

# SCIENTIFIC AMERICAN

A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

Vol. XVII.—No. 25.  
(NEW SERIES.)

NEW YORK, DECEMBER 21, 1867.

\$3 per Annum  
(IN ADVANCE.)

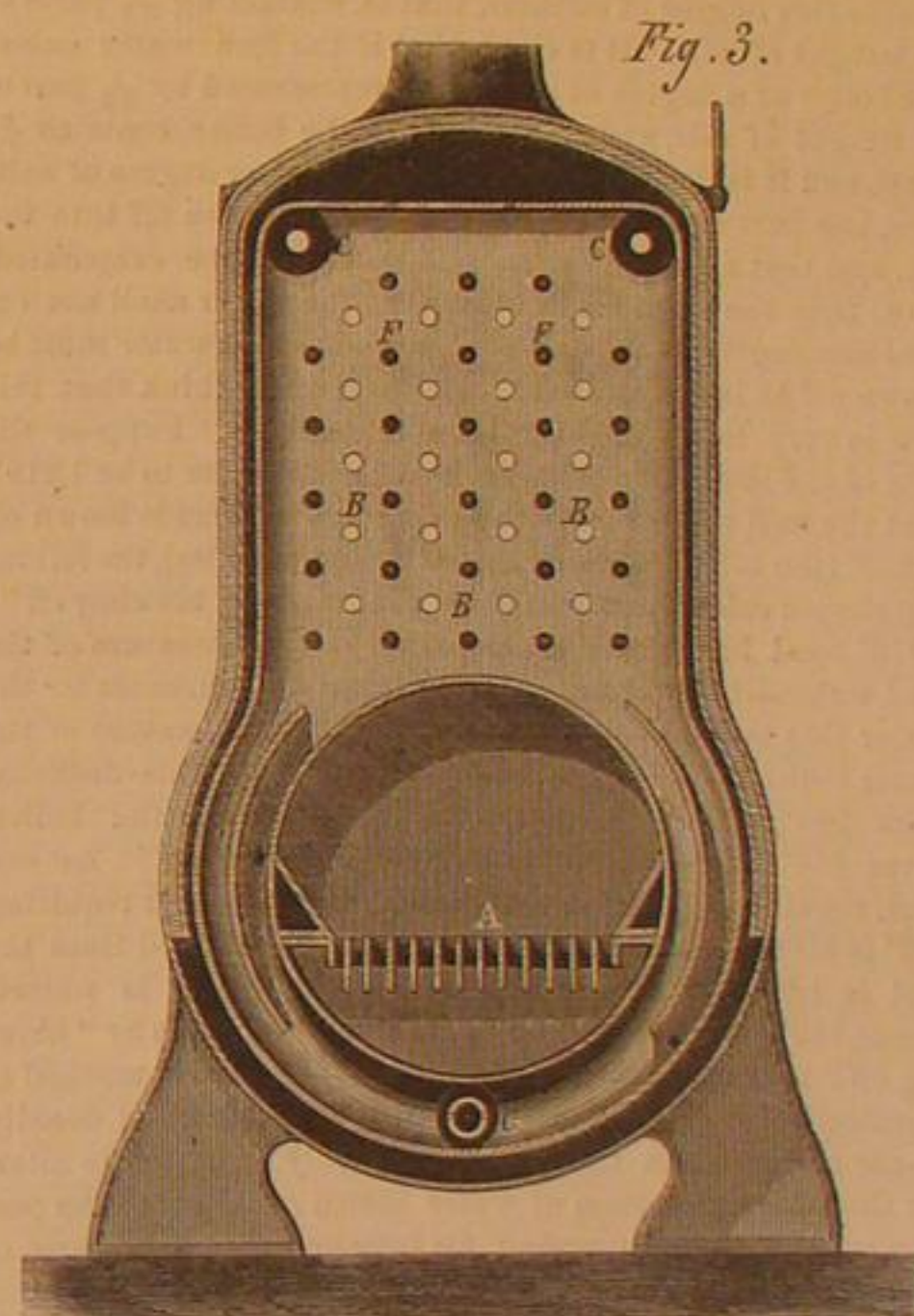
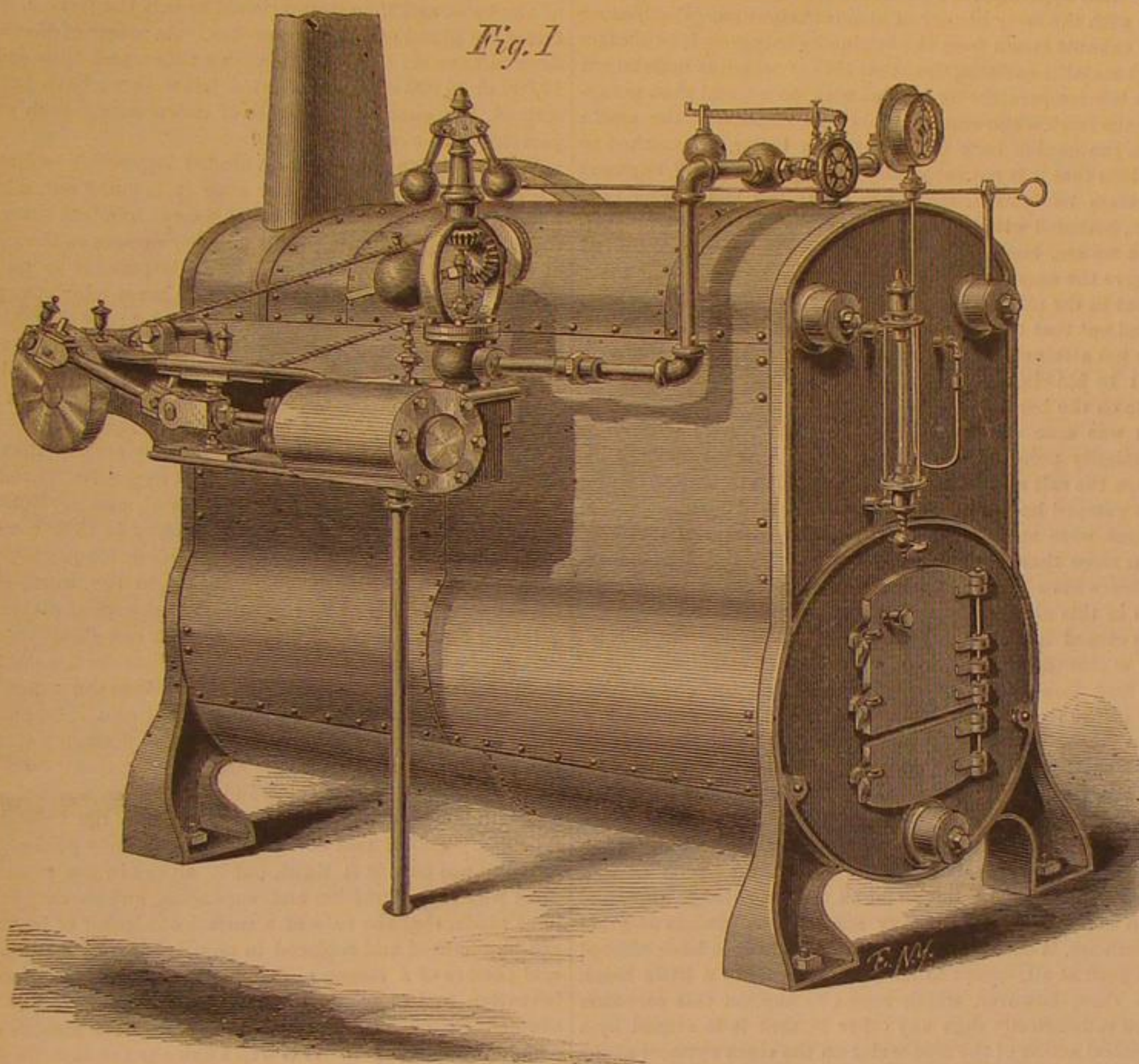
## Improved Safety Generator and Portable Engine.

Fig. 1 of the accompanying engravings represent the Wilcox portable steam engine and safety steam generator combined. The engine is placed horizontally on the side of the generator. The cylinder, bed piece, slides, and main bearing are cast in one piece, and therefore cannot get out of line by displacement or the working strain upon the parts, and are

rounds the grate, forming the furnace and ash pit, the grate being seen at A Figs. 2 and 3. The form of the fire box and ash pit is seen in the end section, Fig. 3. The upper portion of these sections is the steam chamber, or steam and water space. The flat sides of these chambers are stayed by numerous studs, cast in, which are represented at B, Fig. 2, and by the white circles in Fig. 3. There are three openings in

2. The sections are held by the milled flanges sufficiently far apart to allow the flame and gases to pass between their respective sides. The stays, B, are made with an excess of strength over the flat surfaces they support, so that when dangerous pressure occurs a small hole will be formed by the giving way of the metal between the stays before the stays themselves will part, and a disastrous explosion be thereby prevented.

There are curved partitions within the ring portion as shown in Fig. 4, for the purpose of aiding the circulation of the water. The column of water next the furnace is being constantly converted into mingled steam and water which being lighter than the solid columns of water on the opposite side of the partition, the difference in gravity induces rapid circulation, by which the steam is swept from the heating surface as fast as generated and fresh water is as constantly



brought in contact with the heated sides of the surface, the steam being carried to the chamber above, where it separates from the water and rises into the steam space, while the solid water returns to the other side of the partition, carrying with it the sediment, which settles in the quiet space below the grate, and may be blown out through a cock on the back end of the generator.

The same bolts that hold the sections together extend through the cast-iron ends and support the whole structure.

The sides, top, and bottom of the generator—in fact the whole space between the cast-iron ends—is covered with a sheet-metal jacket made double and filled with plaster of Paris or some other non-conductor, which prevents loss of heat by radiation.

Boilers constructed in sections have within a few years attained a great popularity, and this is not strange when it is considered that when the large mass of water and steam finds vent through the shell of a boiler, its sudden liberation spreads destruction around. If a hole of a few inches in area is made, the steam and water escape only gradually and without doing serious harm. It is impossible, probably, to prevent the giving out of boilers through carelessness or ignorance; the remedy appears to be to so construct the boiler that when any part fails,

only a portion can give out at a time. This object may be attained by building the boiler in sections, so that if one fails the others are left intact and their contents liberated gradually by escaping through the small openings communicating with the ruptured section. The sections, however, of this generator are of such great strength that they can be burst only by the grossest stupidity. They

not subject to unequal contraction and expansion either by the heat of the boiler or of the cylinder; indeed, the generator is so constructed, as will be presently described, that there is little heat given off from the exterior. The cylinder has a cast-iron polished jacket, the crank is balanced, the material is excellent, and the workmanship—as was evident to all who examined the engine exhibited at the late Fair of the American Institute—of the very best description. The connection of the governor with the inlet pipe is direct, and the pipe itself as short as possible, and of ample diameter; thus the steam is never cramped and the quantity admitted to the cylinder is under perfect control. The pump and fly wheel are placed on the side opposite the cylinder, the shaft crossing the back end of the generator. On the front are seen the steam gage, water gage, damper handle, etc. The whole arrangement is neat, compact, and serviceable.

Figs. 2, 3, and 4 present different views of the generator, of which Fig. 1 is a perspective representation, which, however, is a small one, intended for a portable engine of from three to ten horse-power. Fig. 2 is a semi-sectional view of a portion of the generator. As will be seen, the generator is constructed in sections, one of them being shown very perfectly in Fig. 4. These sections are of cast iron, forming hollow chambers, which are fitted and bolted together to any required number. The lower portion is a ring which sur-

Fig. 2

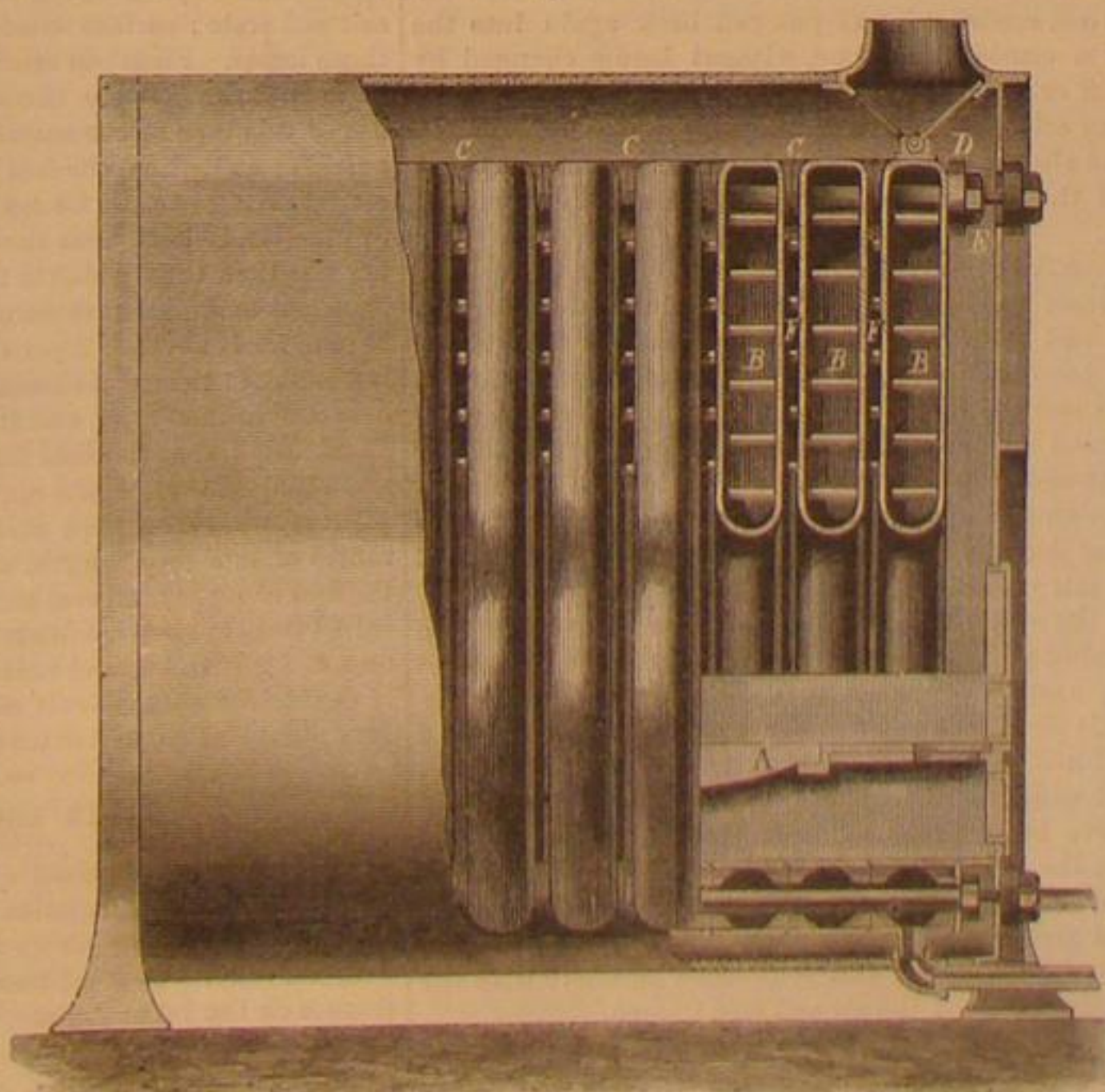


Fig. 4



## THE WILCOX COMBINED STEAM GENERATOR AND ENGINE.

each section surrounded by circular flanges, C, and by these openings each section communicates with those adjacent. These flanges are milled off to form the joints, each alternate one having a slight lip that fits in a corresponding recess in the next. The sections are then brought together and secured by means of a stout bolt passing through each of the apertures, C, upon which is placed a cap, D, and nut, E, Fig.



are tested to a pressure of from 400 to 500 pounds per square inch before being combined, even when the working pressure required is from 60 to 100 pounds only.

In small boilers there is not always sufficient steam and water capacity in proportion to the work demanded, and in case of a heavy load being thrown upon the engine or fresh fuel put upon the fire there will be fluctuations in the water level, the steam pressure inducing foaming and demanding constant care and the most skillful management.

This generator is so proportioned as to be free from the above objections, and is very economical in fuel and perfectly safe from danger of explosion. For further information apply to the Wilcox Caloric and Steam Engine Company, Providence, R. I.

#### SURFACE CONDENSATION FOR MARINE ENGINES.—THE LOSS BY "BLOWING OFF."

The subject of the surface or the jet condenser is a constant theme with engineers, and although we do not by any means desire to pronounce against the employment of surface condensers in sea-going steamers, we think the economy attainable from their use is to a considerable extent overrated. In order to appreciate this, let us in the first place look at the possible theoretical gain attainable by the use of a surface condenser (irrespective of the cost of the apparatus and the expense of its maintenance), and then examine the drawbacks attending its employment.

The water of the ocean contains on an average  $\frac{1}{32}$  part of its weight of salt, and it is a common practice with sea-going engineers to carry the water in the boilers at about double this degree of saltiness, that is, containing  $\frac{2}{32}$  parts of its weight of salt. It is clear that if the feed water enters the boiler at a degree of saturation represented by  $\frac{1}{32}$  part of its weight of salt, and the water in the boiler contains  $\frac{2}{32}$  parts, and it is desired to keep it at the latter degree of saltiness, one part of the feed water must be blown off into the sea, and that an equal part will remain to be evaporated. Now, from the fact that in order that the water shall not exceed this degree of saltiness ( $\frac{2}{32}$ ), as much feed water must be blown off as is evaporated into steam, many think that this loss is very much greater than it really is. Suppose the sum of the latent and sensible heat in the steam to be 1,210°, that the feed water enters the boiler at 110°, and is blown off at 230° (the temperature of the water in the boiler), the following simple calculation will show the loss by "blowing off"; 1,210° total heat in the steam—120° the temperature of the feed water—1,090° heat required from the furnaces for the water that is to be evaporated. Now the temperature of the water blown off from the boiler is 120°, and this deducted from 230°, the temperature of the water in the boiler, gives 110°, the loss of heat by "blowing off." As one part, requiring 1,090° is evaporated, and one part requiring 110° is blown into the sea, the total heat utilized from the fuel is 1,090°+110°=1,200°; and of this 110° is wasted. Hence 110°×100÷1,200°=9.16, the percent of loss by "blowing off" to maintain the saturation at  $\frac{2}{32}$ . This method of calculation is of course applicable to any degree of density of the salt water in the boiler; it is only necessary to allow for the ratio the portion of water blown off bears to the portion evaporated. Supposing, for instance, that the degree of saturation of the water in the boiler was  $\frac{3}{32}$  (a saturation sometimes maintained), instead of  $\frac{2}{32}$ , the calculation of loss would be as follows, bearing in mind that in this case two parts of the water pumped into the boiler are converted into steam, while but one part is blown overboard. Therefore 1,090°×2=2,180°, is the heat required from the furnaces for water that is converted into steam; and hence, 110° (temperature of the one part blown off) ×100÷2,180°=5.04 per cent, the loss by "blowing off" to maintain the saturation at  $\frac{3}{32}$ . And the same method of calculation may be used to ascertain the economy of using a heater to raise the temperature of the feed water, by passing it around or through a series of tubes, on the other side of which the hot water blown off from the boiler circulates, before being discharged into the sea. But it should be pointed out that it will not give a true result to calculate the loss by "blowing off," first with the heater and then without it, and then to call the difference between these two amounts the gain; for the reason that this method does not bring the important element of the heat imparted to that portion of the water which is converted into steam into the calculation, the saving is the difference between the heat required from the fuel to boil off that portion of the water which makes the steam. Thus, if without a heater 1,250° is required, and with a heater but 1,150°, the gain will be 1150°×100÷1,250°=8 per cent.

It need scarcely be stated that the object of blowing off a portion of the water from boilers using sea water, is to prevent the deposit of salt and other substances, which form scale on the heating surfaces. If a portion of the water was not blown off, the boiler would speedily become choked with salt, and the heating surfaces incrustated with a thick layer of hard, non-conducting scale; because only pure water is evaporated, and the solid substances in it remain in the boiler. It will be readily perceived that if the water is carried at such a degree of saltiness as to cause the surfaces, which conduct the heat of the furnaces to the water, to become incrustated with a non-conducting substance (such as scale is), that not only will the evaporative efficiency of the boiler become less and less, as the deposition of scale increases, but the incrustation may become of such a thickness, on certain parts, as to almost prevent the heat of the fires from being transmitted to the water; as a consequence of this condition, those portions which are exposed to the highest temperature from the furnaces—particularly the crown sheets—are liable to be made red hot, and to be bulged in and ruptured, allowing the

scalding water and steam to escape over the fires. This being the case, if the engineer stints the quantity of water blown off, although at first he will be able to carry more steam and burn less coal, it will not be long before he will find that "she does not steam as well as she did," and the coal pile is being reduced more rapidly; hence it is far better to submit to the constant, but not increasing loss of a liberal "blowing off," than by stinting it to make a little more steam at first, in a short time to be followed by such a degree of incrustation as not only to far more than neutralize the economy attainable at the start, but also to incur a great amount of labor in picking off the hard scale, when the vessel arrives in port, as well as to shorten the life of the boilers by the overheating, and the incessant chipping of the scaling hammers.

With this state of affairs staring them in the face, it is not surprising that marine engineers have for a great many years given great attention to the method of condensation which, theoretically, returns pure fresh water to the boilers, and thus saves not only the loss of "blowing off," but also prevents the deposition of scale, and consequently keeps the heating surfaces in contact with the water in the highest state of efficiency. This apparatus, the Surface Condenser, is contemporaneous with the early history of steam navigation. Condensing the exhaust steam from the engine by bringing it in contact with metallic surfaces, the other side of which is maintained at a low temperature by contact with water, and then pumping the fresh water made by this condensation of the steam from the engine back again into the boiler, is a method so obvious that it is not surprising that our forefathers, engaged in steam navigation, made use of it; the more so as they were bothered with scale from the outset, much more, in fact, than we are, because their boilers were but poorly contrived to give the easy access necessary for the use of scaling tools.

But in the early history of surface condensation it was soon found out that the theoretical gain expected to attend its use was not attainable, either as regards stopping the waste of heat by blowing off, or wholly preventing the formation of scale on the heating surfaces.

It was soon established that if the surface condenser was practically perfect—that is, that there was no leakage between the salt and fresh water compartments, and salt water was pumped back into the boilers by the feed pump—that the boilers were speedily corroded or eaten away, and injured even more than by the effects of incrustation. Various hypotheses have been from time to time advanced in explanation of this phenomenon. Among others, that the corrosion was caused by galvanic action; the voltaic current, according to this theory, produced by the contact and circulation of the feed water about the brass of the condenser and the copper of the feed pipes. No sooner had this view of the case been generally talked about among engineers, than copper or brass feed pipes were suppressed, and cast iron substituted; besides, the tubes, and indeed every part of the condenser made of brass which came in contact with the feed water, were covered with tin. So if copper and brass had any thing to do with corrosion, it clearly would stop as soon as that cause was removed. But as far as our knowledge goes, and from conversation with many sea-going engineers of great experience, it does not seem that these changes have effected any good at all, except to save the expense of a little brass. The view, however, which seems to explain this corrosion more satisfactorily than any other is, that it is caused by a chemical action of the feed water on the clean surfaces of the boiler. And means to prevent corrosion founded on this explanation, appear to have been uniformly followed by very satisfactory results. It seems to be pretty conclusively established that if the surface condenser is tight, and the feed water boiled off, condensed, and pumped back again into the boiler for a considerable time, without being changed by blowing off or mixing it with sea water, that the feed water acquires an acid and corrosive property which attacks the seams, and also selects places in the middle of sheets to eat into, until the iron often looks as though it had had the small pox.

This corrosive property of the feed water, so it is stated, is acquired from the decomposition of the lubricants used in cylinders and steam chests, more particularly the tallow, doubtless increased from the sulphuric acid almost always used in its rectification. The means to prevent corrosion, if it is produced by this cause, at once suggest themselves; they are twofold; first, a thin layer of scale must be permitted to form on the interior surfaces of the boilers, and the water in them must be frequently changed, by blowing off and pumping salt water into them. The layer of scale of course prevents the water from coming in contact with the iron, and changing the water cleans it of the corrosive properties it may have acquired by continually passing through the engine. This method is now the usual practice with sea-going steamers fitted with surface condensers, and we believe the difficulties which not long since bid fair to put a damper on its use have been wholly removed. Again, the tallow and oil used in the cylinders is carried over into the condenser by the steam, and sometimes to such an extent as to choke the tubes, and frequently to form hard balls, or pellets, which collect in the condenser and sometimes interfere with the action of the valves of the air and feed pumps.

And this fact leads us to a consideration of the construction of surface condensers. The condensing surfaces almost always consist of a great number of small tubes, by some engineers made  $\frac{1}{2}$  of an inch outside diameter, and seldom if ever over 1 inch; now the great end to be attained in the construction of this species of condenser, is to secure these tubes in the tube heads, so that the joints will be tight, and at the same time to allow the tubes to slip back and forth through the joint as their lengths are altered by the varying temperatures within the condenser; further, these joints must be made so

that the tubes may be easily and quickly withdrawn, either to clean them from the impurities already alluded to carried over by the steam, or to replace a defective one. Simple as these conditions may appear at first sight, the fact that there is scarcely a point about the marine steam engine which has received so much attention from engineers as this one, and has been the subject of so many patents, shows that it has not by any means been an easy problem to solve. The expense of some of these plans is so great as to almost preclude their use in ships designed for commercial purposes. For instance, in the patent adopted by Mr. Isherwood for the navy, each joint is made in the thick brass tube heads as follows:—first, a hole, a loose fit for the tube, is bored through the head, then this hole is counterbored about half way through, thus forming part of a stuffing box; into this larger hole a rubber ring is inserted, surrounding the ends of the tubes, which projects a short distance beyond the head; a polished brass ferrule, or ring, is then inserted around the tube, and rests on the rubber ring, on which it is pressed by a composition follower, which is large enough to perform the same duty for a great number of tubes. This follower is bored similar to the tube head, that is, first with holes the size of the tube, and then counterbored to suit the ferrule, which forms the gland of the stuffing box. As many of these condensers have six or seven thousand tubes, and thus require 12,000 or 14,000 such complicated joints as we have just described, the enormous expense of constructing such an apparatus will be easily perceived.

With this plan not only is it almost impossible to discover a leaky or defective tube, but after it is found out, a heavy follower, which makes the joint of several hundred tubes, has to be removed. Again, as this follower presses on the glands of so many stuffing boxes, it is quite impossible to put the exact pressure on each of these stuffing boxes which the packing in them requires to make a perfect joint; the consequence is that a considerable number of the tubes are either so tightly packed that they cannot contract or expand without bending, or they are so loosely packed that the joints leak from the salt to the fresh water side of the condenser.

For these and other reasons it is pretty certain that this surface condenser is not only the most expensive, but at the same time the most inefficient introduced, and yet hundreds of thousands of dollars have been wasted in their construction in the U. S. Navy during the last five or six years.

Now that we have directed attention to the worst closed surface condenser we know of, we will take great pleasure in pointing out the most efficient, and at the same time the most inexpensive one yet introduced. The tubes are the same as in the former one, but they are secured into the heads in a very different manner. The heads are of cast iron, and the holes for the tubes are bored of a uniform diameter straight through them, about twice the area of the tubes. In the annular space between the tubes and these holes, a soft pine cylinder (in length about twice the thickness of the tube head) is driven. This simple device forms a positively perfect joint, because not only is it tight, but it allows in the most complete way for contraction and expansion, and so easy is this joint made, that the tube of a surface condenser of large size can be removed and replaced in one day by the firemen and coal passers of a steamer. This condenser is an American invention, and so complete is it regarded that it has been adopted extensively by the most conservative marine engineers in Great Britain. It is well known as the Horatio Allen patent.

To retrace our steps a little, we will direct attention to the fact that in the first part of this article we pointed out the losses caused by "blowing off," to prevent the deposition of salt and scale; surface condensation is intended to prevent those losses. From our remarks on this point it seems pretty plain that the possible theoretical saving attainable by the use of this type of condenser, is not over 12 per cent at the outside; and when the fact is borne in mind that this theoretical saving cannot, for reasons already shown, be obtained in practice, it is obvious that the actual saving is considerably less than that which is theoretically calculated. Experience and observation sustain the conclusion that the saving in practice is not over 8 per cent., and when against this saving is placed the great excess in original cost of this condenser over the ordinary jet, and its greater complication, it must be admitted that the field for the surface condenser is much more limited than would appear at first sight.

From what has been stated, it is obvious that for ocean routes of moderate length, when the accounts are squared at the end of a year, no real economy will be found to have resulted from surface condensation. For instance, to employ it on a Long Island Sound route, although the steamers scarcely ever leave water as salt as the ocean, is, to say the least, very short-sighted and extravagant engineering.

#### SOME USEFUL HINTS.

Doctor Hall in his most excellent monthly for December states his views and experience on many utilitarian subjects in his unique way which we transfer to these columns.

By the way, a new volume of the *Journal of Health* commences on the 1st of January and we would recommend it as a most useful and entertaining family magazine. Price \$1.50 a year, published monthly. Address W. W. Hall, M. D. No. 2 West 43d street, New York.

DRIVING NAILS.—Within a year we have seen it stated, as a new truth, that if a nail were wetted in the mouth and if, in addition, the narrow edge was placed with the grain of the wood, it would seldom split the board into which it was driven. We well remember to have seen our father do this as far back as in eighteen hundred and eighteen. But errors and truths are alike exhumed from the grave of the past in mechanics



medicine and theology, and even in so-called "science" itself; the best remedy under the circumstances is for each man to be for himself "wary" of what is new, look into everything proposed with a patient, close and critical eye, and never give up old things too readily; for in very many cases, our fathers were wiser in their generations than we sometimes give them credit for.

**ANIMAL GRAFTING.**—Mr. Best, a French naturalist, cut on a rat's tail and joined it on to the freshly cut tail of another rat; the parts grew together and waggled like any other tail; in four months it was found that all the proper vessels, veins, arteries, and nerves were supplied. Dr. Allen, of Bond street, narrates that a tooth freshly drawn from a negro boy was inserted into the socket from which his mistress had a "snag" taken, and it grew firm and did her good service for many years. It was considered at that time, that as the boy belonged to the mistress, so did his tooth and that hence the exchange was no robbery.

But the tables, later on, were turned against the white man. The owner of a plantation had a faithful and most truthful old negro, to whom he committed the fattening of a turkey for a Christmas dinner; but on Christmas morning the turkey was no where to be found; some of the other "hands," on being questioned, gave the information, that the faithful old servant had killed the turkey the night before and made a good supper of it himself. The master was surprised and greatly grieved; and summoning the old man to his presence, he acknowledged that he had killed and eaten the turkey. But, said the master, don't you think it wrong to steal from me that way, making use of my property? Why no, massa, that's no stealing. I'm your property and the turkey is in me, and we both belong to you as before, only turkey has changed places, and instead of being in the coop, he is in a safer place, in my stomach, and we both are yours, turkey and negro too and you have as much as you had before, so I done no wrong." The logic puzzled the master, and he let Sambo off.

**FLESH UNITING.**—It is a common surgical operation to supply a new nose or ear or part of the face or lips from the arm, letting them grow together, then cut the arm loose, and manipulate the flesh into the proper shape.

An iron gate slammed to, while my neighbor's child was holding to the stationary upright; the mother saw it from her window, and running to her child she found the fleshy part of the end of the thumb cut off; with great presence of mind she pressed the severed pieces together: they united firmly. Our readers may make a practical use of these facts in many of the accidents of life; after all, these are the application of a principle of a common cut or gash, for if instantly the sides are pressed together and are kept together, the healing process goes on with great rapidity, leaving only a scar.

**HAIR REMOVED.**—Persons are sometimes annoyed by hairs growing in unsightly places, which may be removed. Thus, take sixty grains of quicklime, forty grains of yellow sulphate of arsenic and sixty grains of powdered starch, make it into a paste with water, apply it to the spot from which it is desired to remove the hair, and in a few minutes it is done.

[But Doctor what is the effect on the skin of the patient?]

**FROSTY WEATHER.**—Few have failed to observe what a vigor and elasticity are imparted to both mind and body by a frosty atmosphere, and what a loss of all these there is in a hot summer day; this is probably owing to the fact that at noon of any clear frosty day in winter, there is ten times as much elasticity in the air as there is at any noon of summer; hence to all invalids, the days most valuable for exercise are those of frosty weather, and those least beneficial are where it is warm or thundery; hence every hour of daylight spent in the open air in frosty weather in some kind of out-door activities is that much gain to the vitality of the system, imparting vigor to the mind, elasticity to the body, and elevation to the moral feelings and power of the man.

**SEA SICKNESS** is caused in great part by the confusing effect which the tossing on the water has upon the brain, and multitudes of ways have been pursued for avoiding or at least mitigating this annoyance. The best plan is to let it have its course and rid the system of that excess of bile which is almost always present in this over-eating age; the general health rarely fails to be greatly improved by it, although in very rare cases, perhaps not over one in a million, dies under the effects of the long continued and exhausting retching. If a person will lie down with the eyes closed, and not allow the head for an instant to be raised from the pillow there is an almost entire exemption from nausea and other discomforts, but the result of this course is that it will be necessary to keep a-bed during the entire voyage; the effort should be to shorten the sickness and get rid of it as soon as possible, and this is best done by not lying down at all, but resolutely keeping on the feet on deck, in the open air, if the weather permits, that is, if it is not raining; this requires moral courage and some considerable force of will and character, but it seldom fails to abridge the period of sea-sickness, sometimes to confine it to a few hours duration and then the remainder of the voyage can be enjoyed as it ought to be.

The tendency to nausea on ship-board is abated somewhat by any stimulus which acts decidedly on the nervous system, such as chloroform, brandy, opiates, etc. Irritants, such as the strongest spices, abate nausea; so will great mental emotion, in short, any thing which draws off the attention of the mind. No person can get sea-sick if the ship is on fire, nor will a person who is drunk. A brisk purgative is good just before going on board or a dose of medicine taken the night before. Still the wisest, most healthful and most expeditious

method of meeting sea-sickness is to avoid all preventives, all medicines, and manfully determine to keep upon your feet and let it do its worst.

In this connection space may be given to sea voyages, and the best means of enjoying them; and first of all have a plenty of woolen clothing and wear it even in midsummer except during the middle of still days; but every day, and all day a good flannel shirt should be worn next the skin even in the tropics, to counteract the baleful effect of damps, fogs, and changes of temperature. The British government compels its sailors to wear woolen flannel shirts all the year round in all latitudes as a result of its observed necessity in keeping off disabling diseases.

**PROTECTING THE FEET** from the dampness of the decks is an indispensable item of health and comfort on ship-board as the boards are seldom dry for two hours at a time in any voyage. Thick soled shoes and woolen hose should be worn at all times while at sea. Much has been said and written in praise of the pure air of the sea, but as a matter of fact very little of it is obtained by passengers as a general rule, because a bilgy odor pervades the cleanest ship's cabin, and when it is taken into account that in these cabins passengers confine themselves from sundown to a late breakfast next day, and that soon after breakfast the decks, having been washed, are still wet, making it near noon before it is safe for ladies, with their thin shoes, to promenade; it is evident that a very few hours of the most pleasant days are devoted to the breathing of the pure salt sea air, and when it is remembered too, how few days at sea have an entire exemption from rain and raw winds, it is evident the much lauded good effects of sea voyages, especially to invalids, is more a myth than a reality. The truth is, to obtain the very highest healthful advantages of pure air, nothing approaches moderate, leisure working in the garden or the orchard.

### Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

#### Experiments with Boiler Foam Pipes.

**MESSERS. EDITORS:**—On page 324, No. 21, current volume *SCIENTIFIC AMERICAN*, I noticed an article entitled "The Effect of Variable Calibers in Foam Pipes." I have seen and used on several occasions the "foam pipe" there spoken of, but in two only did I notice the curious fact that your correspondent speaks of, and in both cases they were attached to tubular boilers which were used to supply steam to stationary engines. In one case I experimented pretty thoroughly and attached a glass gage to the foam pipe as well as to the boiler. The pipe was three-quarter-inch, and was screwed or tapped into the top of the boiler and led from the steam space above to the water space below, near the bottom of the boiler, and was between four and five feet long and was tapped into the bottom the same as at the top, so the difference in diameter could have been but little, if any.

When getting up steam the water always stood highest in the boiler which I attributed to the increased bulk of the water by heat, while that in the pipe was yet cold and weighed more than that in the boiler, bulk for bulk. But when I opened a cock at the bottom of the pipe and let out the cold water while the hot filled up the pipe again, it would rise to the same level as that in the boiler; the difference was not great, still I think it acts on the same principle when the steam is up and forty or fifty pounds pressure on, for with that pressure and with but little fire on and no steam passing from the boiler, the water would be the same in both gages, but when I started the engine and before the work was put on the water in the foam pipe would settle but little and as soon as the load was put on the engine, it would settle still more.

I discovered also that when the fire was out (providing, however, that it had not been out too long), and fifty or sixty pounds of steam on, and I raised the safety valve so as to let the steam escape freely, the water would settle as before, or if the steam was low and I increased the fire, and there being a heavy load on the engine at the same time, the same effect as before, only the depression of the water was more marked.

From this it will be seen that the water rose or lowered in the pipe just according to the amount of heat and quantity of steam used. I judged from this that while the water was in a state of ebullition and full of minute globules of steam passing upward to the surface, which would increase its bulk, (while it is obvious that the water in the pipe is perfectly quiet,) it could not receive heat enough from those two three-quarter-inch holes to cause it to boil, although at the same time it might be nearly as hot as that in the boiler.

The cause of its settling when the safety valve was raised (the fire having been put out previously), I attributed to the decreasing pressure causing the water to boil, on the same principle that hot and nearly boiling water placed under the receiver of an air pump will boil. My theory may be wrong, but I shall feel justified in holding to it till I hear a more plausible one.

D. A. MADDOCK.

Lenoxville, C. E.

#### Relative Size of Pump Barrels and Tubes.

**MESSERS. EDITORS:**—J. P. B., on page 359 current volume of the "SCIENTIFIC" notes difficulty in raising water 25 feet through 56 feet of pipe, with a pump of 2½ inch barrel. I think that a smaller sized pump barrel should be used, also that the draft pipe should be large. In a similar case I found that a large pump, though it would raise the water, worked so hard that its use was impracticable, while a much smaller one works easily and delivers the water freely. Scientifically, the reasons for such a result may be seen as follows:—

1st, The pressure upon piston valves of different sizes in

sustaining water at the same height is in proportion to their areas.

2d, The pressure upon the same valve at different heights is in proportion to the heights.

3d, The pressure on valves generally must be in proportion to the products of their areas into the heights at which the water is sustained or raised. With a given power at the pump handle, therefore, it is plain that as the height of the water increases, the area of the valve (or cross section of the pump barrel) must decrease.

Again, the smaller the tube through which it is drawn the greater the amount of the friction of the water against its sides in delivering the same quantity of water; and the larger the pump the greater the quantity of water required in the same time, which would also increase the friction, consequently by increasing the size of the pump and diminishing the size of the tube, a limit would always be found beyond which, because of friction alone, the water would refuse to obey the action of the pump.

In conclusion it may be remarked that inasmuch as the increased size of the draft tube will not in the least effect the amount of pressure on the piston at vent, it will in all cases be found advantageous to the easy and free delivery of the water to use large tubes rather than small ones, especially where they must be of great length.

M. N. HORTON.

Oneida, N. Y.

### Electricity.

**MESSERS. EDITORS:**—Electricity is defined to be the name given to an imponderable agent which pervades the material world, and which is visible only in its effects. It is exceedingly elastic, susceptible of high degrees of intensity, with a tendency to equilibrium unlike that of any other known agent. Whether it resides only on the surface, or penetrates into the interior of a conducting body, appears to be a matter of dispute among electricians, at least in regard to dynamical electricity, though it is difficult to imagine why there should be any difference in this respect between the static and dynamical. If electricity be material, it must possess gravity, and attract and be attracted as other bodies. All bodies would be surrounded by an atmosphere of electricity, each in proportion to its mass, or what would be the same in effect, the electricity (from its exceedingly elastic nature penetrating all space) would be more or less dense in proximity to other attracting bodies. If the mass of a given body should be by any cause reduced, it is evident that there would be a corresponding want of capacity to attract or retain electricity, and the equilibrium would be restored by the excess passing to some other body. A current would be formed by reducing the mass of friction (as in the electrical machine), or by oxidation (as in the galvanic battery), in consequence of one body attracting electricity from another constantly diminishing body. The attraction of gravitation would seem to be the immediate, and the reduction of the mass of a body, the primary cause of a current of electricity. A telegraph wire having its own atmosphere of electricity, a wave communicated to one end would be propagated through its entire length. In an electromagnet the atmosphere of electricity being put in motion by the current of the surrounding coil, would form an electric screw, which at one end (pole) would screw into and attract, and at the other end (pole) would unscrew and repel the electric nut of another magnet. Having been engaged for some years in perfecting a machine for developing the motive power of electro-magnetism, these hints are offered more for the purpose of obtaining information than of imparting it.

FRANKLIN.

Cairo, W. Va.

#### Some Questions on the Day Line Matter.

**MESSERS. EDITORS:**—Please give the following questions a place in your paper for the consideration of its readers:

Suppose a man start from New York on Monday noon, go west, keeping pace with the sun, in his journey around the globe, where would he pass from Monday to Tuesday?

When it is Monday noon at New York it is 48 minutes past midnight at Pekin, in China; is it Monday or Tuesday at Pekin when it is Monday noon at New York?

When it is Monday noon at New York, how far is it Monday east and west from New York on the globe?

Is there a certain point of time in the revolution of the globe when it is Monday, for example, on the entire globe and twelve hours from that time, Monday on one half and Tuesday on the other?

Is there a certain point on the globe where the days of the week begin and end; if so, where is it, and what cause has fixed that point?

These are no visionary questions, and can be readily and definitely answered.

LYMAN THAYER.

Burlington, Vt.

### Musical Vibrations.

**MESSERS. EDITORS:**—The above subject being before the readers of the *SCIENTIFIC AMERICAN* from an article in a late number, I would inquire if the squeaking and chattering of lathe tools has been observed as a method of indicating the frequency of the vibrations. The tone being observed and the velocity of the moving surface known the chatters on a given space may be counted with apparently a correct result. A side tool with large work, not too firm, affords eligible conditions for the experiment.

H. W. C.

Newark, N. J.

The Paris Exposition gives 16,000 medals. As each will bear the name of the recipient, they will not all be ready before next March.



**Improvement in Hoops for Children.**

The engraving represents a hoop with its handle, the design and operation of which is perfectly clear without a detailed description. Attached to the hoop is a split or slotted handle having four rollers bearing alternately on the inside and outside of the hoop and allowing it to turn with the greatest ease. The young operator grasps the handle, inclines forward, and starts on the run, when the hoop obeys the impulse and the flag streams out inviting him to follow. As the hoop cannot escape the direction in which it is guided, the child is not compelled to retrieve his toy from the mud of the streets nor risk his safety by getting in the way of passing carriages. This device makes hoop rolling practicable for very young children who have not acquired sufficient skill to govern the course of a hoop by the ordinary stick.

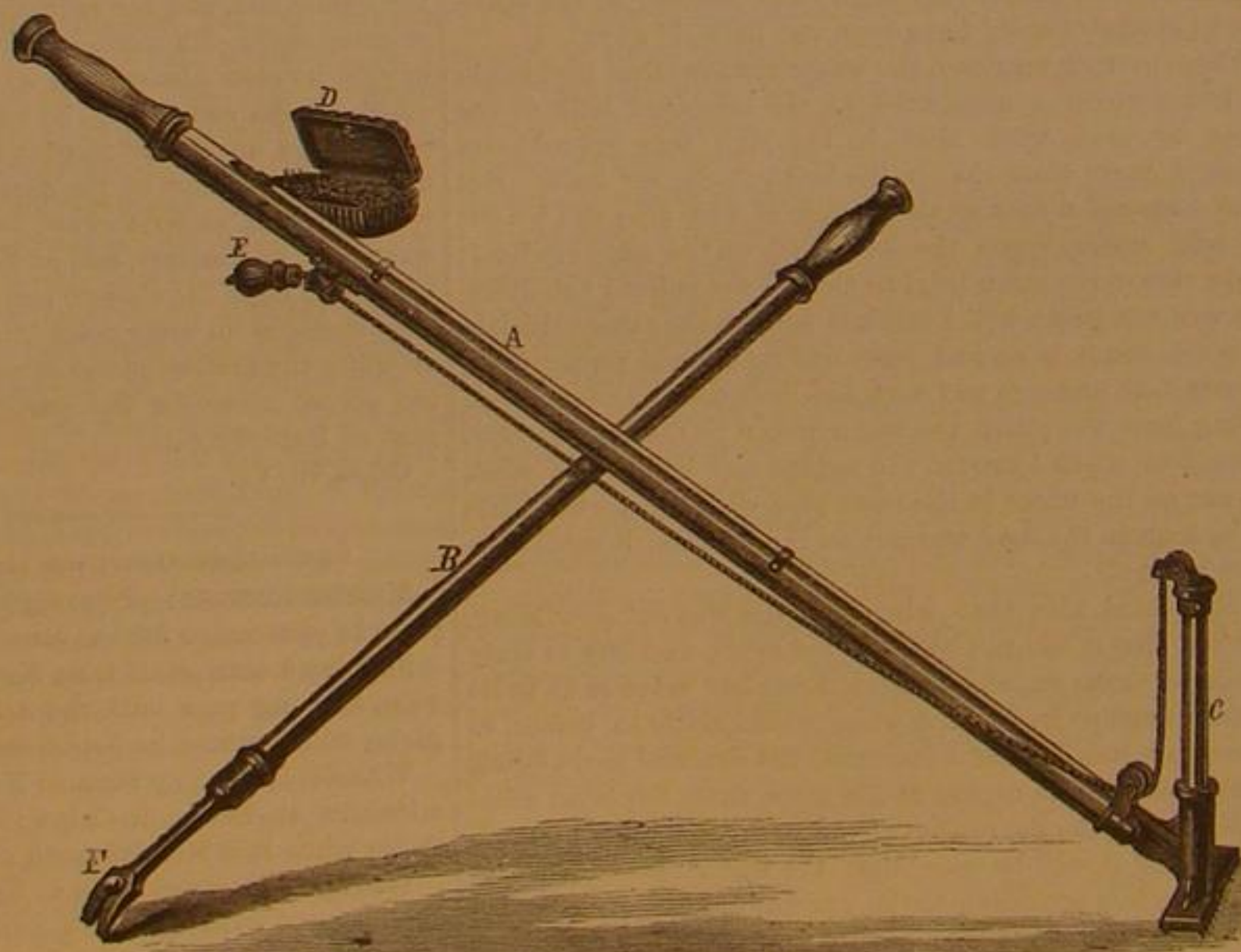
It was patented July 16, 1867, by James Faye, who may be addressed for rights or further particulars at No. 476 Pennsylvania Ave., Washington, D. C.

**FAYE'S PILOT HOOP.**

They are patented in this country under two patents granted Wm. Brown, of Springfield, Mass., dated Feb. 5, and July 30, 1867; and are also patented in Great Britain, France, etc. Wm. M. Evans & Co., 55 Beekman street, are sole manufacturers for the United States and Canada. G. E. Harding, General Agent for New York city and New England States, 726 Broadway, New York. By reference to the advertising columns it will be seen that agents are desired immediately for its sale.

**Modified Collodio-Chloride Process.**

It is often a matter of considerable value in photography to take up an old process, or an old idea, and view it in the light which the experience of years is capable of shedding around it. Much good might result to photography if all working at the art would occasionally look back on the days gone by, and seek out the good and useful of the past for the purpose of molding it to the requirements of the present or the prospects of the future. An old idea revived, but clad in a new dress, now and then makes its appearance, often at an opportune moment. This remark is specially illustrated by

**BROWN'S COMBINED CARPET STRETCHER AND TACK DRIVER.**

some photographs lying beside us as we write, and which, for delicacy and beauty, could scarcely be surpassed. The mode in which these were produced we shall now briefly describe: A good sample of collodion is obtained—one which will yield a rather tough but not too contractile film answers better than any other—and to the sample a soluble chloride, such as chloride of calcium, is added in the proportion of four grains or five to each ounce. Of course the salt should not be added directly to the collodion, but a solution made as follows:—Chloride of calcium, 16 grains; alcohol, 1 ounce. Two fluid drachms of this solution are added to six drachms of the collodion, and the proper strength thus ensured.

A thin specimen of enameled paper is now selected and coated with the collodion, just as an ordinary plate is covered with the film. The paper now resembles ordinary albumenized paper, and is submitted to similar treatment in the successive steps of the process. It is floated on the ordinary nitrate of silver solution, and, when dry, exposed under a negative. The printing is quickly effected, and on removal from the frame, the proof is washed in water and toned. In the case of the prints before us the ordinary alkaline gold toning bath was used with excellent effect. The fixation and washing are conducted in the usual way.

The process is very simple and useful for many subjects

requiring the rendering of the most minute detail, as the cartes before us will bear close examination with a powerful magnifier, and when thus scrutinized, not only bear ample testimony to the capabilities of the process, but also to the quality of the negatives from which the proofs were obtained. There is another element of some importance in these prints, which is not to be neglected, now that we have had such good reason to discuss the probabilities of the permanence or otherwise of our prints. We refer to the fact that as the increased delicacy in the rendering of detail is ensured by keeping the sensitive material on the surface of the paper, so is the integrity of the particles of metal constituting the finished print ensured by their envelopment in so indifferent a body as collodion is generally believed to be.—*British Journal of Photography.*

**A Good Old English Patent.**

Specification of the Patent granted to Henry William Vander Kleet, of No. 253 High Holborn, in the County of Middlesex, Gentleman; for a method of constructing a Walking Staff, to contain a Pistol, Powder, Ball, and Sundry Telescope, Pen, Ink, Paper, Pencil, Knife, and Drawing Utensils. Dated August 17, 1813.

To all to whom these presents shall come, etc. Now KNOW YE, that in compliance with the said proviso, I, the said Henry William Vander Kleet do hereby declare that the nature of my said invention, and the manner in which the same is to be performed, is described and ascertained in the following explanation thereof; that is to say: The staff is about the usual length of a common walking cane, and is made of brass, and may be covered or veneered with prepared whalebone, leather, or any other substance, and the shape is round and rather conical, tapering from the head to the point. It is divided into nine parts, principally tubes (exclusive of the cap or head, and the top or lid of the inkstand), which are all screwed together, except that part containing the pistol, which is fastened by means of two spring catches fixed opposite each other. The first or uppermost part or division is an inkstand, with a metal lid screwed thereon, and a small hole in the center of such lid for a pen to pass through, and a metal knob or button to screw into the hole as a stopper, when the stand is not in use. The cap or head of the staff screws on the inkstand, and may be made of silver or any other metal. The second part serves for the handle of the pistol (which is made of iron), and fixed in the lower end thereof, the barrel being about five inches in length, and about half an inch in diameter; the trigger shuts in underneath the barrel, and is projected by the act of cocking the pistol; and the pistol is kept at half-cock, as well as the pan fastened down, when not in use, by a small bolt, affixed to the upper side of the barrel, the removal of which disengages the pan, enables the pistol to be brought to the full cock and discharged. In the upper end of the second part is placed a piece of wood, with three small holes, to receive a penknife, pen, and blacklead pencil, and the wood is covered with a brass or silver plate, with correspondent holes; the distance of the plate from the opening is about an inch; and on each side of the second part, near the middle, is fixed two small silver loops, through which pass a leather strap and tassel, to put round the wrist of the person carrying the staff. The third part is a hollow tube or case, for the reception of the pistol, with a narrower circular space at the bottom, to fit the muzzle, and keep it steady in the case; and immediately underneath which space is a distended worm spring made of steel, with a small circular brass plate, upon which the muzzle of the pistol rests or presses; the use of which spring is to throw off the pistol case and the lower part of the staff from the pistol immediately on pressing the spring catches. The fourth part is about eight inches in length, and forms a telescope, with two or more brass sliding tubes. The fifth part of the staff is a hollow tube, or case, for carrying writing or drawing paper in. The sixth part is a hollow tube or case, for carrying a piece of India ink, and several hair pencils. The seventh part contains a turn-screw, for taking off the fore part of the pistol barrel when it is to be loaded or cleaned. The eighth part is a small case for containing gunpowder. And the ninth part is a case containing the pistol balls. The eighth and ninth parts are made of brass, and form together the ferrule of the staff.

**To Preserve the Health of Gold Fish.**

The following rules for keeping gold fish in a healthy condition have been furnished by a correspondent:

"For each quart of water only one fish, as gold fish cannot thrive if crowded. Do not change the source of water whether from well or hydrant. In summer renew it daily; in winter only every second or third day.

"Shallow glass dishes should not be used. They should be deep and kept in the shade, strong light and a heated room being detrimental to the fish. The bottom of the globe should be covered with smooth gravel to absorb the excrements and keep the water clean.

In changing the water for cleaning the globe you should take the fish out with a fine net, but never with the hand. Do not feed them with bread or cake or any food containing tannin; but give them wafers, ant eggs, flies, yolk of eggs, water cress, etc., but only once in three or four days and then sparingly.

"In the months of November, December, January, and February the fish should not be fed at all, as this is their hibernating season and food in this season is unnatural. In March, April and May they should be fed scantily.

"If these rules are followed the aquarian ornaments of your homes will live and thrive for many years."

The amount thus far subscribed for the Governor Andrew Family Fund, in Massachusetts, is eighty thousand dollars.



**The Great Trans-Continental Railway Line.**

We have published several articles describing the object and mode of construction of the great railway line from Omaha, Nebraska, on the Missouri River, to Sacramento, California. The line has, however, been generally mentioned under the title of what may be considered its eastern division, the Union Pacific Railroad, while in fact there are two companies, the one at the western end being known as the Union Pacific; and this company is building the road from Sacramento east to Salt Lake.

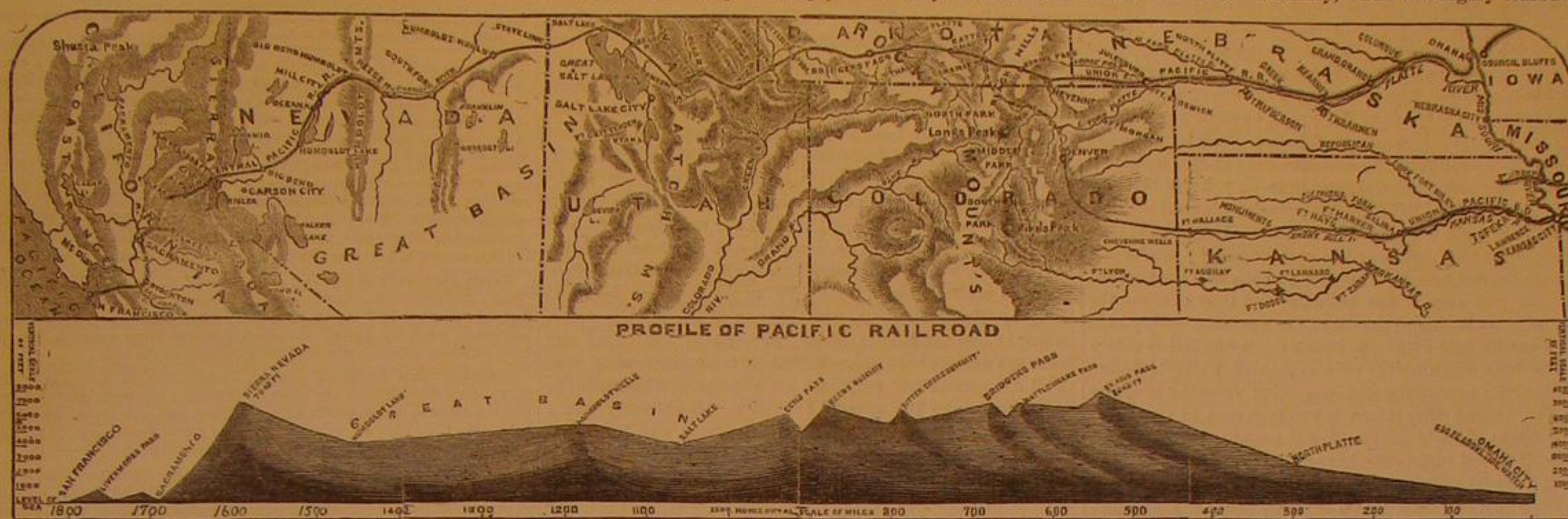
By the map which accompanies this article, it will be seen that this company has completed over 160 miles of the road, having reached the summit of the Sierra Nevada. The serrated lines show the roads as built, and the smooth lines the route and length of the unfinished portion; except that the former do not extend quite far enough to show the amount

stone vaults, increasing every day in value, and destined some time to tickle the palate of the epicure. Here is also to be seen a fine fragment of an old Roman amphitheater, built in the days of the Emperor Gallienus, and capable of holding 15,000 people. Its solid walls and massive arches attest the substantial character of Roman architecture, and seem likely to stand, while more modern structures crumble and fall to dust.

For a distance of sixty miles beyond Bordeaux the railway passes over a wide desolate plain of shifting sands, whose soil, cold, wet, and barren, barely supports a thick growth of briary shrubs, and some dwarf pitch pines, which supply the government with resin and turpentine. Upon the open treeless portion of these plains sheep are pastured to a considerable extent, tended by shepherds who walk upon stilts, and from this perched-up position they can overlook

since. The inhabitants are delighted to show the house where their Majesties passed the bridal night, previous to setting out for Paris.

Returning to Bayonne, the birthplace of the bayonet, a strongly fortified city, the key to the passes of the Pyrenees on the west, we took a carriage and rode over to Baintz, a distance of six miles, the imperial salt watering place, where the Empress Eugénie and her husband Louis have a fine villa close to the seashore. The Empress has also erected a little chapel within the enclosure of the surrounding grounds, and is very justly regarded by the people as a kind-hearted and pious lady. The splendid and well shaded roadway was thronged with mules and donkeys, with immense panniers thrown across their backs, and it was no uncommon sight to see a female seated upon these venerable animals, with her feet hanging astride the neck. A donkey, when thoroughly loaded as I



THE CONTINENTAL RAILROAD—MAP AND PROFILE MAP OF THE LINE FROM OMAHA TO SAN FRANCISCO.

completed at the time of publication of this issue of the SCIENTIFIC AMERICAN. The Union Pacific Road is expected to be completed to Evans Pass, a distance of 555 miles from Omaha, by January 1st, 1867.

This point is the highest elevation on the route, as may be seen by the profile of the road.

The preliminary organization of the Union Pacific Railroad Company was made in October, 1863. The first contract for construction was made in August, 1864; but various conflicting interests, connected with the location of the line, delayed its progress, and the first forty miles were not laid until January, 1866. At that time all obstacles were removed, and the road has been built more rapidly than any other similar work in the world. There were 305 miles completed on the 1st of January, 1867, and contracts have been made for rock cuttings, to be done during the winter. The work on the California end of the route is being pushed forward with great energy toward the east, and it is expected that the whole grand line to the Pacific will be open for business in 1870. The present outfit of the company comprises ample depots, stations, car and repair shops, and all the equipments of a first-class road. It has now in use fifty-three locomotives, twenty passenger and mail cars, and seven hundred and ninety-three freight cars. The financial condition of the company is fully exhibited in an advertisement in another column.

**EDITORIAL CORRESPONDENCE.**

*From Paris to Madrid—The Character of the Country—Bordeaux and its Wine—Pau and its Climate—The Spanish People—Agriculture, Manners, Customs, Towns, and Cities—A Spanish Railway.*

MADRID, November 18, 1867.

The troubles in Italy have turned the tide of continental travel toward Spain, and although this old dominion is familiar to most American readers by the writings of Prescott, Irving, and Ticknor, yet few comparatively of our countrymen ever visit it. A railway is now complete from Paris to Madrid, and thence to Cadiz, at the utmost southern verge of the Peninsula, with connecting links to Barcelona, Alicante, Cartagena, and Malaga, on the Mediterranean, to Lisbon, in Portugal, and to Bilbao, Santander, and St. Sebastian, on the north. The express train runs from Paris to Madrid in forty hours, but those who wish to perform the journey in an easy and comfortable manner will not omit to stop for a short time at the interesting old city of Tours, and thence on to Poitiers—both of which are filled with thrilling incidents connected with the life and times of Louis XI., Catharine de Medicis, and other great characters who have so swayed for good and evil the history and destiny of France.

A day spent in Bordeaux will well repay the time. It is a large thriving city, and stands literally above vast catacombs of wine and brandy barrels. Its noble river, the Garonne, throngs with vessels from all parts of the commercial world, and is spanned by a massive stone bridge of 1,596 feet in length, supported upon heavy piers, the finest structure of the kind in France; the quay extends along the banks of the river for a distance of three miles, and presents a busy scene of rumbling wine carts, and a strange mixture of peoples and tongues. We visited the wine cellars of one of the largest firms in the trade, and were conducted through cellars and passages lined with hogsheds and stacks of bottles filled with the choicest vintages of the country. We noticed tier upon tier of bottles covered by the accumulated mold of a quarter of a century, quietly reposing in iron frames or

their flocks, and prevent them from straying.

In appearance, one of these peasant shepherds resembles a tall man upon two wooden legs; and so expert are they, that by the aid of a long pole, they can clear the country with the rapidity of a horse at full trot. They suffer great privations, and are short-lived; but they are Frenchmen, and prefer this nomadic life rather than emigrate to a land of plenty. Statistics show that in 1864 less than two thousand Frenchmen permanently emigrated from their much-beloved country.

From the old town of Dax—so famous for its dry bracing air—a branch road runs to Pau. The country all along this route is very beautiful and generally fertile. A most charming feature of the landscape is the well-fenced farms with noble farmhouses and outbuildings located thereon, the same as in our own country. It was pleasant also to see roses blooming in the gardens, and the farmers with their carefully blanketed oxen engaged in plowing, sowing, and other agricultural labors. I enquired the reason why working cattle when at work were kept covered with blankets, but no good reason could be assigned beyond the fact that the custom was immemorial—descending from father to son. As in other European countries the yoke is fastened to the heads of the oxen by means of straps wound around the horns, which seems to me a system of cruel torture, but it is old, and as custom among farmers in Europe appears to be arbitrary it would be useless to reason with them that the yoke upon the shoulders is far better than the one which they have inherited. Be it said however to the praise of the inhabitants of the Basque Pyrenees, the men instead of the women perform the labors of the field. Why is this? Simply because they have a better and more advanced civilization, for which they are mainly indebted to King Henry of Navarre, and to Margaret of Valois, who were not too bigoted even in those rude times, to listen to those who led the vanguard of freedom from ecclesiastical tyranny and oppression, a work that is now rapidly advancing throughout all Europe, and will continue to advance proportionately as the minds of men begin to think and act upon intelligent and independent convictions.

Pau has a fine old castle, where good King Henry IV. was born, Dec. 13, 1553. The apartments are grand, and, strange to say, cheerful—a comfort which is usually wanting in all other kingly palaces that I have visited. The royal bed, and the tortoise shell cradle wherein His Highness was rocked, are still preserved among the curiosities of the castle. From the high tower where Margaret of Valois gave asylum to John Calvin, and listened to his stern preaching, a grand view is had of the Pyrenees and surrounding country. An other old tower was used alternately to imprison Romanists and Reformers, but history does not inform us that "pure religion and undefiled" was ever advanced by prisons and persecutions. Pau, which ranks as one of the healthiest spots in Europe, is a place of great resort for consumptives. Their wasted, tottering frames are seen moving about the streets, receiving temporary inspiration from the bracing air, but only to add, it may be, a few more days to their lives. The constant presence of so many "sick, lame, halt, and blind," in this beautiful and healthful spot, of course detracts from its pleasures to those who, more happily circumstanced, might desire to remain and enjoy the fine scenery and the charming excursions through the neighboring mountains. A few miles beyond Bayonne we stopped at the old town of St. Jean de Luz, where Louis XIV. married Maria Theresa, the Infanta of Spain, daughter of Philip IV., in 1660. In honor of this event, the authorities of the town closed the door through which the royal pair entered, and it has remained shut ever

have frequently seen them, affords a most grotesque sight, as often under a pile of bags or brush, nothing of his corporeal frame is visible except the ears, nose and feet.

At the poor, miserable town of Irum, we reached the Spanish frontier, where baggage is searched and cars are changed. The gage of the Spanish railway is a few inches broader than the French, so constructed in order to prevent the running of cars across the border in time of war. The examination of the Spanish officials is very strict, and an armed guard is maintained at all the stations, who search the trains, and lynx-eye all the passengers to discover concealed weapons, and, if possible, to detect revolutionary design. After a delay of an hour and a half, we set out on our journey toward the interior, thankful that we had escaped with so little annoyance. We were permitted to enjoy the complaisance, however, but for a brief period, for on reaching Miranda, a station some six hours journey from Irum, our baggage was again thrown out of the car, and underwent another examination, and one of the guards entered our car and commenced searching under the seats and carpets, and ended his investigation by pounding vigorously upon the cushions and upholstery. Nothing of a warlike character being discovered, we were permitted to pursue our journey in peace until we halted for the night. The recent attempt at revolution in Spain has excited the authorities to an excessive vigilance, and strangers are looked upon with suspicion. The night of our arrival at Burgos, the train bound for Paris was attacked by a band of brigands, who expected to plunder a large amount of bullion belonging to the government, but they missed the prize. The engineer, however, was killed, and some depredations were committed upon the passengers. We saw one of the brigands being marched through the streets of Burgos the next day, on his way to prison, escorted by two armed guards.

Our first night's experience in Spain was had at Vitoria, an old, wind-blown, weather-beaten city, containing about seventeen thousand inhabitants. Vitoria is historically celebrated as the spot where the Duke of Wellington, in 1813, encountered the forces under Joseph Bonaparte, who was the acting king of Spain. Joseph was badly whipped and ran off, leaving an enormous amount of plunder in the hands of the Iron Duke. This victory resulted in the final expulsion of the French from Spain. The town has the usual Spanish Plaza, with very narrow streets, which emit the foulest odors, through open gratings of cesspools that receive all the sewage of the houses, without the necessary draining. No carriages or vehicles of any sort are seen upon the streets, except a few ox-carts, having solid wooden wheels bound by a thick iron tire, and a few iron straps on the sides. In some cases a thick wooden rim, or double felly, secured by pins, is used in place of iron. The water necessary for domestic purposes is collected at the public fountain in the Plaza, in large water jugs, such as the woman of Samaria brought to the well, and these are carried either upon the heads of women or the backs of donkeys. The priests are numerous, and are really the only fine looking men I have yet seen in Spain. They have usually pleasant, intelligent faces, and walk about the streets with great dignity, clothed in their flowing black cassocks and broad-brimmed, turned-up hats. They enjoy the cigarette, and in one instance we noticed a group of them descending the steps of San Miguel after morning mass, pulling the smoke of these little paper rolls. The moment the Spanish territory is entered, the observing traveller notices a complete change, not only of language but also in the appearance of the people, manners and customs, as well as in the character of the country itself. The French are gay,



light-hearted and cheerful and fond of amusement, and particularly polite and attentive to strangers. The Spaniard, muffled within the folds of a huge cloak, appears dull and taciturn, and being naturally suspicious, he seems reserved and manifests no interest in what is going on around him.

The towns are a fitting type of the Spanish character, and many of them have stood unchanged for centuries, apparently unconscious of the stirring activities in the world beyond, but steam and electricity have at last crossed the Pyrenees, and entered these abodes of mournful desolation, and sooner or later a newer and better civilization will reanimate them into a new existence.

The people pride themselves upon their ancestral renown, and in the Basque Provinces they claim to be the descendants of Noah and Tubal. Their antiquity is well attested by the rudeness of their agriculture and the few, uncouth implements which they employ. The plow is made of the trunk of a crooked tree with a lower branch sharpened and faced with a thin sheet of iron. The trunk forms the beam, and lies obliquely between the heads of the mules or oxen, no chains or traces being used. Heavy, ugly-looking stuffed collars are placed upon the necks of the mules, in front of which there is also a strong wooden yoke, similar to an ox yoke, but instead of bows it is provided with two long wooden pins at each end, to prevent it from slipping off the neck. This yoke is then fastened to the plow beam, or to a cart tongue, by means of a long rope twisted several times around both and then passed under the fore legs of the animals; and thus equipped the plowman holds in his right hand the upturned end, which forms a handle, and with whip in the other, the soil is thinly skimmed over, and after the corn is planted, I should judge from its sickly appearance and the thick covering of grass upon the ground that it was left to take care of itself. In some portions of Spain the plow is not used to open the green sward. It is not sufficiently heavy for that purpose, but the labor is done by men working in gangs, who use a heavy, long-tined fork or spade, which is raised above the head and forced down into the turf. They all raise the implement at the same moment, and throw it violently into the ground. Women usually follow with hoes, to break the clods—truly a curious sight, and an evidence that their claim to relationship with Noah is tolerably well founded.

The topographical character of northern Spain is somewhat peculiar. It is interspersed with bare, desolate-looking mountains, scattered about in promiscuous disorder; timberless, fenceless plains, and some apparently fertile valleys; poor villages of low stone houses or huts, covered with red tile—windows often without glass; a huge church of rough stone wholly destitute of architectural symmetry and effect; peasants dressed in fancy costume; men, women, priests, donkeys, dogs, and hogs make up the picture of a country nowhere better portrayed than by their own author of Don Quixote and Gil Blas. The domestic architecture of Spain belongs to a ruder age, but the country is especially distinguished for the grandeur and magnificence of its ecclesiastical edifices, as also for its many interesting remnants of walls, towers, and fortifications of the Roman, Moorish, Gothic, and Castilian periods. For example, in the dull, decayed old city of Burgos, a place of less than twenty thousand inhabitants, there is an old cathedral erected by King St. Ferdinand in the thirteenth century, which is one of the most sublime Gothic structures to be found in Europe, and strikes the mind of every beholder with wonder and astonishment. The exterior effect of this noble building is much injured by its unfavorable location and the mean buildings which have been erected close to its side walls. Nevertheless the principal front is exceedingly fine and the spires and pinnacles rise most beautifully in richly carved open work, so that on a clear night the stars may be seen glittering through them. The interior is in the form of a Latin cross, 300 feet long, 213 feet wide, and 193 feet high. Independent of the magnificent central nave with its elaborate ornamentation and fine retablo, or high altar, there are two lateral naves and fifteen distinct chapels, some of which are as large as an ordinary church; besides these there are also extensive cloisters, and other church appurtenances, the whole containing fine tombs, sculptures, and paintings of ancient date.

At the time of our visit morning mass was being celebrated in all the chapels and also at the high altar by upward of twenty priests and groups of worshippers, chiefly women veiled in black, were kneeling upon the cold marble pavements, and so far as the outward eye could discern they were offering up devout prayer either at the shrine of the Virgin or before a carved embodiment of a suffering God.

There are several very curious relics in this cathedral which are held in high veneration by the inhabitants of Burgos. For instance they have the Christo de Burgos, a wooden image of Christ which was, according to their traditions, carved by Nicodemus, a ruler of the Jews, shortly after he and Joseph of Arimathea had buried our Lord. It was rescued from a box found floating in the sea. The hair, beard, eyelashes and thorns are real, and the image is said to sweat on Fridays, and even to bleed on certain occasions. The image is dressed up in an embroidered petticoat after the modern fashion. There is also an image of St. Cecilia, a recumbent figure, to which is ascribed the special virtue of curing aches and pains about the head. The devotees of this saint bring their tresses to the shrine under the belief that by so doing they will be cured of the headache. This faith in the virtues of a wooden saint is much more sensible than the more common one that resorts to the advertised nostrums of quacks, which flourishes no where so extensively as in our own country. Here is also to be seen the famous old trunk of Mio Cid, the legendary hero and poet of Spain, who being short of money to prosecute his campaign against Valencia resorted to the sharp financial dodge of filling the box with sand and

pledging it as so much gold to the Jews for a liberal loan of hard cash. The bones of the Cid and of his faithful heroic wife Jimena are carefully preserved in a walnut case. The dust is corked up in a beer bottle and is shown to strangers in a room fitted up as a chapel in the old town hall. In this same building is also preserved the first throne of the kings of Castile, a very common old wooden arm chair. Burgos has several very extensive monasteries and convents which are no longer permitted to flourish in Spain as in former times.

At Valladolid, formerly the capitol of Castile, once an imperial city, now much reduced in circumstances, we visited the old house where Christopher Columbus died May 20, 1506. It is a plain two-story building, stucco front the lower story striped to imitate stone, the upper painted to imitate columns with scroll work capitals. On the outside just above the door a carefully sculptured medallion has been inserted which represents the head of Columbus, a globe, anchor, scroll, and a horn of plenty. Underneath are the words "Aqui Murio Colon," "Here died Columbus." A large old building called the Audiencia, now used as a court house, contains the room where Ferdinand and Isabella were married Oct. 18, 1469. It is a very plain apartment with an altar at one end before which it is supposed that the royal couple pledged their marriage vows. Phillip the II., of Spain, was also born here in an old brick palace now deserted and opposite to this is the house once owned and occupied by the learned Gondomar, who was ambassador of Phillip IV. to the Court of James I., King of England. The poor old dwelling of Cervantes, author of Don Quixote, is one of the lions of the place and bears his sculptured head. Valladolid is an interesting spot to all Americans, but very few even of those who travel in Spain ever take the trouble to visit it. Like many other Spanish cities its ancient glory has departed, and it appears to have retired from active business.

The railway between Irun and Madrid is a stupendous piece of engineering, and but for the enterprise, skill, and capital of a French company, Spain would have remained isolated, a sort of political fossil whose glory reverts to the buried centuries of the past.

There are upward of seventy tunnels on the line, of which one that pierces the Guardarama mountains is three thousand feet in length, cut through granite mixed with gneiss and other crystalline schists. The cars are comfortable and good order and regularity are as well maintained as upon European lines, in spite of the grumbling tourists and letter writers of England, who, according to John Murray, do more growling than any other traveller.

S. H. W.

#### The Patent Office.

With the additional force of newly-appointed examiners, and the extra hours of duty performed by all the examiners, the accumulated work of the Patent Office has been nearly brought up. There are now but few classes that are more than a few weeks behind in examination, while most of the rooms are entirely cleared of back cases.

As an indication of the enterprise of the Patent Office, see the long list of patents reported in these columns every week. We received from Washington by a single mail last week official circulars of allowance of FIFTY-ONE patents, all solicited through this office.

#### MANUFACTURING, MINING, AND RAILROAD ITEMS.

The percentage of female operatives to males, in all the mechanical operations carried on in this city, is 37.18; in Philadelphia, 44.81.

It is stated that Mr. Winans of this country has proposed to buy the Moscow railroad, so long in the market and recently offered to the Russo-French company by the Government. He is willing to pay 25,000,000 roubles (\$19,700,000) within a year, besides undertaking to amortize a former loan.

The Turkish government is trying to turn to account its forests and mines but the want of means of communication in the interior is an almost insurmountable barrier. So in spite of the great mineral wealth of the country no one will take the mines. One forest district in Bosnia has been however sold, and is expected to yield \$100,000.

Operations on the railroad which is being built to the summit of Mount Washington have ceased for the season. A new company have been organized fixing the capital at \$300,000. A little over a mile of the road has been constructed and it is expected that the balance will be finished next year.

Crescent employs 9,950 workpeople. The blast furnaces there turn out 130,000 tons of pig iron annually, while the forges produce 100,000 tons of wrought iron in the same period.

In the ordinary method of manufacturing alloys of copper and zinc, the copper is first melted and into the molten mass the zinc is introduced in a solid state. By a late English patent it is proposed to melt both metals, pour the melted zinc into a ladle situated near the melting furnace, and afterwards pour the melted copper into the same vessel, the mixture is then stirred, and the combination takes place, the heat which is evolved in the act, raising the sensible temperature of the alloy and preventing the undue cooling which would result but for the said evolution.

A Mr. Sibert of Staunton, Va., has, it is stated discovered a process for converting iron ore directly into cast steel by a single operation in an ordinary furnace. This gentleman is now laying a number of steel rails made by this process on the track at Staunton and we may hear more from them hereafter.

Since the closing of the war the gold field of Georgia is again engaging attention. In former years the yield of gold was so large that Government established a mint at Dahlonega, Lumpkin county, in the western part of the State. Orders have been recently given to have this mint which was necessarily closed during the war, opened again. Three large ingots of gold from the Levis gold mine valued at \$4,500 the product of one week's work at the cost of \$1.60 were recently exhibited in Washington.

The process of galvanizing iron, as practiced in one of the leading establishments of Philadelphia is as follows:—Selected sheets of iron after being trimmed to requisite size and cleaned by a weak acid solution, are rolled smooth, then dried in an oven and each sheet placed in contact with zinc. Both metals are raised to unequal heat and thus fusion is effected. The regulation of the heat necessary to metallic combination is a point of nicety and care.

The highest elevation ever reached by the railroad is a point on the Pacific road, 8,240 feet above the ocean level or more than four thousand feet higher than the summit of Mount Cenis.

Twelve hundred tons of steel rails have been substituted for iron ones on the Boston and Providence railroad. At Roxbury they have been in use for upwards of a year, at a point where one hundred and twenty trains or locomotives pass over them daily but there is as yet no perceptible wearing away. Iron rails had to be relaid seventeen times a year at the same place,

The rapid growth of the town of St. James, in Missouri, shows what railroads are now doing in developing the country. St. James, on the line of the Southwest Pacific Railroad, was laid out in 1876, but owing to the war but few buildings were erected for several years. In 1895 the population amounted to about 1,300. Within a year past there have been erected, or put under contract, as many new buildings as the town contained last year.

About 25 miles from Santa Fe, New Mexico, is an extensive bed of coal which has been pronounced by experts true anthracite, and is so far as yet discovered the only anthracite deposits west of the Alleghany mountains.

Not less than thirty thousand French Artizans are employed in the manufacture of artificial flowers, and the trade in this line amounts in value to \$5,000,000 every year. America is the best customer of France in the articles, demanding in the same time \$1,000,000 while \$800,000 worth finds a market in Prussia. England consumes \$600,000 worth, Germany is a customer to the extent of \$400,000, and Italy for somewhat less.

#### Recent American and Foreign Patents.

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

**LEACHING TAN BARK.**—Charles Korn, Wurtsborough, N. Y.—This invention relates to a new apparatus for leaching tan bark and consists in the use of a vat which is provided with various compartments which are connected in such a manner that the tanning liquid will continually circulate through the same in any required order or succession.

**STEAM VALVE.**—R. A. Filkins, North Adams, Mass.—This invention relates to a conical valve which has a perfectly smooth lower base or face and which rests on a seat in which the channels for the steam passage are arranged. A passage is provided in the valve which when brought in line with the steam pipe connects the two parts of the same while otherwise it can be so set that the passage will be completely or partly interrupted as may be desired.

**WATER INDICATOR FOR STEAM BOILERS.**—R. A. Filkins, North Adams, Mass.—This invention relates to a device by which the height of the water in a steam boiler can be instantly ascertained without the use of faucets or taps and which, when the water in the boiler descends below a certain line, will blow an alarm whistle and notify the attendants of the fact.

**PLUMBERS' AND PAINTERS' LAMP.**—George Wanler, New York city.—This invention relates to a new lamp for creating a powerful flame similar to that produced by means of the ordinary blow pipe. Its object is to have a self-acting blow pipe and to produce a flame which can be used by painters for burning old paint on doors, etc., prior to applying the fresh paint.

**DISTILLING APPARATUS.**—Theodore Gründmann, Cleveland, Ohio.—This invention relates to a new and simple device for distilling, condensing and cooling mash, beer, cider or other suitable liquid adaptable more particularly for distilling on a small scale. The invention consists in arranging above the retort a small vessel into which the vapors pass and whence they are conducted to the cooler.

**SCAFFOLD.**—Clark Robinson, Rochester, Minn.—This invention relates to a portable scaffold which is to be used by painters, carpenters and masons, and which can be raised or lowered at will to any desired height by the parties standing upon the platform of the scaffold.

**CARRIAGE.**—Ephraim Soper, New York city.—This invention relates to a new construction of the front support of carriages and its object is to allow the application of C-springs to the front part of carriages and also the strengthening of the top bed and upper transverse plate. The invention consists chiefly in the use of a front perch which is secured or swivelled to the back bar and extends to the under side of the carriage to which it is pivoted, thus doing away with the through perch and still permitting the use of C-springs which are fastened to the back bar and top bed and from which the front end of the carriage body is suspended.

**DOOR SPRING.**—Josiah J. Mackey, South Brooklyn, N. Y.—This invention relates to a new and improved application of a spring to doors for the purpose of preventing the slamming of the same as they close.

**MACHINE FOR STACKING HAY.**—William Louden, Fairfield, Iowa.—This invention relates to a new and improved device for stacking hay whereby several important advantages are obtained over other devices hitherto devised for the purpose and a great saving in labor effected.

**SPINDLE BOLSTER.**—Francis A. Sterry, Canton, Mass.—This invention consists in forming an annular recess in the top part of the bolster in which is placed an absorbent for the oil and also in cutting slots through the central portion of the bolster through which the lubricating oil passes to the spindle.

**HOLDER FOR HORSES.**—John P. Reynolds, Miraflo, Mo.—The present invention relates to a holder for horses while being shod which holder is constructed in such a manner and so applied to the horse as to occasion no injury to him and without the least danger of accident or injury to the person operating upon or shoeing the horse.

**TAPE.**—Frederick G. Sargent and Norman H. Bruce, Granville, Mass.—This invention consists in so preparing such surfaces of the said metal wire as are in contact and held by the folded over paper with a coating or covering of paint or fibrous or other material suitable to allow the said wire and card paper to become firmly united and joined together with the use of glue or gelatin or other proper adhesive material, and also to enable the string around such wire or metal to be similarly fastened thereto.

**LIFE PRESERVER.**—D. H. Heyen, New York city.—This invention consists in combining an elastic air-tight tube with a broad substantial belt thereby effectually protecting the air tube from injury and rendering its application to the purpose intended much more easy than where air tubes or vessels are attached directly to the body of life preservers without such support.

**COMBINATION OF AN ALARM AND LOCK.**—Ezekiel Tracy, Kansas City, Mo.—The present invention consists in so combining an alarm with a lock and arranging it in connection therewith that in unlocking the lock an alarm will be set free and sounded and thus the approach or entrance of burglars or other parties indicated to the occupants of the premises or room where the lock is applied.

**PESSEARY OR SUPPORT FOR THE UTERUS.**—Mrs. Emilie T. Brigham, Philadelphia, Pa.—This invention consists in combining with a pessary which may be made of india-rubber or any other suitable material of the proper shape a coiled, spiral or other suitable-shaped spring support of a length sufficient to pass through and out of the mouth of the vagina where at its outer end it is secured to the person by straps or other suitable fastening or holding means or devices. The object of the spring support is to hold the pessary against and about the mouth and neck of the uterus and thus to support the same, the spring shape causing it to produce an elastic support thereto and one most comfortable and easy to the wearer.

**DOUGH KNEADING MACHINE.**—Samuel Emmore, Stouchburgh, Pa.—This invention relates to a new machine for mixing and working dough, and consists in the use of an axle provided with stirrers; a screw thread is formed near one end of the axle, at one bearing, so that when it is revolved it will receive a combined intermittent, rotary and reciprocating motion.

**HITCHING STRAP.**—Thomas B. Chambers, Newtown, Pa.—This invention relates to a new manner of arranging the strap for hitching horses to posts, or other stationary devices, and consists in the use of a chain or strap, secured with its ends to the rings of the bridle. The hitching strap, which is fastened to the halter, is passed through this chain or strap, and is tied to the post.

**TRANSMITTING AND CONVERTING MOTION.**—Nathaniel Thompson, Farmington, Mich.—This invention relates to a new and improved means for transmitting and converting motion, a reciprocating motion being converted into a rotary one, and vice versa. The invention is an improvement on the double crank and pinion, which is an old and well known means for imperfectly effecting the result specified, but which by this improvement is made to operate in a satisfactory manner.

**SCREEN-GUARD ATTACHMENT FOR CULTIVATOR PLOWS.**—G. Brain, Springfield, Ohio.—This invention relates to a new and improved screen-guard attachment for cultivator plows, whereby clods of earth are prevented from being thrown upon the plants, and a greater or less quantity of fine earth thrown upon or around them, as may be required.



arms they are passed through suitable points in the belt at or near its ends, the two ends of the belt will thereby be secured or fastened together, and in such a manner as to bring the arms upon the lacing through the thickness of the belt, in lieu of in the direction of its length and that of the slots through which the arms to the fastener pass.

**MILL SET.**—T. C. Ball, Bellow Falls, Vt.—In this invention, which is designed for circular saw mills, a table slides back and forth under the head block, having a rail attached to its upper surface, which slides between two guides, projecting downward from the knee. The rail, being inclined at an angle of thirty or forty degrees from the perpendicular to the head block, causes the knees to advance or recede as the table moves in one direction or the other. Several of these tables are connected by a rod, which is operated by a novel reversing arrangement.

**CORRESPONDENTS** who expect to receive answers to their letters must, in all cases, sign their names. We have no right to know those who seek self-formation from us - besides, as sometimes happens, we may prefer to address the correspondent 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 50 cents a line, under the head of "Business and Personal."

W. W. McE., of Ala., says:—"I want some information in regard to the link motion. What is the rule, if any, to find the throw of the eccentric, the lap of valve over the ports, and the required travel of valve to cut off at any point in the stroke to as short as six inches?" The best plan in order to become practically acquainted with the properties and peculiarities of the link motion is to lay it down, valve and all, full size, on a drawing board. Or, better still, to make pasteboard or wooden models of the same, which may be obtained any measurement desired.

I. V. J., of N. Y.—“Can you give me some idea of the method of generating carbonic acid gas such as is used for so-called soda water with the proportions of material used and gas obtained?” Carbonic acid for soda water is commonly generated by mixing marble dust with an equal weight of sulphuric acid. Marble contains over 40 per cent of carbonic acid. A cubic foot of carbonic acid weighs two ounces.

## EXTENSION NOTICES.

Warren Gate, of Peekskill, N. Y., having petitioned for the extension of patent granted to them the 7th day of March, 1851, for an improvement in the gage of straw cutters, for seven years from the expiration of said patent which takes place on the 7th day of March, 1858, it is ordered that the said petition be heard at the Patent Office on Monday, the 17th day February next.



## Device for Lathe Carriages.

Various devices have been adopted for the purpose of adjusting the tool of a slide lathe, but they have been all more or less defective, and their use has been in most cases abandoned.

The most popular form still in existence is the weighted rest, but the principle is in this erroneous, as steadiness and stiffness must be sacrificed; for weight is all that can be relied upon for keeping the carriage snugly in position on the bed, and in cases where interstices or irregularities occur in turning, the result is anything but satisfactory. Another point which can be urged against this arrangement is the inordinate wear of the bed occasioned by the necessarily augmented weight. This would not be productive of so much evil were it to extend the full length of the bed, but in tools where short work has been done for even a limited time, a very material hollow is perceivable between the sliding points of the carriage, which is ruinous to the accuracy of the machine. These disadvantages have proved themselves so well founded, that numerous leading manufacturers have entirely relinquished the use of a weighted carriage, and now use merely annular wedges, which certainly cannot be charged with the leading defects of the method just commented upon; but what they gain in this respect they lose in awkwardness of their manipulation, and it is only by a series of trials involving time that the desired adjustment can be attained at all.

Now, the device which our engravings represent, seems to preëminently combine all the most desired features; its solidity is not in the least degree impaired by complete control and fine adjustment of the tool point, even when in operation, and it possesses in itself a novelty, in its adaptedness to cutting screws, of so much merit that this alone is sufficient to recommend it. When cutting screws by means of the ordinary rest, the operator is obliged to draw back the rest when the lathe is reversed, in order that the thread or tool may not be injured. Each time the cut is recommenced the same formula must be observed, which, aside from being inconvenient, is disadvantageous, as the accuracy of the feed is interfered with by the alternating movement of the tool to and from the work. The "Improved Rest" is adjusted to the carriage, A, in the ordinary way, B, is of box form within which is fitted the wedge, E, and block, C, wherein the tool post, D, is inserted. C swings at the point, H, and rests upon the wedge, E, which is in turn controlled by the screw, F. G is a guard to keep the dirt from getting under the wedge. Now, it will be seen that when the elevation of the point of the tool, I, is necessary, a turn of the screw, F, pushes the wedge under, C, and produces the required effect; when depression of the tool point is desired, a withdrawal of the wedge by the same means accomplishes it. When it becomes necessary to reverse the lathe, as in cutting screws, it is obvious that the tool will ride on the work quite lightly, swinging on the pin, H (or it may be relieved by hand to the same end), but immediately on recommencing cutting, the tool will engage solidly, and thus only one movement of the feed is requisite, and that always toward the work between the centers.

This invention was patented by Jonathan E. Burdge, August 13, 1867, and the sole right has been purchased by the Niles Tool Works, of Cincinnati, O., who are prepared to furnish the rests, or furnish tools of their own manufacture, with the patent rest attached.

## Improved Spectroscope.

Professor Osborn, of Lafayette College, Easton, Pa., has made improvements in the spectroscope, by which it may be readily applied to a variety of practical purposes, especially in metallurgical operations. In a recent letter to us he says:

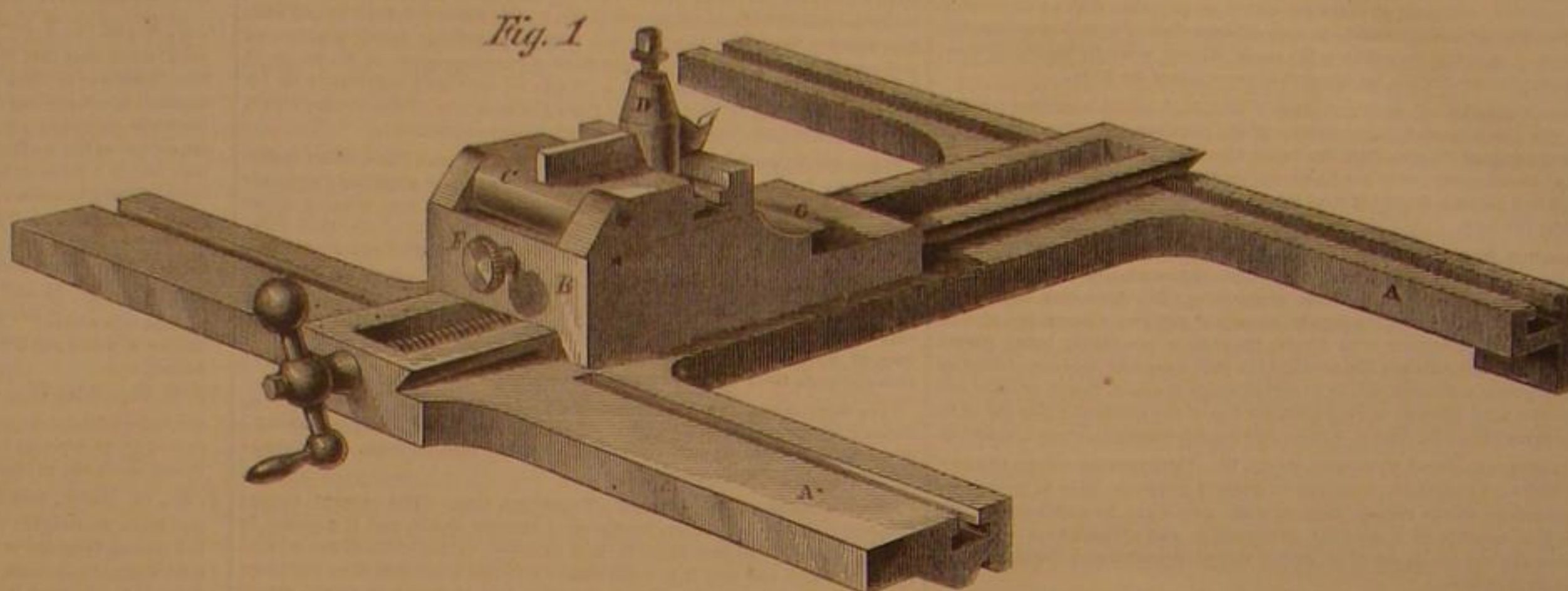
"The instrument complete is so arranged that the observer reads the degree on the scale by the actual light which he is analyzing. The very light which comprises, in its flame, the vaporized metal as lime, iron, chromium, titanium, sodium, etc., discloses to the observer in the spectral form its own nature, not only, but often to a great degree, the approximate quantities found in the original ore or even in the coal used, or from the wasting brick of the furnace. Nothing can exceed the beauty of the spectral forms which suddenly appear and disappear in the otherwise darkened tube, as the observer stands at the 'tunnel head' of the furnace, watching as it were, the spectral secrets of that terrible flame which pours forth from the stack, especially when, after the 'cast' and consequent cessation of the blast, that blast is again turned on.

"The bright yellow bar of sodium is almost always present during examination of all flames resulting from the use of any and all forms of anthracite in the furnace and forge, or from decomposing soda feldspars.

"But one of the most striking facts in my examinations occurred at our last analysis of a flame from a reheating fur-

nace on the Lehigh, at the wire works of Stuart & Co. The workmen held partly out a bar of intensely heated iron on the hearth of the furnace, when, at rapid intervals, the dark lines which are seen in the solar spectrum appeared faintly, but certainly, flitting over the spectrum of the fierce flame by which the intensely heated iron was enveloped.

"An instrument, of a circular form, is in course of construction, under my direction, for the easy examination of these flames, and which may be used at any time and at considerable distances, and I am hoping that such shall be its sensitiveness that the furnace master may sit in his room and know much of the efficiency and value of the operations proceeding at the furnace, by its use. I am situated on a hill, and by means of my instrument, placed upon my dinner

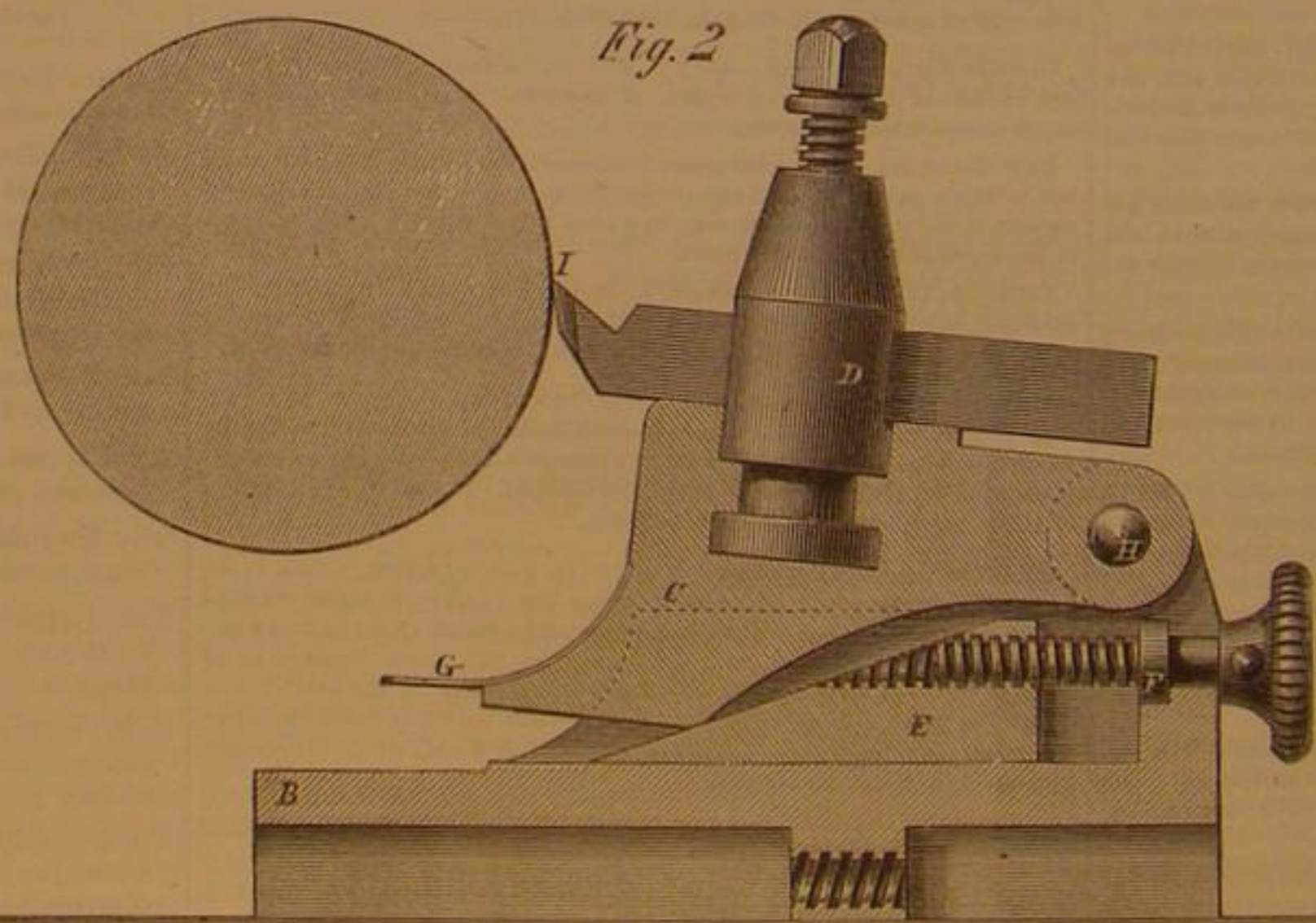


THE BURDGE PATENT IMPROVED TOOL REST.

table, I can get a beautiful spectrum from a reheating furnace situated not much less than a half mile from my instrument, and am able to detect the sodium in the coal, or from the decomposed fire brick, and also any lime, potash, etc., which proceeds from the furnace mouth. I have no doubt that some exceedingly important uses may be made of this discovery of the spectroscope in the line of metallurgical operations."

## On the Pressure of Steam at High Temperatures.

Prof. Klingenfeld has lately succeeded in finding a formula for the calculation of the expansive energy of heated water:



as the same is quite simple and short, and the differences between the results obtained by it and the best known experiments are quite insignificant, we hope its publication will not be out of place. It is the following:

$$t = 180 \log. (4 + 6a) + 32.$$

$t$  expresses the temperature,  $a$  the number of atmospheres, and  $\log.$  Brigg's logarithms.

In the following table we have placed the calculation by this formula side by side with the results of M. Regnault's experiments, quoted from the excellent Principles of Physics of Prof. Benjamin Silliman.

Pressure, Atmospheres.	Temperature, Fahr. Observed.	Temperature, Fahr. Calculated.	Difference, Degrees.
1	212	212	0
2	249.5	248.7	+0.8
3	273.3	273.6	-0.3
4	291.2	292.4	-1.2
5	306	307.5	-1.5
6	318.2	320.3	-2.1
7	329.6	332.1	-2.5
8	339.5	348.8	-1.3
9	348.4	349.3	-0.9
10	356.6	357	-0.4

Example.—Required, the temperature to produce a pressure of 67 pounds per square inch (the atmosphere taken at 15 lbs.)

$$t = 180 \log. \left( \frac{154}{5} \right) + 32 \left( \log. \left( 4 + \frac{6 \times 67}{15} \right) \right), \text{ being equal to } \log. \left( \frac{154}{5} \right).$$

$$\log. \frac{154}{5} = 1.4885.$$

$$t = (180 \times 1.4885) + 32 = 299.93, \text{ the temperature required.}$$

## The National, Anti-Monopoly, Cheap Freight Railway League.

This is the somewhat pretentious title of an association the object of which is to construct railroads for the use and benefit of the public, with a view to the ultimate adoption of the system on all roads. The idea is, that our railroads, as at present conducted, are doing but a tithe of the work they are calculated for; that the cheap transportation of freight from point of production to point of consumption is a desideratum to all classes; that the proper development of our immense agricultural, mineral, and manufacturing resources demands cheap and rapid means of intercommunication, and that open competition and equal advantages are better than close monopolies.

The intention of the association is to construct several new lines of railroads connecting the South and West with the East, making, in the aggregate, about 4,000 miles of road, exclusive of branches. On these roads trains for freight are to be run—by any individuals or companies who may wish to avail themselves of the privilege by paying a certain toll—at a certain rate of speed, thus keeping the road in continual use. Once established on one independent line, its advantages and benefits would probably insure its adoption on every road in the country.

We have repeatedly referred to this project in favorable terms, but we deem it of too great importance to be allowed to rest. The whole country is interested in this matter. Not unfrequently the cost of transporting articles of prime necessity from their locality of production to the place of consumption is greater than the first value. Every means that can cheapen the price of food, fuel, etc., is eminently worthy attention, and no means is more direct than the diminution in the cost of transportation.

We agree with the *American Railroad Journal*, which says:—

"Few persons, at sight, comprehend the immense effect of an improved system for the rapid and cheap handling of the agricultural, mining, and manufacturing resources of the country. It was stated by an intelligent farmer of the West, a few days since, that the 'Cheap Freight Railway System,' if accomplished, would add three-fourths to the average net profits of agriculture, after deducting the cost of production, to the whole country west of Utica. It has been clearly pointed out that Pennsylvania, in consequence of expensive freights, is suffering under a year-

ly deficiency of production of more than one hundred millions as compared with some other States, and that Ohio and the West generally, stand in nearly the same category, while the Southern States exhibit a still more meager production. It was well remarked by an experienced railway financier of England, lately, in this country, that 'the great West is strangled by illiberal railway policy, while the South is starved,' and he concludes that 'cheap freights and very numerous trains are the remedy.'"

As to the feasibility of the plan we have no doubts; the great difficulty will be in convincing railroad corporations and their stockholders that equal rights without monopoly will be in the end more profitable than the present system. Their prejudices, however, would rapidly disappear with the first successful development of the new plan.

FEAT OF A FILE MAKER.—A workman in one of the Sheffield Works has cut a file 19 inches long, 8 inches wide, and 1 inch thick. The file is rough on one side and bastard-cut on the other. The chisel used in cutting it was 12 inches in length so that instead of being over-cut and up-cut in rows one row sufficed for both cuts.

M. PAUL MORIN, the chemist in charge of the Aluminum Bronze Works near Paris, asserts that the melted alloy when poured into the mold is transparent. Mr. T. Sterry Hunt hearing of the assertion witnessed the operation and states that the appearance of the molten stream seemed to corroborate the statement.



# Scientific American.

MUNN &amp; COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY AT  
NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN. S. H. WALES. A. E. BEACH.

For "The American News Company," Agents, 121 Nassau street, New York  
 For "The New York News Company," 8 Spruce street.

Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions or advertisements for the SCIENTIFIC AMERICAN. Orders sent to them will be promptly attended to.

Messrs. Trubner & Co., 60 Paternoster Row London, are also Agents for the SCIENTIFIC AMERICAN.

VOL. XVII., No. 25....[NEW SERIES]....Twenty-first Year.

NEW YORK, SATURDAY, DECEMBER 21, 1867.

## Contents:

(Illustrated articles are marked with an asterisk.)

*Improved Safety Generator and Surface Condensation for Marine Engines—The Loss by "Blow- ing Off".....	385	Manufacturing, Mining, and Rail- road Items.....	390
Some Useful Hints.....	386	Recent American and Foreign Patents.....	391
Experiments with Boiler Foam Pipes.....	387	Answers to Correspondents.....	391
Relative Size of Pump Barrels and Tubes.....	387	*Extension Notices.....	392
Electricity.....	387	*Device for Lathe Carriages.....	392
Some Questions on the Day Line Matter.....	387	*Improved Spectroscope.....	392
Musical Vibrations.....	387	On the Pressure of Steam at High Temperatures.....	392
*Improvement in Hoops for Chik- den.....	388	The National Anti-Monopoly Cheap Freight Railway League.....	392
*Device for Stretching and Laying Carpets and Drawing Tacks.....	388	Closing of the Volume—Index and Title Page.....	393
Medicine Colloid-Chloride Pro- cess.....	388	The SCIENTIFIC AMERICAN—Com- mencement of a New Volume.....	393
A Good Old English Patent.....	388	Improvements in Steam Engines Since the Time of Watt.....	393
To Preserve the Health of Gold Fish.....	388	Petroleum for Steamship Boilers— Report of the Navy Depart- ment.....	393
*The Great Trans-Continental Railway Line.....	389	Patents.....	393
Editorial Correspondence.....	389	Wood Engravings—How They Are Made.....	393
The Patent Office.....	389	Patent Claims.....	394
		Pending Applications for Reissues.....	395

## CLOSING OF THE VOLUME—INDEX AND TITLE PAGE.

We had at one time the impression that only a portion of our readers desired the index and frontispiece which are published at the close of each volume of the SCIENTIFIC AMERICAN. Acting on this idea, at the close of Vol. XVI., we notified our readers that the index and title page would be sent only when applied for. The applications were so numerous and general that we have concluded to print as a part of the next or closing number of Vol. XVII., the full index and title page. We were gratified to learn by the immense number of applications for the index after the close of last volume, that so large a proportion of our subscribers preserved their numbers for binding.

## THE "SCIENTIFIC AMERICAN"—COMMENCEMENT OF A NEW VOLUME.

With the issue of the next number, Volume XVII. of the SCIENTIFIC AMERICAN—New Series—will close. One year ago we enlarged the paper—nearly doubling its size—at a heavy expense, but without raising the price of subscription, confident that our endeavors to improve and beautify the paper, and benefit our readers, would be appreciated by them and result in a corresponding increase of the number of our subscribers. We were not mistaken, and the SCIENTIFIC AMERICAN continues to be, as for nearly a quarter of a century it has been, the best and most highly valued journal devoted to Science and Mechanics in the country. Its editorials are widely copied, both here and abroad; its published correspondence brings practical men, throughout the country and world, *en rapport* with each other; its illustrations and descriptions of new inventions make the mechanic acquainted with the improvements of others, and serve as valuable guides to the inventor; its replies to correspondents contain weekly a vast fund of valuable information on almost every practical subject, and its department for the young conveys knowledge which is of present interest, and may be of future benefit. In addition to these departments, our Editorial Summary gives notices of mechanical novelties and recent scientific discoveries, culled with great care from various sources, not only from our domestic and English exchanges, but translated from French and German periodicals expressly for our columns. Our Mining, Manufacturing and Railway Items present from week to week a brief but comprehensive résumé of the events and discoveries in these departments. The list of foreign patents taken out by Americans, which is prepared for our columns weekly, and the complete official list of United States patents are of great value to the inventor, manufacturer and mechanic.

What the SCIENTIFIC AMERICAN has been the past year it will be hereafter, except that no efforts will be spared to improve in every department as opportunity offers and the progress of the times demands. Our aim is to encourage honest and persistent endeavor, to give counsel and advice where needed, to state our sincere opinion when requested, to defend the mechanic from unprincipled charlatans by exposing the fallacy of their pretensions, and to contribute, as much as lies in our power, to the assistance of inventors. The opinions of correspondents are respectfully considered, and their productions published when they possess such merit as makes them valuable to others. We shall not hesitate to expose the humbugs of pretenders, while we shall be no less earnest in the encouragement of honest seekers after truth.

## IMPROVEMENTS IN STEAM ENGINES SINCE THE TIME OF WATT.

So long as steam remains a mechanical power adapted to the uses of man, so long will the fame of James Watt endure as the grand improver of the mechanism through which that agent works. Still, it may be doubted whether the practice of ascribing all the benefits of the steam engine, as at present used, to the genius of Watt, and thus robbing later inventors of the credit due them, is borne out by the facts. The steam engine of the present day is a much greater advance on the best, constructed under Watt's supervision and from his plans, than his was on the crude attempts of Savary. Within the memory of living mechanics, the steam engine has undergone such a complete transformation, not only in outward form, but internal construction, as to be an almost entirely different machine. A stationary engine of thirty years ago would be a curiosity to our young engineers. The length of stroke as compared with diameter of the cylinder was enormous; the fly wheel was only a fly wheel, never a pulley; the valves were unbalanced; few engines "cut off" or used steam expansively, and the governor merely checked the inlet of steam to the chest, but did not govern the valves. All these important points have been the subject of comparatively recent improvements.

On the best engines now built the steam is used expansively, in one cylinder, by means of cut-off valves, and the action of the valves is governed directly and absolutely by the regulator or governor; so that the amount of steam admitted to act upon the cylinder piston is adjusted exactly or nearly so, to the work required of the engine—a most important, if not a radical, improvement. The immense pressure sustained by the old-fashioned valves, which had to be moved by purely mechanical force under a load denoted by the pressure of steam per square inch multiplied by the area of the valve, and against the immense friction of the surfaces of the valve face and seat, is now almost wholly annihilated by improvements in this part of the machine. The improved packings for piston and stuffing boxes, while diminishing friction in these parts, have added immensely to their efficiency, and in connection with the use of live steam cylinder jackets, have insured a great saving of steam, and, consequently, fuel. The condenser for low-pressure engines has been as much improved by comparatively modern inventions as any other part.

It is evident that Watt had an idea of these possibilities. For instance, he conceived the project of using steam expansively in one cylinder, but it was left to later inventors to perfect it. It would be unjust to those mechanics who have for the past twenty-five years made steam and the steam engine their study, to deprive them of the credit due them for increasing the efficiency of this great mechanical motor. James Watt was a great inventor, but he did not exhaust the possibilities of the steam engine by his inventions.

## PETROLEUM FOR STEAMSHIP BOILERS—THE REPORT OF THE NAVY DEPARTMENT.

We have frequently alluded to the project of substituting petroleum for coal as a fuel for generating steam, and on pages 137 and 153, current volume, we considered the matter in two articles in which we treated on the comparative heating powers of petroleum and coal; their relative values as heat producers; relative cost; relative space occupied on board ship, and the dangers, real or supposed, of storing petroleum on board vessels. In subsequent articles we also considered the life of the petroleum apparatus as compared with the coal furnace, and the difference in the cost of labor. From these facts, fortified by figures which were eminently reliable, but which were as favorable as possible to petroleum, we deduced the conclusion that this substance could not safely and economically usurp the place of coal. This conclusion is fully sustained by the report of the Secretary of the Navy who says:

The act approved April 17, 1866, appropriated five thousand dollars for testing the use of petroleum as a fuel for marine boilers. An elaborate series of experiments has been made at the New York and Boston Navy Yards. The conclusion arrived at is that convenience, comfort, health, and safety are against the use of petroleum in steam vessels, and that the only advantage thus far shown is a not very important reduction in bulk and weight of fuel carried.

It would seem that this declaration is sufficiently explicit to satisfy the most sanguine advocates of petroleum as a substitute for coal. We have had no personal nor pecuniary interest in this question, our only desire being to present the plain facts without wishing to do an injury to any experimenters. It may be that some cheaper material than coal, less bulky, and more easily managed, may in the future be discovered, but we have yet to see the proofs that petroleum is the substance destined to supersede coal.

## PATENTS.

The rapid increase during late years in the number of patents annually granted for new inventions, is something astonishing. Statistics in an old Patent Office Report at hand show that, during the first fifty years after the establishment of the Office, the number of patents issued for that entire period fell far below every annual issue for some years past, and a comparison of the list of claims published in the earlier numbers of the SCIENTIFIC AMERICAN, with the lengthy record which, week after week, now appear in our columns, is proof conclusive of the growth of business in this department.

The report of Secretary Browning for the year ending October 1st shows that 2,500 more applications were made this year than last, and over 5,000 more than on any previous

year. The whole number of applications was 16,547. Of these, 12,879 were allowed, and 11,655 have been issued—an increase of about 3,000 over last year's issue. During the same time, 3,486 caveats were filed, 96 applications for extensions were received, and 82 extensions were granted.

The Patent Office receipts for the year were \$611,910.61, the expenditures \$553,599.98, leaving a balance of \$58,310.63, which, added to the balance on hand, makes the amount now in the treasury to the credit of the Patent Fund, \$286,607.89.

## WOOD ENGRAVINGS—HOW THEY ARE MADE.

The art of engraving is one of the oldest, and its origin is lost in the mists of antiquity. Probably it was contemporaneous with the origin of written language, and may have preceded it in point of time. A variety of substances are employed to receive the work of the engraver, but wood is now more extensively used than any other; and wood engraving has been brought to such perfection as to rival in delicacy of finish and richness of effect the best efforts of engravers on metals. Wood engraving is used entirely for the illustrations in periodicals and mainly for those in books, although occasionally specimens of steel plate engraving are inserted in very elegant and costly volumes. The woods employed are box, pear, apple, beach, maple, mahogany, and pine, of which box is infinitely the best. The large illuminated posters used by exhibitions are coarse engravings on pine or some other common wood, cut with the grain. Of course, no attempt at finish or elegance can be very successful with such material, yet the effect, when combined with judgment in the printing, is frequently quite imposing.

Box wood, on which the best engravings are cut, is the product of a shrubby evergreen, a dwarf variety of which is in common use here as borders to flower beds and gravel walks. The tree variety seldom passes in this country beyond the size to which the term shrub rather than tree could be properly applied, although we have seen one specimen at least fifteen feet high, the stem or trunk of which was over seven inches in diameter. In southern Europe, however, this size and even larger is quite common. The name box—Latin *boxus*—is from a Greek word which means also cup or vase, denoting its use in former times for the construction of drinking vessels. It is still largely employed for the manufacture of ornamental boxes and other specimens of the turner's art. But its principal value is its adaptability for engraving.

Large quantities are sent from Spain, the Levant, and the island of Majorca. A considerable quantity is brought also from Turkey. The wood is yellow in color, hard, heavy, very close and even grained, and susceptible of a high polish. Its specific gravity varies from 0.971 to 1.328. If the latter is taken as a standard, the specific gravity of box wood exceeds that of any other wood known to the arts, as ebony has a specific gravity of only 1.259, and guaiac of 1.302. The wood is prepared for use by steeping large blocks in water for 24 hours, after which it is boiled in water and then dried in sand or ashes.

It is brought to this country in logs or blocks, denuded of its bark, and for engraving purposes is sawed across the grain, squared, and planed to a true surface on each face. It is seldom obtained in pieces six inches square, although we have seen one specimen perfectly sound, and of excellent quality, which squared to seven-and-one-eighth inches. Most blocks, however, of such dimensions on which engravings are cut, are composed of from three to eight pieces, joined and secured in the most exact manner. The engravings prepared for the SCIENTIFIC AMERICAN are invariably cut on box wood, and not infrequently one of the blocks contains eight or ten pieces.

The blocks when ready for the designer or artist are exactly the thickness or height of the ordinary type—a shade less than fifteen-sixteenths of an inch, or, more correctly, twenty-nine thirty-seconds of an inch. The upper surface, which receives the design, is finished very smoothly, and preparatory to receiving the drawing is coated with flake white—that scraped from the faces of enameled cards being generally used. The artist transfers the outline of the design to the face of the block by means of a transparent paper on which the design is drawn. The drawing and shading is made by lead pencils of different qualities and a camel's hair pencil charged with sepia or India ink. When done by an artistic hand the drawings are very beautiful, presenting an elegance of appearance very difficult to reproduce on paper from the engraved block.

Although the engraver must follow the lines and shadings of the designer, the former, to be successful, must possess great skill, acquired only by practice, and use considerable judgment in carrying out the artist's ideas. The excellence of the engravings published in this journal testify to the talent of our principal artist, Mr. F. Louis Seitz, and our engraver, Mr. Richard Ten Eyck.

The engraving is done in the same manner and with tools similar to those employed in engraving on metals. Most of it is done entirely by hand, although sectional views and those portions which consist only of unshaded parallel lines are engraved by a simple machine called a "ruling machine."

During the progress of the work of designing and engraving, the blocks must be defended from damp atmosphere and the sun's rays. If the design is to be reproduced indefinitely it is usually considered best to make from the block one or more electrotypes, which, being of type metal coated with copper and mounted on wood, will last for years. In wood engraving the "whites" are cut away from the surface, leaving those parts which are to receive the ink and produce the impression, in relief. But occasionally the reverse course is adopted and the figures or letters are sunk into the wood and the ground is left, producing a black ground with white







I claim the concave-shaped clutch, E, as described, suspended on chains or bars, as specified, in combination with bar, A, and its appendages (roller, handle and eyelet), the whole constructed and operating substantially as herein described and specified.

**71,629.—BURNING FLUID.**—Thomas Martin and J. G. Evans, Muscatine, Iowa.

We claim a burning fluid composed of the ingredients and combined in the proportions herein specified.

**71,630.—VENTILATING COWL.**—Benj. F. Miller, New York city.

I claim, 1st, The curved air passage, c, extending from the trunk, b, to the mouth of the ventilator, as and for the purposes set forth.

2d, The inclined plate, i, and plate, g, in combination with the openings, 2 and 3, for receiving and discharging water that may enter the ventilator, as set forth.

3d, The opening, 4, at the lower end of the curved plate, c, for the purposes and as set forth.

4th, The flange plates, 5, upon the plates, d, extending from the plate, f, to direct moisture out through the opening, 4, as specified.

5th, The perforated doors, h, h, in combination with ventilator, formed with the curved air passage, c, and flaring mouth, as and for the purposes set forth.

**71,631.—CLOCK CASE.**—Deitz Monnin, Paris, France.

I claim a cast metal clock case, having its front, sides, base, top and dial cast in one piece, as set forth.

**71,632.—CONSTRUCTION OF CORRUGATED SHEET METAL.**

**71,633.—CARTRIDGE BOX.**—Albert Newcomb and Benj. Lyon

(assignors to themselves and Samuel W. Porter), Springfield, Mass.

We claim a cartridge box, having an elastic bed or support in the bottom of the chamber, b, upon which the cartridge may rest while in place, substantially as herein described and for the purposes specified.

**71,634.—SPRING BED BOTTOM.**—Bartolomeus J. Oleff, Milwaukee, Wis.

I claim a bed bottom made crowning, with slats, C and D, springs B, and hooks, E, in combination, substantially as and for the purposes described.

Also, hook, E, with its nut, G, in combination with the spring, B, and slat, C, connected thereto for the purpose of tightening the slat and spring, as described.

Also, the arrangement of the inside longitudinal slats, C, in pairs, connected to springs, B, with the two outside slats single, with their connections, as described.

**71,635.—PAPER CLIP.**—John H. Parsons, Quincy, Mich.

I claim, 1st, The plate, C, provided with the slots, d, constructed as described, in combination with the clip, A, having the holes, h, all arranged substantially as described, and for the purposes set forth.

2d, The combination of the elaps, T or H, plate, C, clip, A, and guides, y, substantially as shown and for the purposes set forth.

**71,636.—FASTENING FOR GATES AND BARN DOORS.**—Ezekiel

Pea, Mechanicsburg, Ill.

I claim this combination of latch, B, spring, C, and lever, A, applied to gate and door fastenings, as described.

**71,637.—BURGLAR ALARM AND LOCK APPARATUS.**—Charles

E. Pierce, New York city.

I claim, 1st, The combination of the bolts shown in figs. 5 and 6, with the parts 5a, 5b and 6a, operating to lock a window, in the manner shown.

2d, The parts represented on figs. 14, 14a, 14b and 14c, or their equivalent, operating as described and for the purposes set forth.

3d, In combination with the elements of the preceding claim, I claim the lever, Q, operating as described.

4th, In combination with the alarm mechanism, I claim the levers for increasing the length of movement, and the rollers, all combined as and for the purposes set forth.

5th, The center wheel, M, on figs. 1 and 2, made up of parts, M1 and M2, for purposes set forth.

6th, The bolt on fig. 7, made up of parts, C', I, b', and K, for locking a door or gate, at the same time that it operates the alarm mechanism, as described and for purposes set forth.

7th, In combination with elements of the claim preceding, I claim the plates, J and H, as and for the purposes set forth.

8th, In combination with the parts claimed in the second and third claims, I claim the dial plate, with openings, a, and for the purposes set forth.

**71,638.—MECHANISM FOR FEEDING SCREW BLANKS.**—Elijah

S. Pierce, Hartford, Conn.

I claim, 1st, The combination of the cams, M and N, the levers, B C D and G, the rocking shafts, E and R, the connecting rod, F, the spindle, H, the conveying arm, J, the rod, P, the arm, Q, the rocking piece, L, the feeding trough, O, or their mechanical equivalents, the whole constituting a feeding and conveying mechanism, substantially as herein described and for the purposes set forth.

2d, The combination of the conveying arm, J, the rod, P, the arm, Q, and the feeding trough, O, operating substantially as herein described and for the purposes set forth.

3d, The conveying arm, J, the rod, P, and the arm, Q, constructed and operating substantially as described.

**71,639.—ADJUSTABLE TUMBLERS FOR PERMUTATION LOCKS.**

—Oliver E. Pillard (assignor to Frederic H. North), New Britain, Conn.

I claim the friction strap, l, applied around the periphery of the stud disk, b, and within the notched tumbler, d, in combination with mechanism for tightening said strap, substantially as and for the purposes set forth.

**71,640.—ADJUSTABLE TUMBLERS FOR PERMUTATION LOCKS.**

—James H. Porter, New York city, assignor to Frederic H. North, New Britain, Conn.

I claim the circular tumbler, d, formed of two parts hinged together, in combination with the disk, b, and with mechanism substantially as specified, for drawing the parts of the tumbler together and clamping said disk, as set forth.

**71,641.—BUTTON.**—H. Prouhet, St. Louis, Mo.

I claim the disk, A', and the locking plate, a2, when combined and arranged substantially as described and set forth.

**71,642.—SNOW PLOW.**—Samuel Richards, Philadelphia, Pa.

I claim, 1st, Combining with an ordinary eight-wheel flat car or car bottom, the removable front plate, F, and the removable inclined top piece, F',

2d, Combining with an ordinary eight-wheel flat car or car bottom, the removable front plate, F, the removable inclined top piece, F', and the upper wedge block, G, or their equivalents.

3d, The arrangement of an axle or windlass, I, endless cord, and shifting wedge piece, G, or their equivalents.

**71,643.—SALT BOTTLE OR CASTER.**—George B. Richardson,

Boston, Mass., assignor to Thos. T. Sanborn and Wm. M. Cobb.

I claim the movable pulverizer, B, provided with points or projections, in combination with a receptacle, A, constructed and operating substantially in the manner and for the purpose set forth.

Also, in combination with the above, the piece, e, of cork, or its equivalent, placed at the bottom of the bottle, A, for the purpose described.

**71,644.—JAWS FOR STEEL TRAP.**—William Richter (assignor

to S. D. Newbro), Lansing, Mich.

I claim the employment of the clutches, of the particular form and shape specified, constructed and attached to or near the external edges of the jaws of steel traps, substantially as above described and for the purpose set forth.

**71,645.—CHURN.**—F. W. Robbins, Salem, Ohio.

I claim a churn dasher when constructed with a spiral beater, p, continuous or in sections, in the manner substantially as set forth.

**71,646.—LASTING SHOES.**—Christopher Robinson and Wm.

H. Lovejoy, Lynn, Mass.

We claim the improved mode of connecting the upper to the insole, viz., by the two ranges of sewing, one of which is carried through the other and the upper, and the other through the insole alone, as set forth.

**71,647.—MACHINE FOR STRETCHING CLOTH.**—Henry P. Roche,

Utica, N. Y.

I claim, 1st, The combination of the roller, F4, with the supporting sockets, F5 and F6, and eccentric sleeve for disconnecting the socket from its driving mechanism, as and for the purposes described.

2d, In combination with the above, the spreading roller, H, constructed and operating as and for the purpose set forth.

3d, The combination of roller, F1, sockets, F3 and F5, and roller, H, constructed as described, with friction bars, B B, substantially as and for the purposes set forth.

4th, In combination with the above, the bath, A, as and for the purposes set forth.

**71,648.—SAFETY TRAP FOR BRIDLE.**—Henry H. Rockwell

(assignor to himself, Henry L. Bacon, and John H. Latham), New London, Conn.

I claim the arrangement and combination of the disks with the strap or straps and the roll rings thereof, the said disks being for the purpose and to operate as specified.

**71,649.—HARVESTER RAKE.**—John L. Rohrer, Upper Leacock Township, Pa.

I claim the combination and arrangement of the reel arms, J, with the spider, G G, and pinion, F, in combination with the pinion, E, operating obliquely, both on the same shaft, and operated with the raking attachment, in the manner and for the purpose specified.

Also, the arrangement of the clutch, B, in its flange, pivoted, b, on the cap, A, operated by a spring rod, N, to connect and disconnect the cap with the driving wheel, O, which actuate the rake and reel, in the manner and for the purpose set forth.

Also, the bent or shouldered plates, Q, provided with a straight and a curved slot, when employed for connecting and adjusting the rake arm, I, or curved slot, with the arms, G and H, in the manner and for the purpose specified.

**71,650.—WASHING MACHINE.**—W. C. T. Runnells, Searsport, Me.

I claim the combination of the corrugated and hinged bottom, g, with the rollers, f, table, e, weight boxes, f, shaft, d, crank, b, cord, k, and tub, a, substantially as and for the purpose specified.

**71,651.—LAMP CHIMNEY.**—E. O. Schartau, Philadelphia, Pa.

I claim the glass chimney with the flared top, whether scalloped or plain on the edge, as herein described.

Also, the glass chimney having a shoulder formed at the top, for the purpose of permanently attaching a glass or metallic toy, as herein described and for the purposes set forth.

**71,652.—CHURN.**—Arba M. Seymour, Jr., Madison Wis.

I claim the construction, arrangement, and operation of the dashers, as and for the purpose specified.

**71,653.—HARNESS PAD BLOCK.**—Palmer Shaw, Syracuse, N. Y.

I claim, 1st, A harness pad block when so constructed that the portion in which the nails are driven is made separate and detachable from the main portion of the block, substantially as and for the purpose set forth.

2d, The hollow iron block, A, filling, B, and set screw, c, c, constructed and combined substantially as herein shown and for the purpose described.

**71,654.—BED BOTTOM.**—Charles E. Simmons and Homer

Cook, Waukegan, Ill.

We claim the combination of braces, D D D' D' and F F, hinged to the upper frame, B, and to the plates, f, f, with the pivoting plates, C, C, arranged and operating as described.

**71,655.—TWINE HOLDER.**—R. L. Smith, Wolcottville, Conn.

I claim the loop or plug with the upper part of the twine holder, for the purposes and as specified.

**71,656.—WASHING MACHINE.**—Thomas Smith, N. Y. city.

I claim the circular flexible and spinning washboard, in combination with a series of rotating or vibrating extensible arms and clamps, or their equivalents, carrying the fabrics to be washed, all operating substantially in the manner and to the effects described.

**71,657.—APPARATUS FOR GENERATING OXYGEN GAS.**—Benj.

R. Smithson, New York city, assignor to himself and Samuel West, Boston, Mass.

I claim within described apparatus for generating oxygen gas, constructed and operating substantially as set forth.

**71,658.—SHOEMAKER'S LAMP.**—John M. Sporer, Philadelphia, Pa.

I claim the combination and arrangement of the cylinder, B, trough, D, curved arms, E E', and the steady rests, b b', as shown and described.

**71,659.—GRATE FOR STOVES AND OTHER HEATERS.**—Samuel

B. Stewart, Brush Valley, Pa.

I claim, 1st, A grate swinging horizontally and communicating successively with two or more separate flues, substantially in the manner described, for the purpose of warming different rooms in succession by a single fire.

2d, A revolving grate divided into compartments, each communicating with an independent flue, substantially in the manner described.

3d, The combination, substantially in the manner described, of a revolving grate, divided into compartments by vertical radial partitions, and revolving on a vertical axis, with a flue having corresponding partitions, for the purpose set forth.

4th, The combination, substantially in the manner described, of a revolving grate, with a heating or cooking stove, and one or more open grates, for the purpose of applying the heat successively to each, or simultaneously to all, as set forth.

5th, The combination, substantially in the manner described, with a revolving grate having radial partitions or wings attached to and revolving with it, in the ash pit of a discharge spout, for carrying of the ashes swept into it by the wings in their revolution.

**71,660.—GRAIN BINDER.**—Ole O. Storie, Norway, Wis., assignor to himself and Isaac N. Mason, Milwaukee, Wis.

I claim, 1st, Rake, B, endless chain, C, spur wheels, D and D', connecting rod, E, loose wheel, F, socket, G, and sliding way, H, in combination substantially as described.

2d, Compressor, c, binding cord, i, crank, d, and wheel, s, in combination, when operated substantially as and for the purpose described.

3d, Wabbling wheel, U, pulleys, V, and nippers, X, in combination, operating substantially as and for the purpose described.

4th, Clutch, M, spring, P, lever, Q, and wheel, S, in combination substantially as described.

5th, Clutch, M, pinion, R, wheel, S, wheel, T, and cylinder, W, operating in combination, substantially as described.

6th, Slotted wheel, Y, in combination with compressor, c, and nippers, X, substantially as and for the purpose described.

7th, Slotted wheel, Y, knife, Z, and spring, a, in combination substantially as described.

**71,661.—HORSE HAY FORK.**—H. C. Stouffer, John Heaton

and Alphens A. Bushing, Columbiana, Ohio.

We claim the curved lever, E, check rod, F, and spring, H, as arranged, in combination with the link, D, and feet, C, in the manner as and for the purpose described.

**71,662.—HAT IRONING MACHINE.**—George W. Stout and John

C. Richardson, Newark, N. J., assignors to themselves, James Davis, Jr., and Samuel R. Hawley.

We claim, 1st, A pair of irons operating in conjunction to iron simultaneously both sides of the brim, substantially as described.

2d, The combination in the same machine of revolving irons for finishing the brim, and also the top and sides of the crown.

3d, Finishing irons operating simultaneously upon the top of the crown, both sides of the brim, and also upon the sides of the crown.

4th, So combining the irons which operate upon the brim only, that they may be readily separated from each other at will, as and for the purposes described.

5th, The combination of the brim irons with their connecting spring, rod, and crank, substantially as and for the purpose set forth.

6th, The combination of the brim irons with their driving mechanism, so as to admit of the shifting of the positions of the irons without arresting the motions derived from the driving mechanism, substantially as set forth.

7th, The combination of the brim irons and the top iron with their driving mechanism, so that the relative positions of the irons may be changed, for the purpose set forth.

8th, The combination of a revolving hat block with revolving irons.

9th, The combination of a swinging arm which carries the side irons, with a pivoted head stock, as and for the purpose described.

10th, The combination of a swinging arm, which carries the hat block, with a swinging arm which carries a sliding iron.

**71,663.—SIZING FOR BANK NOTE PAPER.**—John M. Sturgeon,

New York city.

I claim a sizing made from the within formula, substantially as described, and combined for the purposes set forth.

**71,664.—STUFFING BOX PACKING.**—Charles M. Templeton,

Concord, N. H.

I claim the packing ring, consisting of the outer parts, R R R, and the inner parts, r r r, the same being arranged to break joints with each other, in common with the follower, F, all operating as and for the purpose described.

**71,665.—CARBURETING APPARATUS.**—Wm. Thompson and

J. E. Hall, Cleveland, Ohio.

We claim, 1st, The agitator, J, constructed with an annular chamber, L, wings, M and N, and tubular arms, O, in the manner and for the purpose substantially as set forth.

2d, Perforated float, B, top, Q, spouts or sleeves, C, and cotton, D, or its equivalent, as arranged in combination with the float, E, and agitator, J, in the manner and for the purpose substantially as described.

3d, The float, E, agitator, J, constructed as described, in combination with a carbureter, in the manner and for the purpose substantially as described.

4th, The combination of the agitator, J, provided with a float and a revolving agitator, constructed as described, whereby the carbureting fluid is agitated for the purpose of largely increasing its evaporation or elimination, substantially as and for the purpose set forth.

**71,666.—REGULATING WATCHES.**—Hiram Todd, Columbus, O.

I claim, 1st, The combination of the screw, E, sliding rod, B, link, C, and the regulator bar, H, as shown and described for the purpose specified.

2d, The employment of the expansion and contraction of the link, C, in combination with nut, B, and regulator bar, H, constructed to act upon the hair spring of the watch and more perfectly regulate the same, as set forth.

**71,667.—COMPOSITION FOR ROOFING.**—Reuben Tyler and

Peter Campbell, Jr., Diana, N. Y.

We claim the composition of coal or gas tar with marl and a small quantity of pulverized marble, which will harden and make a good water-proof or fire-proof roof for building purposes.

**71,668.—MACHINE FOR CUTTING AND MITERING PRINTERS' RULES.**—Richard Walker (assignor to himself and Joseph B. Bancroft),

Suffield, Mass.

I claim, 1st, The cutter, p, attached to the adjustable head, m, in combination with the cutter, d, as described.

2d, The combination of the segmental platform, l, with the cutter, m, cam lever, o, and head, m, as set forth.

3d, The combination of the cutter-holding arm, b, the connecting bar, e, the cam, h, and the spring rod, k k', substantially as and for the purpose set forth.

4th, The graduated bar, r, and gage, s, in combination with the platform, l, as and for the purpose described.

**71,669.—SAWING MACHINE.**—Peleg Werni and Reuben B.

De Bare (assignors to Reuben B. De Bare), Chicago, Ill.

We claim suspending the saw upon the rod, R, passing through a slide, T, which has a vertical movement upon rods, a, a, attached to the vertical frame, and a slide being provided with a cord, b, passing over a pulley, c, all constructed and operating in the manner as and for the purposes specified.

**71,670.—CUTTER HEAD FOR MOLDINGS.**—John Whitworth

(assignor to himself and W. H. Hawkins), Cleveland, Ohio.

I claim the herein described chilled cast-iron cutter, made in the manner as and for the purpose substantially set forth, as a new article of manufacture.

**71,671.—PORTABLE ROPE BRIDGE.**—Algernon L. Wilkinson,

Huntsville, Ala., and Elias Y. Boggs, Nashville, Tenn., assignors to Alger-

son L. Wilkinson.

I claim the arches, B B, when constructed of single pieces of angle or channel iron, and provided with links, c, c, to hold them to a railroad track, in combination with the cross bars, o o, constructed with a swivel link, v, and a goose neck, u, substantially as and for the purpose indicated.

**71,672.—SCROLL SAW MILL.**—Benj. F. Williamson, Franklin

County, Ohio.

I claim the inclined and adjustable revolving platform or table, D, constructed to operate substantially as described and for the purpose set forth.

Also, in combination with the platform, A, the plate or heading, I, constructed to operate substantially as and for the purpose set forth.

**71,673.—CAR COUPLING.**—M. K. Adams, Mountain Eagle, Pa.

I claim a car coupling consisting of the double-headed bolt, E, in combination with the draw head, A, provided with the recess, i, and hinged lid, B, having the loop, c, attached, when the whole is arranged to operate substantially as described.

**71,674.—HOISTING DEVICE FOR TRUCKS.**—Nathan Albertson,

Plainfield, Ind.

I claim the vertical rack, E, operated by the lever, F, in combination with the spring door, b, when attached to a truck constructed, arranged, and operating as and for the purpose described.

**71,675.—GATE.**—Wm. J. Alexander, Rolling Prairie, Ind.

I claim the gate, A, the braces, C and E, the chain, F, with the weight, G, and pin, I, as substantially arranged and set forth in the foregoing.

**71,676.—WHEEL.**—Julius M. Bailey, Indianapolis, Ind.

I claim, 1st, The socket, h, when provided with grooves upon one side, in which the tenons of the flanges fit, and with grooves upon their inner sides to which the tenons of the flanges fit, and with a wedge, U, said wedge adjusted by means receive the tenons of the flanges in the tire, A, and the nut, D, all constructed as described for the purpose specified.

2d, Having the spoke, E, stepped into the slotted bed or socket, F, in combination with the wedge, G, all substantially as set forth and described.

**71,677.—EXHAUST FOR MILLSTONES.**—David Baird, Bloody

Run, Pa.

I claim the combination and arrangement for the box, B, having the discharge port, D, and enclosing the millstones, with the exhaust pipe, E, chamber, C, having two outlets, e, e, and the fan, F, the latter arranged between

the two exhaust pipes, e e, and drawing the air through each of them, substantially in the manner and for the purposes indicated.

**71,678.—HEAD BLOCK FOR SAW MILLS.**—Thomas C. Ball (assignor to himself, Abijah S. Clark, and Sumner Chapman), Bellows Falls, Vt.



100, c', formed in it, and the hinged side plates, D, with each other, substantially as herein shown and described and for the purpose set forth.

71,703.—**SAFETY POCKET.**—Joseph Colton, New Orleans, La.  
I claim the combination of the jaws, A, B, piece, C, slides, a, spring slides, b, d, springs, e, f, pin, h, and the pocket, as herein described, for the purpose specified.

71,707.—**DENTAL SUBSTITUTE.**—George W. Cool, Portland, Oregon.  
I claim the mode of fastening the thin plate or lining to the vulcanite or other dental plate heretofore in use, in the manner above described.

71,708.—**FIRE FRAME FOR CHIMNEYS.**—John Correia, Brooklyn, N. Y.  
I claim the metallic frame for kitchen chimneys, formed in the manner and for the purposes set forth, and in combination with the metallic flue, throat piece, and back plate, as and for the purposes set forth.

71,709.—**FLUID BOLT.**—Martin Cosgro (assignor to himself and Geo. H. Reynolds), Peoria, Ill.  
I claim a bolt, B, provided with broad arms, or wings, C, constructed and arranged substantially as described, for promoting and equalizing the currents of air, which are made to pass through the bolt by means of the exhaust fan, E.

71,710.—**MANUFACTURE OF HORSESHOE NAILS.**—Harley D. Cowles, Bridgeport, Conn., assignor to the Bridgeport Horseshoe Nail Company.  
I claim, 1st, The compound cutting apparatus, consisting of the series of dies and the series of cutters, substantially as herein described.  
2d, The method of making nails for horseshoes, namely, by first rolling the plate to the form described and represented by figs. 1 and 2, and then cutting the nails therefrom by means of the series of dies and series of cutters, secured or formed in sectional holders, all as herein described.

71,711.—**DRAUGHT AND VENTILATING DEVICE FOR OPEN GRATES, ETC.**—Jas. M. Crockett, Newbern, Va.  
I claim the arrangement and construction of the box, A, damper, C, lid, E, and pipe, D, when combined as herein described and for the purposes set forth.

71,712.—**MEDICAL COMPOUND.**—William Davidson (assignor to himself and William J. Rannie), Binghamton, N. Y.  
I claim the composition herein described for the purposes set forth.

71,713.—**BELT-LACING DEVICE.**—David P. Davis, New York city.  
I claim the two-part lacing, A, for belts, etc., each similarly constructed, substantially as described.

71,714.—**SHINGLE MACHINE.**—Benj. Day, Bangor, assignor to himself and A. L. Smith, Orrington, Me.  
I claim, 1st, The shingle frame, B, adjustable forming board, H, knife, K, and self-adjusting roller, L, all constructed and arranged to operate in the manner and for the purpose substantially as described and shown.  
2d, The auxiliary bearing, O, constructed and arranged to move with the forming board a part of its descent, and to resume its position and office upon the ascent of the forming board, substantially in manner as and for the purposes specified.  
3d, In combination with knife, K, and roller, L, the hinged shield, L, substantially as described and shown.

71,715.—**PLOW.**—Samuel T. Denise, Red Bank, N. J.  
I claim the combination, in a plow, of the vertical roller, E, with the horizontal roller, I, the latter rotating the former, substantially in the manner and for the purpose specified.

71,716.—**WASHING MACHINE.**—George M. Denison, New London, Conn.  
I claim, 1st, The rubbing surface composed of bristles arranged in rows, alternating with elastic ribs or ridges, substantially as and for the purpose specified.  
2d, The roller, C, arranged in relation with the rows of bristles, and the elastic ribs or ridges, substantially as and for the purpose specified.  
3d, The rubber, constructed in the manner specified, in combination with the guides, A, in the side plates of the corrugated board, substantially as and for the purpose herein set forth.

71,717.—**CAR COUPLING.**—M. Disney, San Francisco, Cal.  
I claim, 1st, A car coupling, having a movable retaining lip, C, clutch, b, and the detaching lever, E, the whole constructed and operating substantially as and for the purpose herein described.  
2d, The automatic catch, d, constructed and operating substantially as and for the purpose described.

71,718.—**HARVESTER RAKE.**—J. A. Dodge and Geo. Perry, Auburn, N. Y., assignors to John A. Dodge.  
We claim, 1st, The switch, S, constructed, arranged, and operating as described.  
2d, The combination, with a continuously rotating rake, of a vertically moving latch, T, constructed, arranged, and operating as described.  
3d, The combination, as described, of the vertically moving switch, S, with the stop, s, for the purpose set forth.  
4th, The combination, substantially as described, with the continuous cam guide of the switch arranged to play vertically to change the path of the rake.  
5th, The combination, with a continuous cam guide, K, of an outside track, k, a switch, S, and a latch, T, when both the latter are arranged to play vertically, for the purposes set forth.  
6th, The combination of the switch, S, the crank arm, s, the cord, s, the spring, s, all constructed and arranged as described, for joint operation.  
7th, The combination of the independently hinged rising and falling rake arms, continuously rotating round a common center, with the continuous cam guide, the vertically moving switch, and the latch, whereby either one of the arms can be used as a rake or as a rake, at the pleasure of the operator.  
8th, The rake arms, having curved depending arms carrying friction rollers, and operating as described.  
9th, The arrangement of the friction rollers on the bent arms, n, so that they always travel outside of the continuous cam guide, K.  
10th, The combination of the continuous cam and fixed cam plate, with the independently hinged, continuously rotating, rising and falling arms, carrying friction rollers, running outside of the cam guide, and controlled by the switch, whereby the beaters are made to act as either a rake or a reel, as required.  
11th, The combination, substantially as described, with a continuous guide, a cam plate, a cam, a switch, and a latch, of independent continuously revolving rising and falling arms, a crown wheel carrying the arms, and a bevel wheel to rotate them.  
12th, The combination and arrangement, substantially as described, of the drag bar, the adjustable shoe, and the finger beam, with the raking mechanism, whereby the rake can be mounted directly over the shoe, without interfering with the adjustability of the shoe.  
13th, Mounting the rake on the adjustable bar, b, as and for the purpose described.  
14th, The combination of a platform and hinged drag bar, having a standard mounted on each, with raking mechanism mounted in a frame adjustable backward and forward on the standards, substantially in the manner and for the purpose described.

71,719.—**YARD MEASURE.**—Joseph Douglass, McConnellstown, Pa.  
I claim the yard stick, with handle, B, and measuring flanges, C, C', substantially as described.

71,720.—**CAR BRAKE.**—Eugene Hippolyte Duru, Paris, France.  
The adjusting gear, B, F, N, in combination with the pinions, C, and with a railroad car, substantially as and for the purpose set forth.

71,721.—**LOCKING KNOB LATCH.**—Carl Herrman Eiffler, New York city.  
I claim, 1st, The arrangement of an adjusting screw, a, provided with a transverse hole to receive the set screw, b, in combination with the spindle, C, and knobs, D, E, constructed and operating substantially as and for the purpose set forth.  
2d, In closing in the knob, E, the mechanism which serves to throw said knob in and out of gear with the latch, substantially as and for the purpose set forth.  
3d, The nut, c, on the spindle, C, in combination with the movable stump, d, tumbler, g, knob, E, and latch, B, constructed and operating substantially as and for the purpose set forth.  
4th, The safety stop, o, in combination with the knob, E, washer, F, and latch, B, constructed and operating substantially as and for the purpose described.  
5th, The disk, f, provided with cam slots, e, e, in combination with the movable stump, d, safety stop, o, and tumbler, g, constructed and operating substantially as and for the purpose set forth.  
6th, The adjustment, u, in combination with the keyhole and with the safety stop, o, constructed and operating substantially as and for the purpose described.

71,722.—**NUT LOCK AND WASHER.**—Edward A. Ellsworth, Washington, D. C.  
I claim, 1st, The spring nut lock, B, and washer, A, constructed in one piece, substantially as described, for the purpose specified.  
2d, One or more points or downward projections or flanges, a, in combination with the spring nut lock and washer, substantially as described, for the purpose specified.

71,723.—**DOUGH-KNEADING MACHINE.**—Samuel Emmore (assignor to himself and A. Burkholder), Stouchburg, Pa.  
I claim, 1st, The shaft, C, when provided with a screw thread, so as to impart a combined intermittent rotary and reciprocating motion for the stirring of a dough kneading machine, substantially as and for the purpose herein shown and described.  
2d, The tub, A, when consisting of two parts hinged together, in combination with the sliding cover, D, all made and operating substantially as herein shown and described.

71,724.—**FERTILIZING COMPOUND.**—Levi S. Fales, Tarrytown, N. Y.

I claim the fertilizer, composed of sea sand, sulphate of ammonia, charcoal, bones, and dried blood, substantially as herein set forth.

71,725.—**FERTILIZER.**—Levi S. Fales, Tarrytown, N. Y.  
I claim the fertilizer, formed by the combination of the several specified materials, substantially as herein set forth.

71,726.—**SADDLERS' AND SHOEMAKERS' TOOLS.**—George V. Farr and Ephraim Hall, Brandon, Vt.  
We claim, 1st, The channelling tool above described, composed of the adjustable knife, B, the stock, A, and the spring cap, C, the lip or bottom of the cap, and the shoulder, O, of the stock, forming a gage to bring the knife at the edge of the sole to be channelled, substantially as set forth.  
2d, The rounded or curved forms of the cap, C, and shoulder, O, in the direction of their length, substantially as and for the purpose described.

71,727.—**BIT BRACE.**—Samuel F. Fenn (assignor to himself and F. B. Clark), Middletown, Conn.  
I claim the spring stirrup, a, attached by the pivot, b, to the spindle, A, of a brace, constructed and operating substantially as and for the purpose described.

71,728.—**DEVICE FOR FILLING AND PACKING ROTARY PAPER PULP BOILERS.**—Albert Fickett, Rochester, N. Y.  
I claim, 1st, The use of a screw shaft and a movable head working upon and operated by the screw shaft, as above described.  
2d, The said screw shaft and movable head, in combination with the use of the light pulley, A, operated by two bolts, one open, the other crossed, in conjunction with the lever, H, and the belt tighteners, b, b, substantially as and for the use above described.  
3d, The use of two or more guide pieces fastened to the interior surface of the rotary or cylinder in a longitudinal direction, which perform the double function of preventing the movable head from tilting when the screw shaft is put in motion, and of adjusting the contents of the rotary.  
4th, The use of a hollow and perforated screw shaft, substantially as and for the use above described.  
5th, The use of a perforated piston head to allow free circulation of the liquor and steam, substantially as above described.

71,729.—**LOW WATER INDICATOR.**—R. A. Filkins, North Adams, Mass., assignor to himself and W. B. Werden, Waukegan, Ill.  
I claim, 1st, The tube, E, in combination with the tube, B, whereby the cold air is prevented from striking the tube, B, while hot water is in the latter, substantially as described, for the purpose specified.  
2d, The lever, F, pivoted to the arm, h, of the globe, C, sliding rod, l, to which the float, G, is secured by the chain, n, packing tube, m, and spring, o, all arranged and operating as herein set forth, for the purpose specified.

71,730.—**ROTARY STEAM VALVE.**—R. A. Filkins, North Adams, Mass., assignor to himself and W. B. Werden, Waukegan, Ill.  
I claim the construction of the hollow conical valve, C, and its arrangement with the shell, E, nut, F, flange, e', partition, j, ring, f, shoulder, m, and pipe, A, all made and operating substantially as and for the purpose herein shown and described.

71,731.—**ROOFING CEMENT.**—R. H. Fitts, Lawrence, Kansas.  
I claim the composition, substantially as described, and for the purposes set forth.

71,732.—**TOY GUN OR PISTOL.**—F. Fuller, New York city.  
I claim the combination of the discharging rod, C, constructed with a grooved head, B, the spring chamber, e', substantially as set forth. The wedge-shaped trigger, E, arranged to elevate and release the discharging rod, C, and the shoulder, e', with the stop, g, and depressing spring, h, all constructed substantially as set forth and described.

71,733.—**DRESS FOR MILLSTONE.**—A. N. Garland, West Charleston, Vt.  
I claim the millstone dress above described, consisting of the smooth surface inside, and the file surface outside of the line, D, together with the smooth shallow channels in the bed stone, and deeper ones in the runner, the channels in both stones being constructed in the curved form above described, widening towards the rim of the stones, and having one smooth inclined surface and one perpendicular wall, e', the upper edge of the wall being sharp and smooth, and all the parts being constructed and arranged substantially in the manner and for the purposes specified.

71,734.—**PLOW.**—George Gibbs, Canton, Ohio.  
I claim, 1st, The straight beam, A, in combination with the detachable wooden brace, B, fitted into sockets, for the purposes as herein specified.  
2d, The land side, d, of the form and for the purposes as set forth.  
3d, The collar nose, e, made and used as and for the purpose specified; and  
4th, The beam, a, brace, b, land side, d, and collar nose, e, combined to form the design specified, when made and used as herein described.

71,735.—**PLOW.**—William Gibbs, George Gibbs, and Louis P. Wikida, Canton, Ohio.  
We claim the flange on cast shares, when constructed and used as herein before described.

71,736.—**FENCE.**—Samuel Good, Greenville, Ohio.  
I claim the blocks, A and B, when constructed substantially as described, having a suitable base, C, and formed into a fence, as specified.

71,737.—**RAILROAD GATE.**—A. C. Goodman, and Henry Fessler, Canton, assignors to themselves and Henry Foltz, Stark County, O.  
We claim, 1st, The gate, C, provided with a weight, D, which causes it to assume a vertical position when not confined, as and for the purpose set forth.  
2d, The arrangement of the crank shafts, E, with their bars, F, connecting rods, G, G, and the gate, C, as and for the purpose specified.  
3d, The arrangement of the spring notched bar, H, with the crank shaft, E, and gate, C, as and for the purpose set forth.

71,738.—**REGULATOR FOR MARINE CLOCKS.**—A. I. Goodrich, Waterbury, Conn.  
I claim a regulator for marine clocks, made of one piece or strip of metal from end to end, substantially as described.

71,739.—**BAG TIE.**—John J. Gordon, Flint, Mich.  
I claim the bar, A, hook, B, and cord, C, constructed, combined, and used, substantially as and for the purpose set forth.

71,740.—**BALING PRESS.**—Jackson Gorham, Bairdstown, Ga.  
I claim the arms, 1, constructed as described, having diverging side pieces, b, b, the bottoms of said arms resting in grooves of the framing, d, and attached to the ends of the top, J, which passes over the pulleys, e, in the end of the lever, H, to the shaft, C, all arranged and operating as herein described.

71,741.—**SHAFT ATTACHMENT TO CARRIAGES.**—Jackson Gorham (assignor to himself and John Armstrong), Bairdstown, Ga.  
I claim the attachment to carriage shafts, consisting of rods having hooks, and hung to the whiffletree and sliding hooks, substantially as and for the purpose described.

71,742.—**APPARATUS FOR MAKING PAPER ARTICLES.**—Harison Grambo, Philadelphia, Pa.  
I claim, 1st, Forming articles from paper pulp, complete by continuous operations, substantially as described.  
2d, The feed and agitator box, G, substantially as described, for the purpose specified.  
3d, The interlayer, E, substantially as described, for the purpose specified.  
4th, The cone, I, and flexible former, K, substantially as described, for the purpose specified.  
5th, The cords, p, and windlass, n, or equivalents, in combination with the former, K, I, substantially as described, for the purpose specified.  
6th, The blocking mechanism, L, M, N, substantially as described, for the purpose specified.  
7th, The drying and pressing cylinder, N', in combination with the blocking mechanism, L, and blast apparatus, O, substantially as described, for the purpose specified.  
8th, The flooding device, U, V, substantially as described, for the purpose specified.  
9th, The series of set screws, S, arranged in circular form, carrying cam rollers, T, on swivel arms, u, for the purpose substantially as described.  
10th, The combination and arrangement of the various devices and parts herein described, or their equivalents, operating in the manner and for the purpose substantially as described.

71,743.—**MEDICATED BALM.**—Lucia F. Griffin, New York city.  
I claim a medicated balm composition, of the ingredients herein named, as and for the purposes set forth.

71,744.—**DISTILLING APPARATUS.**—Theodore Grundman, Cleveland, Ohio.  
I claim, 1st, The vessel, B, when connected with the upper part of the retort, by means of a pipe, A, and when provided with a dish-shaped cooling cover, substantially as and for the purpose herein shown and described.  
2d, The retort, A, and vessel, B, when made and arranged as set forth, in combination with a cooler, E, as described.

71,745.—**SASH STOP.**—James R. Hall, Georgetown, Ill.  
I claim the combination of the spring, E, and lever catch, G, and eccentric roller, I, substantially as and for the purpose described.

71,746.—**STREET PAVEMENT.**—Alexander Hamar, New York city.  
I claim, 1st, The method herein described of paving streets by the employment of small blocks of wood glued together to form sections of about four feet square, which sections are arranged side by side upon a bed composed of sand, lime, and silicate of soda, with spaces between the sections to be filled with asphalt, as hereinbefore described.  
2d, Also, the combination, as described, of the small wooden blocks glued together in sections, the mortar foundation, the parallel timbers underlaping the joints of the sections, and the asphalt filling between the sections, for the purposes set forth.

71,747.—**GRADING AND EXCAVATING MACHINE.**—T. C. Hammond, Nicolaus, Cal.  
I claim, 1st, The construction of a plow with an angular upright standard, having a sole plate and wing, and a mold board and share, together with all the connecting parts, substantially as described, for the purpose specified.  
2d, A double plow of the above description, all of the different parts of which are reversed and pointing and facing in opposite directions, and connected by a continuous beam and furrow bar.  
3d, The peculiar circular beveled shape of the apron frame plate, 2, by means of which the apron frame is closely fitted to the under side of the mold board of the plow.  
4th, The construction of a double-acting traction horse-power, working upon two wheels with separate reversed parts, the whole being so constructed as to work in opposite directions without turning.  
5th, The construction of the wooden extension bridge, before described, for the purpose before described.

71,748.—**HANGING TEA-KETTLE LID.**—C. C. Hare, and S. J. Hare, Louisville, Ky.  
We claim a lid for a tea-kettle with a swinging lid in two pieces, connected and operating as herein described.  
2d, A swinging lid, having a curved or semi-circular slot, e, in the rim, b, in combination with the ear, a, the bail, d, and the pin, a, of a tea kettle, arranged and operating as herein described.

71,749.—**FIELD DERRICK.**—Isaac J. Hattabough, Santa Clara County, Cal.  
I claim, 1st, The double sheaves for the operating line.  
2d, The pivots and plates at top and bottom of the pole, for the guys and pole swivel.  
3d, The combination of the sheaves, H, with the pivots to plate, I, in combination with operating rope, E, pole, A, arm, B, adjuster, D, guys, J, to make a simple and complete combination for a derrick for field purposes, as described, and substantially as set forth.

71,750.—**FENCE.**—C. Augustus Haviland, Davenport, Iowa.  
I claim, 1st, The arrangement and combination of boards, blocks, and posts in the manner and for the purpose herein set forth.  
2d, The construction of a fence post, with slot or aperture, C, in the manner and for the purpose herein described.

71,751.—**PILL AND OTHER BOXES.**—George H. Hawkins, New York city.  
I claim forming pill or other boxes of buckram, or other woven fibrous material, stiffened with starch or other glutinous material, and struck up into proper shape while moist or damp, by means of hot metal dies, substantially as herein shown and described.

71,752.—**COMPOSITION FOR COATING WOODEN STRUCTURES.**—Joseph Heckel, Decatur, Ill.  
I claim the composition above described, when compounded and used substantially as and for the purposes specified.

71,753.—**STEREOSCOPE.**—Alexander Heilbrun, Cincinnati, O.  
I claim, 1st, The arrangement of the two shafts, G and H, endless chains, J, fingers, L, arms, Q, R, roller, O, and catches, X, in the described combination with the series of slides secured to one or more endless ribbons, T, in the manner and for the purpose set forth.  
2d, In the described combination, the fingers, L, groove, h, roller, O, arms, Q and R, and the catches, X, for the purpose set forth.  
3d, In combination with the elements of claim, 1st, I claim the springs, g, for holding the slides to the under side of the open frame, F.  
4th, The guard or partition, Z, curved upward at its front end, as and for the purpose stated.  
5th, The hinged and folding foot, I, having the bracket, j, and screw, k for the purpose set forth.

71,754.—**MANUFACTURE OF IRON.**—David W. Hendrickson, New York city.  
I claim the use of zinc or zinciferous ores, manganese, or the Franklinites ores, as a flux or a mixture in iron-furnaces, in combination with the compound blast of superheated steam and air for manufacturing iron suitable for the Bessemer process of and for manufacturing steel and other purposes, substantially in the manner and for the purpose herein set forth, and shown in the accompanying drawings.

71,755.—**LIFE PRESERVER.**—D. H. Heyen, New York city.  
I claim the air tube, B, in combination with the belt, A, attached and arranged substantially as shown and described for the purpose set forth.

71,756.—**NOZZLE FOR FIRE ENGINES, ETC.**—J. J. Hofer, New Orleans, La.  
I claim an air chamber, in combination with the nozzle, constructed and operating substantially as and for the purpose described.

71,757.—**DRY GAS-REGULATOR.**—J. B. Hoffman, Philadelphia, Pa.  
I claim, 1st, A bellows-like receiver, H, applied to a gas regulator, and connected to the valve of the latter substantially as described, so that as the pressure of the gas varies, the receiver will expand or contract, and the opening for the passage of the gas will be increased or diminished in size.  
2d, The chamber, I, and its tight detachable cap, j, arranged on the top of the regulator in respect to the weights, x, as and for the purpose set forth.

71,758.—**APPARATUS FOR IRONING CLOTHES.**—C. R. Hoyt, New York city.  
I claim, 1st, The ironing table, B, whose free end rests upon the posts, L, and spring, K, ironing roller, D2, upon shaft, S, revolving in contact with the curved fire plate, E2, fan blower, W, and driving shaft, F, all arranged as described for the purpose specified.  
2d, The ironing table, B, pivoted to the frame, A, at one end, and whose outer end rests upon the posts, L, and spring, K, as and for the purpose specified.  
3d, The combination of the fan blower, W, with the yielding spring ironing table, B, ironing roller, D2, and fire-plate, E2, substantially as described for the purpose specified.  
4th, The arrangement upon the frame, A, of the driving shaft, F, pinion wheel, Q2, shaft, S, wheels, R, T, U, fan blower, W, grooved roller, N, cord, O, furnace, B2, ironing roller, D2, curved fire plate, E2, yielding ironing table, B, as herein set forth for the purpose specified.

71,759.—**TIRE FORGE HEATING APPARATUS.**—Jos. R. Humphreys, Pennsylvania, N. J.  
I claim the casing, B, and box, A, constructed for the reception of a tire, and for application to a smith's forge, substantially as described.

71,760.—**WASHING MACHINE.**—Eli Hunt, Shelburn, Ind.  
I claim an improved clothes-washing machine, consisting of the open cylindrical clothes receptacle, C, provided with the litters, f, and rods, d, fitted within the cylindrical sub-box, A, the hinged doors in the hinged top of the sub-box, and cylinder, all constructed, arranged, and combined to operate as described and specified.

71,761.—**STEAM ENGINE GOVERNOR.**—R. K. Huntoon, (assignor to himself and Charles S. Lynch), Boston, Mass.  
I claim the arrangement and combination of the lever, e', rod, f', and weight, h', with the shaft, B, its propeller or propellers, D, the vessel, A, the ratchet, r', sectional frame, s, the pawls, t, n, the rocker frame, b', and its cams or lifters, c', d', such ratchet being applied to a shaft, d, and the whole being substantially as specified.  
Also, the combination and arrangement of the oil receiver, c, its eduction hole, e, and air pipe, f, with the governor as described.

71,762.—**WINDLASS FOR BOATS.**—Edgar Huson, Ithaca, N. Y.  
I claim, 1st, Making a boat windlass by the use of the slotted plate, E, about the shaft, G, supported on the vibratory standards, K and F, and having the clicks, C and D, which act in the described manner on the ratchet or cog-wheel, B, and head, A, thus producing by both the forward and backward motions of the lever, one and the same motion of the rope, cable, or chain, as described.  
2d, The combined whole, made as figured and described, for the purpose of a convenient and useful windlass for boats and other similar craft as described.

71,763.—**HARPOON.**—Zeno Kelley, New Bedford, Mass.  
I claim the harpoon herein described, with rubber spring, C, on the end of the shaft, spiral spring, D', on the shaft, and stop, E', on the blade, and slide, E', on the shaft, or their equivalents, constructed and operating substantially as herein set forth and described.

71,764.—**HAY RAKER AND LOADER.**—Henry Kewley, Perry, Ohio.  
I claim, 1st, The raking device herein described, consisting of the series of movable and independent rake teeth, S, rake head, P, provided with apertures, side pieces, O, O', rail, Q, journals, R, stop pins, T, arm, T2, and pendulum rods, T3, T4, all arranged and operating as and for the purpose herein specified.  
2d, The said raking device, constructed as herein described, in combination with the conveyers, J, provided with sets of lines, K, and bands, I, as and for the purpose set forth.  
3d, The pivoted apron or broad chute, U1, constructed with a series of fingers, U2, and turned-up sides, U2, supports, U, and cords, W, arranged and operating as and for the purpose specified.

71,765.—**APPARATUS FOR LEACHING BARK.**—Chas. Korn, Wurtsborough, N. Y.  
I claim, 1st, The vessel, A, when divided by means of partitions, B, into various compartments, which are connected by means of pipes, H, with a perforated trough, G, the latter being also subdivided by means of partitions, substantially as set forth, all made and operating so that a constant circulation of the tanning liquid may be established between all the compartments, as herein shown and described.  
2d, Providing the partition of the trough, G, with gates, and the pipes and holes, arranged in the bottom of the trough, with plugs or valves, substantially as described, so that the contents of some of the compartments may be made to circulate, leaving those of the other compartments intact, as set forth.

71,766.—**INKSTAND.**—Rufus Lapham, New York city.  
I claim an inkstand, made substantially as described.

71,767.—**PORTABLE FENCE.**—Sebastian Leonard, Jr., Fairfield county, Ohio.  
I claim the combination of the posts, A, B, the keys, C, C', brace, D, and cross ground-sill, E, all constructed and arranged substantially as and for the purpose described.

71,768.—**BLEACHING VEGETABLE OILS.**—Theo. Leonhard, Paterson, N. J.  
I claim the vessel, A, containing a revolving shaft, E, with wings, D, or their equivalents, substantially as described, for the purpose of bleaching and preparing vegetable oils as set forth.

71,769.—**RAILROAD SWITCH.**—H. C. Lewis, Miller Township, Pa.  
I claim the chains, provided with bolts, which pass into cross ties for securing the rails, J, K, and allow the same to be moved laterally, as and for the purposes set forth.

71,770.—**EYE GLASSES AND SPECTACLES.**—Henry Lomb, New York city.  
I claim the elastic bands or straps, a, in combination with an eye glass or spectacle frame, when such bands or straps are fastened to the frame only at or near their ends, and between such points are left free of the frame, with an opening or space between, substantially as described for the purpose specified.

71,771.—**HOISTING MACHINE FOR STACKING HAY.**—William Loudon, Fairfield, Iowa.  
I claim, 1st, In the construction of a hay-elevating device a derrick, composed of two flexible supporting frames, so arranged that they shall be extended sufficiently to allow a load of hay to pass through between them, or contracted so as to pass through an ordinary farm gate, substantially as described.  
2d, Supporting an elevated bar, B, by means of two independent supporting frames, one of which is securely braced to it, so as to support sufficient rigidity, while the other is loosely pivoted, so that as the base of the derrick is extended or contracted, the inclination of the bar, B, will be varied, for the purpose of preserving the proper inclination of the bar on slanting ground, and to facilitate the labor of putting up or taking down, substantially as shown and described.  
3d, In the arrangement for conveying the hay over the stack or other place where it is to be deposited, I claim the combination of the travelling pulley, C, provided with a frame which straddles the bar upon which it works, the frame of the travelling pulley and working into a notch or catch on the under side of the bar, as herein shown and described.  
4th, Placing the drum, G, in a frame, F, connected to the derrick by joints or hinges, h, so that in hauling or moving the derrick it may be turned over in the center substantially as and for the purpose set forth.  
5th, The pulleys, a, m', or the hoisting power frame, l, the pendant hook, a, on the sweep, p, in combination with the pivoted arm, o, all arranged to operate in the manner substantially as and for the purpose set forth.







**2,809.—HARVESTING MACHINE.**—David J. Marvin, Stockton, Cal.  
I claim, 1st, In a combined header and thrasher, so pivoting or blading the cutter frame upon the main axle, a, that it can be moved longitudinally, and also raised or lowered at pleasure, substantially as and for the purpose specified.  
2d, In a combined header and thrasher, having its cutter frame mounted or hinged as above described, the combination and arrangement of the bar, a', post, b', pulley, d', cord, e', and crank rod, N, substantially as and for the purpose herein set forth.  
3d, The arrangement of the sickle plate, b, aprons, 2 and 3, corrugated feed roller, B, thrashing cylinder, P, fan, S, incline, a, p, straw carrier, D, wheels, E, coverer, F, and elevator, G, substantially as described.  
4th, In a combined header and thrashing machine, as above described, the arrangement of the lever, A, swinging axle, a, and gear wheels, b' Q, for the purpose of throwing the thrashing and cleaning mechanism into or out of gear, substantially in the manner specified.

## DESIGNS.

**2,844.—Cook's Stove.**—Conrad Harris and Paul W. Zolner, Cincinnati, Ohio.  
**2,845.—Decorating Croquet Balls and Mallets.**—Chas. Wright Kirby, New York City.

## PENDING APPLICATIONS FOR REISSUES.

Application has been made to the Commissioner of Patents for the Reissue of the following Patents, with new claims as subjoined. Parties who desire to oppose the grant of any of these reissues should immediately address MUNN & CO., 37 Park Row, N. Y.

**39,102.—LAMP BURNERS.**—Wm. Painter, Baltimore, Md., and Charles Painter, Owings Mills, Md., assignees of Wm. Painter, aforesaid. Dated June 30, 1863. Application for reissue received and filed Oct. 23, 1867.  
We claim having the side pieces, b, h, and the ends, g, constructed and arranged in reverse inclined positions, in the manner herein shown and described.  
The combination of the attachment above specified with the tubes, F, A, the latter being screwed into the fountain or body, B, of the lamp and enclosing the wick adjusting wheels, h, as set forth.  
Enclosing the wick ratchets, b, b', within the tube, A, closed at its upper end to prevent the escape of vapor or odor as set forth.  
Making the outer case, A, adjustable upon the tube, A, so that the height of the cap, C, may be regulated as and for the purpose set forth.

**45,219.—FIRE ENGINE.**—The Gould Machine Company (assigned by mesne assignments of John N. Dennison, Newark, N. J. Dated Feb. 7, 1865. Application for reissue received and filed Nov. 23, 1867.  
We claim, 1st, A force pump which may be adapted to throw a larger or smaller quantity of water at each stroke by varying the effective area of its piston surface in any manner substantially as herein set forth.  
2d, A force pump provided with one or more parts or passages, the openings of which will relieve a part of the piston surface from labor or pressure on the water, so that the whole power of the steam piston can be applied to the water delivered from the pump by the operative parts of the piston.  
3d, Increasing or diminishing the effective area of the pump or pumps, by means of a valve placed in the partition between them, or by other means, substantially the same, so that the quantity of water discharged at a stroke can be increased or diminished at pleasure, without altering the speed or stroke.

**69,181.—BUCKLE.**—Ezra Cole, Fairfield, Mich. Dated Feb. 24, 1867. Application for reissue received and filed Nov. 23, 1867.  
I claim the buckle constructed as described, consisting of the curved frame, A, having at one end the plate, C, provided with a downward projection or lug, D, in combination with the ball, E, whose pins, F, rest and slide upon the upper edges of the curved frame, A, as herein described, and as for the purpose specified.

**49,799.—PLOW.**—William S. Spratt, West Manchester, Pa.—Dated Sept. 5, 1865. Application for reissue received and filed Nov. 23, 1867. Div. A.

I claim making a mold board for steel plows, with a bed for the plow share, said mold board and share bed being made in one or more parts, with the land side bolted to the share bed, the whole being constructed and arranged substantially as herein described and for the purpose set forth.  
**49,799.—PLOW.**—William S. Spratt, West Manchester, Pa.—Dated Sept. 5, 1865. Application for reissue received and filed Nov. 23, 1867. Div. B.

I claim making a mold board for steel plows with a bed for the plow share, said mold board and share bed being made in one or more parts, with the land side welded to the share bed, the whole being constructed and arranged substantially as herein described and for the purpose set forth.  
**52,297.—TOBACCO PIPE.**—Gustav Lautenschlager, Cincinnati, Ohio, and George L. Gott, New York City. Dated Jan. 30, 1866. Application for reissue received and filed Nov. 23, 1867.

We claim a bowl or a nicotine receptacle of a tobacco pipe, made of coal dust mixed with pitch or other suitable cement, and formed substantially as and for the purposes described.  
**1,493 (Whole No. 32,497).—CORK MACHINE.**—Isaac Goodspeed, Norwich, Conn., A. A. Goodspeed, Putnam, Conn., and E. S. Stebbins, Worcester, Mass. Dated June 4, 1861. Application for reissue received and filed Nov. 23, 1867.  
We claim the following to be the invention of the said Isaac Goodspeed, that is to say,—

We claim the combination composed of one or more cutters, a, tapering guides or trussers, b, c, for the equivalent of the latter, the rotary shaft, d, shaft, while it and the cutter, or cutters, may be in revolution, the whole being to cut a conic frustum for a slab of cork, or other material.  
We also claim the combination of the same and mechanism for holding the cork slab in place with respect to and while being cut by the cutters, such mechanism being the holder, b, and its adjuncts, as hereinbefore specified.  
We also claim a combination composed not only of one or more cutters, a, a shaft, d, tapering guides, b, c, and mechanism for advancing such cutter or cutters, while in revolution with the shaft, but a mechanism for retracting the cutter, or cutters, after a cork or stopper may have been formed by them as specified.

We also claim the combination of the driving pulley, j, the shaft, d, one or more cutters, a, tapering guides, b, c, and mechanism for advancing such cutter or cutters, while the same and the shaft, d, may be in revolution.  
**49,185.—CRANK PIN BOXES.**—Thomas Welch, Churchville, N. Y. Dated Aug. 1, 1866. Application for reissue received and filed Nov. 27, 1867.

I claim in combination with adjustable boxes in harvesters, a pitman so united therewith that it will move freely, or work independently of the boxes without cramping or binding the parts, for the purpose set forth.  
2d, In combination with the adjustable boxes and independently acting pitman, a, set screws, s, for the purposes set forth.

**49,183.—HARVESTER.**—Thomas Welch, Churchville, N. Y. Dated Aug. 1, 1866. Application for reissue received and filed Nov. 27, 1867.

I claim, 1st, Providing the crank pin box of a harvester with an oil reservoir, for the purpose set forth.  
2d, The crank pin box or head of harvester, so constructed with reference to the crank pin as to project by or around the end of the crank pin, for the purpose specified.  
3d, In combination with a crank pin box provided with an oil reservoir, a screw cap, G, or its equivalent for the purpose of allowing the reservoir to be filled with and prevent the escape of unnecessary oil therefrom.  
4th, A spherical taper pin, or conical shaped joint, for connecting the pitman and knife head of a harvester, when the parts of said joints are held together by means of a bolt passing into or through the knife head, for the purpose set forth.  
5th, In combination with a spherical taper pin, or conical shaped joint, secured by a bolt as above specified, a washer made of leather, iron, India rubber, or any other suitable material, and used upon the said bolt for the purpose set forth.

**NOTE.**—The above claims for Reissue are now pending before the Patent Office and will not be officially passed upon until the expiration of 30 days from the date of filing the application. All persons who desire to oppose the grant of any of these claims should make immediate application to MUNN & CO., Solicitors of Patents, 37 Park Row, N. Y.

## Advertisements.

The value of the SCIENTIFIC AMERICAN as an advertising medium cannot be over-estimated. Its circulation is ten times greater than that of any similar journal now published. It goes into all the States and Territories, and is read in all the principal libraries and reading rooms of the world. We invite the attention of those who wish to make their business known to the annexed rates. A business man wants something more than to see his advertisement in a printed newspaper. He wants circulation. If it is worth 25 cents per line to advertise in a paper of three thousand circulation, it is worth \$2.50 per line to advertise in one of thirty thousand.

## RATES OF ADVERTISING.

Back Page.....75 cents a line.  
Back Page, for engravings.....\$1.00 a line.  
Inside Page.....40 cents a line.  
Inside Page, for engravings.....60 cents a line.

**AGENTS WANTED.**—Good Inducements—Please address, with stamp, Box 24, Danbury, Conn.

**CLERGYMEN** would find much matter in The Phrenological Journal to be found nowhere else.

**FOR THE BEST FRICTION CLUTCH PULLEY,** apply to HUTCHINSON & LAURENCE, 8 Dey street, New York.

**PARTNER WANTED IN A MACHINE Shop.**—A Machinist preferred. Address R. D. E., Station C, New York.

**SMALL STEAM ENGINES,** From 2 1-2 to 8 Horse-Power, manufactured and in store. For sale by JOHN F. C. RIDER, 47 Dey st., New York.

**ALLEN'S PATENT FOR Preventing and Removing the Scale from Steam Boilers,** can be used at any time while the Engine is working. For particulars address ALLEN & NEEDLES, 41 South Water street, Philadelphia.

**FOR SALE.**—A Paper Mill, complete in every particular, with all modern improvements for manufacturing paper out of rags or straw. Run by never-failing and abundant supply of water. Address Paper Mill, Box 1655, Indianapolis, Ind.

**PECK'S PATENT DROP PRESS.**—All Sizes, on hand or made to order at short notice, by the patentees and sole manufacturers, MILLS PECK & CO., 25 13 ] 294 Elm st., New Haven, Conn.

**MERCHANTS** should read The Phrenological Journal to learn how to select trustworthy clerks.

**DOUGLASS' PATENT SELF-FEED Friction Hand Drill.** The simplest and best in use. Send for illustrated Circular. HUTCHINSON & LAURENCE, 8 Dey st.

**INVENTORS** having Patents to sell will find it to their advantage to visit GEO. M. DANFORTH & CO.'S **Inventors' Exchange,** 512 Broadway, New York, Opposite St. Nicholas Hotel.

Refer by permission to John B. Appleton, of Appleton & Co., Publishers, 442 Broadway, N. Y.; Hon. Jonathan E. Field, Stockbridge, Mass.; Hon. Robt. McClelland, Detroit, Mich.; formerly Sec. Int., Washington; Hon. A. B. Olin, Judge Supreme Court, Washington, D. C. 25 4  
**STEAM ENGINES and BOILERS,** Steam Boilers, Engines, Lathes, Planers, Shaping Machines, Brass Finisher's Tools, and Machinists' Tools of all kinds. Also, Grist Mills, Cotton Gins, Saw Mills, Wheel and Hub Machines, Shingle Machines, and Wood Working Machinery of all kinds at JOHN F. C. RIDER'S, 47 Dey St., New York. 25 17  
Manufacture at South Newmarket, N. H.

**STEEL CASTINGS.** HAVING INCREASED OUR FACILITIES, we are now prepared to do Job Steel Castings of all descriptions, to pattern. SCHENECTADY STEEL WORKS, Schenectady, N. Y. 25 17

**THE PHRENOLOGICAL JOURNAL** for December contains 17 portraits of distinguished men with their biographies:—Gen. Peabody, President Woolsey, Elias Howe, Oliver Cromwell, Rev. Drs. Worcester, Giles, Silver, Hubbard, Stuart, Agassiz, Hayden, and others. The Boston of Turkey, and a Glance at his Empire; Our Social Relations; the late Paris Exposition; Unmarried; What shall we do with Old Maids? History of the New Jerusalem; or Swedenborgian Church; Saints and Sinners; and much other instructive matter. End of Vol. 45. A new volume begins with the next number. Now is the time to subscribe—only \$3 a year. Address R. B. WELLS, 529 Broadway, New York. 25 21

**YOUR SON** would be greatly benefitted by reading The Phrenological Journal. He would learn how to make the most of himself. \$3 a year.

## 525 MILES

OF THE

## Union Pacific Railroad

Running West from Omaha

ACROSS THE CONTINENT, ARE NOW COMPLETED.

This brings the line to the Eastern base of the Rocky Mountains, and it is expected that the track will be laid thirty miles further, to Evans Pass, the highest point on the road, by January. The maximum grade from the foot of the mountains to the summit is but eighty feet to the mile, while that of many eastern roads is over one hundred. Work in the rock cuttings on the western slope will continue through the winter, and there is now no reason to doubt that the entire grand line to the Pacific will be open for business in 1870.

The means provided for the construction of this Great National Work are ample. The United States grants its Six Per Cent Bonds at the rate of from \$16,000 to \$48,000 per mile, for which it takes a second lien as security, and receives payment to a large if not to the full extent of its claim in services. These Bonds are issued as each twenty mile section is finished, and after it has been examined by United States Commissioners and pronounced to be in all respects a first class road, thoroughly supplied with depots, repair shops, stations, and all the necessary rolling stock and other equipments.

The United States also makes a donation of 12,800 acres of land to the mile, which will be a source of large revenue to the Company. Much of this land in the Platte Valley is among the most fertile in the world, and other large portions are covered with heavy pine forests and abound in coal of the best quality.

The Company is also authorized to issue its own First Mortgage Bonds to an amount equal to the issue of the Government and no more. Hon. E. D. Morgan and Hon. Oakes Ames are Trustees for the Bondholders, and deliver the Bonds to the Company only as the work progresses, so that they always represent an actual and productive value.

The authorized capital of the Company is One Hundred Million Dollars, of which over five millions have been paid in upon the work already done.

## EARNINGS OF THE COMPANY.

At present, the profits of the Company are derived only from its local traffic, but this is already much more than sufficient to pay the interest on all the Bonds the Company can issue, if not another mile were built. It is not doubted that when the road is completed the through traffic of the only line connecting the Atlantic and Pacific States will be large beyond precedent, and, as there will be no competition, it can always be done at profitable rates.

It will be noticed that the Union Pacific Railroad is, in fact, a Government Work, built under the supervision of Government officers, and, to a large extent, with Government money, and that its Bonds are issued under Government direction. It is believed that no similar security is so carefully guarded, and certainly no other is based upon a larger or more valuable property. As the Company's

## FIRST MORTGAGE BONDS

are offered for the present at 90 CENTS ON THE DOLLAR, they are the cheapest security in the market, being more than 15 per cent lower than U. S. Stocks. They pay

## SIX PER CENT IN GOLD,

or over NINE PER CENT upon the investment. Subscriptions will be received in New York at the Company's Office, No. 30 Nassau street, and by CONTINENTAL NATIONAL BANK, No. 7 Nassau st., CLARK, DODGE & CO., Bankers, No. 51 Wall st., JOHN J. CISCO & SON, Bankers, No. 33 Wall st., and by the Company's advertised Agents throughout the United States. Remittances should be made in drafts or other funds par in New York, and the bonds will be sent free of charge by return express.

A New Pamphlet and Map, showing the Progress of the Work, Resources for Construction, and Value of Bonds, may be obtained at the Company's Office, or of its advertised Agents, or will be sent free on application.

JOHN J. CISCO, Treasurer.

New York, Nov. 23d, 1867.

**LAWYERS** should read The Phrenological Journal, that they may read clients and culprits.

**STEAM and GAS FITTERS,** Also, Plumbers' Goods, and Tools of all kinds. Quinn's Patent Boiler Filler, the only Sure Remedy for a leaky Tube. Also, Steam Gages, Gage Cocks, Water Gages, safety Valves, and Feed Pumps, for sale by JOHN F. C. RIDER, 47 Dey st., N. Y. 25 17  
Manufacture at South Newmarket, N. H.

**POSITIVE STEAM PUMP.** WM. HAKSEN, Patentee and Manufacturer, Greenpoint, L. I. Economy in Steam. Economy in Space. Economy in Cost. Send for circular to J. W. COLE, Manufacturer's Agent, No. 305 Broadway, New York. 1\*

**YOUR "Sweetheart,"** would thank you for The Phrenological Journal. In it she would find the means by which to judge character correctly.

**FOR SALE CHEAP.**—A Fine, Large, Compound Microscope, in good order, London Make, with a large Magnet and an Artificial Horizon. Apply to J. WOOD, 22 South William st., N. Y. city. 1\*

**THE REPEATING LIGHT or POCKET MATCH,** at wholesale and retail. Send 5 cents for sample. Address W. H. S., Box 635, Springfield, Mass. 1\*

**EDITORS** should read The Phrenological Journal and learn how to make perfect newspapers.

**THE SCIENTIFIC AMERICAN** says: "The health, pleasure, and comfort of the skater is greatly increased" by the use of the

## CHEMICAL OR

## HOT SKATE.

Send for Circular and testimonials, or inclose \$7, and receive by Express "the only complete skate in the world." Liberal discount to Agents and the Trade. Address "HOT SKATE CO.," 35 William st., New York.

**TAYLOR'S GROOVING MACHINES.** Groove with and across the grain, 1/4 to 1 1/2 inch wide. Sold only by S. C. HILLS, 12 Platt st., N. Y. 24 8\*

**HOLIDAY PRESENTS.**—Kelso's Cyphering Machine (by mail, \$1), beautifully finished in a handsome case, as a Birthday, Christmas, or New Year's Present, cannot be beat. Agents wanted. It pays. SAMUEL J. KELSO, 194 Jefferson Avenue. P. O. Box 653, Detroit, Mich. 24 5

**RAILROAD, STEAMSHIP, MANUFACTURERS,** and Engineer's Supplies, of all kinds, at 24 26 ] M. T. DAVIDSON & CO.'S, 84 John st., N. Y.

**WANTED.**—One or two sets good second hand Woolen Machinery. Those having such for sale will address WM. MOORE, Kokomo, Ind. 24 5\*

**WANTED.**—Sunflower, Pumpkin, and Broomcorn Seed, in large lots. State price and quantity on hand. To be delivered in the city. Lowest cash price. Address WALTON, 70 and 72 Reade st., New York. 24 6]

**SCHOOL TEACHERS** should read The Phrenological Journal, and learn to classify their students. Also to govern them wisely. \$3 a year.

**STONE COAL FURNACE.**—The best inducements ever offered to parties who wish to engage in the manufacture of Iron from Stone Coal. Practical Furnace Men preferable. For further particulars address LEWIS DAVIS, Jackson C. H., Ohio. 24 2\*]

**LE COUNT'S Patent Hollow Lathe Dogs,** 8 Sizes, from 1/2 to 2 inches.....\$ 8 00  
12 Sizes, from 3 to 4 inches.....\$17 50  
Improved Machinists' Clamps, 5 sizes.....\$11 00  
Stout Boiler-makers' Clamps.....\$ 4 00  
All with Steel Screws, well fitted for circular 10 Geo\* C. W. LE COUNT South Norwalk, Ct.

**THE BEST BOLT CUTTER IS MERRI MAN'S PATENT.**—Which cuts a full, smooth thread at once passing over the bolt. The dies revolve, are instantly adjustable to the slightest variation, and open to release the bolt. Foreign Patents for sale. Send for circulars. H. B. BROWN & CO., New Haven, Conn. 20 17]

## Worth Your Attention!

If you desire the controlling manufacture of the best cheap Fruit Box ever invented (a new thing) address A. M. WARD, New Britain, Conn. 24 2

**YOUR WIFE** will thank you for The Phrenological Journal, with its suggestions for training children. Only \$3 a year by post. Address R. B. WELLS, New York.

**YOUR DAUGHTER** would thank you for The Phrenological Journal, with its instructions on health and beauty. Only \$3 a year.

**PORTABLE STEAM ENGINES,** Combining the maximum of efficiency, durability, and economy with the minimum of weight and price. They are widely and favorably known, more than 600 being in use. All warranted satisfactory or no sale. Descriptive circulars sent on application. Address J. C. HOADLEY & CO., Lawrence, Mass. 1 17

**WOODWORTH PLANING MACHINES,** Molding, Mortising, Tenoning, and Sash Machines, Scroll Saws, Resin-Blowing Mills, Circular Saws, Spoke Lathes, Danic's, and Gray & Wood Planers, Shafting Pulleys, etc., at reduced prices. Address CHAS. H. SMITH, 125 North 3d st., Philadelphia, Pa. 24 6]

**BROWN'S PATENT LOW-WATER RE-PORTERS,** a certain preventive from the explosion of Steam Boilers by reason of low water. Warranted the most reliable and most simple low-water indicator ever offered. Sole Agents for New York State, M. T. DAVIDSON & CO., 84 John st., New York. 24 15]

**WANTED.**—To make an agreement with some man or company to go to California to put up or run machinery. Feels himself fully competent to do so, or control work, and can give the best references as to ability and moral character. Address "M. L. S.," Box 141, Columbus, Miss. 24 2\*

**BARREL MACHINERY.**—Greenwood's Patent Shave and Heading Machinery, for Tight and Slack Work. Geddard's Patent Barrel Head. G. L. Benton's Patent Convex Emery Wheels, for Gunning and Sharpening Saws. JOHN GREENWOOD, Rochester Barrel Machine Works Rochester, N. Y. 24 17

**MECHANICS** should read The Phrenological Journal, and learn how to select boys to learn trades.

## For Sale.

**A Horizontal High-Pressure Steam Engine,** 15-in. cylinder, 2-ft. crank, heavy belt fly wheel, 12 ft. diameter, 20-in. face. Also, one good blower, 3-ft. shell 11 1/2-in. pipe. One 40-hundred fly wheel, 8-ft. diameter, and several centrifugal power pumps. All the above in good order and being replaced by machines of greater capacity. An immediate purchaser can make excellent terms. Address R. N. GERK, President Syracuse Iron Works, Syracuse, N. Y. 24 3

**CAUTION.**—We are the Sole Agents, in New York and its vicinity, for the Silver Lake Manufacturing Co.'s Patent Lubricating Packing for Steam engines, Pumps, etc. All parties are cautioned against the use or sale of any packing made from dry soap stone or other powdered substances used in any fibrous material. Address M. T. DAVIDSON & CO., 84 John st., New York. 24 15]

**WANTED.**—By an old established Machine Shop, manufacturing stationary and portable engines, saw and gristmill work, located in Central Ohio, a Master Mechanic, Draftsman, and Designer. One of unquestionable ability and experience, and proper qualifications, can find steady employment. Also, a Foreman to take charge of the Machine Shop of Agricultural Works. Address "Machine Shop," at this office, stating present business, age, etc. 24 3

**AGENTS WANTED.**—In every County and State of the United States. Men who have a practical knowledge of Flour Milling, or are skilled in other machinery, to sell Teah's Patent self-tightening anti-friction Mill Bush. This Bush is gotten up on entirely new principles, and thus far, has no rival to compare with, and can be sold wherever exhibited to 100,000. Half of the profits are allowed to good agents. For particulars and descriptive circular address JOHN H. TEAH, Eberly's Mills, Cumberland county, Pa. 24 2\*

**SCHLENKER'S PATENT BOLT CUTTING MACHINE.**—The Best in Market.—Two Sizes, cutting bolts from 1/2 to 3 inches. Up to 3 1/2 inches, once passing over the iron is sufficient for cutting a perfect thread, either V, square, or wood screw. Heads to fit the ordinary lathe or other bolt cutting machines, furnished to order. Also, nut taps furnished to order. Send for circular. Address R. L. HOWARD, Buffalo, N. Y. 24 3

**ENGINE LATHES, IRON PLANERS,** Upright Drills, Bolt Cutters, Compound Planers, Slotter, Shapers, Gear-Cutting Engines, Universal Chuck Twist Drills, Ratchet Drills, etc., at reduced prices. Address CHAS. H. SMITH, 125 South 3d st., Philadelphia, Pa. 24 12]

## Sault's Patent

**FRICTIONLESS Locomotive Valves,** easily applied; requires no changes. M. & T. SAULT, New Haven, Conn. 24 17]

**VALUABLE TOY PATENT For Sale.**—The Metamorphoscope, Patented Nov. 13th, 1867, is a toy that contains a greater variety of pleasing and interesting features than anything in that line ever invented. Through its peculiar but simple combinations, over four thousand changes of figures are produced, forming extremely droll and laughable combinations. We make it a Spelling Book of thousands of words. Ever varied land-scapes can be formed by this simple apparatus. Special attention is called to an entirely new and varied panorama for public assemblies, that can be produced at a trifling cost. This extremely valuable feature, combined with the Toy, makes the Metamorphoscope a very desirable Patent. The whole or State Rights of the Toy far Agents wanted to introduce it. A full information addressed to the Patentees and Manufacturers, GOODEN, MILLER & MORFORD, 636 Franklin st., Philadelphia. 24 2\*



## WOODWARD'S ARCHITECTURE



AND RURAL ART, No. ONE.  
125 Designs and Plans for Cottages,  
Farm Houses, Barns, and Grounds.  
Post-paid, \$1.50.  
RURAL ART, No. TWO.  
Designs for Country and Suburban  
Houses, with examples of French  
Roofs. Post-paid, \$1.50.  
WOODWARD'S COUNTRY HOMES.  
150 Designs and Plans. Post-paid,  
\$1.50.  
WHEELER'S RURAL HOMES.  
Houses for Country Life. Post-paid, \$1.50.  
WHEELER'S HOMES FOR THE PEOPLE.  
The Villa, Mansion, and Cottage. Post-paid, \$3.00.  
JACQUES' MANUAL OF THE HOUSE.  
125 designs for Suburban and Country. Post-paid, \$1.50.  
CUMMINGS' ARCHITECTURAL DETAILS.  
714 designs to scale, quarto, post-paid, \$10.00.  
GEO. E. WOODWARD, 191 Broadway, New York,  
Publisher of Architectural Books.  
24 31

## SEND FOR A DESCRIPTIVE CATA-

logue of  
**Shaw & Justice's**

## DEAD STROKE POWER HAMMER.

Manufactured and for sale by PHILIP S. JUSTICE,  
42 CHURCH ST., New York, or 14 North 5th St., Philadelphia.

## ANTI-INCORUSTATION, OR BOILER

A Powder of H. N. WINANS, 11 Wall St., New York,  
removes old scale and prevents new deposits. 12 years'  
use proves it efficient and unobjectionable. 24 3\*

## LUCIUS W. POND,

## Iron and Wood Tools,

## And Machinery,

## TURBINE WATER WHEELS.

Works at Worcester, Mass.  
Sale Rooms 55 Liberty St., (2 doors West of Broad-  
way), New York. 24 11

## OIL! OIL!! OIL!!!

## FIRST PREMIUM.....PARIS, 1867.

## EXPOSITION UNIVERSELLE!

## PEASE'S IMPROVED OILS!

Acknowledged the Best in the World! The Highest  
Award over all others!

Grand Silver Medal and Diploma!  
The Only One to the United States awarded to  
F. S. PEASE,

For the Greatest Excellence in Oils for Lubricating and  
Burning.

London,.....1862.

## WORLD'S FAIR—TWO PRIZE MEDALS

Awarded to F. S. PEASE for Improved Engine, Sig-  
nal, Lard, and Premium Petroleum, as the Best made!

These Improved Oils cost no more than many of the  
common oils in market, while they are endorsed by the  
greatest experience and highest authority in the United  
States and Europe, and offered to the public upon the  
most thorough, reliable, and practical tests as the Best  
Oils made for  
Railroads, Steamers, and for Machinery and  
Burning.

F. S. PEASE, Oil Manufacturer,  
Nos. 61 and 63 Main Street, Buffalo, N. Y.  
N. B.—Reliable orders filled for any part of the world.  
10 11

## DOUGLASS MANUFACTURING CO.

Exclusive Manufacturers of  
**COOK'S PATENT**

## BORING IMPLEMENTS.

Also, a complete assortment of  
**MECHANICS' TOOLS.**

Framing Chisels, Socket Firmer  
Chisels and Gouges, Socket Par-  
ing Chisels, Drawing Knives,  
Screwdrivers Augers and Bits,  
Bung Boring, Boring Machines,  
Gimlets, Firmer Chisels and  
Gouges, Hollow Augers, Cork-  
screws, etc.  
Warehouse, 70 Beekman Street, New York. 10 11

## AIR SPRING FORCE HAMMERS ARE

Made by CHAS. MERRILL & SONS, 556 Grand  
Street, New York. They will do more and better work,  
with less power and repairs, than any other Hammer.  
Send for a circular. 1 11

## FOR BRASS LATHES and all Machinery

connected with Brass Finishing and Fitting Line.  
Improved Lathes for making large valves, etc. Address  
Exeter Machine Works, Exeter, N. H. 24 11

## MASON'S PATENT FRICTION

CLUTCHES, for starting Machinery, especially  
Heavy Machinery, without sudden shock or jar, are man-  
ufactured by VOLNEY W. MASON,  
Providence, R. I. 14 12\*

## GUN AND SEWING MACHINE Screws

of all kinds and sizes on hand and made to order by  
the LAMB KNITTING MACHINE MFG CO.,  
Successors to the  
25 COW 91

## THE BEST HOLIDAY PRESENT

SENT—Chase's Improved dollar micro-  
scope, most valuable, amusing, interesting,  
instructive, and useful thing in the world,  
for old and young. Adapted for counter-  
feit money, cloth, flowers, pictures, living  
insects, etc., etc. Sent by mail on receipt  
of \$1, with "Chase's Descriptive National  
Bank Note Detector." Agents wanted. Ad-  
dress O. N. CHASE, 81 Washington St., Bos-  
ton, or Fowler & Wells, New York. 19 40w

## TO MANUFACTURERS OF TEXTILE

Fabrics.—Dutcher's Patent Temples, adapted to  
weaving all kinds of goods; also, Thompson's Patent Oil  
Cans for oiling Machinery—neat and economical; also  
Patent Shuttle Guides, which will protect the weaver and  
save the owner the cost of the guides every year. Fur-  
nished by E. D. & G. DRAKE,  
Hopedale, Mass. 13 130w\*

## LE COUNT'S PATENT

HOLLOW LATHES, DOGS, MACHINIST  
AND BOILER MAKERS' CLAMPS.  
Are as Strong as Steel. Light and Neat. At a Low Price.  
Send for Circular to  
C. W. LE COUNT,  
South Norwalk, Conn. 17 60w 5\*

## L. D. FAY, MANUFACTURER OF MA-

CHINISTS' TOOLS, WOOD-TURNING LATHES  
etc., from new and improved patterns. Gauge Lathes for  
turning box and broom handles or beaded work. Lath  
Chucks, largest assortment to be found in New England  
Manufactory Worcester, Mass. 15 60w11

## MACHINERY.—S. C. HILLS, No. 12 Platt

Street, New York, dealer in Steam Engines, Boilers,  
Pumps, Lathes, Chucks, Drills, Pumps; Mortising, Plan-  
ing and Sash Machines, Woodworking, and Daniel's Plan-  
ing, Rust's Planing, Cob and Corn Mills; Harrison's Grist  
Mills, Johnson's Shingle Mills; Belling, Oil, etc. 6

## AMERICAN EMERY.

ARROWSIC EMERY, Manufactured at  
and twenty. The only real emery in the world, excepting  
in Turkey. For sale in quantities to suit, at reduced prices,  
by STANWOOD, McLELLAN & FULLER,  
24 Central Street, Boston.

From Stanley Rule and Level Co., New Britain, Conn.  
"We have been using some numbers of your Emery on  
steel, and it gives good satisfaction. If it proves to work  
as on trial, thus far, we shall use nothing else. For some  
reason, London emery does not give us good satisfaction  
on steel."

Bristol, Conn.:  
Our men, who work by the job, say your Emery is bet-  
ter than any English or American Emery they ever used.

Mackintosh Hemphill Co., Pittsburgh, Pa.:  
The quality of your Emery Cloth is excellent. 22 9\*

## LIBERAL ARRANGEMENTS WILL BE

made with parties who wish to build the Ohio Reap-  
er and Mower, by J. A. SEXTON, Canton, Ohio. 22 4\*

## PRATT, WHITNEY &amp; CO.,

HARTFORD, CONN.  
Make Hand and Engine Lathes, Crank and Gear Plan-  
ers, Drills, Screw and Milling Machines, Water Motors,  
etc., unsurpassed for nice construction, strength, dura-  
bility, and convenience. 22 13

## GREAT ECONOMY IN FUEL.—

The Washington Iron Works' New Steam Engine,  
with Variable Cut-off, worked by the Governor patented  
by Wm. Wright, Oct. 1866, is the most perfectly simple and  
economical Engine yet introduced, saving 50 per cent in  
fuel. This engine takes the lead of all others, and is being  
put in in different parts of New England, this city, Phila-  
delphia, and in the principal manufacturing districts of  
the country. For information address  
WASHINGTON IRON WORKS,  
Newburgh, N. Y.,  
Or apply at the office of the Company, 51 Liberty St.,  
New York City. Circulars sent to order. 22 11

## BUERK'S WATCHMAN'S TIME DE-

TECTOR.—Important for all large Corporations  
and Manufacturing concerns—capable of controlling with  
the utmost accuracy the motion of a watchman or  
patrolman, as the same reaches different stations of his  
beat. Send for a Circular. J. E. BUERK,  
P. O. Box 1067, Boston, Mass.

N. B.—This detector is covered by two U. S. patents.  
Parties using or selling these instruments without author-  
ity from me will be dealt with according to law. 24 19\*

## THE FUEL SAVING FURNACE CO.,

No. 205 BROADWAY N. Y.  
15 11

## EMPLOYMENT! \$10 a day and Expenses

paid. Circulars free. O. T. GAREY, Biddford, Me.

## LENOIR GAS ENGINES, From half-

Horse to three Horse-power, for sale at COMPANY'S  
OFFICE, No. 26 Pine St., Room 3, New York. 22 25\*

## ARTIFICIAL EARS FOR THE DEAF:

Can be Concealed. Send to E. HASLAM, 306  
Broadway, New York, for a descriptive pamphlet. 22 4\*

## FOR SALE—Very superior upright Drills,

New Friction Feed, materials and workmanship  
first class. Send for cut  
BULLARD & PARSONS, Hartford, Conn.

## TODD &amp; RAFFERTY, Manufacturers and

DEALERS IN MACHINERY.  
Works, Paterson, N. J.; Warehouses, 4 Dey St., New York.  
Steam Engines and Boilers, Steam Pumps, Machinery,  
Tools, Also, Flat, Hemp, Tow, and Rope Machinery;  
Barn's and Judson's Governors, Second-hand Machinery.

## BABCOCK &amp; WILCOX'S

PATENT STATIONARY STEAM EN-  
GINES, Built by the  
Hope Iron Works, Providence, R. I.  
Warranted Superior to any other engine in the market,  
for economy of fuel, regularity of operation, and liability  
to derangement. (17 11) JOS. P. MANTON, Agt.

## HOYT BROTHERS'

Patent Stretched, Patent Jointed, and Patent Rivet-  
ed Leather Banding. These Bands are warranted to run  
straight and maintain a perfect bearing on the pulleys.  
They are made from the center part, only, of the hide, tan-  
ned whole for the purpose, in the best of oak bark, and  
stretched, both wet and dry, by power machinery.  
For descriptive circulars address HOYT BROTHERS, 35 & 36 Spruce St., N. Y. 12 14\*

## FOR SALE—Mineral Land—Missouri Pine

and Mineral Land. For sale, my one-third interest in  
a tract of 4,000 acres, with two Steam Saw Mills and Lead  
Mines now in course of development. Send for descrip-  
tion and map. THOS. ALLEN, 722 South Fourth Street,  
St. Louis, Missouri. 21 6\*

## THE AMERICAN TURBINE WATER

WHEEL, Patented by Stout, Mills, and Temple, pos-  
sesses new and valuable improvements, and remedies de-  
fects which exist in all other Turbine wheels. Per cent  
of power guaranteed to be equal to any overshot wheel.  
For descriptive circulars address OLIVER & CO.,  
Agents, 55 Liberty Street, New York. 22 11

## WATER WHEELS.—

The Helical Jovial Turbine is manufactured by  
J. E. STEVENSON, 40 Dey Street, New York.

## CARPENTERS SEND for

Catalogue of New and Practical Architectural Works, enclosing stamp.  
A. J. BICKNELL, Troy, N. Y. 20 11

## ERICSSON CALORIC ENGINES OF

THE GREATLY IMPROVED CONSTRUCTION.—Ten  
years of practical working by the thousands of these en-  
gines in use, have demonstrated beyond cavil their supe-  
riority over less than ten horse-power is required.  
Portable and Stationary Steam Engines, First and Saw  
Mills, Cotton Gins, Air Pumps, Shuttles, Pulleys, Gearing  
Pumps, and General Jobbing. Orders promptly filled  
any kind of Machinery. JAMES A. ROBINSON,  
141 Duane Street, Cor. Hudson, New York. 14 11-D

## IMPORTANT.

MOST VALUABLE MACHINE for all kinds of irreg-  
ular and straight work in wood, called the Variety Mol-  
ding and Planing Machine, indispensable to carpenters in  
all branches of wood-working. Our improved guards  
make it safe to operate. Combination collars for cutters,  
saving 100 per cent, and feed table and connection, for  
waved moldings and planing, place it above all others.  
Evidence of the superiority of these machines is the  
large numbers we sell, in the different states, and parties  
laying aside other forms, such work, etc.  
We hear there are manufacturers infringing on some  
one or more of our fine patents in this machine. We can-  
not the public from purchasing such.  
All communications must be addressed "Combination  
Molding and Planing Machine Company, Post-office Box  
220, New York. All our machines are tested before de-  
livery, and warranted.  
Send for descriptive pamphlet. Agents solicited. 14 11

## TO IRON FOUNDERS.—

By using the waste heat from a Cupola Furnace,  
connected with a Harrison Boiler, a saving of the entire  
cost of fuel for the blast can be guaranteed.  
As soon applied, it may be seen daily in operation from  
2 to 5 o'clock, p. m., at the Harrison Boiler works, Gray's  
Ferry Road, Philadelphia, Pa. J. B. HYDE, Agent,  
119 Broadway, New York. 17 11

## BABCOCK &amp; WILCOX'S PATENT

STATIONARY STEAM ENGINES,  
From 25 to 1,000 horse-power, built in the best manner and  
at the shortest notice by the  
South Brooklyn Steam Engine & Boiler Works  
Imley, Summit, and Van Hook Sts., Brooklyn, N. Y.  
200 Over 4,000 horse-power of these engines are now  
running and contracted for. D. McLEOD, Proprietor.  
11 11

## WOODWORTH PLANERS A SPE-

CIALTY.—From new patterns of the most ap-  
proved style and workmanship. Wood-working Machine-  
ry generally, Nos. 34 and 36 Central, corner Union Street,  
Worcester, Mass. 12 15w11

## ASHCROFT'S LOW WATER DETECT-

OR will insure your Boiler against explosion. JOHN  
ASHCROFT, 50 John St., New York. 21 12

## SHEET AND ROLL BRASS,

BRASS AND COPPER WIRE, GERMAN SILVER, etc.,  
Manufactured by the  
THOMAS MANUFACTURING CO.,  
Thomaston, Conn.  
Special attention to particular sizes and widths for Type  
Founders, Machinists, etc. 2 20\*

## PATENT SHINGLE, STAVE, AND

Barrel Machinery, Comprising Shingle Mills, Head-  
ing Mills, Stave Cutters, Shingle Jointers, Shingle and  
Heading Jointers, Heading Rounders and Planers, Equal-  
izing and Cut-off Saws. Send for Illustrated List.  
FULLER & FORD,  
17 12w11

## FOR ENGINE BUILDERS' AND STEAM

Fitters' Brass Work, address  
F. LUNKENHEIMER,  
Cincinnati Brass Works.  
10 26\*

## WHEELER &amp; WILSON, 625 BROAD-

WAY, N. Y.—Lock-stitch Sewing Machine and Bat-  
tonhole do. 15

## R. BALL &amp; CO.,

SCHOOL STREET, WORCESTER, MASS.  
Manufacturers of Woodworth's, Daniel's, and Gray &  
Wood's Planers, Saw Molding, Tenoning, Mortising, Up-  
right and Vertical Shaping, Boring Machines, Scroll Saws  
and a variety of other Machines and articles for working  
wood.  
Send for our Illustrated Catalogue. 1 25\*

## NITRO-GLYCERIN.—

UNITED STATES BLASTING OIL CO.—We are  
now prepared to fill all orders for Nitro-Glycerin, and re-  
spectfully invite the attention of Contractors, Miners and  
Quarries to the immense economy in the use of the  
same. Address orders to  
JAMES DEVERAUX, Sec.,  
32 Pine Street, New York. 1 28\*

## ANDREWS'S PATENT PUMPS, EN-

GINES, etc.—  
CENTRIFUGAL PUMPS, from 30 Gals. to 40,000 Gals  
per minute, capacity.  
OSCILLATING ENGINES (Double and Single), from  
2 to 200 horse-power.  
TUBULAR BOILERS, from 2 to 50 horse-power, con-  
sume all smoke.  
STEAM HOISTERS, to raise from 1/2 to 5 tons.  
PORTABLE ENGINES, 2 to 30 horse-power.  
These machines are all first-class, and are unsurpassed  
for compactness, simplicity, durability, and economy of  
working. For descriptive pamphlets and price list ad-  
dress the manufacturers. W. D. ANDREWS & BRO.,  
414 Water Street, N. Y. 1 11

## PATENT POWER AND FOOT-PUNCH-

ING PRESSES, the best in market, manufactured by  
N. C. STILES, Middletown, Conn. Cutting and Stamp-  
ing Dies made to order. Send for Circulars. 14 15w11

## FOR FIRST-CLASS SHAFTING WITH

Patent Self-oiling Boxes and adjustable Hangers, also  
Mill Work and special machinery, address  
BULLARD & PARSONS, Hartford, Conn. 1 11

## PRESSURE BLOWERS—Equal in Force

to Piston Blowers, and a perfect substitute for both  
Fan and Piston—running more easily than either. Adapt-  
ed for Blast, and Cupola, and Heating Purposes, Forces  
Steamships, Boilers, Ventilation, etc., etc. Prices accord-  
ing to sizes, ranging from \$25 to \$1,500. Address, for Cir-  
cular  
B. F. STURTEVANT,  
72 Sudbury Street, Boston, Mass. 14 11

## THE CELEBRATED "SCHECK"

WOODWORTH PLANERS  
WITH NEW AND IMPORTANT IMPROVEMENTS,  
Manufactured by the  
SCHECK MACHINE CO., MATTHEWAN, N. Y.  
JOHN B. SCHECK, President.  
T. J. B. SCHECK, Treas. 14 11

## IRON PLANERS, ENGINE LATHES,

Drills, and other Machinists' Tools, of Superior Qual-  
ity, on hand and finishing. For Sale Low. For Descrip-  
tion and Price, address NEW HAVEN MANUFACTUR-  
ING CO., New Haven, Ct. 14 13\* 11

## PHOENIX IRON WORKS.—

Established 1824.  
GEO. S. LINCOLN & CO.,  
Iron Founders and Manufacturers of Machinists' Tools  
54 to 60 Arch Street, Hartford, Conn.

We are prepared to furnish first-class Machinists' Tools  
on hand and finishing. Samples may be seen in our Warehouse.  
Also, we keep constantly on hand our Patent FRICTION  
PULLEY, Counter Shafts for Lathes, etc. 23 11

## PORTABLE AND STATIONARY Steam

Engines and Boilers, Circular Saw Mills, Mill Work  
Cotton Gins and Cotton Gin Materials, manufactured  
by the ALBERTSON & DOUGLASS MACHINE CO.,  
New London, Conn. 14 11

## A MESSIEURS LES INVENTEURS—

Avis important. Les inventeurs non familiers avec  
in langue Anglaise, et qui prefereraient nous communi-  
quer leurs inventions en Francaise peuvent nous adresser  
dans leur langue natale. Envoyez nous un dessin et  
une description concise pour notre examen. Toutes  
communications seront regues en confiance.  
MUNN & CO.,  
Scientific American Office, No. 37 Park Row, New York

## SETS, VOLUMES AND NUMBERS.

Entire sets, volumes and numbers of SCIENTIFIC  
AMERICAN (Old and New Series) can be supplied by ad-  
dressing A. B. CO., Box No. 775, care of MUNN & CO., New  
York.

## MODELS, PATTERNS, EXPERIMENT-

AL and other Machinery, Models for the Patent  
Office, built to order by HOLSKEL MACHINE CO., Nos  
228, 230, and 232 Water Street, near Jefferson. Refer to  
SCIENTIFIC AMERICAN OFFICE. 1 11

## CHARLES A. SEELY, CONSULTING

and Analytical Chemist, No. 36 Pine Street, New  
York. Assays and Analyses of all kinds. Advice, Instru-  
tion, reports, etc., on the useful arts. 11 11

## CAN I OBTAIN A PATENT?—For Ad-

vice and instructions address MUNN & CO., 37 Park  
Row New York for TWENTY YEARS Attorneys for  
American and Foreign Patents. Caveats and Patents  
quickly prepared. The SCIENTIFIC AMERICAN \$3 a year  
30,000 Patent cases have been prepared by M. & Co.

## LATHES CHUCKS—HORTON'S PAT-

ENT—from 4 to 36 inches. Also for car wheels.  
Manufacturer's address, E. HORTON & SON, Windsor  
Locks, Conn. 1 20\*

## WANTED—Ladies and Gentlemen every-

where, in a business that will pay \$5 to \$20 per  
day; no book, patent right, or material required, but a  
standard article of merit, wanted by everybody, and sold  
at one third the usual price, with 30 per cent profit to our  
agents. Samples and circulars sent by mail for 25 cents.  
21 20w11

## THE Excelsior Wind Mill and the Genuine

Concord Axes manufactured by  
J. B. ARTHUR BROS. & CO., Fisherville, N. H.

## MACHINE CARD CLOTHING.—

SARGENT CARD CLOTHING CO.,  
Manufacturers of Cotton, Wool, and Flax Machine Card  
Clothing of every variety. E. S. LAWRENCE,  
Supt., Worcester, Mass. Sargent & Co., Agents, 26 Beek-  
man Street New York. 2 20\*

## STOCKS, DIES, AND SCREW PLATES,

Horton's and other Chucks. JOHN ASHCROFT, 50  
John St., New York. 21 12

## WIRE ROPE.

Manufactured by  
JOHN A. ROEBLING  
Trenton, N. J.

## FOR Inclined Planes, Standing Ship Rig-

ging, Bridges, Ferries, Stays or Guys on Derricks  
and Cranes, Tiller Ropes, each Cord of Copper and Iron,  
Lightning Conductors of Copper. Special attention given  
to hoisting ropes of all kinds for Mines and Elevators. Ap-  
ply for circular, giving price and other information. 22 15w11

## BOILER FELTING SAVES TWENTY-

five per cent of Fuel.  
JOHN ASHCROFT,  
50 John St., New York. 21 12

## HUTCHINSON &amp; LAURENCE, 8 Dey

Street, New York. Steam Engines and Boilers,  
Iron and Wood-working Machinery New and Second-  
hand, Machinists' Supplies, etc., General Agents for Jud-  
son's, and other improved Governors. 22 4

## PATENT IMPROVED ENDLESS OR

BAND SAW MACHINES, where saw breaking is  
entirely prevented; they run one-third faster than any  
other band saw. Also, a narrower saw, than usual, can be  
used and produce from three to five times more work than  
any of the best up-and-down saws in use; save much pow-  
er and stock. Refer now can be given from almost any part  
of the country. Machines for cutting boards are in pro-  
cess of building. We also manufacture well designed oval  
and other wood turning lathes, double adjustable spindle  
boring machines, circular saw mandrels, shuffling pulleys,  
flanges, etc. FIRST & PRYBIL,  
20 6\* 175 and 177 Hester St., New York City.

## PAT. ERASER

PATENT INK ERASER, BURNISHER  
Pencil Sharpener, and Pen Holder combined. Sells  
at sight. Agents wanted. Can make \$50 a week. Sample,  
post paid, 25 cents, or two copies for 50 cents.  
MOORE ERASER CO.,  
404 Library St., Philadelphia, Pa. 22 41

## STEAM AND WATER GAGES, STEAM

Whistles, Gage Cocks, and Engineer's Supplies.  
JOHN ASHCROFT, 50 John St., New York. 21 12

## B. T. TRIMMER'S Smut Machines and

Separators, manufactured at the Rochester Agri-  
cultural Works, Rochester, N. Y. 21 15\*

## WROUGHT-IRON Pipe for Steam Gas and

Water; Brass Globe Valves and Stop Cocks, Iron  
Fittings, etc. JOHN ASHCROFT, 50 John St., N. Y. 21 12

## D. BALLAUF, MODEL MAKER, No.

414 Seventh Street, Washington, D. C.  
Orders for Certified Duplicates of Patent Office Models  
and Original Models for Inventors. 16 15\*

## \$200



**A Handsome Bound Volume, containing 150**  
Mechanical Engravings, and the United States Census by  
Counties, with Hints and Receipts for Mechanics, mailed  
on receipt of 25c.