, extending across the space between the ends, the rollers being provided with ratchets or pawls for tightening or holding the springs.

WAGON WHEELS.—C. F. Carman, Hamburg, Iowa.—This invention consists in connecting two spokes to the hub in each mortice, one of which is dovetailed and keyed in to the mortise, similarly formed, by driving the other as a key, and both spokes of each pair have inclined tenons so that they branch in each direction to the rim, at distances from each other equal to the distances from one, to one of the next pair.

FRICTION CLUTCH AND BRAKE.—Darius Banks, New York city.—This invention consists in an arrangement of a loose sliding pulley with a conical projection, a set of friction rollers for imparting motion to the said pulley by frictional contact with the said hub, a fixed tubular brake with one or more internal annular flanges taking into grooves in the hubs of the wheels, and operating levers, all so arranged that a movement of the said levers in one direction connects the friction devices, and disconnects the brake, and the opposite movement disconnects the friction devices and, connects the brake.

CENTER BEARING FOR LOCOMOTIVES, ETC.—B. W. Healey, Providence, R. I.—This invention relates to improvements in supporting locomotives, tenders, cars, etc., on their trucks, and has for its object to provide a ball and socket connection for the same.

HARNESS.—John K. Harris, Springfield, Ohio.—This invention relates to the harness patented by H. C. Smith, July 10th, 1866, and improved by J. K. Harris, May 26th, 1868, and comprises further improvements upon said harness, for the purpose of making it lighter, safer, neater in appearance, more economical in construction and more convenient in operation.

PAPER BOXES.—H. A. Devendorf, Port Jackson, N. Y.—This invention relates to an improvement in the manner of constructing paper boxes, whereby they can be made more economically and with less labor, while the article produced will be stronger and more substantial than the boxes hitherto made of the same material.

CAR COUPLING.—A. Z. Long, Scranton, Pa.—The object of this invention is to provide for public use, a simple and cheap automatic coupling for cars, so constructed that it is adapted to couple together cars of unequal hight, and also cars constructed for different gages of road.

HEATING STOVE.—H. E. Blemker, Evansville, Ind.—The object of this invention is to provide an attachable and detachable device of improved construction, designed to be attached to heating stoves in order to secure more perfect combustion of the fuel and smoke, a better draft, and better radiation of the heat.

MODE OF RAISING WATER.—David Jones, Newport, Wales.—This invention relates to a new and important improvements in the method of raising water by means of a vacuum produced by the condensation of steam.

COMPOUND.—Philip O'Reilly, Hartford, Conn.—The object of this invention is to provide a compound for producing a fine jet in black paints, and for other purposes.

WEATHER STRIP.—E. P. Ford, Shipman, Ill.—This invention relates to a self-acting weather strip to be attached to outside doors for stopping wind and rain.

STUMP EXTRACTOR.—William Smith, Pine Hill, Wis.—This invention consists, in general terms, of a gallows frame, provided at its upper part with a ratchet wheel and pawl lever, the shaft of the ratchet wheel bearing a gear pinion, which engages with another gear wheel on the winding shaft or drum. The stump chain being attached to this latter shaft or drum is wound thereon when the ratchet lever is vibrated.

VEGETABLE GATHERER.—Jacob Schermerhorn, Daysville, N. Y.—This invention consists in a rake or comb, having long curved metallic fingers suspended from the front of a pair of handles supported on an axle and wheels, and provided with a pocket so arranged that the operator pushing the machine in advance may cause the fingers to run along the ground under the articles to be gathered, which will, by depressing the handles below the level of the axle, freely roll down over a riddle into the pocket, said riddle being arranged between the fingers and the pocket, for separating small articles and other matter liable to be taken up.

MEAT-CHOPPING MACHINE.—Paul Clareton, New York city.—This invention relates to a new machine, by which meat, vegetables, and other articles can be rapidly and successfully cut into small pieces for sausage stuffing, and other purposes. The invention consists in the arrangement of a carriage, which supports a driving shaft and a series of cutters that are fastened to vertical guide bars. By turning the shaft, which carries a series of cams, the cutters are alternately raised, and are then thrown down with considerable force by means of powerful springs.

KNIFE SCOURER.—Samuel R. Goodsell and John Quincy Adams, Brooklyn, N. Y.—This invention relates to a new device for cleaning knives, forks, and other similar articles, and consists in a novel construction of a sliding rubber.

VELOCIPEDE.—J. W. McMillan, Greenville, Ala.—This invention relates to a new three or four-wheeled velocipede, which is so constructed that motion can be imparted to both axles at once, either by the hands or feet of the operator, or by both hands and feet combined. The invention consists in the general combination, with ratchet wheels mounted on both axles of connecting levers, treadles, and hand levers, all arranged in such manner that the aforementioned results can, without difficulty, be realized.

ZINC FURNACE.—Alois Thoma, New York city.—This invention relates to a new zinc furnace, which is so arranged, that it is doubled—that is to say, that the furnaces which are usually separated are, with their gas generators, built together to form in a single structure. the double furnace. Room, building, material, and labor are economized by this arrangement.

VIOLINS.—Jacob Lenhard, New York city.—This invention relates to an improved manner of securing the bridge to a violin or other bow instrument, with the object of securing greater freedom to the sounding board, to allow the same to vibrate with less difficulty than heretofore.

COMBINED TOILET AND NURSERY TABLE.—Henry Havekorst, Leavenworth City, Kansas.—This invention relates to a new table, which can be used as a toilet table, and which, as it can be supported on one single leg on the side, may be used as a nursery table, to have its top extending over the bed of a sick person. The table can also be used as a writing and reading desk, as it can be made high or low at will.

HAY RAKE AND TEDDER.—Frederick E. Nearing, Brookfield, Conn.—This invention relates to a new horse hay rake, which is so constructed that it can be readily transformed into a hay tedder, and which is otherwise of very simple and convenient construction. The invention consists in making the rake head of two or more parts, so jointed, that some parts can be turned, to make the teeth project at different angles from the head, when it is desired to use it for turning hay.

STALL FLOOR.—Wm. M. Bleakley, Verplank, N. Y.—This invention relates to a new stall floor, which is arranged so that it can be taken up to clean the trench under it, and which is made with a view to cleanliness and simplicity of construction. The invention consists in constructing the floor of a series of slats which are at their front ends pivoted to a fixed cross bar, so that they can be swung up to clean the ditch under them, and which are so made, that crevices are formed between them to let the waters pass into the ditch.

VELOCIPEDES.—W. F. Holske and B. T. Babbitt, New York city.—The main object of this invention is to produce a novel mechanism for propelling velocipedes and other vehicles, by means of muscular or other power; said power being applied by persons, animals, or machines placed upon and conveyed by the said vehicles. The invention consists in the application of friction clutches to the edges of wheels to be revolved.

WRITING PEN.—James W. Truman, Macon, Ga.—This invention relates to a new writing pen, the point of which can always be fed up, when worn, so that the pen can remain in constant operation. The invention consists in arranging under a split, or non-split plate, which is shaped similar to the ordinary steel pen, an adjustable wire or rod, which, with its end, will form the writing point of the pen. The end of this wire, or rod, can be fed forward when worn, and used again, until the wire is almost entirely used up, and the wire can then be readily replaced. The ink is held and flows freely between the plate and rod.

CLOTHES RACK.—James Alcorn, Charlestown, Mass.—The object of this invention is to provide a simple and efficient folding clothes rack, which may be readily adjusted to suspend the hinged holding bars horizontally for holding the clothes, or vertically, to hang in the most compact position, and without strain on the suspending parts.

HARROW.—S. G. Jones, Niantic, Ill.—This invention relates to improvements in harrows, and is designed to provide a harrow capable of being contracted or expanded in the direction of its breadth, to change the width for different kinds of work; also for folding to occupy but little space in storing.

PISTON PACKING.—John Gates, Portland, Oregon.—This invention relates to improvements in piston packing, designed to provide an arrangement, whereby a skeleton piston head, consisting of only one piece of metal, may be used, and the packing rings may be adjusted without the employment of screws, thereby dispensing with the usual follower, and tightening and adjusting screws, commonly employed.

LET-OFF MECHANISM.—Wm. R. Clark, North Adams, Mass.—This invention consists in an arrangement of worm gearing and bell-crank levers, for varying the pressure of friction straps on the beam heads.

GUN LOCKS.—R. D. Hay and J. M. Hill, Crooked Creek, N. C.—This invention relates to improvements in gun locks, having for its object to provide a movable nipple guard, which will prevent the hammer from falling upon the cap, in case of accidentally becoming disengaged from its holder by any means other than the regular action of the trigger in discharging it, and which will, by the action of the trigger, be moved out of the way of the hammer when regularly discharged.

CURRENT WHEELS.—J. B. Holmes, Lawrence, Kansas.—This invention relates to improvements in wheels, to be operated by the natural current of streams, for elevating water or propelling machinery, and consists in the arrangement and connection of the buckets together, and to the elevator or other device to be propelled.

MECHANICAL MOVEMENT.—Henry Shutts, Oregon, Mo.—This invention consists in an arrangement of an oscillating eccentric wheel and two sets of cams, said cams being arranged to act upon the face of the cam wheel at points opposite to each other, and the cams of each set being arranged to throw in opposite directions, and caused to transmit a reciprocating motion to a sliding bar.

CORN SHELLER.—F. Fanning, Atchison, Kansas.—This invention has for its object to furnish an improved corn sheller which shall be so constructed as to shell the corn rapidly and thoroughly, and which may be readily adjusted to hold the ear in contact with the shelling cylinder a greater or less time, according to the dampness or dryness of the corn to be shelled.

SPRING SADDLE-TREE.—John R. Bragg, Williamsburg, Mo.—This invention has for its object to furnish an improved spring saddle-tree which shall be simple in construction, while forming an easy and comfortable seat.

HANGING WINDOW BLINDS.—Daniel Kidder, Franklin, N. H.—This invention has for its object to improve the manner of hanging and operating window blinds so as to make them safer and more conveniently operated than the blinds hung and operated in the ordinary manner.

ANCHOR FOR ANIMALS.—P. H. Raiford, Houston, Texas.—This invention has for its object to furnish an improved device for use in staking out horses and other animals to graze, which shall be so constructed and arranged that it will be impossible for the animal to twist or wind up the rope while grazing.

IRONING BOARD.—Andrew Matson, Elizabeth, N. J.—This invention has for its object to furnish a simple and convenient ironing board, which shall be so constructed and arranged that when not in use it may be folded up so as to occupy but little more space than an ordinary ironing board.

BAG HOLDER.—E. A. Fisher, Morganville, N. Y.—This invention has for its object to furnish an improved bag holder which shall be so constructed as to hold the bag in either a vertical or inclined position while being filled.

SOLDERING MACHINE.—J. G. Borden and W. Power, Brewster Station, N. Y.—This invention has for its object to furnish an improved machine by means of which the heads of sheet-metal cans may be soldered to their bodies quickly and thoroughly and without waste or undue use of the solder.

CAR COUPLING.—Charles Layton, Matawan, N. J.—This invention has for its object to furnish an improved car coupling which shall be simple in construction and effective and reliable in operation, and which shall, at the same time, be self-coupling.

CORD ATTACHMENT OR HOLDER.—E. d'Heureuse, New York city.—The invention has for its object to furnish an improved attachment or holder for cords for hanging pictures and mirrors, and for other purposes, which shall be so constructed and arranged that the cord may be conveniently arranged and securely held in any position into which it may be adjusted.

FIRE-PROOF SHUTTERS.—Thomas Reese and William L. Reese, St. Louis, Mo.—This invention has for its object to improve the construction of fire-proof shutters in such a way that they may be unfastened and opened conveniently from the outside to enable the firemen to obtain ready access to the interior of the building, so that the water may be applied directly to the fire before it has attained too much headway to be readily extinguished.

LUBRICATING CUSHION FOR CAR JOURNALS.—P. S. Devlan, Jersey City, N. J.—This invention has for its object to furnish an improved lubricating cushion for car journals, which shall be simple in construction, easily put in and taken out of the journal box, which may be washed when necessary, without injury, and returned to the journal box, and which will absorb the oil and convey it to the journal so as to keep the said journal constantly lubricated.

Business and Personal.

The Charge for Insertion under this head is One Dollar a Line. If the Notices exceed Four Lines, One Dollar and a Half per line will be charged.

NEW PUBLICATIONS.

A PRACTICAL TREATISE ON HEAT, as Applied to the Useful Arts, for the Use of Engineers, Architects, etc. By Thos. Box, author of "Practical Hydraulics." Philadelphia: Henry Carey Baird, publisher, 406 Walnut street. Small 8vo. Price, by mail, postpaid, $4·25.

A practical treatise upon this subject, comprising the results of the most recent observations and experiments, is very much needed at the present time; and both the author and publisher of the volume before us have conferred a great benefit upon the public by its timely publication. We would be glad to give it an extended review, adequate to its merits, but we must content ourselves at this time with an enumeration of the general contents of the work. These comprise: General principles and facts in the theory of heat and combustion, the principles and details of steam boilers, efflux of air, vapor evaporation, distillation, drying, heating liquids and air, transmission of heat and laws of cooling, laws of cooling at high temperatures, transmission of heat by conduction, ventilation, examples of heating and ventilation, wind and its effects upon heating and ventilation, etc., etc. The work is amply illustrated, well indexed, and printed in the excellent style which characterizes the industrial publications of Mr. Baird. It would be hard to perform the work which Mr. Box has undertaken in a more creditable manner than he has done it. To be at once brief and exhaustive is a difficult task for any author, but one in which this writer seems to excel.

A TREATISE ON ROPE MAKING, as Practiced in Private and Public Rope Yards. With a Description of the Manufacture, Rules, Tables of Weights, etc. Adapted to the Trade, Shipping, Mining, Railways, Builders, etc. By Robert Chapman, Master Rope-Maker of Her Majesty's Dockyard, Deptford, England. Revised Edition. Philadelphia: Henry Carey Baird, 406 Walnut street. Price, by mail, free of postage, $1·50.

The above is the title of a work upon an important subject, which has been hitherto too much neglected by writers on industrial topics. Intimately connected as it is with commerce and the security of vessels at sea, it is time that the public should be supplied with accurate information upon it. It is eminently practical in beginning with the discussion of the fiber of hemp, and proceeding, step by step, through all the intermediate processes necessary to complete the largest and most perfect cable. The work was evidently prepared to assist workmen in obtaining a knowledge of the calculations necessary to the art of ropemaking, and is eminently calculated to accomplish that purpose.

INDEX.

ILLUSTRATIONS.

MISCELLANY.

Figures preceded by a *Star* (*) refer to illustrated articles.

PATENT CLAIMS.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; beside, as sometimes happens, we may prefer to address correspondents by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisemets at $1·00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

C. H. S., of Pa.—A pendulum that vibrates seconds in the latitude of New York city, is according to Saigey, 39·1023743 inches in length, from the point of suspension to the center of oscillation. This length, or the known lengths of pendulums, beating seconds at other points would form a basis for the restoration of the standard foot should it ever become lost. It is probable, however, that the foot will before many years go out of use as a unit of measurement, and the meter become universally used instead.

F. R., of N. Y.—The advantage gained by condensation in steam engines, is not as many untheoretical men suppose, owing to the accumulation of pressure on the side of the piston where the steam is acting upon it, but to the removal of the resistance of the pressure of the atmosphere upon the exhaust. This resistance can never be more than fifteen pounds, in round numbers. A mercurial column 24 inches in hight, balances about 12 lbs. atmospheric pressure to the square inch, subject to some variations for different altitudes, temperatures, etc.

F. O. N., of Mass.—A good cement for uniting iron pipes that will withstand the action of hot water is made by mixing clean iron filings, or powdered borings, with powdered sal ammoniac and sulphur: 1 part by weight of sulphur, 2 of sal ammoniac, and 80 of iron. After mixing, sift coarsely and mix with water as it is used, to small quantities at a time.

B. F. P., of Miss.—Either the screw, or wheel and axle, of which gearing is a modification, have a power which is limited only by strength of materials. A given power will however raise more weight in a given time by a combination of gearing than by a screw, as the latter absorbs more of the power by friction.

T. H. M., of N. Y.—If you intend to invent a machine for setting and distributing type, you must familiarize yourself by personal examination, with the practical details of the business.

J. J. B., of Ohio.—To obtain an engineer's certificate, you must possess a practical knowledge of the construction and operation of the steam engine.

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J. A. F., of N. Y.—We should use brass to make the toy wheel of which you speak, making the step of soft metal and the shaft of hard metal.

S. W. W., of Mass., wishes to know of a process by which oil can be extracted from leather without injury to the leather; perhaps some of our correspondents may know of such a process.

J. R. G., of Pa.—A complete answer to your enquiry may be found on page 393, Vol. XVIII, of the SCIENTIFIC AMERICAN.

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PROVISIONAL PROTECTION FOR SIX MONTHS.

871.—MECHANISM FOR REGULATING THE TENSION OF THE WARP IN WEAVING LOOMS.—Munson Sigler, Paterson, N. J. March 22, 1869.

1,373.—RAILWAY CARRIAGE WHEEL.—R. B. Hugunin and A. M. Hazen Cleveland, Ohio. May 4, 1869.

1,374.—MOTORS, OR PUMPS FOR RAISING OR FORCING LIQUID OR AERIFORM BODIES.—J. B. Root, New York city. May 4, 1869.

1,398.—REFRIGERATOR.—M. A. Hamilton, Detroit, Mich. May 6, 1869.

1,400.—SUSPENDERS OR BRACES.—T. J. Flagg, New York city. May 6 1869.

1,430.—BRONZE ORDNANCE.—S. B. Dean, Boston, Mass. May 10, 1869.

1,443.—CASTING METALS UNDER PRESSURE.—J. J. C. Smith, of Somerville and J. A. Locke, Boston, Mass. May 11, 1869.

1,444.—STEAM AND OTHER ENGINERY.—J. A. Marden, Boston, Mass. May 11, 1869.

1,408.—APPARATUS FOR THE MANUFACTURE OF ENVELOPES.—D. McConell Smyth, Orange, N. J. May 7, 1869.

1,426.—HARDENING COMMON OR GRAY CAST IRON AND STEEL.—Byron W Nichols, Canton, Ohio. May 10, 1869.

1,440.—DETERGENT OR SAPONACEOUS COMPOUND.—Wm. H. Newton, New York city. May 11, 1869.

1,391.—TREATMENT OF CAST IRON FOR THE PRODUCTION OF WROUGHT IRON AND STEEL THEREFROM.—W. M. Lyon, Pittsburgh, Pa. May 6, 1869.

1,401.—FLUID METERS.—C. F. Jenny, New York State. May 7, 1869.

1,427.—GUN LOCK.—R. D. Hay and J. M. Hill, Crooked Creek, N. C. May 10, 1869.

1,447.—CONNECTING AND SUSTAINING THE RAILS OF RAILWAYS.—Samuel J. Reeves, Philadelphia, Pa. May 11, 1869.

1,459.—SAW TEETH AND MACHINERY OR APPARATUS FOR FORMING THE SAME.—R. J. Lusk, John Lough, Thomas Ritchie, Jas. Ross, and W. Lough, Buckingham, Canada. May 12, 1869.

1,480.—KNIVES AND FORKS.—Charles Moore, Westbrook, Conn. May 14, 1869.

1,490.—CARTRIDGES FOR BREECH-LOADING FIREARMS.—Isaac M. Milbank, Greenfield Hill, Conn. May 15, 1869.

1,509.—SLIVER CANS.—Ezra Haskell, Dover, N. H. May 17, 1869.

1,510.—REVOLVING FIREARMS.—Messrs. Smith & Wesson, Springfield, Mass. May 17, 1869.

1,512.—MACHINERY FOR FORMING THE THREADS OF METAL SCREWS.—T. T. Prosser, Chicago, Ill. May 17, 1869.

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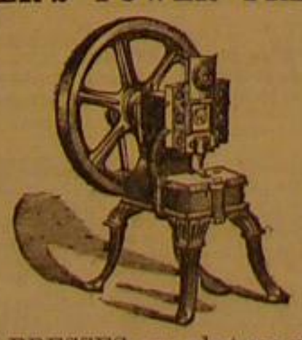

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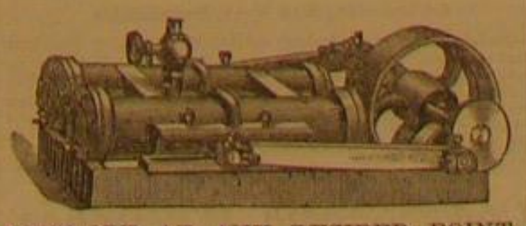

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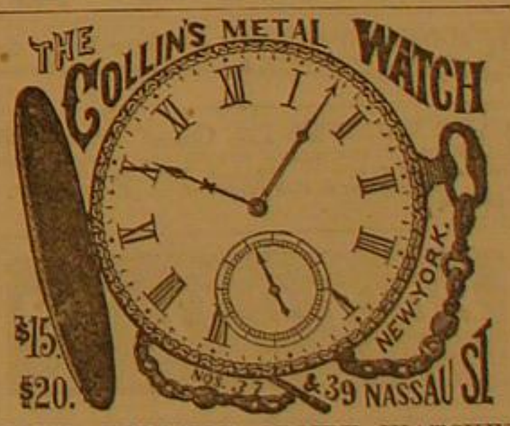

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