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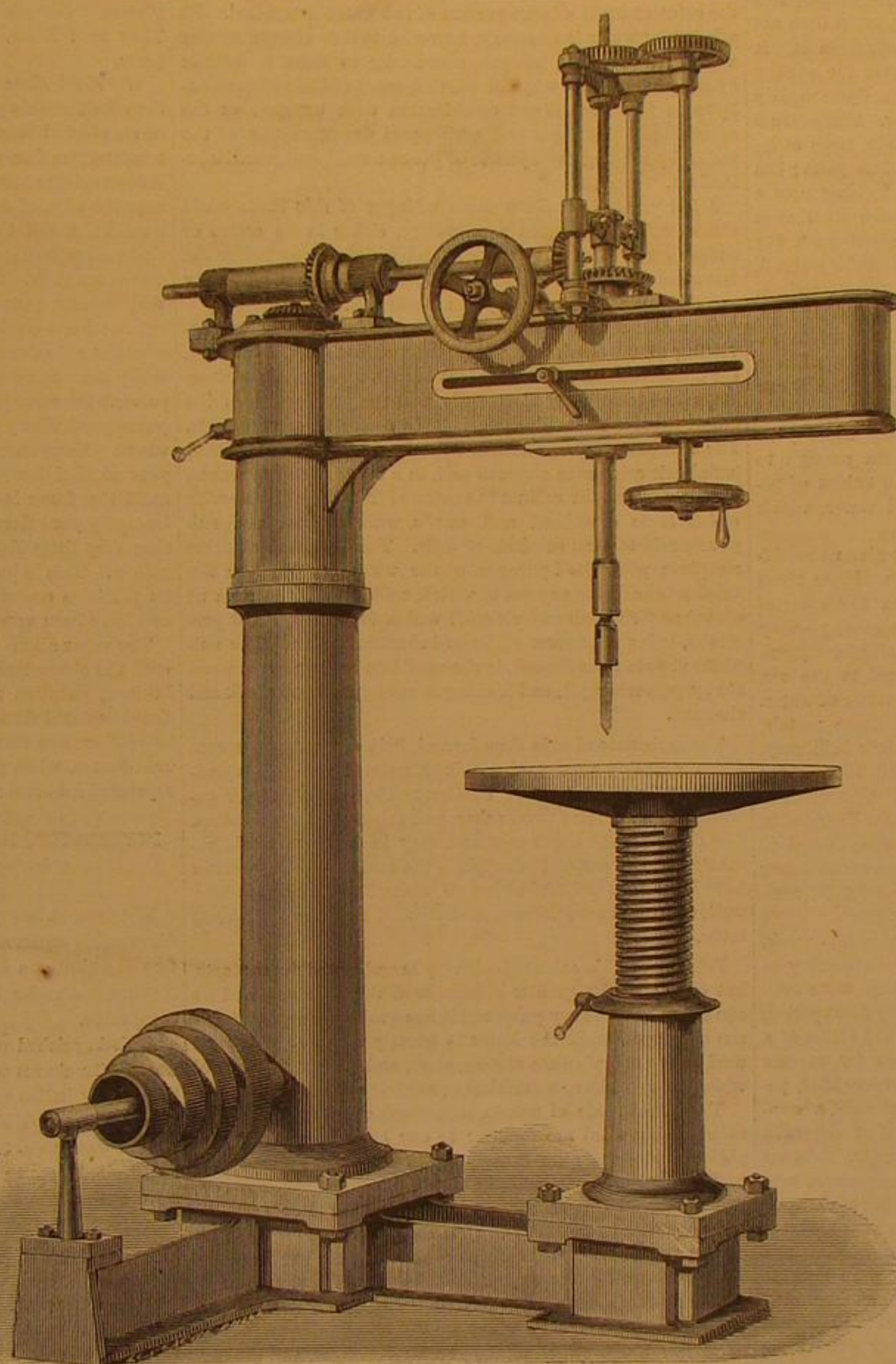
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[IN ADVANCE.]

## Improved Radial Drill Press.

There is no more indispensable machine, in metal-working establishments, than a good drill press, and much ingenuity has been shown in planning them so as to obtain the greatest possible efficiency for the least cost and weight of metal. The improved radial drill illustrated herewith has this advantage over others in ordinary use, that it adapts itself to the position of the work to be drilled, thus obviating the necessity of moving and adjusting the latter, which, in the case of heavy pieces, is often tedious and difficult.

The manner of accomplishing this will be readily understood by reference to the annexed figure, in which the spindle is shown in its proper position, over the table, for small work. The radiating arm is fitted to a neck at the top of the column, and traverses freely in all directions; in this, slides the head, carrying the drill-spindle and gearing, which is moved backwards and forwards by a rack and pinion and hand-wheels, one on each side of the machine.

It will be seen that the arm or swing is capable of being placed in any position, radiating from the column as a centre, and that the drill can hence be made to reach any point within the circle, except the part occupied by the column and the driving pulley. A large number of holes may thus be drilled in succession in the same surface, without moving the work, an advantage which will commend itself to machinists. The difficulty of leveling up a piece to be drilled for every hole, the time thus spent, and the danger of moving it after starting the drill, are annoyances that do not attach to this machine. When once the work is judiciously and firmly placed, a series of holes may be drilled, each of which will be perfectly parallel with the others. We have seen the machine at work in a number of shops, and consider it an excellent tool. It is especially useful in fitting up such work as steam engine cylinders, steam chests, bed plates, etc. All work which cannot be conveniently handled may be drilled by once setting it, instead of frequent changes of its position, thus saving a vast amount of labor and inconvenience. They have been adopted by many of the best shops in the country. They are manufactured and sold by R. H. Barr & Co., Wilmington, Del., whose advertisement may be found on another page.



RADIAL DRILL PRESS.

tion showing its internal construction. The reservoir or dome, A, is of cast iron, in the form shown, bolted to the top of the boiler at the point deemed most convenient. At its top it receives a pipe, B, connected with the feed-water pump and is the water supply pipe. The passage from the interior end

of this pipe to the dome, A, is governed by an ordinary upward-lifting valve, or check valve, as seen plainly in Fig. 2. Just below the inlet pipe, B, is the pipe, C, connecting with the steam space of the boiler, having its lower end at the desired level of the water and forming the short leg of the siphon. Near the bottom of the dome is another pipe, D, forming a communication with the dome and the water space of the boiler, its lower end reaching nearly to the boiler bottom, as shown by the dotted lines in Fig. 2. This is the long leg of the siphon. Both these pipes are, of course, open at the bottom and each are provided with cocks to be used, if necessary, to close communication between the interior of the dome and the boiler when the dome is to be cleared of the sediment deposited by the water. Inside the dome is a hollow lever float, E, pivoted to the rod, F, and balanced by the adjustable weight, G.

When the water falls below its proper level, exposing the open lower end of the pipe, C, steam, of course, passes up into the dome, A, and the water contained in it and supporting the float, E, will descend, carrying with it the float and opening the valve to the inlet of water through the pipe, B. So long as this valve is open, water will, consequently, be forced in by the pump through the pipe, D, to near the bottom of the boiler. Soon as the water rises sufficiently to cover the end of the pipe, C, no more steam will enter the dome, equilibrium will be restored, and the valve closed. If the pump is kept continually at work a side pipe may be used to carry off the overplus of water. Thus the height of water in the boiler will be automatically preserved at an absolutely uniform level.

The apparatus heats the feed water in the chamber, A, to the same temperature as the water in the boiler, thus preventing the unequal expansion and contraction of the iron. In addition to this office of the apparatus it is intended also to separate and precipitate the salts and earthy matters held in solution, as the water admitted to the dome becomes vaporized by the steam admitted through the pipe, C, and consequently parts with its impurities, which, being specifically heavier, sink

to the bottom of the dome, from which they can be readily removed on taking off the top of the dome. Applied to marine or other boilers subject to foaming the apparatus will work as a regulator to the feed, fully as well as where there is no such annoyance.

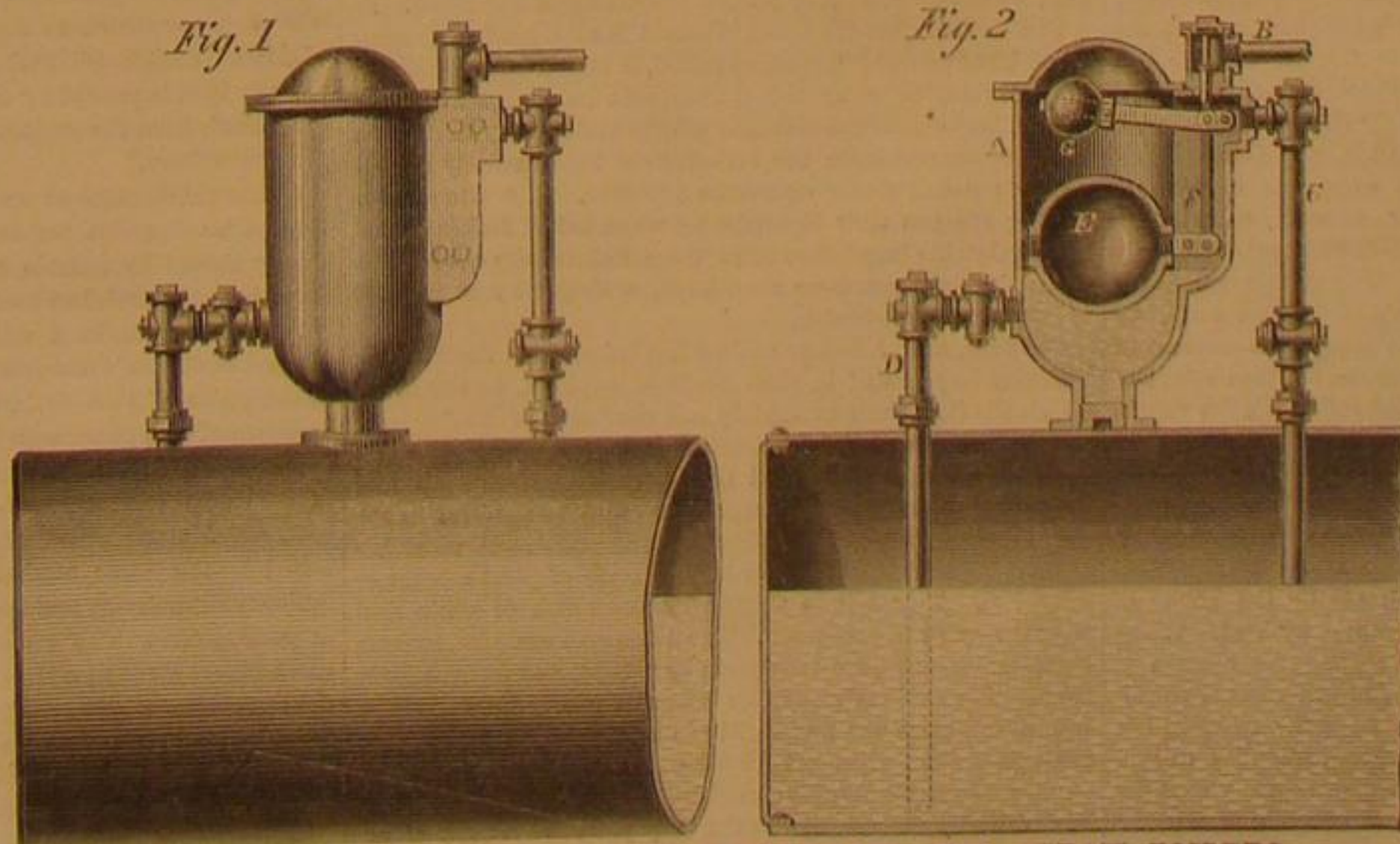
This apparatus has been in practical use for two years on eleven steam boilers, and has been subjected to all the tests necessary to prove its absolute reliability.

A simple adaptation makes this arrangement equally appropriate to an upright boiler, as it may be attached to its side or to the front of a horizontal boiler, if preferred, instead of on the top. It is the subject of two patents, dated respectively Feb. 19, 1867, and Nov. 5, 1867. For further particulars, address H. B. Beckman & Co., Newburgh, N. Y.

To make an amusing sympathetic ink, mix lemon and onion juice. Writing or pictures made with this mixture on plain white paper, will, when dry, be invisible. But on warming the paper before a fire the lines will appear in brown tints. Very pretty effects may be thus produced.

## The Siphon Feed Water Regulator and Purifier.

The objects accomplished by the invention herewith represented, are four-fold: the regulation of the water fed to a steam boiler; the absolute prevention of low water; the prevention of explosions, or injury to boilers so frequently caused by unequal expansion and contraction from the variable temperature at which water is usually fed to the boiler; and the purification of the feed water before reaching the boiler, and the deposition and easy removal of the deposit. The apparatus is very simple in construction and entirely automatic in operation. It is, in reality, a siphon, the short leg of which is alternately a conduit for water and steam. Fig. 1 is a perspective view of the apparatus as applied to a horizontal boiler. Fig. 2, to which the letters of reference are attached, is a sec-



IMPROVEMENT IN FEED WATER APPARATUS FOR STEAM BOILERS.



## THE TWINS OF CHEMISTRY--POTASSIUM AND SODIUM.

Standing before us are two small bottles, each containing some shining metallic globules, not unlike shot in appearance. Surrounding these globules and completely covering them, is a peculiar fluid called naphtha. The metallic globules are potassium and sodium. Their appearance is so similar, that unless the bottles were labeled, it would be difficult to distinguish one from the other. The external appearance of these metals is not the only point of similarity between them, as we shall presently see. We extract from the bottle labeled potassium, one of the little balls, holding it in the forceps for a moment exposed to the air; the naphtha quickly evaporates, the beautiful bluish white polish disappears, and a greyish white, lusterless surface, replaces it. If we now project this little ball upon the surface of some cold water, lo! it does not sink; a beautiful rose-colored flame bursts forth from it. It seems to become animated, and shoots about over the surface as though it were alive. But its life is short, the flame rapidly decreases in size, and finally dies out altogether. The globule has disappeared, leaving apparently not a single trace of its existence. We shall presently see where it has gone; but first, let us make some other experiments. Taking now a globule of sodium, we find upon exposure to the air that it rapidly tarnishes like the potassium; projecting it upon the water, it rapidly decreases in volume, but no flame is emitted. Soon it also disappears without trace, as did the potassium. We repeat the experiment with hot water. This time we get a brilliant display, discharges of little balls of melted sodium in an incandescent state, fly off in all directions like a miniature Roman candle. Another striking experiment can be performed with potassium, a fragment of this metal being twisted into the dry wick of a candle, you may light your candle with an icicle, provided the room is warm enough to form a single drop of water on its point. The oxides of potassium and sodium have been dissolved by the water, which accounts for their disappearance.

These experiments properly understood, will give us considerable knowledge of the nature of these metals. From them and what we have already said, we may learn the color of these metals—bluish gray; their low specific gravity—they float upon the surface of water; their great affinity for oxygen, shown by their rapidly tarnishing when exposed to the air, and their deportment when thrown upon the surface of water. It is the oxygen of the air, which, uniting with these metals, forms the greyish-white oxide which dulls their brilliancy. It is the oxygen of the water, which uniting with them, gives rise to the beautiful display we have described. The union is attended by heat, sufficient to ignite the hydrogen liberated in the decomposition of the water (water being composed of oxygen and hydrogen), and some vapors of the metal being mixed with the hydrogen gas, impart to it the splendid rose-color which is so striking a feature of the experiment.

We, lately, introduced you to the Goliath; we, this week, present to you the Twins of Chemistry. The discovery of these metals marks an era in the science. They were both discovered by Sir Humphrey Davy, within a very short period, their separation from oxygen being effected by the action of a voltaic battery of great power. Their affinities for oxygen are so great, that up to the time of their discovery 1807, potassa, a compound of potassium and oxygen, and soda, a compound of sodium and oxygen, had been regarded as elements, although they had been suspected to be compounds. It is not unlikely that some substances now regarded as elements, may also hereafter be found to be compounds, a number of them exhibiting peculiar properties, which indicate the possibility of their non-elementary character. We have called these metals twins, not only on account of the fact that they were born to Chemistry so nearly at the same period, but also on account of the many points of similarity which they possess in properties and appearance. They both possess very strong affinity for oxygen, as we have already shown, and in order to prevent their uniting with it they are kept covered with naphtha, which contains no oxygen, its elements being hydrogen and carbon. Their oxides are alkalis; that is, they possess the following properties: They are readily soluble in water; they combine with and neutralize the strongest acids; they change certain vegetable blues to green, and some yellows to brown; vegetable blues which have been changed to red by the action of an acid, are restored by their action. These properties belong to the oxides of a class of elementary substances, which are called alkali metals, of which there are five in all, the two under present consideration being plentiful and of great importance in the arts, and the others of rare occurrence.

The oxide of potassium is called potassa, and the oxide of sodium is called soda. An impure carbonate of potassa called potash, and an impure carbonate of soda, called soda ash, are the most common forms in which these substances are met with in commerce and the arts. The metals are never found naturally pure, and are obtained in that state, by the somewhat difficult, and sometimes dangerous process of distilling the carbonates of their oxides, in an iron retort of peculiar construction, with charcoal, and collecting the vapors of the metals in a receiver containing naphtha, and kept cold by immersion in water.

The rationale of the above process may be thus described: Carbon, in the form of charcoal is, at ordinary temperatures, one of the most inert and unchangeable of all known substances. It will remain for ages unaltered by the action of other elements, until its energies are aroused by heat. When heated to the point of combustion, its affinity for oxygen is greater than any known substance. We have seen the powerful affinity that potassium and sodium have for oxygen, but their strength is weakness to that of carbon, when its temperature is up. It is irresistible, and it wrenches, as it were by main force from them, the oxygen to form with it carbonic

acid (six parts by weight of carbon, and sixteen of oxygen); leaving them to be volatilized by the heat, and recondensed in the naphtha as above described.

The grand natural source from which the supply of potash is obtained, is the ashes of wood and other vegetable matter. The potassium exists in the plants previous to combustion, having been absorbed by them from the soils in which they grew. The soils obtain the potash from the decomposition of rocks, clays especially, having a large proportion, derived from the decomposition of feldspar, which contains from ten to twelve per cent of it, and from mica, which contains from five to six per cent. It is also found combined with other substances in sea water. The potash is obtained from the ashes by filtering water through them, which dissolves out the potash (technically called leaching), and boiling down the solution until a large portion of the water is expelled. Its affinity for water is so strong, however, that it always retains a portion combined with it chemically to form a definite hydrate. The only ways in which it can be obtained in an anhydrous form, are direct combination with oxygen, or the expulsion of hydrogen and consequent decomposition of the water, by heating the hydrate of potassa with pure metallic potassium.

A few years since, the western villages of this State could almost universally claim a potashery, either in an active or extinct state. Now they are gradually giving way before the increased consumption of coal, to sections where wood is plenty and cheap, and consequently the staple fuel.

Soda ash, otherwise carbonate of soda, is obtained by converting common salt (chloride of sodium) into sulphate of soda, the decomposition of the sulphate of soda into a crude carbonate, called technically black balls, and the purification of the latter, till it is the white, marketable soda ash of commerce. The first part of the process is done by heating oil of vitriol (sulphuric acid) with common salt, in a reverberatory furnace. In this reaction the sodium is separated from the chlorine with which it is combined, and unites with oxygen and sulphuric acid to form sulphate of soda. The liberated chlorine combines with the hydrogen of the water contained in the sulphuric acid (the oxygen of which, unites with the soda as above) to form hydrochloric acid, which is collected and preserved, being a product of large industrial value. The sulphate of soda thus formed, is changed into an impure carbonate by pulverizing it, and heating it with pulverized chalk and charcoal.

The carbonate of soda thus formed, is in a very impure condition, containing among other things, unburnt coal. It is purified by a leaching process, similar to that employed for extracting potash from wood ashes, and subsequent evaporation. The details of the above processes vary in different establishments, but the general principle is the same. Other processes have been invented, and although some have promised very well, the process we have described still remains in general favor.

Potash and soda ash are both very largely used in the arts, but owing to the greater cheapness of the soda ash, and its equal utility for many purposes, it has gradually replaced the use of potash, until the latter is greatly reduced. They are used in the manufacture of soap, glass, and other industries, of which we shall have something to say hereafter.

The bicarbonate of potash (saleratus) and bicarbonate of soda (baking soda) are familiar to our housekeepers, but the philosophy of their use in making bread is not perhaps generally understood. In making bread with yeast, carbonic acid gas is generated by fermentation of the dough. This gas expands by heat in baking, and thus the bread is "raised"—that is, its particles are forced apart, and the mass rendered spongy in consistence by the expanding gas. The bicarbonates of potash and soda contain in combination a large amount of carbonic acid, the affinity of which for the alkaline bases is comparatively weak. This affinity can be overcome, and the carbonic acid replaced by lactic acid, the acid generated in the "souring of milk," tartaric acid (cream tartar), acetic acid, and a large number of other acids. Dough compounded with sour milk, and bicarbonate of soda or potassa, will, when heated, be raised by the carbonic acid generated in the decomposition of these salts, lactate of soda being formed and remaining in the bread. When sweet milk is used, cream tartar is added, which also decomposes the carbonates, and liberates the carbonic acid gas; a tartrate of soda or potassa remaining in the bread. So it will be seen that the bread is raised in all cases by the same gas. The "aerated" bread, so called, is raised by first mixing the dough with water and a little salt in very strong iron globes, into which the carbonic acid, generated by the action of sulphuric acid upon the carbonate of lime (usually marble dust), is forced under enormous pressure. The dough containing the gas thus incorporated when baked makes a good light palatable bread, free from the alkaline salts above mentioned, which have been considered, with good reason, more or less injurious to health.

Consider, now, how our subject has led us from the metallic globules imprisoned in their bottle of naphtha, to the bread which the Scriptures so forcibly call the "staff of life."

Gunpowder is about as nearly the opposite of bread in its relations to life as could well be imagined; yet we shall find the globules have also an important office to perform in the manufacture of this death-dealing compound. A most important ingredient of gunpowder is nitrate of potash (niter or saltpeter). This salt is formed by the union of nitric acid with the oxide of potassium. The nitric acid contains, in combination, nitrogen, fourteen parts by weight, and oxygen, forty parts. The oxide of potassium contains nearly forty parts by weight of potassium, and eight of oxygen. Nitrate of potash contains about forty-eight fifty-fourths of its entire weight of oxygen. Gunpowder also contains charcoal and sulphur. We have called your attention to the very powerful affinity of hot

carbon for oxygen. Nitrogen is, on the contrary, remarkable for its feeble affinities. Nitrogenous substances are most easily decomposed, and it is because animal substances contain so large an amount of nitrogen that they decay so rapidly, unless decomposition is artificially prevented. When the powerful affinity of the carbon, and the feeble affinity of nitrogen for oxygen are considered, you will not be at a loss to account for the rapid and violent decomposition of gunpowder, when sufficiently heated. But we must remember, also, that the heat which arouses the affinity of the carbon, at the same time weakens the affinities of the substances which form the niter; the latter salt being easily decomposed by heat, without the presence of carbon. The sulphur plays a part in the reaction which we must pass by in this article. The proportions in different gunpowders vary to some extent; we shall give only those of the English and Austrian musket powder. They are: Niter, 75 parts; sulphur, 10 parts; charcoal, 15 parts.

We shall close this article by stating that the salts of all the alkali metals give marked and beautiful colors to the flame of an alcohol lamp, when their vapors are present in it. A common gas flame does not wholly obscure these colors. Tobacco contains nitrate of potash. If a cigar be lighted at or near the edge of a flame of a common bat-wing gas burner a beautiful violet tinge will be imparted to the flame. The violet color is the characteristic color of the heated vapor of potassium salts. Soda imparts to the flame a rich yellow tint. Very minute quantities of these metals can be detected thus; but the flame ought to be as free as possible from the vapors of other substances, as the presence of more than one may easily obscure, or at least modify the tint of the flame, so as to prevent the success of the experiment. The salts of sodium (more particularly the chloride) are to be found almost everywhere. Even the dust floating in the air contains it. Light your alcohol lamp, set it upon your table, and let it stand until the flame is steady. Now drop a book upon the table. Instantly your flame, which was before a very pale blue, emitting very little light, becomes strongly luminous and bright yellow. This is because you have raised a dust, and some of its particles containing chloride of sodium have passed into and have been vaporized by the flame.

The other alkali metals alluded to above, but not described, with the characteristic colors of the vapors of their salts, are, lithium, purplish red; rubidium and cesium, violet. The simple colored flame test will not distinguish the salts of the two latter from those of potassium; but the lights of the colored flames, when passed through the spectroscope, and thus separated into their elements, exhibit marked differences.

## INTERESTING FACTS ABOUT THE HISTORY AND CONSUMPTION OF COAL.

(From the Rondout Courier.)

The present being a season when coal is fast becoming an indispensable commodity in almost every household, and, therefore, constitutes a subject of considerable importance, a brief dissertation under the above caption may not be thought unseasonable.

A distinguished writer, alluding to the introduction of the use of bituminous or flame-burning coal in England, remarks, that the prejudice against it was so strong that the Crown was petitioned to prohibit the "noxious fuel," and a royal proclamation was issued to that effect. This, however, failed to have the desired result; a commission was, therefore, issued to ascertain who burned coal within the city of London and its vicinity, with power to punish them by fine for the first offence, and by demolition of their furnaces if they persisted in transgression. A law was at length passed making it a capital offence to burn coal within the city of London, and only permitting it to be used in the gorges of the neighborhood. Among the records in the Tower, Mr. Astle found a document imparting the fact that, in the time of Edward I., a man had been tried, convicted, and executed for the crime of burning coal in London. It took three centuries to entirely efface this prejudice. Darlington says that "coal was not generally employed as fuel until the beginning of the reign of Charles I. It is, however, mentioned in documents anterior to the reign of Henry III., for that monarch, in the year 1234, renewed a charter granted by his father to the inhabitants of Newcastle, who were permitted to dig for coal upon paying a yearly tax of £100. That fossil fuel had been introduced into London prior to 1306 is proved by the fact that in that year its use was prohibited, from the supposed tendency of its smoke to corrupt the atmosphere."

Although bituminous was the only fossil coal used either in Europe or America before the present century, it has been clearly shown by reliable authorities that anthracite or non-flame burning coal, has been known for ages.

Sir E. Pollock, in a case which was tried in 1840, thus alluded to the beds of anthracite coal in South Wales, and the peculiarities of that fuel: "A great many years ago it was ascertained that there were large fields (I hardly know how to use a term capacious enough to give you a notion of the immense tracts of country), which produce a particular species of coal, called stone or anthracite. This is a substance, though called by the name of coal, that differs very much from the ordinary bituminous coal that you are accustomed to see blazing in your grates. The common coal, from whatever place derived, blazes away in a cheerful fire, and breaks up readily; but the anthracite or stone coal, differs both in appearance, structure, and character from common coal. It has a luster which is vitreous and almost metallic; it does not break up easily in pieces, and for many purposes of combustion, is wholly and entirely useless. This coal has been known to exist for centu-



ries. It was known to be of no use for domestic purposes; it had never been applied to any of the great processes of smelting, although attention had been called to it in various ways; and it was thought that there must be some mode by which so plentiful an article, and apparently so tempting and promising a subject for the philosopher, or for the enterprising manufacturer, could be brought into use."

Such is a brief history of the worthlessness of anthracite coal in Wales, before Crane introduced his hot air blast, for smelting iron, in 1837. Even in this late day it is not used in England for domestic purposes. In America, the first cargo of anthracite coal was sent down the Susquehanna in boats, and reached the United States armory in 1775; but it was not until 1808 that grates were constructed at Wilkesbarre, Pa., to burn it for domestic use, under the direction of Judge Bell. The Lehigh Coal Mining Company was formed in 1793, for the development and working of this then improved combustible; but it was not until 1814 that the first twenty tons were conveyed down the Lehigh and the Delaware rivers, at great cost and labor, to Philadelphia, where a few wagon loads had preceded them from the Schuylkill district in the year 1812. It was as late as 1820 before the comparatively large quantity of 365 tons of anthracite (average of one ton for each day in the year) reached Philadelphia. In 1825 the product was 6,500 tons. In the same year the Schuylkill mines were opened, and coal reached the city of New York and other places east.

In the year 1824 the Delaware and Hudson Canal was projected by Maurice Wurts, and its building commenced; and in 1829 it was opened for navigation. Mr. Wurts had an abiding faith that the canal would become a paying institution, and he lived to realize his prediction that the time would come when 500,000 tons of coal would be floated to tide water in its vessels. We of the present day look with something like contempt upon this quantity as the carrying capacity of the canal, now that its annual tonnage has reached the millions, but then it was looked upon as the exaggeration of a visionary projector. To-day the wildest predictions have been more than realized. It has been the means of giving support to hosts of men, has built up a number of thriving villages along its route, and has given vitality to many otherwise unimportant points.

The company have almost every year increased their business facilities. During the current year, extensive coal fields have been purchased in addition to those already owned by the company, and an immense sum of money appropriated for their development and improvement. With a view to a still greater increase in business, they are now making experiments with a steam canal boat, which bids fair to be a success. Realizing the advantages to accrue from having a live representative at this place, with an eye to the interests of the company, the Hon. Thomas Cornell has been elected one of the directors—than whom no better selection could have been made. The stupendous character of its operations may be imagined when we state that it has thus far this season brought down 1,495,789.1 tons of coal—an increase of 235,646.13 tons over last year.

The following figures show the number of tons of coal brought to tide-water by the canal since its first season in 1829:

1829	7,000	1849	454,240
1830	43,000	1850	432,329
1831	54,000	1851	472,478
1832	84,000	1852	497,829
1833	111,777	1853	494,227
1834	45,700	1854	438,405
1835	90,000	1855	565,460
1836	103,861	1856	499,620
1837	115,287	1857	490,677
1838	78,297	1858	548,789
1839	122,360	1859	591,000
1840	148,470	1860	464,238
1841	192,370	1861	724,190
1842	205,238	1862	604,530
1843	227,065	1863	815,575
1844	251,005	1864	829,589
1845	278,435	1865	748,475
1846	320,000	1866	1,278,882
1847	388,203	1867	1,221,063
1848	437,500	1868 (to Nov. 24th)	1,450,769

Grates were now constructed with vertical front bars, as it was believed that coal would not burn with horizontal openings. Lumps of the size of a person's fist were selected for use; these required so long a time to ignite or kindle fire, that a fire was kept up day and night, to avoid the necessity of re-kindling. Egg size sold at a less price than what is now known as "broken." "Nut" and smaller sizes were considered of no value, but deemed mere refuse, and as such, accumulated in large quantities at the yards as well as at the mines. In New York this refuse coal was extensively used toward filling in docks.

In the fall of 1835, a large quantity of this coal having accumulated in West Philadelphia, was purchased and shipped to New York by a gentleman named Jordan L. Mott, of that city, he having invented a grate for burning this fine or refuse coal. This was the first movement that gave a fixed value to the small sizes of coal which, at this day, has become so important an article of consumption. Gen. Harvey, in alluding to this subject says: "Mr. Mott's admirable arrangement for burning small coal caused its speedy introduction for domestic use, and contributed largely to the right appreciation and proper modes of using anthracite for mechanical and other purposes."

The change in the use of coal for wood on board of steamboats took place in 1838, '39, and '40, previous to which time, the upper deck, the space now occupied by splendid saloons, was used for storing wood. After that, anthracite coal went rapidly into use for all purposes requiring fuel, until the annual products of the mines of Pennsylvania exceed ten millions tons.

A PRACTICAL acquaintance with the hand tool will save the machinist many hours of vexatious labor.

## PRACTICAL RECIPES.

**WHITEWASH FOR OUTSIDE WORK.**—Take of good quicklime half a bushel, slack in the usual manner and add one pound common salt, half a pound of sulphate of zinc (white vitriol), and one gallon of sweet milk. The salt and the white vitriol should be dissolved before they are added, when the whole should be thoroughly mixed with sufficient water to give the proper consistency. The sooner the mixture is then applied the better.

**CHAPPED HANDS, ETC.**—In this season of cold winds many are suffering from chapped hands, lips, and faces. The following course will scarcely fail to cure, and is almost certain to prevent these inconveniences. Wash the chapped surface with fine soap, and while the soap is on the hands place in the palm a tablespoonful of Indian meal. Before removing the soap, scrub the hands thoroughly with the meal and the soapsuds, then rinse the hands thoroughly with soft tepid water until all trace of the soap is removed, using a little meal each time until the last, which will aid greatly in removing the soap and dirt from the cracks in the cuticle. Finally, wipe the hands very thoroughly and rinse them in enough water to moisten their surface, in which has been poured a quarter of a teaspoonful of pure glycerin, dry them without wiping, using a mild heat, and rubbing them until the water has all evaporated. By this process, the dirt will have been all removed, and in its stead will remain a coating of glycerine. The effect of this application will be apparent by morning, if it be made upon retiring to rest; and whoever tries it once will do it a second time. The glycerin must be pure, however, or it will irritate instead of healing.

**TO REVIVE THE COLOR OF BLACK CLOTH.**—Take of blue galls, bruised, four ounces; logwood, copperas, iron filings, free from grease, and sumach leaves, each one ounce. Put all but the iron filings and copperas into one quart of good vinegar, and set the vessel containing them in a warm water bath for twenty-four hours, then add the iron filings and copperas and shake occasionally for a week. It should be kept in a well-corked bottle. It may be applied to faded spots with a soft sponge. It is good also to restore the black color of leather when it turns red, the leather being previously well cleaned with soap and water.

**TO PREPARE CASKS FOR CIDER.**—Cider should never be put into new casks without previously scalding them with water containing salt, or with water in which pomace has been boiled. Beer casks should never be used for cider, or cider casks for beer. Wine and brandy casks will keep cider well, if the tartar adhering to their sides is first carefully scraped off and the casks be well scalded. Burning a little sulphur in a cask will effectually remove must.

**TO MAKE A PURE CARAMEL.**—The commercial caramel is a solution of burnt sugar in water. It is rarely pure, often containing undecomposed sugar and bitter compounds generated during the heating process. To purify its solution, it should be filtered and alcohol added until no precipitate is thrown down. The precipitate is a dark brown powder, in many instances almost black, and is pure caramel, soluble in water, but insoluble in alcohol.

**TO FILL HOLES IN IRON CASTINGS.**—Sulphur one part, sal ammoniac two parts, powdered iron turnings eighty parts, make into a thick paste with water immediately before using. The materials should also be kept separate until the time they are wanted.

## A NEW TOY FOR YOUNG AND OLD.

Probably there is not one of the readers of the SCIENTIFIC AMERICAN who has not derived amusement from the spinning of tops; and the variety of their forms and performances is so great that we might have supposed the field of invention had been fully cultivated and reaped; but after seeing the old toy adapted to exhibit mechanical and optical effects, we expect still further advance in "top dressing"—to continue our figure of cultivation.

The Japanese have latterly astonished us with their performances in the top department, but we think they have not exhausted the powers of entertainment from top-spinning, judging after the novel exhibition we have witnessed, by one of our old correspondents, whose signature to several articles on amateur turning some of our subscribers will recognize.

He has penned a description of the top he employs, on which, after perusal, any of our young amateur friends may exercise their ingenuity in imitating. We promise that they will not only be interested but entertained; and as the inventor declines to take out a patent, and prefers to offer its free construction to our friends in the toy manufacture, we ask a careful examination of his device, statement, and explanation.

## A Huge Mud Digger.

An Eastern exchange says: The largest mud excavator in the United States has just been completed in Portland for a Boston party to be used in excavating the South Boston flats. The digger is eighty feet long and forty feet wide. It has double dredger with twenty-nine large iron buckets on each elevator. The elevators are placed on the sides of the scow and can be worked singly or together. Its operation is as follows: Two large scows are anchored ahead and astern of the digger, about 200 feet apart. These scows are secured by timbers that are driven into the mud, and raised, when necessary, by machinery. Two chains run through the digger and are attached to the anchored scows. When the engines are in operation they

move a shovel, which is held in position under the dredger by an arm, one of these shovels being attached to the lower end of each elevator. As the dredger moves along between the two anchored scows, the shovels stir up the mud and the buckets on the elevator scoop it up and deposit it in a scow secured to the forward part of the dredge. The elevator runs by two engines, with cylinders six by eight inches, acting independent of each other. There are two main engines for running the machinery and moving the dredger, with cylinders four-teen by twenty inches.

## The Tea Trade in New York.

A correspondent of the Troy (N. Y.) Times gives some interesting facts in regard to the tea trade of this metropolis, some of which we referred to on page 123 of No. 8, current volume, SCIENTIFIC AMERICAN. He says:

There are a few places where we are wont to drop in and take a cup of tea, which to a wanderer in this great labyrinth is very acceptable. We do not refer to the restaurants, which are very well if one can do no better, but to the tea brokers in Wall street and that vicinity. These gentlemen always have some extra qualities on hand, and the kettle is never off the boil; and here one can brew a cup of gunpowder, young or old hyson, or breakfast tea in a minute by the watch. Formerly teas were sold at auction, and in this way a cargo of ten thousand chests could be disposed of in an hour. The great center of the tea trade was then the Phenix salesroom, in the Journal of Commerce building, for which a rent of \$40 was exacted for each sale. The sample chests were placed on examination one day previous, and each chest was numbered and then tapped with an auger for sampling, while a pile of catalogues lay on the desk. On some occasions over two hundred sample chests might be found, and it was no small task for a grocer to examine this array of different qualities in a single day. But it had to be done, and hence the room would be crowded, each man chewing and smelling, and in every possible way reaching an estimate of value which he penciled on his catalogue so as to be prepared to bid. Some dealers took the liberty to send boys for samples which they tested in their own offices, the samples becoming the perquisites of the clerks, and sometimes amounting to a large value. The floor of the salesroom would be covered with tea dust and the general waste of the article would be very great, averaging six hundred pounds at each auction. The purchase of tea under such circumstances was a great trial of skill, the bidding being for the first choice out of ten lots, and each subsequent choice being put up until the whole was disposed of. Some having got the bid would choose a lot whose inferiority would at once attest their ignorance and call forth a general smile of ridicule.

The auctioneer on these occasions was almost invariably the late Lindley M. Hoffman, whose eloquence on the stand was only equaled by his grace of action. He was a small man, full of motion, which, in his case, was like the performance of an acrobat. At one time he would be on one leg, at another both arms would be over his head, while his whole body would be convulsed with excitement. He had a marvelous memory of name and face, and amid a hundred voices would discover the first claimant. We have seldom been more rapt by any oratory than by his magic performance, and we can understand the full meaning of that man who said he would rather hear Hoffman sell a cargo of teas than attend the best opera.

With the death of Hoffman, tea auctions went out of use and the present fashion of brokerage commenced, with which importers are generally better pleased. They save the waste, which is at least equal to five hundred dollars on each sale, while the auctioneer's fee and rent of salesroom are two hundred dollars additional. There are about a half-dozen tea brokers here, and all tea imported into this city, with a very few exceptions, passes through their hands. Their offices contain hundreds of samples placed in the boxes, and they can in an instant show a purchaser the grade he may require. This is tested by making a cup of tea, the drawing being invariably of the weight of a five cent silver coin, which always rests on the tiny scale. Tea tasting is exceeding hard on the nervous system, and while it may be very pleasant for us to drop in and take a casual drink, it is a very different thing to taste a hundred samples in a day. No one who has not a very enduring constitution can long maintain this continual stimulus. One of the best tea tasters in America is a nervous, timid man, who should have been very rich, but he is not, and never will be. He deals in the article, but in such a small way that it does not amount to a success. Had he possessed nerve to operate boldly, he might have been a millionaire; but as it is, after thirty years of trade, but little removed from the foot of the ladder. He has a rare gift, but it has been of little use.

Tea, when sold by an importer, is always weighed by a city weigher, who receives a fee for each package. The fees on a cargo amount to about \$200. Down weight being always given, the jobber generally can gain a pound on reweighing it. As a rule, a cargo of tea stored for one year will gain enough by absorbing moisture to pay the interest on the capital. Hence some importers make a rule to sell no tea until it has been stored a year. We have known teas held in New York five years and then sold for nearly half less than had twice been offered for them.

Every cargo will be more or less damaged by water, and these teas are sold at auction by the underwriters. They are bought by parties to re-manufacture, which is done by coloring them with Paris green and drying them in maltkilns. They are retailed at what are called "cheap stores," where the poorest class do their trading, and where damaged goods generally find a market. We well remember the wrecking of an Indian man off the Jersey coast, part of whose cargo was brought up reeking with salt water, and the chests were knocked to pieces and emptied on a large sail which had been spread in the street. Here we saw a mass of tea forty feet square and a foot deep, which brought about five cents per pound, and was not worth even that petty sum. Bad as it was somebody used it. The restoration of damaged tea is now a regular business, in which a number of men find employment, and thus live by poisoning others.

## OBITUARY--DR. WARREN ROWELL.

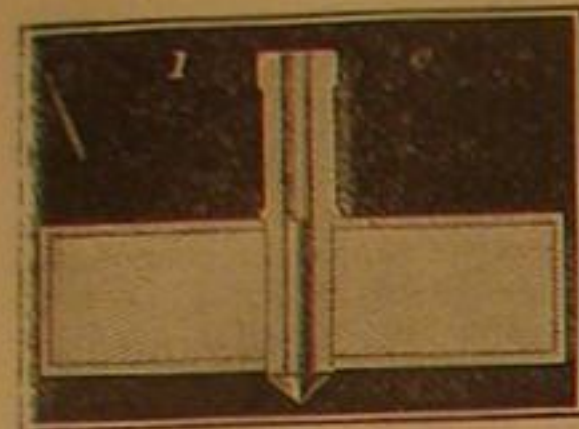
We regret to be compelled to note the death of DR. WARREN ROWELL, which occurred on the 2d of December. DR. ROWELL was an occasional contributor to our columns, his articles proving his ability to deal with practically scientific subjects, especially those affecting mechanics. A man of positive opinions, formed always by observation, experiment, or experience, his instructions were valuable to those who lacked his opportunities or talents. We shall miss his genial companionship and his ready criticisms, which were always tempered with reason and defended with ability.



## THE LENOX TOP.

This top, so named from its birthplace, Lenox, Mass., is offered without any patent or royalty, to the attention of amateur and professional manufacturers, and rests its claims for priority over all other tops on the following five combinations:

1st, It spins for a great length of time, say half an hour or more. 2d, It gives motion to other objects, during its rotation; thus making marbles, money, or China dolls, spin round it, acting as satellites. 3d, It gives motion to paper tubes, ornamented by colored and gilt papers, silk, ribbons, etc. These, when rotating on a loose spindle inserted into the stem of the top, appear like Venetian glass goblets. Also, when the spindles are made of wire and bent, the rotation gives to the wires the appearance of vases, etc. 4th, It produces a change of appearance in spiral rings, painted on circular cards, by forming circles of great beauty. 5th, It acts as the carrier of another top, on its shoulders, like Sinbad the Sailor; both tops revolving at the same time.



To effect these five objects, the same form of top and handle to spin it are employed, but the tops are

of different sizes, and weights. The top is spun on a China plate or shallow saucer, which inclines to the center. The ordinary plate will answer for all the combinations, No. 1, 3, 4, and 5, but for No. 2, a larger plate, with a gradual slope or incline from the rim to the center of the plate, is absolutely essential; as the rotation of the marbles, dolls, etc., depends on the centrifugal force communicated by the top in the center of the plate, during its revolutions, to the marbles, etc., which slide down the inclined plane, and receive a rotary impulse from the central top, until its forces are entirely exhausted.

The China plate may be of 8, 9, or 10 inches, inside diameter, of hard enamel to prevent holes from being drilled into it by the steel point, and the plate should have a drop of olive oil rubbed on it to prevent the same injury. The larger the plate, the heavier you can make the top, and the longer it will keep the satellites in motion.

The edge of the top, which communicates motion to the marbles, etc., may be made rough, but it is better to slip on it an india-rubber band, which acts perfectly.

The top can be made of a thick disk of metal, with a hole drilled through the center; a tube is fastened into this hole leaving three quarters of an inch of the tube projecting above the disk on its upper side, and level with the bottom of the disk on the lower side. Into the bottom of the tube, insert a short piece of steel wire, having a point on the end, projecting about one quarter inch. This constitutes the whole of the top.

The handle is a piece of wood, which can be grasped in the left hand, and a steel wire passes at right angles through the end of the piece of wood. The wire must be of the size of the hole in the tube; and when inserted and held perpendicularly, the top will stand upright on the plate, and if a string has been wound around the upper projecting part of the tube, and drawn first slowly, and then quickly by the right hand you set the top in rapid motion. The steel wire must not be pressed too strongly against the inside head of the steel point, nor should it be withdrawn before the string is wound off, and the top has acquired a steady motion.

The handle will be held more firmly, if the thumb clasps the steel wire, while the wooden handle is grasped in the hand.



Various other ways of making tops will answer the purposes intended, but this top and handle are of extremely simple construction; any amateur can make it, and the time it will rotate, is greater than any top I ever tried.

Strength and dexterity in the art of spinning and the length and fineness of the cord, influence the time the

top will remain up. With a silk braided fishing line, six feet long, wound three times up and down the stem, I succeeded in making a top weighing ten ounces revolve for thirty-five minutes, on a plate; and I do not consider a top well made, that cannot keep up twenty-five minutes at least.

As amateurs may like to know how to make such a top without the aid of the founder, I will describe the process I adopted for making one of the tops, I send with this.

I cut two thin brass plates with shears, into squares, drilled holes in the center to fit a piece of brass tube tightly. I then turned these pieces of sheet brass round the size of the top, by means of a screw chuck and nut.

The piece of brass tube, and one side of each of the sheet brass disks, was tinned with muriate of zinc, tin, and an alcohol lamp.

One of the disks was placed firmly and truly, on the brass tube, three quarters of an inch from the end of it. A piece of card paper was wound around the disk to form a cup or mold about one half an inch deep and fastened by a wire twisted around it. I then melted lead and old type metal, half and half, in a ladle and poured it into the card mold. The heat of the boiling fluid melted the tin on the brass sheet disk, without burning the surrounding card, and when cold the disk and tube were fastened firmly together by the melted material.

I now put the end of the tube into a chuck, turned off the face of the metal, leaving the tube on that end projecting one eighth of an inch and turned the side true. The top now

was finished with the exception of the brass disk at the bottom, which after heating the top moderately over the alcohol lamp, and applying some solder made of tin and bismuth, was placed on the projecting end of the tube and pressed until cold. I then turned a steel point, and hammered it into the end of the tube; put the top again on the lathe held by the long projecting stem, turned the steel point true to the center, and it was completed with the exception of polishing the two brass plates with fine emery paper and rottenstone. The brass plates, I also ornamented with a slate pencil dipped in water, forming circles on them by the hand; and after applying a little heat, varnished them with French copal varnish.

The whole top can be made accurately, without a slide rest. Of course, such tops can be made more cheaply by dies, or by the brass spinning process. This would be requisite for wholesale manufacture.

Having described the top and handle, way of spinning it, and making a top, I will describe its performance. Let me state the way in which this very amusing toy was suggested to me.



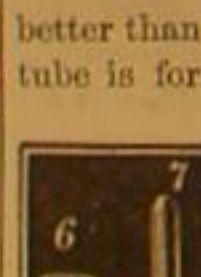
I made a pair of wooden tops, or "Jennie Spinners," which you spin between the thumb and forefinger. They were made to show some young ladies the action of a lathe. After spinning one on a plate, the other was set in motion. The plate had a dip or incline to the center, and the first jennie spinner lay motionless. The second one naturally slid to the center of the plate, and, coming in contact with the first one, set it in motion a second time by friction. Following up this suggestion, I made heavy metal tops for the first motor, and, for the satellites, small saucers, which could hold dolls, etc., and which would slide down and reach the first motor. The beauty of the toy cannot be appreciated without seeing the curves and rotary movement of the waltzing dolls and circulating money, etc. These will revolve for several minutes.

Centrifugal force, gravitation, and friction, are extremely well illustrated by this toy, beside the pleasure afforded in making the top spin, and seeing the satellites revolve. The third object of the top is to illustrate the well known fact of persistency of vision. The eye retains an image impressed on it after the object which it represented has gone. This combination was suggested by a friend placing a piece of twisted paper into the tube, whilst the top was revolving. He exclaimed, Look at my champagne glass! The hint was not lost, although I had not heard, at that time, of a toy which by a crank and wheel produced similar effects. I have not seen the toy, but it must be more complicated and expensive, and cannot afford the same pleasure to the operator.

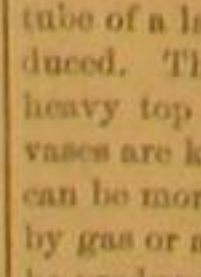


If a tube of paper, which exactly fits the upright tube, should be inserted in the stem of the top when in motion, it would only appear like a straight mast in a boat; but if the tube of paper is smaller than the hole in the stem, the upper end of the tube will lean, and as the top revolves, will show a cone. Tubes of paper are a light material, and if a wire is inserted in the lower part of the tube, and the wire is then placed in the upper stem of the top, it will keep the paper stiff, and yet give the requisite lean or wobble, to the upper end of the paper tube. Rapid rotation will leave the impression on the retina of the eye, of a wine-glass in motion.

When these tubes are colored, by painting them, or winding strips of colored or gilt paper, strung beads, etc., round them, either in rings or spirally, the effect is greatly heightened, and the revolving tubes have the appearance of the most delicate Venetian glass goblets. These tubes can be made by any young lady with note paper, a little paste, and a thin glass tube to roll them on. A glass tube is much better than wire, or wood, as it is withdrawn readily after the tube is formed. The tube is left to dry, and when dry, is

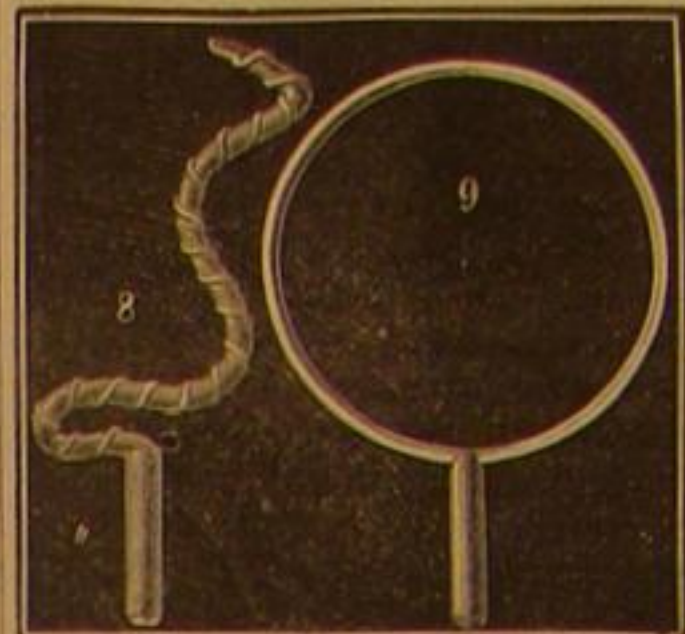


printed or covered by colored strips of paper, silks, ribbons, gilt stripes, etc., according to the taste of the lady. I have more than one hundred of such tubes of every variety of color and material. Feathers, beads, loops of floss silk, &c., will suggest themselves to the maker, without any limit or more particular directions. In order to make these tubes appear more like wine goblets, a card is cut round, pierced with a small hole for the wire to pass through, and painted with colors to match the tubes. This is also a lady's pastime, and very easily done. Or, a number of colored pieces of paper, can be strung on a small screw and nut chuck on a lathe, and then rings of different sizes can be cut with a sharp chisel, thus furnishing a diversity of colored papers to paste on to the round cards, according to the taste of the lady. But a much greater effect can be produced, by taking annealed iron or brass wire, and shaping it with plyers so as to obtain the profile of goblets, jars, vases, etc.; and then by covering these with bright colors, and placing the stems in the



tube of a larger revolving top, most beautiful effects are produced. This is also, the handiwork of a lady, and when a heavy top weighing sixteen or twenty ounces, is used, the vases are kept steady and spin for a very long time. Nothing can be more fairy-like than these revolving spectral vases, seen by gas or a lamp at night. Although these optical effects may be produced in day light, when the operator or spectator has his back to the strong light of a single window, and places the top and vase before him, in a direct line with the eye, and has

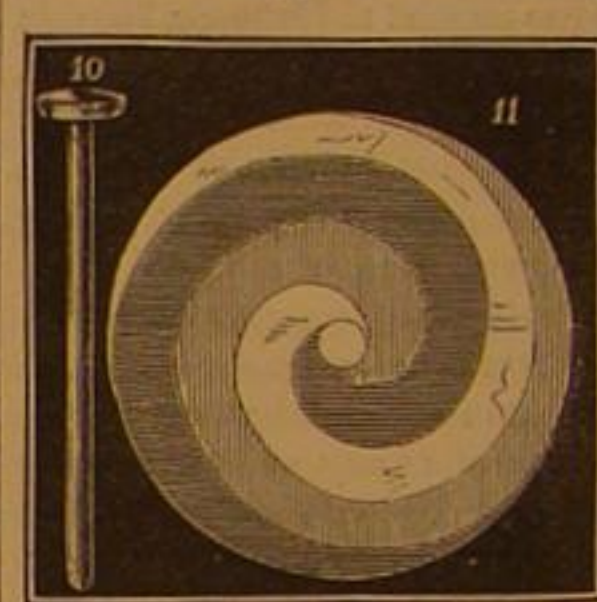
for back ground some dark object; yet, it is far more effective



by gaslight, or the light of a kerosene lamp, depressed so as to throw all the light on the plate. The effect is then extremely beautiful. Another optical illusion of a very charming appearance, is produced by painting spirals in colors or cards, which have a small hole in the center, through

which a wire is passed of about two inches in length. This wire has on the uppermost end a small button, which prevents the round card from flying off while revolving. The card and wire are made to rotate, when the top is in motion, by the insertion of the wire in the top, as previously described, and then by raising or depressing the card on the wire by two other wires held one in each hand of the operator. The spirals are converted into brilliant rings, which change places, and melt into each other, as the card is depressed or raised by the two hands, in a most charming way.

Sinbad's "Old Man of the Sea," is represented by a different top, which I call the Japanese Needle Top, made like a gyroscope top, but with a small hole in the end of the stem or spindle, to allow it to spin on a needle point. The body of this top is pierced, and like a carriage wheel, revolves on the spindle like the carriage on the axle tree, but when placed upright on its spinning point, the wheel presses on the washer near the end of the spindle, and its friction against the washer is so great, that the spindle revolves with the wheel, and becomes as rigid as if the two were soldered together. Seize, however, the upper end of the spindle, between the thumb



and fingers, and then the wheel continues its revolutions by itself alone, and the spindle remains again stationary, and allows you to place it on another plate, when it again revolves with the wheel, until all the centrifugal force is expended.

This is the Japanese plan of making tops, a thousand years old, but by no means the best plan

of spinning a top, if you want it to keep up a great length of time. It is, however, a very important feature of a top which requires to be moved around during its rotations, and it enables you to lift it up, and place the spinning end in a cup, attached to the upper end of another top, during the revolutions of the latter, and also, if a small hole be drilled in the point of the spindle, to place it on the point of a needle and let it spin there. The needle can be held between the fingers, or stuck into the cork of a bottle, or it can be inserted into the end of the other top.

In all these cases, which are very pretty illustrations of Japanese top spinning, the friction is so small that a top will revolve twenty minutes, or even longer, on the point of the needle.

To place the spindle on the needle requires a steady hand and sharp eye. The practice is best acquired by having the needle fixed firmly in some substance, and the top placed on the needle point, before pulling the string and by holding it pressed against the needle point during the drawing of the string, and then allowing it to rotate. If you spin it on a plate, lift it up, and place it on a needle, a great deal of power is expended uselessly.



I generally wind the string, hold the spindle in the right hand, and pull the string with the left; the wheel of the top is kept either in a vertical or horizontal position, and then I place the top on the needle point with the right hand.

A left-handed person would reverse the order. You can readily place the needle top on the needle, held in the upper stem of the revolving Lenox top by a very simple contrivance; a guiding tube with a funnel-shaped end slips on the needle and it can be held stationary (while the needle itself is revolving) by the fingers of the left hand. The guide is held a little above the point of the needle, and the needle top, when rotating, is placed in the funnel, which carries it safely on to the needle point, and then the right hand releases the spindle of the needle top. The guiding tube drops down, and both tops revolve, unequally at first, but soon in unison. The expert hand can make one top revolve to the right, while the other top revolves the contrary direction. The needle can be fastened true and firm into a brass wire which is turned true so as to fit into the hole in the upper stem of the Lenox top; a large needle or pointed wire is the best to employ, as small needles bend and break easily.

The string in all tops should be fine, strong, and as long as the arm of the operator can draw it. A braided or twisted silk line is the best.

The plates should be strong, with an inclination to the center. A common coarse French saucer answers very well, and if the needle top falls, is not so readily broken; beside, it does not cost as much to repair the breakage. The enamel of



The plate should be very hard to prevent the point of the heavy top from drilling a hole in it. The direction to spin the Japanese needle top is to hold the fly wheel and end of string between the thumb and forefinger of left hand, wind the string around the neck of the wheel with the right hand. Now take the spindle between the thumb and forefingers of the right hand, and loosen the hold with the left hand, take the end of the string in it, pull leisurely at first and then faster until all the string is unwound, and the top rotates briskly.

Fig. 1 is the vertical section of the top of the disk of heavy metal, as lead or type metal, the stem a brass tube, the top and bottom of the top of sheet brass, the whole being soldered together, and a steel point being secured in the lower end of the brass tube. The upward projection tube is for receiving the spinning string.

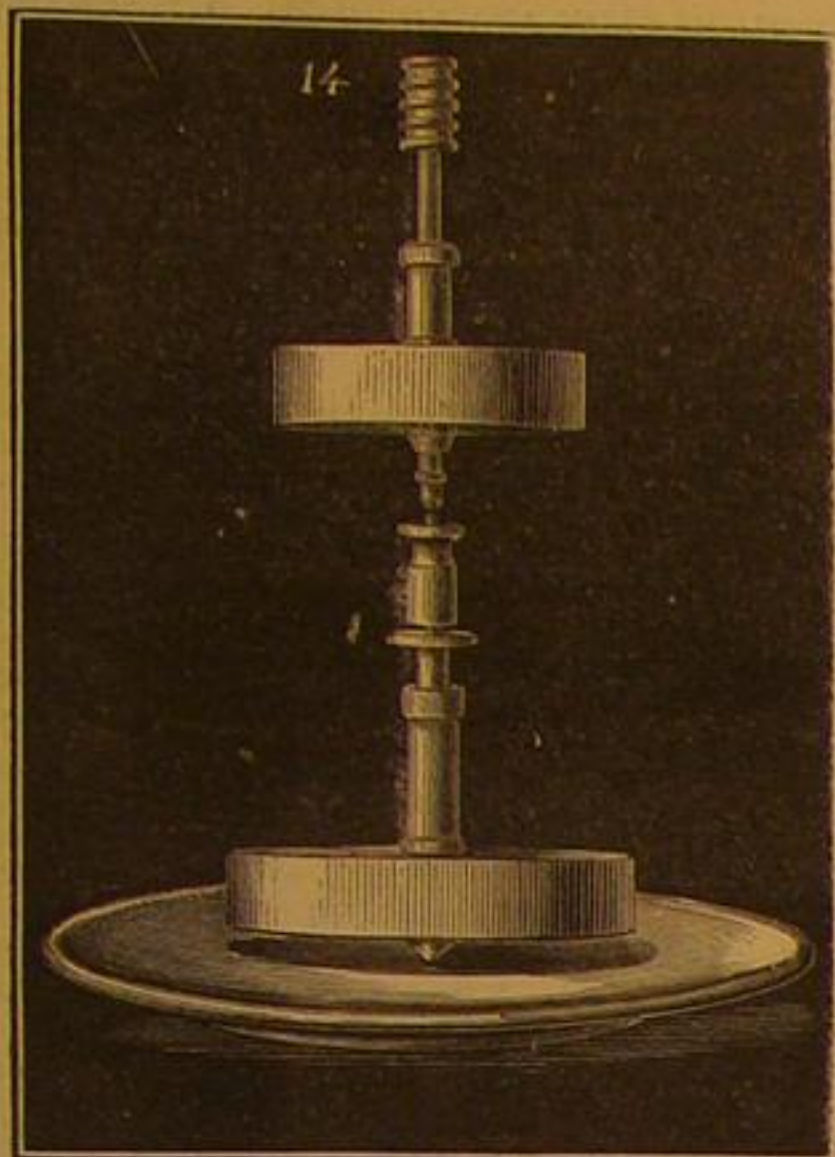


Fig. 2 is the handle, the main portion being of wood and the projection a steel wire.

Figs. 3, 4, and 5, show the various styles of amusement that may be obtained from this simple top. In one case a coin may be made to rotate, or a doll to waltz, or a bead to gyrate.

The paper tubes and bent wire experiments are shown in Figs. 6, 7, 8, and 9, fully explained in the body of the description.

Figs. 10 and 11 are the spiral card experiments; 12 and 13 the Japanese needle top amusements, and Fig. 14 Sinbad the Sailor and the Old Man of the Sea.

E. J. W.

Lenox, Mass.

#### CUNNINGHAM'S PATENT MORTISING AUGER.

The peculiarity in this auger consists in forming the twist or helical portion into a number of chisel-shaped lips rising from the edge of the twist and presenting sharp edges in the direction of the bore of the auger, so that the wood may be cut laterally if pushed against the instrument after the hole has been bored to a sufficient depth for the proposed mortise or slot. The end lips may be made chisel-shaped or hollow like a gouge, as desired. If the auger or bit is held in the rapidly revolving arbor of a mortising or boring machine the mortise may be cut at full depth at one operation, by moving the wood laterally against the auger. This auger will cut either with or across the grain, and the mortise or slot may be made of a greater diameter than that of the auger if required. The number of these cutting lips or rotating chisels is sufficient to insure a perfect cut the whole length of the twisted portion of the auger, even if one or more of the bits should be broken. In the one represented in the engraving, five of these lips are contained in one revolution or circumference of the auger, and where the upper lip of one ends the lower edge of the succeeding one. If the mortise cut by the auger is required to have square corners, of course they will be chiseled as usual.

The chisel edges insure a perfectly smooth hole for ordinary boring and the breaks between the edges allow a larger space and easier clearance for chips than the ordinary auger.

Patented through the Scientific American Patent Agency, September 1, 1868, by Peter Cunningham, who may

be addressed for the purchase of territorial or manufacturing rights at Eckley, Luzerne County, Pa.

#### A Horse in Battle.

Kinglake, in his "History of the Crimean Invasion," gives the following graphic description of a horse in battle: "The extent to which a charger can apprehend the perils of a battle-field may be easily underrated by one who confines his observation to horses still carrying their riders; for as long as a troop-horse in action feels the weight and hand of a master his deep trust in man keeps him seemingly free from great terror, and he goes through the fight, unless wounded, as though

it were a field day at home; but the moment that death or a disabling wound deprives him of his rider, he seems all at once to learn what a battle is—to perceive its real dangers with the clearness of a human being, and to be agonized with horror of the fate he may incur for want of a hand to guide him. Careless of the mere thunders of guns, he shows plainly enough that he more or less knows the dread accent that is used by missiles of war while cutting their way through the air, for as often as these sounds disclose to him the near passage of bullet or round-shot he shrinks and cringes. His eyeballs protrude. Wild with fright, he still does not commonly gallop home into camp. His instinct seems rather to tell him that what safety, if any, there is for him, must be found in the ranks; and he rushes at the first squadron he can find, urging piteously, yet with violence, that he too by right is a troop-horse—that he too is willing to charge, but not to be left behind—that he must and he will 'fall in.'"

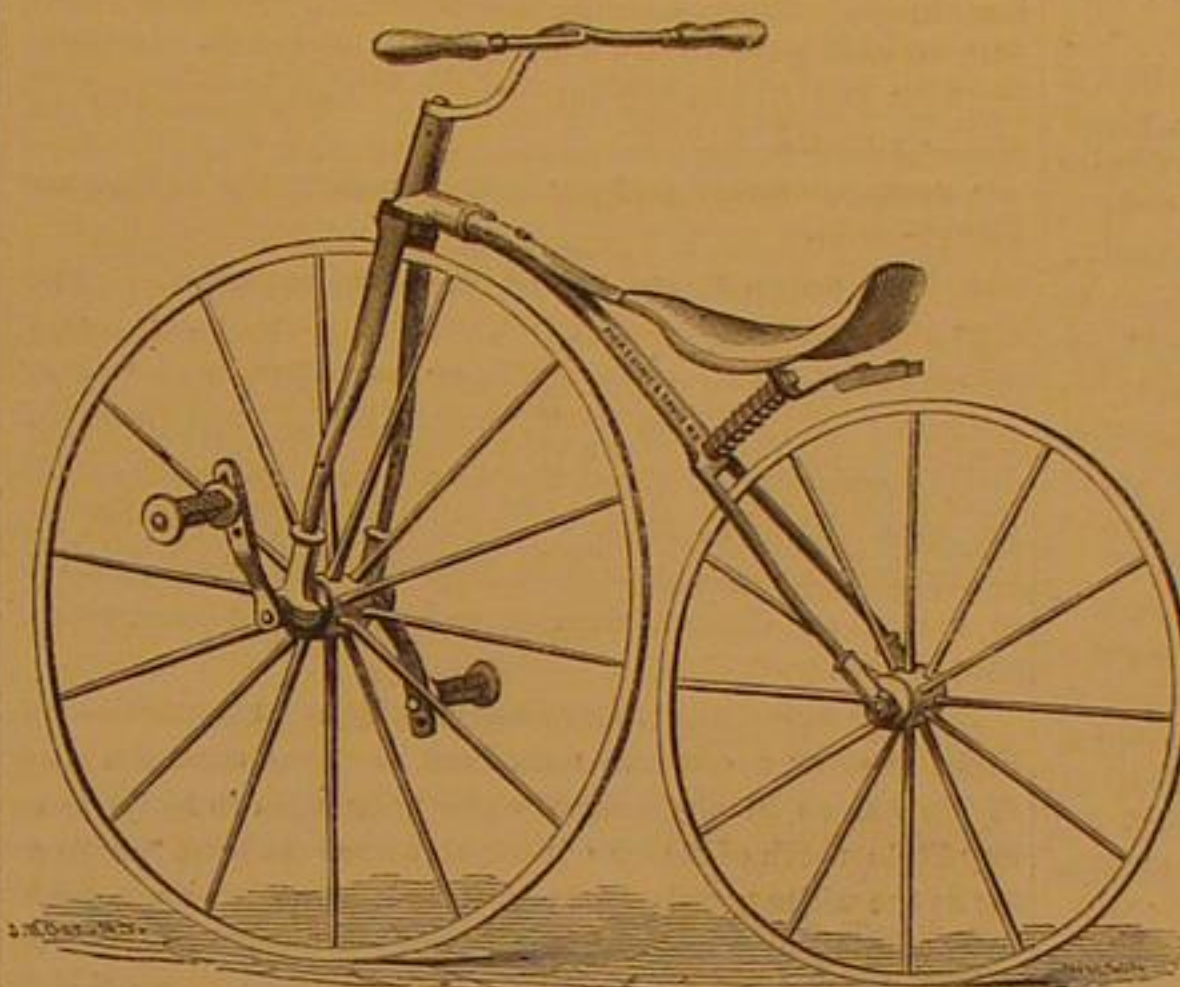
This almost equals the superb description of the war-horse in Job.

#### PICKERING'S VELOCIPEDE.

The velocipede seems destined to come into use in this country—though perhaps not soon to the extent that it has in France. It is so attractive and fascinating, developing so much strength and skill, and affording so great amusement to the rider, that its votaries and students will be numerous.

Of the various kinds, four, three, and two wheeled, the latter is the only artistic one, and except for unusual occasions, we would say never has the driving wheel more than three feet diameter; for ordinary use 33 inches is a good size, while for boys we would say 28 to 30 inches.

At first sight one would suppose it to be a formidable undertaking to mount and steer one of these two wheeled articles, but a few hours practice, causes the student to feel quite master of the ceremonies.



The velocipede which we illustrate this week has been designed by T. R. Pickering, of this city, and made by Pickering and Davis, 144 Greene street, and differs materially from the French in many points; it is more simple and durable, lighter, stronger, and cheaper. The reach or frame is made of hydraulic tubing. Pickering's is made by gage, just as sewing machines, Waltham watches, and Springfield muskets are made, so that when any part wears out or is broken, it may be replaced at an hour's notice. Its bearings are of composition or gun metal, and the reach or frame is tubular, giving both lightness and strength. The hub of the hind wheel is bushed with metal, and the axle constitutes its own oil box. It differs from the French *veloce* in the arrangement of the tiller, which is brought well back, and is sufficiently high to allow of a perfectly upright position in riding. The stirrups or crank pedals are three sided, with circular flanges at each end; and as they are fitted to turn on the crank pins, the pressure of the foot will always bring one of the three sides into proper position. They are so shaped as to allow of the use of the fore part of the foot, bringing the ankle joint in play, relieving the knee, and rendering propulsion much easier than when the shank of the foot alone is used as in propelling the French vehicle. The connecting apparatus differs from that of the French bicycle in that the saddle bar serves only as a seat and a brake, and is not attached to the rear wheel. By a simple pressure forward against the tiller, and a backward pressure against the tail of the saddle, the saddle-spring is compressed, and the brake attached to it brought firmly down upon the wheel.

#### A Singular Case of Supposed Lunacy.

A most singular circumstance has recently occurred in Louisville. One Robert Sadler being arraigned on a writ of *habeas corpus* inquiring, the following appeared in testimony: It was alleged that in the night time he would alarm his family and his neighbors with screams as if in severe pain, exclaiming that he felt the pain inflicted upon persons at a distance, by amputation or other causes. Mr. Sadler was said to be of good character and incapable of wilfully feigning what he did not feel, and therefore was supposed by his friends to be insane. In consequence of this belief a writ was issued to make the proper legal inquiry and to decide the question. The jury however could not agree to call him insane and he was discharged. It was proved that he uttered his cries and expressions of pain at the precise time that those with whose sufferings he claimed to be in sympathy, were actually undergoing the operations, which would cause similar pain; and this under circumstances which precluded the belief that he could have been aware, by external means, of the time or place at which such operations were to take place. The length of time during which he had displayed this morbid sensibility

had been so prolonged, that if he had really been practicing a deception it could scarcely have failed to be discovered. In his conversation, and in all other particulars except the one we have described, Mr. Sadler gave no evidence of anything except the most perfect sanity. The case seems to be well authenticated, and if the truth of the details can be relied upon is altogether a very remarkable one. It resembles very nearly, in its prominent features, the characteristics of the so-called cases of bewitchment which occurred in the earlier history of New England. It is not impossible that a recurrence of that physical affection, for such it undoubtedly was, may again recur, though it is quite impossible that its treatment would be so irrational in the present age as in the past. There is more we believe in the nervous system of mankind than has been even dreamed of in our philosophy, and such cases as the above carefully studied might be useful in throwing light upon mysteries hitherto unexplained and inexplicable.

#### PROTECTION OF SHEEP FROM DOGS.

It would be a work of supererogation—much more than duty requires—to say anything in praise of dogs, their sagacity, fidelity, generosity, unselfishness, courage, etc., as everybody acknowledges that some specimens possess these virtues in a remarkable degree. But we question whether their characteristics might not be summed up in the same manner that our school Olney's Geography used to designate the character of the people of different countries; thus, "The Lapps are ignorant, superstitious, vindictive, surly, and filthy in their persons; but affectionate, docile, hospitable, and faithful." While the dog—or some of his race—may be all that his lovers say, is he not also cruel, malicious, treacherous, a thief and a robber, a murderer and a slayer? Yea, a slayer for the pleasure of slaying. It is unpleasant to believe so, but the delight some dogs have in worrying innocent kittens and in teasing motherly tabbies does not speak well for their generosity or courage. Neither does the fact that one dog will kill a dozen or twenty sheep in a single night when, even if hungry, he could not eat half a one, induce a strong belief in his unselfish virtues.

Not less than half a million of sheep are killed annually and as many more permanently injured by dogs within the limits of the United States. It may seriously be questioned whether all the virtues of the canine race aggregated is worth as much as these one million sheep. Still, as hunters and guardians of property dogs are not to be despised. Cannot some simple means be devised for protecting sheep from these domestic wolves short of exterminating the canines?

A writer in one of our agricultural exchanges says that cattle, and more particularly cows with young calves, are a sure protection to sheep from the attacks of dogs and wild animals, and cites several notable cases in point, enough to establish the fact. But another writes thus:

"I have found sheep do very well among cattle, but cattle do badly among sheep. To prove it, let the farmer take the fodder left by the cattle, even when part of it has been trodden under feet, and if the sheep are not fully fed, he will see the sheep eat it very greedily; then let him take what his sheep leave and offer it to his cattle and he will find they won't eat it if they can get anything else; or, let him turn his milch cows into a sheep pasture and he will find them to fail in milk."

In this dilemma it is questionable whether it is better to have less milk and more mutton, or vice versa.

#### Original Letter from Robert Fulton.

The following letter was addressed by Robert Fulton to Andrew Brink, the Captain of the *Clermont*, the first steamboat of the Hudson river. The original letter is in possession of Persen Brink, of the town of Saugerties, Ulster county, and a copy of it was sent to the Kingston *Argus* for publication:

"NEW YORK, October 9, 1807.

"Captain Brink—Sir: Inclosed is the number of voyages which it is intended the boat should run this season. You may have them published in the Albany papers. As she is strongly made, and every one, except Jackson, under your command, you must insist on each one doing his duty, or turn him on shore and put another in his place. Everything must be kept in order—everything in its place, and all parts of the boat scoured and clean. It is not sufficient to tell men to do a thing, but stand over them and make them do it. One pair of good and quick eyes is worth six pair of hands in a commander. If the boat is dirty or out of order, the fault should be yours. Let no man be idle when there is the least thing to do, and make them move quickly.

"Run no risk of any kind; when you meet or overtake vessels beating or crossing your way, always run under their stern, if there be the least doubt that you cannot clear their head by 50 yards or more.

"Give the amount of receipts and expenses every week to the Chancellor.

"Your most obedient,  
"ROBERT FULTON."

TRIAL OF VELOCIPEDES.—On Saturday, the 28th of November, a trial of velocipedes took place in this city, at the armory of the 22d Regiment in Fourteenth street. Four different makers were represented. Two of the velocipedes were of the French style, high and awkward to mount. The one generally conceded to be the best was an American design, embracing several improvements upon the French machine. Various adroit manipulations of these machines were performed by the exhibitors. Among the most notable of these was one in which they all took part, to show the applicability of these vehicles to military service.



# JAPAN—ABSTRACT OF A LECTURE BY THE HON. GEORGE H. FISHER.

Reported for the Scientific American.

One of the most interesting and instructive popular lectures of the season was recently delivered in this city, by the Hon. Geo. H. Fisher, late United States Consul to Japan, to a large and appreciative audience. We give the following abstract:

The lecturer, after briefly alluding to the early treaties between the United States and Japan, proceeded to correct certain false reports and impressions prevalent in relation to the affairs of that country. The origin of these false reports and impressions was traced to a diplomacy, which he asserted, had done its utmost to retard civilization in that remarkable country, and to prevent the diffusion of accurate information in regard to it. The present Tycoon was described as a man of honor and good sense, but the lecturer maintained that the monopoly of the three ports now open is calculated to foster unfriendly feeling. The prejudice which has hitherto existed against foreigners is gradually yielding. Although nothing like the caste peculiar to India is known in Japan, still there are insurmountable obstacles to the mingling of the higher and lower classes. A mark of rank is the wearing of two swords. The right to do this, although hereditary, may be made the subject of purchase. The women also wear a kind of sword or dagger which is rarely used. The power of money in Japan was stated to be very great, even to the purchasing of the performance of enormous crimes; but we are sure the lecturer did not mean to be understood that Japan was exceptional in that respect. The laws of the land are entirely traditional and lawyers are not known there. The lash is the most frequent punishment for inferior crimes and misdemeanors; banishment to an island in the vicinity is a common punishment for higher crimes. The people are hospitable and friendly. They wash their persons but not their clothing. The fashions are always the same. Adults are not unfrequently met with in the streets perfectly naked. Their food is chiefly vegetable. Their physical strength is very great. Their temples of worship are extremely beautiful, and their surrounding grounds are carefully kept and supplied with beautiful trees and flowers. The Holy Mountain of Japan is worshipped as the gate of heaven, and many make pilgrimages to it, ascending its sides in robes of pure white. Although considering Japan as a grand field for missionary effort, the speaker thought it not advisable to attempt much at the present time.

In speaking of their mechanical ability, the lecturer styled the Japanese the "Yellow Yankees of the East" on account of their skill and taste in arts and manufactures. They are accomplished diplomatists, and are sharp and shrewd in bargaining. The women are slaves to the men. Those who are unmarried are very handsome having most beautiful hair and teeth. As soon as they are married, however, they blacken their teeth and shave their heads, which renders them hideous. Parents are fond of their children. Loafers are unknown. All classes use tobacco and spirits but do not use opium. People pay their debts annually. The Japanese are familiar with, and masters of the steam engine; differing greatly in this respect from their neighbors, the Chinese. The lowest classes are the coolies and tanners.

They are perfect masters of the art of engraving and drawing on wood, and their printing is beautiful and accurate. They do not, however, use movable types. Every Japanese can write his name. They work with hands and toes simultaneously. Their cemeteries excel in beauty, as do the tombs they comprise.

Mr. Fisher stated that machine shops and manufactories are being erected by the Government, and closed his lecture with a prediction that Japan would in the future become a powerful, free, intelligent, and Christian nation.

## The Iron Works of Chicago—Fifteen Thousand Men Employed—A Business of \$25,000,000 a Year.

The Chicago Times publishes a very long and elaborate descriptive article showing the extent of the iron business, and giving the name and size of, and the amount of capital and labor employed, and work turned out by, each of the foundries and workshops in that city. From this article the following interesting facts and figures are taken:

The iron interest of Chicago employs fifteen thousand men, to whom is paid the yearly sum of \$12,000,000 for their labor; \$15,000,000 is invested in the manufacture of iron, which does a business of about \$25,000,000 per annum. The number of iron establishments in the city amounts to one hundred, which are engaged in the manufacture of boilers, cutlery, derricks, engines, farm implements, gages, gearing, lathes, lightning rods, mining machinery, needles, nails, ordnance, plate and pig iron, quadrants, ranges, stoves, tanks, utensils of all kinds, size and value.

The "Eagle Works" are situated in the west side of the city, and their different buildings occupy different sites on five streets, 370 feet on Clinton street, 150 feet on Madison street, 200 on Washington street, 168 on West Water, and 210 on Canal. The principal articles manufactured in these works are engines, boilers, flouring mills, gang mills, circular sawmills, stamp mills, ore and rock crushers, and general running machinery. This establishment employs in the neighborhood of one thousand men, whose annual pay-roll exceeds \$300,000. The estimated value of the property, including machinery and buildings, is \$500,000.

The "Northwestern Manufacturing Company's Works" are run upon the co-operative system, and with a capital of \$450,000, employ 375 men, and do a business of about \$700,000 per annum. This establishment has also a branch called the "Northwestern Pipe Works," which has a capital of \$50,000, and employs 25 men.

The "Barnum and Richardson Manufacturing Company" make castings and car wheels. Their works cover more than an acre of ground. They employ 75 men, have a capital of \$150,000, and do an average yearly business of \$400,000.

"McCormick's Reaper and Mower Works," is perhaps the most interesting manufacturing establishment in Chicago.

The buildings cover an area of 400 by 500 feet, in the business center of the city. The business began here in 1846, twenty-two years ago, and since that time 100,000 harvesting machines have been manufactured in these works. Fifteen years ago 1,000 machines per annum were considered a big undertaking, and predictions were then made that at that rate the country would soon be over-supplied. But now 10,000 machines per year do not begin to supply the demand, which is greatly increasing, and now already overmatches the capacity of the works. 500 men are constantly employed.

Each machine contains not less than 1,000 separate pieces of wood, iron, steel, brass, copper, tin, and zinc, making the enormous number of 10,000,000 pieces which have to be made, counted, assorted, inspected, classified, packed, and shipped in one year's business.

The following is the amount of raw material worked up in this establishment during the year: Lumber, 25,000,000 feet; pig iron, 3,000 tons; bar iron, 1,500 tons; paints, 100,000 pounds; oils, 5,000 gallons; zinc, 125,000 pounds; steel and other metals, 150,000 pounds, and 2,000 tons of coal. The item of scrap lumber, the cuttings left after sawing out the peculiar shaped pieces needed in a harvesting machine, amounts to nearly 500,000 feet of lumber per annum, which provide about all the fuel necessary to make steam for the works. Everything in this establishment is done by machinery, whether of wood or iron. In the blacksmith shops, the bar iron, of large and small sizes, from five and a half to four and a half inches round, is cut up by machinery like so many pipestems. Even the forges are supplied with a steady blast of air from a large fan driven by steam. The machine shops contain one hundred lathes, drills, boring, keyseat-cutting, screw-cutting, and planing machines, worked by an almost endless arrangement of belts and pulleys. In the sickle shop of this establishment is an ingenious machine for cutting the teeth in the sickle edge, which does the work of two or three men, and much more accurately.

The machine shops of the Illinois Central Railway are also in Chicago. They employ 800 men in their establishment, whose monthly pay amounts to \$60,000. Their entire works, including their car shops in the south end of the city, cover about sixteen acres of ground. The cost of construction of the machine-shops alone amounts to \$150,000. The road has 4,000 cars, and 168 locomotives. They have on the stocks, and nearly finished, four of the largest engines ever built in the West, each one weighing about thirty-one tons. The amount of raw material these works have on hand is valued at \$300,000. They use up 2,200 tons of coal per annum, principally Lehigh and Illinois.

## Some Facts About North Carolina.

The *Plaineader*, published at Wilson, North Carolina, quotes at large from our article entitled "Let Us Have Peace," published on page 329 of the present volume, and while cordially approving the views therein set forth, and testifying in the most flattering manner to the estimation in which the SCIENTIFIC AMERICAN is held throughout the South, asks us to aid in the dissemination of some facts in regard to the above State.

It states that in its immediate vicinity and throughout the State, as clear a criminal record can be shown since the close of the war as in any area of equal population to be found in any State north of Mason and Dixon's line. At least it is so far as the white population is concerned. The laws are faithfully administered and sacredly obeyed. Property is as safe as in any civilized community to be found anywhere. It says:

"We invite Northern gentlemen to come among us, putting aside all feelings of animosity, 'burying the past,' and we pledge them a cordial welcome, and a safe field for the investment of their capital, which will bring them handsome returns."

It is with the greatest pleasure that we accede to the request of the *Plaineader*, to assist in the dissemination of such welcome information to us and to our readers, and we think we can safely assure the people of North Carolina that when these facts become generally known an influx of capital can be relied upon. Let the Southern people remember, however, that capital is proverbially timid, and possess their souls in patience until the happy time, sure to come, when mutual confidence shall be fully restored.

## Analysis of Lava.

M. Silvestri's analysis of the lava recently thrown out from Vesuvius shows that it closely resembles common wine-bottle glass. A considerable variety appears to prevail, however, in the constitution of lava, not merely when we compare specimens which have come from different vents, but when the comparison is instituted between masses of lava poured forth from the same vent at different epochs. The lavas which flowed from Vesuvius before the mountain had fallen into the state of quiescence described by Strabo contain disseminated crystals of leucite, a mineral which is very rarely found in the modern lava from this vent. And in general the latter are less crystalline than the old forms of lava. Indeed, the old lavas which flowed from Vesuvius (or Somma, as the ancient volcano was named) indicate a decided tendency to a columnar structure, corresponding to what is seen in the Giant's Causeway, the Isle of Staffa, and elsewhere.

It is a remarkable fact that the lavas of Vesuvius contain a greater variety of minerals than, perhaps, any others in the world. Many mentions that out of three hundred and eighty simple minerals known to him, no less than eighty-two have been found on Vesuvius; and of these several are peculiar to the locality. Sir Charles Lyell expresses the opinion that these have not been thrown up in fragments from some older formation, through which the gaseous explosions have burst, but have been sublimed in the crevices of lava, "just as several new earthy and metallic compounds are known to have been procured by fumeroles since the eruption of 1822."

SOME enterprising lumbermen at Niles, Michigan, are building a steamboat, which is also a saw mill. It is to be 120 feet in length, and when the boiler is placed in will draw but a few inches of water. The boat is to be used on the Missouri river for the manufacture and transportation of lumber.

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

**WHAT IS A FACTORY?**—The law courts in England have decided that a factory is a place of manufacture or industry where not less than fifty work people are employed. Such places are subject to Government supervision under the "Factory Acts." All other places of manufacture are under the regulation of the "Workshop Acts." The working of this distinction and the carrying out of the provisions of the respective acts appear to cause dissatisfaction and to nullify the ends contemplated. There are, it is stated, over a thousand small smithies in East Worcestershire where the children are over-worked and ill-treated. Parents remove their children from "inspected" factories, and place them in workshops where no regard is paid to the law.

**ENGLISH COAL SUPPLY.**—The great northern coal field extends from the Tees on the South to the Coquet on the north, a distance of nearly 50 miles. Its total area may be calculated at 750 square miles, containing in round numbers coal workable to the extent of 8,000,000,000 tons, out of a national stock estimated at fully 83,544,000,000 tons.

A saw mill on the Shediac river, in New Brunswick, recently set itself on fire. A firenet lifted the gate, and the mill starting, the rapid and continuous revolution of the saw, the belting of which had been left on, heated the boxes to such an extent as to set the wood-work on fire.

A mechanical exhibition is to be held in Leipzig, Saxony, in May next. It is to include all kinds of motors and machines which are used in mills, such as steam engines, turbine water wheels of complete construction, or drawings, and, in fact all appliances used in mills. Some very trifling charges are made for space. All applications are to be addressed to Mr. C. Eisenrich, at Leipzig, before the 31st of December next.

The Directors of the Rutland and Burlington Railroad have forbidden station agents to receive as baggage any trunk, valise, or box, known to contain commercial wares. The reason assigned for this action is that commercial travelers often carry thus articles of great value, and having got them checked as baggage, hold the company responsible for loss or damage.

The Governor of Tennessee, in his annual message, recommends that no further appropriations be made to railroads in that State, except in cases where the State has a large interest in such roads, and would suffer heavy loss by the lack of such appropriations.

The *Railway Times* urges as the only remedy against the building of competing roads along some of the main lines of trade, the laying of a third track to accommodate the increasing traffic.

A new city ice boat was lately launched at Philadelphia. She is built of iron and cost \$160,000. It is expected that by aid of this vessel the river will be kept open during the winter months so that vessels may be able to pass up to the city.

The *Moniteur des Interets Materiels* estimates the total production of copper in the world at large for 1856 at 93,415 tons. The United States gave about 14,400 tons.

The Worcester Gas Company's new gasometer is completed. Seven hundred thousand bricks were used in its construction. The capacity is 119,000 cubic feet. The cost amounts to \$50,000.

Discoveries of silver deposits continue to be made in the White Pine Region of Nevada. It is said that the capitalists of San Francisco have largely invested in the mines.

**IRON PRODUCTION OF FRANCE.**—For the first six months of the present year, according to an official statement of the French Committee of Forge-masters, the total productions of the iron works of France amounted to 1,860,532 tons.

**CHESAPEAKE AND LAKE ERIE RAILROAD.**—It is said that arrangements are being made to effect a preliminary survey of the Chesapeake and Lake Erie Railway.

Fifty years ago not a pound of fine wool was grown in the United States, in Great Britain, or in any other country except Spain.

The first twenty miles of the St. Paul and Lake Superior Railroad are completed. The company has called upon the city of St. Paul for \$150,000 in bonds.

A new telegraphic cable has been laid across the Mississippi river at New Orleans.

The estimate for repairs and improvements at West Point Academy this year is \$65,000.

Five hundred hands are working on the branch line of the Baltimore and Potomac Railroad extending from Washington toward Collingwood.

Railroads in Tennessee now in the hands of receivers owe the State over one million of dollars.

The new rolling mill and wire works at Worcester, Mass., will occupy six acres of ground.

The new stone dam across the Farmington river, at Collinsville, Conn., built by the Collins Company, is built of granite blocks cemented, with the top courses dove-tailed together.

The Salt Works at Syracuse, N. Y., are said to have produced eighty million bushels of salt.

The lumber trade at Burlington, Vt., employs annually a capital of three million dollars.

A deed transferring 339,345 acres of land from the United States to the Atchison, Topeka, and Santa Fé Railroad has just been recorded to Topeka, Kansas. It covers thirty pages of the record.

The Mechanic's Institute, at their recent exhibition in Baltimore, awarded a silver medal to the Davol Mills, Fall River, Mass., for the excellence of their goods.

The new bridge at White River Junction, Vt., is said to be a very handsome structure. It is 408 feet in length.

The Gosford (Can.) Railway Company are surveying their proposed route for a wooden railway.

Six different railroads are building in Oregon.

## NEW PUBLICATIONS.

**ALPHABET OF GEOLOGY, or First Lessons in Geology and Mineralogy.** With Suggestions on the Relation of Rocks to Soil. By S. R. Hall, LL.D., with Illustrations. Boston: Gould & Lincoln, 59 Washington st. New York: Sheldon & Co. Cincinnati: Geo. S. Blanchard & Co.

No one will be in danger by the perusal of the above title of ranking this little book higher than it deserves. The reverse would be more likely to be the case. It is the work of a practical teacher, and every page bears the impress of the peculiar, almost indescribable, characteristics of good teaching. As a text book for beginners in the important science of geology, we can hardly see how it could be improved.

**THE CRITTENDEN COMMERCIAL ARITHMETIC AND BUSINESS MANUAL.** Designed for the Use of Business Men, Academies, and Commercial Colleges. By John Grovesbeck. Sixth Edition, Revised and Enlarged. Philadelphia: E. & C. J. Biddle, 508 Minor street.

A plain, practical, common-sense text book, printed in fine style and well bound. The business forms it contains are alone worth its price.

**THE ILLUSTRATED ANNUAL OF RURAL AFFAIRS AND CULTIVATOR ALMANAC, for the Year 1869.**

Containing practical suggestions for the farmer and horticulturist, with about 120 engravings. By J. J. Thomas, associate editor of the *Cultivator and Country Gentleman*. Albany: Luther Tucker & Son, 95 Broadway.

**THE MONTANINI: A Comedy.** Being a continuation of the fourth volume of the Dramatic Series by Laughton Osborn. New York: James Miller, 61 Broadway.



## Recent American and Foreign Patents.

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

**CULTIVATOR.**—A. B. Spies, Sterling, Ill.—This invention relates to a new and improved cultivator for plowing or cultivating those crops which are grown in hills or drills, and which are constructed in such a manner as to admit of a lateral movement of the plow beams, so that the plows may conform to the sinuities of the rows of plants, and also be readily raised out of the ground when required and held in a raised position while the machine is being drawn from place to place.

**CHIMNEY.**—August Wilhelm, St. Petersburg, Russia.—This invention relates to a new and useful improvement in chimneys, for the purpose of causing smoke to be consumed in furnaces or fire chambers.

**SCALING TOOL.**—Geo. V. Sloat, Morrisania, N. Y.—This invention relates to tools which are designed for use in the operation of clearing the fire flues of steam boilers of the scale or hardened sediment which is deposited on the outer surface of such flues.

**ROCK DRILLING MACHINE.**—Robert Gidly, Freedom Plains, N. Y.—This invention relates to a new machine for drilling rocks and other substances, and consists more particularly of a frame which can be adjusted in every direction, so as to bring the drill into any desired position, and of a new apparatus for operating the drill, which apparatus works so as to impart to the drill, in conjunction with a reciprocating, also an intermittent rotary motion. The whole machine is so arranged that it is simple and effective, and substantially throughout.

**CULTIVATOR.**—S. G. Peabody, Champaign, Ill.—This invention has for its object to furnish an improved cultivator, which shall be so constructed as to be arranged that the direction of the wheels may be easily changed by the operator, so that the direction of the plows may be instantly changed by the advance of the wheels in the new direction, thus enabling the machine to be easily and accurately guided in plowing crooked rows or in avoiding irregular hills.

**RAILROAD CAR BRAKE.**—John Hirst, Jamaica, N. Y.—This invention relates to a new manner of arranging the brakes of a railroad car or engine, and consists, first, in the use of an up-and-down adjustable block, which can be forced down upon the rails, it being suspended from an oscillating horizontal shaft that is turned by the brakeman. By forcing this block upon the rails, the car will be most effectually stopped. The shaft is provided with a spring or weight by means of which the rail brake is raised as soon as the chains operating it are slackened.

**GANG PLOW.**—Andrew Smith, Portland, Oregon.—The object of this invention is to improve the construction and operation of the gang plow heretofore invented by the same inventor. The improvements which form the subject of the present invention consist of a new method of attaching the plow to the beam, a new method of attaching and supporting the forward end of the plow beams, a new supporting frame, and a new ratchet apparatus for elevating the plows.

**DOUBLE BARREL SHOT GUN.**—C. E. Snider, Baltimore, Md.—The object of this invention is to improve the apparatus for locking the breech so that it will operate with less friction, and so that the barrels will not start forward at the moment of firing; and secondly, to provide an improved device for actuating the cartridge retractor.

**SNOW PLOW.**—Hiram Harris, Circleville, Ohio.—This invention has for its object to furnish an improved snow plow to be attached to the pilot or cow catcher of a locomotive, and which shall be so constructed and arranged as to raise the snow from the track and throw it to the sides of said track, out of the way.

**APPARATUS FOR OPENING AND CLOSING HATCHES.**—James D. Sinclair, Brooklyn, N. Y.—The object of this invention is to produce an apparatus by means of which any one or all of the hatches in a magazine, storehouse, or other building can be conveniently opened or closed by a person standing on one of the floors, so that it will not be necessary for such person to go for that purpose to each and every floor.

**DRILLING MACHINES.**—George Phillips, Cadet, Mo.—This invention relates to the drilling of rock for wells, deep blasts, and like purposes, and consists of a cylinder and piston for employing steam or compressed air in actuating the drill, in combination with the improved devices constructing the mechanism controlling and regulating the operation of the drill.

**STAIR ROD FASTENING.**—Thomas Sargeant, Williamsburgh, N. Y.—This invention relates to a new and improved method of fastening the rods which secure the carpet to stairs, and it consists in holding the rod in hollow sockets, by a movable knob and bayonet fastening.

**DESULPHURIZING FURNACE.**—Alanson Cary, New York city.—This invention consists in constructing a furnace in such a manner that the coal or other fuel which is used in the furnace for generating the necessary heat is entirely freed from sulphurous and other gases, and reduced to an incandescent state before the heat therefrom is allowed to come in direct contact with the article or substance to be desulphurized.

**WAGON JACK.**—John Q. Crosby, Northboro, Mass.—This invention relates to improvements in jacks, such as are used for raising the wheels of wagons off the ground, the object of which is to simplify the same. It consists of an improved arrangement of the operating lever and slide.

**LAMP WICK TUBE.**—Frank H. Fuller, and O. S. Severance, South Boston, Mass.—The nature of this invention relates to improvements in lamp wick tubes, the object of which is to purify the oil and prevent explosions. It consists in a wick tube, provided with insulating lining.

**STREET LAMP.**—O. Case, and B. D. Evans, Columbus, Ohio.—This invention consists in the arrangement of the reservoir in the frame of the lamp, in combination with a cold air chamber, and cold air pipes for conveying cold air thereto.

**SKIRT MEASURING DEVICE.**—L. G. Rice, Montague, Mass.—This invention consists of an expanding and contracting skeleton frame in the form of a skirt, which may be placed on the floor beside a lady, and adjusted to a position corresponding with the height of her waist, on which a skirt may be fitted to suit the size of the person measured.

**VIBRATING NEEDLE ATTACHMENT FOR SEWING MACHINES.**—Jonathan Sprague, Ann Arbor, and Alvah T. Hill, Pontiac, Mich.—The object of this invention is to provide an attachment for sewing machines for vibrating the needle for button hole stretching, filling, or any similar work requiring a side stitch.

**MACHINE FOR WASHING AND COMbing BRISTLES, HAIR, ETC.**—Louis F. Lannay, Indianapolis, Ind., and William F. Parks, Baltimore, Md.—This invention relates to improvements in machines for washing hair, bristles, etc., such as was patented to Louis F. Lannay, May 19, 1898, and consists in the combination therewith of a combing apparatus whereby the two operations of washing and combing may be accomplished at once, which have heretofore and until now been done separately and necessarily at greater expense than when done simultaneously and for the same machine.

**RASH FASTENING DEVICE.**—Wm. M. Warren & Chas. A. Warren, Watertown, Ct.—This invention relates to that class of rash-fastening devices where racks, pinions, and balancing springs are used, a part of which is applicable whether springs are used or not.—This consists of an improved arrangement of the locking-pin, whereby the same is more readily actuated for unlocking the rash. Also, of an improved, detachable device, for winding up the springs when springs are used for balancing the rash.

**WAGON HUB.**—Alonso S. Woodward, Pepperell, Mass.—The object of this invention is to furnish a light, strong, and easily fitted hub for wagon wheels, the same being made of cast metal in three parts, and held by the longitudinal bolts. Other devices appertain to the invention tending to perfect the same.

**INSTRUMENT FOR SHARPENING CALKS.**—Henry Kime, Marshalltown, Iowa.—The object of this invention is to sharpen the calks of horse shoes, while the latter is on the animal's foot. It consists of a nib plate, pivoted within the

recess of one of the handle of the instrument, and arranged in such correlation with the other handle that the head of the latter will actuate the lever extension of the nib-plate, and cause its nib end to close upon the calk of the horseshoe, nipped between the said nib and the proximate edge of the recess, whereby the calk is cut off with a tapering cut, which leaves it with a sharpened or renewed edge.

**SLED BRAKE.**—James M. Ackerson, La Fayette, N. J.—This invention has for its object to furnish an improved brake for attachment to sleds, sleighs, etc., which shall be simple in construction, readily attached, and conveniently operated, and which shall be so constructed and arranged, that it may be used with equal facility for braking the sled when ascending and when descending a hill.

**REVOLVING HORSE RAKE.**—A. B. Johnson, Washington, Ind.—This invention relates to a new and useful improvement in the construction of a double revolving horse rake, which improvements consist in adjustable axles for the driving wheels suspended to the side beams of the frame by stirrups and an arrangement of devices for holding the rake while at work and turning it over to discharge the hay.

**HAY FORK.**—Roland S. Frame, Washington, Ohio.—The object of this invention is to furnish a simple, effective, and easily operated hay fork, of the class usually known as "horse power hay fork."

**CHEESE CUTTER.**—J. G. Dreher, Pine Grove, Pa.—This invention relates to improvements in cheese-cutting apparatus, whereby it is designed to provide a means for cutting it with accuracy, ease, and without waste, by the employment of a circular table for rotating the cheese and a vertically-oscillating knife.

**WAGON JACK.**—James Moody, Harwich, Mass.—This invention has for its object to furnish an improved wagon or lifting jack, simple in construction, effective in operation, and not liable to get out of order.

**HARROW.**—C. Hanson, Owatonna, Minn.—This invention has for its object to furnish an improved harrow, simple and strong in construction, and effective in operation, doing its work more thoroughly than harrows constructed in the ordinary manner.

**LIFE LINES FOR SEA BATHING.**—William Tell Street, Frankford, Pa.—This invention has for its object to furnish an improved device for the protection of life at sea bathing places, and also for the support and amusement of the bathers.

**WATER METER.**—Isaac Carey, Warwick, N. Y.—This invention relates to a new and improved water meter and is designed to measure and register the amount of water used by the occupants of a building. The invention consists of a tilting measure arranged in connection with valves and water supply and discharge tubes.

**MEMORANDUM BOOKS.**—Luciene G. Matthews, New Albany, Ind.—This invention relates to an improvement in memorandum books and blank books generally, and consists in so forming the cover of the book, and so binding the blank paper or pages of the book, that the two may be readily separated, thereby rendering one cover sufficient for an indefinite number of books.

**WINDOW BLINDS.**—James Boyd, Mamaroneck, N. Y.—This invention relates to a new device for locking slats of Venetian window blinds in any desired position, so as to obtain a certain desired quantity of light in a room. The invention consists in the use of a crank arbor, connected with the slat rod, and provided with a lever that is by a spring pressed against the edge of a notched or corrugated plate. By fitting the lever into any one of the notches, the arbor will be locked, and will also lock the slats. To bring the lever into another notch, it must move in a horizontal direction, and for that purpose the arbor is made sliding in its bearings.

## Answers to Correspondents.

**CORRESPONDENTS** who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; 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 \$1.00 a line, under the head of "Business and Personal."

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

**A. C., of Mich.**—The dials of steam gages are of brass, enameled.

**W. L. J., of Ill.**—We cannot undertake to furnish the information you desire in reference to aerial ships, such as would be useful to you for a popular lecture. If you want information of this character you can find it by reference to our paper during the past twenty years.

**A. P. J., of Colorado.**—There is no doubt that the plan of crushing gold bearing quartz with running water tends to lessen the yield of the metal. The liquid paste that leaks or runs away—as more or less will—must bear with it some portion of the gold. We believe machinery is made in this city for grinding or crushing quartz into a dry powder.

**H. C., of R. I.**—There is no reason except the want of a suitable lamp why the heavy hydro-carbons—petroleum unrefined, for instance, should not be used for illuminating purposes. All the elements of illumination are there; only a sufficiency of oxygen is required.

**J. W. F., of Texas,** asks what is the pressure required to press a 500 lb. bale of cotton. Such information can be obtained only by experiment; theoretical calculations are useless. As our correspondent lives in a cotton growing state it cannot be difficult for him to visit some press, measure the power used, and the elements of the means—pitch of screw, if a screw press, length and actions of levers, if a lever press, etc.—from which exact calculations may be made.

**M. P., of Ohio,** suggests boring into the earth to obtain heat the great power producer, and quotes the fact of the increase of temperature at increasing depths as suggesting the possibility of success. More improbable projects have been proposed and some have been successful.

**F. M. H., of N. Y.,** states that he has contrived a two-wheeled velocipede which will run on snow, support itself in an upright position when not in motion or when running slowly, and promises a description shortly.

**T. P. J., of Ohio.**—Your idea that it is better to throw on a belt at rapid speed of the shaft than at slow speed is not a correct one. We have no doubt many of the accidents reported are occasioned by acting according to just such notions. A good rule is this: "Better be foolishly careful than foolishly careless"; or, in other words, refuse to place a heavy belt on a pulley running rapidly. Carelessness of this rule came near whirling the writer out of this world, and gave his father a broken arm. Insist on slowing the engine or water wheel—the motive power—before you endanger limb or life to save five minutes of time. Machinery is cruel; power exerted by it is imperative; human life is more valuable than time. In dealing with machinery you are the master until you yield your position; then you are a helpless victim to a power that has no mercy or remorse.

**J. S. S., of Md.**—The oxidized blue surface of gun barrels and pistols cannot be restored, when worn off, without heat.

**G. N., of—**Crocos, otherwise crocus martis, rouge, or coleothar is the sesquioxide of iron. It is much used for polishing. You can easily make it by roasting sulphate of iron (green vitriol—copperas).

**J. McC., of N. J.**—A column of air will be much more effectively heated by passing it through a number of heated flues, than through one large one. There is no difficulty in retaining the heat in a long column of air, but the tubes through which it passes ought to be made of some non-radiating material, bright tin plate is as good as anything for the purpose. The column ought to have considerable rise to get up much

of a circulation unless artificial means are used force it, when the amount of rise is immaterial.

**A. H. S., of Mass.**—"The debris of my shop (a machine shop) I sweep up and put in a common receptacle as worthless. I have been told lately that turnings and drillings are valuable. Had a better separate them from the waste?" Unless you have a foundry handy you would not advise the saving of turnings, borings, and drillings, but if so they may be made useful in quantities by compressing them and melting them in a crucible. You had better in any case, separate them from the waste, as their contact tends to a spontaneous combustion.

**G. W. R., of D. C.**—Any substance not capable of becoming a magnet interposed between two magnets, will lessen the force with which they mutually attract each other, so far as it separates the poles from each other, but there is none that will destroy their attractive power.

**J. H. B., of Mass.**—"Will you explain the difference between the fire and 'flash' tests for refined petroleum oil?" The legal test (fire) for petroleum oil is 110° Fah. This means that the liquid shall, when heated to that temperature, extinguish flame when brought in contact with it; as when a lighted match is plunged into kerosene heated to that temperature, which may be easily determined by immersing the bulb of a Fahrenheit thermometer. The "flash" or vapor test is igniting the vapor arising from the heated liquid and noting the temperature of the oil as before. At the heat test no inflammable vapor should be given off. It is the safest method of testing illuminating hydrocarbons.

**P. J., of N. J.**—Merely washing and varnishing old oil paintings will not restore them. Varnishing them frequently destroys their effects by producing false lights. Take your painting out of the frame, lay it on a table or bench, face up, and keep a wet cloth on it for two or three days, changing or cleaning the cloth as often as it becomes soiled. When the painting is clear wash it with a sponge or brush dipped in nut oil. This is better than varnishing.

**W. B. C., of Ill.**—Smalt is either ground glass or quartz sand, in the first case colored in the furnace, and in the latter by heating the sand in an open pan with a coloring matter mixed with oil and turpentine. It should be constantly stirred, and the work done in a draft of good air, the operator keeping on the windward side. The vapors are not healthy.

**A. B. M., of Ind.**—We are aware that a number of processes have been made public for increasing the durability of fence posts, etc.; but while all of these have more or less objections to their general adoption one method is cheap and can be used anywhere. That is to char the posts in a fire, or rather that portion that is to go into the ground. Ordinary tar or the coal tar from gas houses will do the business—convert the outer portion of the wood into charcoal—as well as the charring by fire, only more slowly.

**W. B. B., of R. I.**—Tallow is a better lubricator for the axles of wagon wheels than any patent article ever invented. If you wish to imitate these things add lard and plumbago (black lead). By the way, black lead and tallow is a good mixture where friction is great.

**P. J. V., of Pa.**—Brass turnings and filings may be melted without much waste if compressed in a crucible until the vessel is full, and then the top of it covered and luted with pipe clay.

**M. A. K., of Ohio.**—Castor oil is a good substitute for neat's foot oil for softening leather, belts, boots or harnesses. Neat's foot oil is, however, our choice.

## Business and Personal.

The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

Send a stamp to Milton Bradley & Co., Springfield, Mass., for priced catalogue of their games and home amusements.

Send 10 cents to T. E. Zell, the publisher, Philadelphia, Pa., for a specimen No. of Zell's new popular Encyclopedia.

Very cheap—a desirable new patent offered for whole United States. Circulars and photographs sent. Box 307, Elipon, Wis.

If you wish to buy a patent, or sell one, or become a canvassing agent, address Bent, Goodnow & Co., Boston, Mass.

For 50 cents I will send to any address, postpaid, one of my patent paper cutters and rulers. Address S. W. Wilcox, South Milford, Mass.

Wanted—a permanent situation by an experienced pattern and model maker and draftsman. Good references given. Address S. box 16, Kingsville, Ohio.

Look out for orders, manufacturers and machinists. See manufacturing news of the United States in Boston Bulletin, which will post you where to solicit them. The Commercial Bulletin, Boston, \$4 a year. Advertisements 10c a line.

Millstone-dressing machine, simple and durable. Also, Glaziers' diamonds, and a large assortment of "Carbon" of all sizes and shapes, for all mechanical purposes, always on hand. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

Peck's patent drop press. For circulars, address the sole manufacturers, Milo Peck & Co., New Haven, Conn.

Wanted—A good man, thoroughly posted in the working of spoke and wheel-making machinery, as foreman in a wheel factory at Marietta, Ohio. A good salary will be paid to one who can come well recommended. Address F. W. Marshall, Sec., Postoffice box 304, Marietta, Ohio.

For sale at a bargain—A good second-hand steam engine, 30 horse-power. Apply at once to P. & F. Corbin, New Britain, Conn.

Permanent employment for a No. 1 blacksmith. Address, with terms, Isaac, Evening Shade, Ark.

See A. S. & J. Gear & Co.'s advertisement elsewhere. Keep posted.

If you want to buy a good factory or machine shop, with water power, read advertisement on back page, of one for sale.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 8 Dey st., New York.

For Hackle Pins, etc., address J. W. Bartlett, 563 B'dway, N. Y.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for Lithograph, etc.

Portable pumping machinery to rent, of any capacity desired, and pass sand and gravel without injury. Wm. D. Andrews & Brother, 414 Water st., New York.

N. C. Stiles' pat. punching and drop presses, Middletown, Ct.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

For breech-loading shot guns, address C. Parker, Meriden, Ct.

The Lillington paint, described Nov. 18, in Scientific American, can be had at 225 Water st., New York. Address Lillington Paint Co.

The paper that meets the eye of all the leading manufacturers throughout the United States—The Western Bulletin.



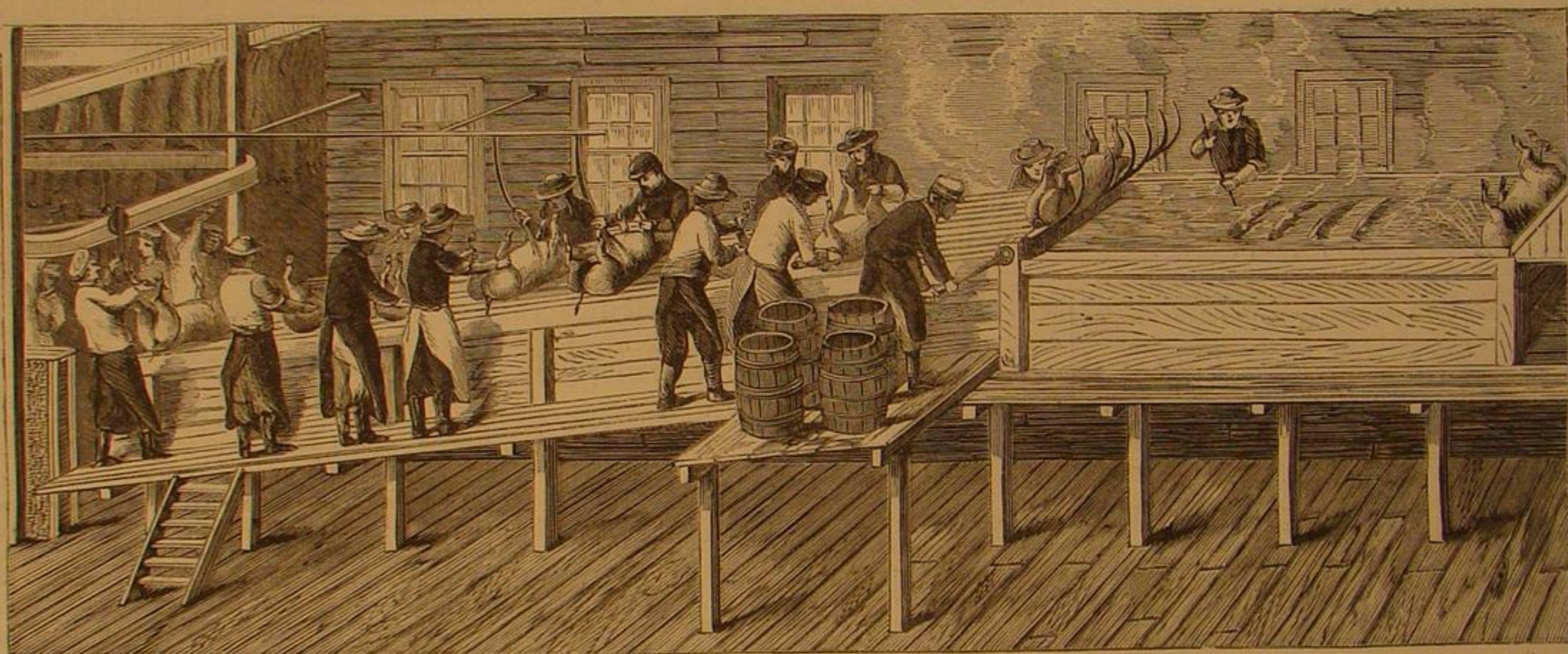
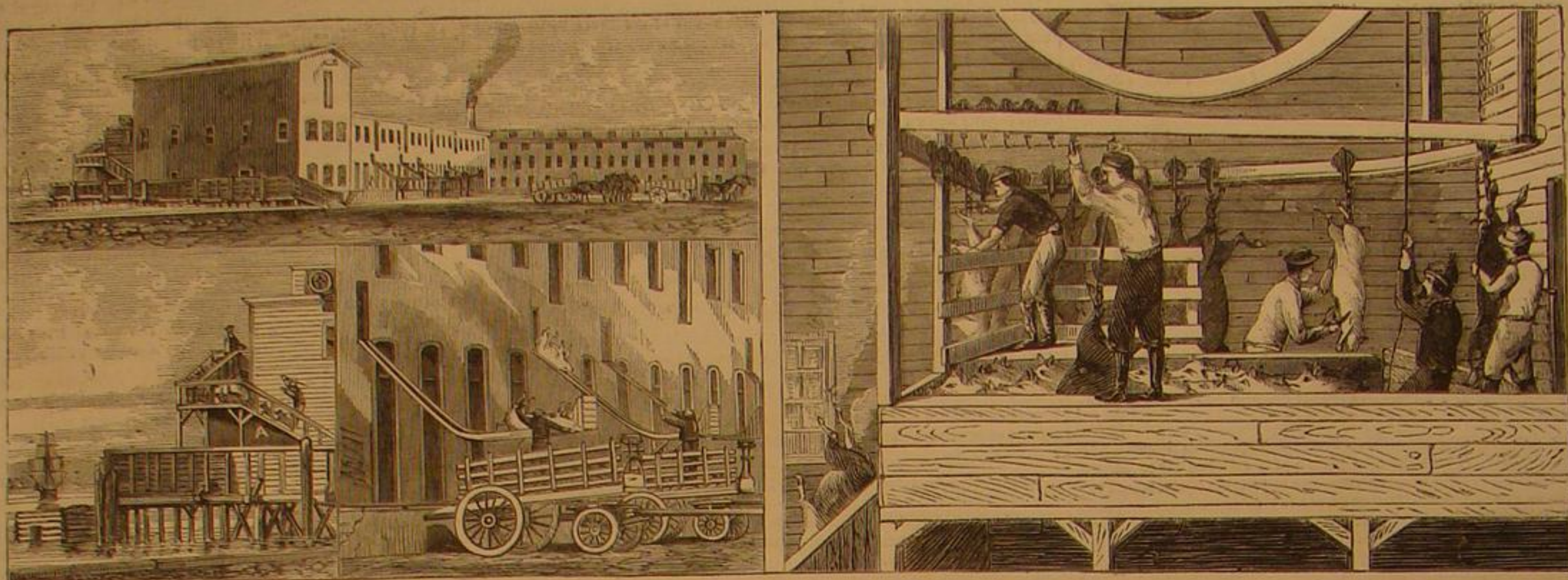
### The Great Abattoirs at Communipaw, New Jersey.

We give in this number a series of engravings representing the buildings of the "New Jersey Stock Yard and Market Company," with the process of dispatching hogs and preparing their carcasses for the market. It will be of interest to many of our readers in the vicinity of the metropolis, and to those engaged in raising beeves, sheep, and hogs, for the market, especially in the South and West.

The buildings and stock yards cover fifteen acres of ground, and the capacity of this establishment for slaughtering and

800 by 100 feet. Here the animals are fed and furnished with water *ad libitum*. Alleys are arranged with gates through which, when opened, the hogs are led or driven, as seen in the engraving, to the second story of the slaughter house. The engraving on the right shows the first process in the killing and bleeding department. An animal being selected, and a small chain being attached to its hind legs, it is hoisted to the iron rod, squealing and struggling with characteristic vigor and obstinacy. The "sticker" then inflicts the fatal stab in the throat, and the hog is slid along the rail toward the scald

and feet, and more difficult parts. At the end of the table stands a man known as the "gambrel cutter"; he puts in the gambrel and again the hog is suspended on a circular railway. The carcass, unopened as yet, is passed at once to the "gut-terers" who stand at the end of the fat-cleaning table. Their duty is to take out the intestines, liver, heart, and lungs, which is all done at once, and deposited by them on the fat-cleaning table, where six men are employed for that purpose. The fat, liver, heart, and intestines are steamed in tanks. The hog is next passed to the washer, where it is thoroughly



### SLAUGHTERING AND DRESSING HOGS--THE COMMUNIPAW ABATTOIRS.

preparing is, of beeves, 7,000; hogs, upward of 35,000, and of sheep over 25,000 per week. The slaughtering and dressing of a bullock requires from ten to twelve minutes, and for hogs and sheep still less. The abattoir proper, or slaughter house—engraving on the left—is 620 feet long by 60 feet wide, with an L 100 feet long by 40 feet wide. Another building, not shown in the engraving, 40 by 40 feet, is for slaughtering sheep. All these buildings are of two stories. A steam engine of twelve H. P. drives shafting for hoisting, etc., and the buildings are plentifully supplied with pure cold and hot water, of both of which vast quantities are used.

The hog department is on the second floor. As the swine arrive by the cars they are driven into large pens in a building

ing trough, to make room for others; and ere this one is dead it has been joined by about a dozen of its companions. In this department three men and a boy are required. The scalding tank is 12 feet long by 5½ feet wide and is attended by two men.

Soon as the hog is scalded sufficiently, he is floated to a sort of rotating grating, by which he is lifted out and rolled upon the scraping table at which are fourteen men, seven on each side. The first two take off the bristles and long, stiff hairs, which are saved in barrels. The animal is then passed to the next eight, four on each side, who are designated "scrapers"; they take off the bulk of the hair, and pass the hog along to the last four, who are called "cleaners"; these clean the head

washed and scraped down with a large knife. The carcass is now ready for the drying room.

At the head of the drying room there is a one track railway, along which is run, on a wheel and hook like the rest, a two-pronged lever or fork. This fork is so placed as to lift the hog by the gambrel and transport him from the dressing rack to any one of the "slides" in the drying room. He is then placed in the slide, pushed back close to his fellow, and left to drain and cool. The fat, as fast as it is cleaned, is carted by means of box trucks to the rendering tanks, ten in number, each of which has a capacity sufficient for the fat from one thousand hogs. The steam is condensed and the offal and blood used in manufacturing fertilizers.



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## THE "SCIENTIFIC AMERICAN"—RETROSPECTIVE AND PROSPECTIVE.

The present volume of the SCIENTIFIC AMERICAN will close with the next number, and it is quite appropriate at this point that we should not only review our work, but also look forward to what we intend to do in the coming volume.

We may be permitted a little self-gratulation upon the growing success of our enterprise, as evinced by our widely-extended subscription list, and the many tokens of warm approval which we daily receive. Our aim has been to present the truths of science in a plain, practical, and intelligible manner, unburdened, so far as is possible, with technicalities; to keep pace with the rapid march of improvement in all departments; and to combine the whole material of each weekly repast, presented to our readers, in such a way, that the tastes and wants of all would be as far as possible remembered. To this end we have called to our aid the best talent that could be procured, regardless of expense. We have embellished our paper with engravings by the best artists, in their peculiar province, to be found in this country; and we look back with satisfaction and a modest pride at the results of our combined labors. Scarcely a topic of modern interest in the sciences or in the arts has not been touched upon in this volume. It contains the materials for a history of the arts during the period of its publication. That the original matter, of which our paper can boast as large a share as any publication of its size upon this continent, has been of a high order, is evidenced by its having been largely copied at home and abroad; in the majority of cases full credit having been given.

The growing popular taste for natural and mechanical science we regard as one of the most encouraging features of the age. We read in it not only the assurance of vast and immediate progress, the discovery of new facts, and substitution of correct for false deductions from those already known, but the assurance of the peculiar adaptation of our paper to the tastes of the age, which guarantees to us as much success in the future as we have had in the past.

The extensive patronage which the SCIENTIFIC AMERICAN enjoys has enabled us to fix and maintain a lower rate of subscription than any other paper of its size and character published in the world; and notwithstanding our design is to always advance, and although to advance implies additional expenditure, we expect to be able to continue our present rates. And we feel justified in entertaining and giving expression to the opinion, that our paper is worth very much more than its cost to any man, be his trade or profession what it may.

We pledge ourselves to spare neither expense nor endeavor to make the SCIENTIFIC AMERICAN the best paper of its class published anywhere; a medium for the free expression of valuable ideas; an honest and impartial critic upon the mistakes and follies of the age; an instrument for the exposure of all humbug and pretension, in the departments to which our paper is devoted; and a storehouse of useful and entertaining knowledge for the people at large.

With the new year we expect to give an increased value to the SCIENTIFIC AMERICAN, both in quantity and quality of the illustrations and general reading; and, with the hearty cooperation of our many friends, we expect to greatly increase our circulation.

## POOR MECHANICAL WORK ON AGRICULTURAL MACHINERY.

No person possessing mechanical taste, at least, no person having a mechanical eye, can have failed to notice the difference between the fit of the parts that make up an agricultural machine and those of almost any other piece of machinery. The steam engine, whether marine, stationary, locomotive, or fire, the machines used in the manufacture of cotton or woolen, or iron, or anything, are pleasing to the eye and gratifying to the taste, whether at rest or in motion. But we seldom see anything in the "make-up" of a mower or reaper that awakens enthusiasm, or calls forth the approbation of the mechanic. To see the grass or grain go down before the inevitable fate and force of the mower or reaper, like the generations of men before the "death dealing scythe of time," may give an idea of power, but neither in rest or action does the agricultural machine—mower, reaper, or thresher—gratify the eye of the mechanic.

It is unpleasant to the mechanic (and it must be unpleasant to the farmer) to see roughly turned shafts, which must revolve very rapidly, seated in boxes that never were turned, or bored, but only smoothed on swiftly revolving spindles covered with emery; the boxes cast iron, and the shafts of the cheapest material. Cast iron, cast iron, and only cast iron, and even that rough and unfinished, seems to be the rule. Where nice forgings are required are castings, malleable it may be, but neither worked nor finished. Work that no mechanic would allow in his shop as a part of his business "plant." Coarse, rough file marks, asphaltum varnish, high colors of paint, and brilliant varnish do not hide from the mechanical eye the shortcomings of the workman on these machines.

They ought not to be called machines so far as workmanship is concerned. It is a shame that the manufacturers of our agricultural machinery should have so low an estimate of the judgment of the farmers of the country as to palm off on them contrivances which cannot stand the test of wear and tear. Many of the purchasers and users of agricultural machinery are good mechanics, good enough to understand the difference between good and poor work. There is no reason why machines for use on the farm should not have as large a proportion of honest workmanship, of good material, and proper proportion of parts as machinery intended for use in the shop, the factory, or the ship.

## CARBONIC ACID IN WATER.

A correspondent calls our attention to the following, from the Philadelphia Ledger, as a specimen of the erroneous character of many things which "go the rounds" of the press:

"To PURIFY A ROOM.—Set a pitcher of water in a room, and in a few hours it will have absorbed all the respired gases in the room, the air of which will become purer, but the water utterly filthy. The colder the water is, the greater the capacity to contain these gases. At ordinary temperature, a pail of water will absorb a pint of carbonic acid gas and several pints of ammonia. The capacity is nearly doubled by reducing the water to the temperature of ice. Hence, water kept in a room a while is always unfit for use. For the same reason, the water from a pump should always be pumped out in the morning before any of it is used. Impure water is more injurious than impure air."

Our correspondent points out the error that water containing carbonic acid will become noxious by its absorption, and that that is a reason why water which has stood in a pump should be rejected. But there is another error still in the statement. A pitcher of water placed in a room will not absorb all the carbonic acid caused by respiration of a single individual for one hour. A healthy adult exhales about 16 cubic inches of carbonic acid per minute from the lungs. Add to this the quantity eliminated from the skin, and we shall have for eight hours nearly six cubic feet. Water, at ordinary temperature absorbs its own bulk of carbonic acid. Under pressure, it may be made to take up five or six times as much, as in soda-water fountains, but, allowing even the greatest absorption, it would be a large pitcher that would contain water enough to absorb the carbonic acid exhaled by a single pair of lungs for one hour. But our correspondent must not expect scientific accuracy in the belittled daily press. We have long ceased to expect it.

Water should be rejected that has stood long in a pump, because it is generally contaminated by the pump itself. If it is good, sparkling, drinkable water before it is drawn into the pump, it has more carbonic acid in it than it will be likely to have after it has become warm by standing in the pump. That fact alone would make it flat and unpalatable, and would be sufficient cause for its rejection. We doubt not the very sage person who wrote the paragraph in question has often tickled his palate with ten cents worth of water charged as highly as possible with carbonic acid from a so-called soda-fountain, and we have no doubt that if he had a mixture of lemon and vanilla syrup in it, he found it pretty good to take on a hot July afternoon, and not in the least detrimental to his bodily health. At least that is our experience.

An ancient pear tree planted at Newton Corner, Mass., in 1650, is still vigorous and bears good crops. It is supposed to be the oldest pear tree in New England.

## DESTRUCTION OF FORT LAFAYETTE BY FIRE.

On the first of December the historic fort known formerly as Fort Diamond and latterly as Fort Lafayette, situated at the Narrows, entrance of New York harbor, was accidentally set on fire, destroying the whole internal portion and leaving only the external walls and the magazine intact. The danger of injury to dwellers on the contiguous shore was deemed so great that the houses in the vicinity of Fort Hamilton, which commands Lafayette, were vacated by their occupants, and a guard was detailed from Fort Hamilton for the protection of property thus abandoned. Fortunately the protection of the magazine was sufficient, and although the fire raged nearly twenty-four hours, and a number of shells were exploded by the heat, no lives were lost.

As a means of defence the fort was worthless and will not probably be rebuilt as a fortification. It will be remembered chiefly as a place of detention for state prisoners during the war of the rebellion.

## A NEW MECHANICAL TOY.

Some of the most ingenious and interesting mechanical toys that have been invented, are the walking boys and girls, just being introduced in Broadway.

The figures are constructed so that they literally walk, taking up the feet by bending of the knees in the most life-like manner. The mechanism is very simple but ingenious. They are propelled by the spring and clock movement usual in operating mechanical figures, but improved and adjusted skillfully to this toy.

It is the invention of W. F. Goodwin, of this city. Mr. Goodwin has obtained patents at home and in most foreign countries through the SCIENTIFIC AMERICAN PATENT AGENCY.

The heads of the figures are manufactured by G. H. Hawkins, 383 Canal street, under a patent also secured through this office.

## OUR SUBSCRIBERS

Have generally approved the rule strictly carried out of stopping the paper at the expiration of the subscription; and while we earnestly desire to keep all our present subscribers, and to increase the list, we do not intend to force the paper upon those who do not desire it. Our rule is advance payment, and whoever gets the SCIENTIFIC AMERICAN need not fear of being dunned to pay up. The receipt of the paper is evidence of payment.

Friends send in your names and get some of your neighbors to join in a club.

## PATENT OFFICE ITEMS.

Messrs. James Griffin and Peters, the board recently appointed at the Patent Office to examine into the manner in which all contracts with the office are filled, have begun the discharge of their duties, and heard some testimony. It will be several days before they will be prepared to make a report.

The Commissioner has refused to extend the patents of Theodore Weed and T. J. W. Robertson, both for sewing machines. He has also recently heard arguments in the case of Cyrenus Wheeler, for harvester, a machine that has been extensively used by farmers.

No decision has yet been announced.

## CANADA, NOVA SCOTIA, AND NEW BRUNSWICK.

We have a large list of subscribers in the Dominion, many of which expire on the first of January. We hope they will not only all renew, but send in other names. The only difference in the terms of subscription is the addition of 25 cents to cover pre-payment of postage.

## A SIGNIFICANT FACT.

During the week ending December 1st., there were filed in the Patent Office 255 applications and caveats. During the same week 103 applications and caveats were entered upon the records of this office. Inventors fully understand where their interests are best served.

## Gold Mines in New York State.

Gold bearing quartz has been discovered in Dutchess county, N. Y., consisting of a series of veins comprising a belt half a mile wide, and extending north-easterly an indefinite distance. No actual workings of these veins have been attempted, but large quantities of the rock have been removed and submitted to analysis, resulting in showing a yield of gold varying from \$27 to \$100 per ton. When it is considered that quartz yielding only \$7 and \$8 per ton is profitably wrought in California and North Carolina the value of this discovery may be appreciated, situated, as it is, within a hundred miles of New York city and near the banks of the Hudson.

PETROLEUM IN THE CAUCASUS.—The Sun is responsible for the following:

"One of the most remarkable deposits of petroleum is in the region of the Caucasus Mountains. The oil springs have been known and the oil collected there (by skimming) for ages. On the eastern shore of the Caspian 20,000 such wells, all of them quite shallow, are now skimmed. The wells are often quite close to each other, and a new one does not affect the productivity of another near it. One sunk in 1863 by the very side of another, which had for centuries produced 3,400 pounds per day, yielded 40,000 pounds per day, without affecting in the least the other. The American method has lately been introduced, and flowing wells have burst forth from a depth of 250 feet, which have, until controlled, maintained a jet from forty to sixty feet high. It is calculated that 19,000,000 pounds are annually produced in the Caucasus region, while 200,000 pounds of paraffine are now made from asphaltum."



## REMINISCENCES OF TRAVEL IN SPAIN.

GOthic CATHEDRAL—THE ATOCHA CHURCH—THE QUEEN'S RELIGIOUS HABITS—ROYAL STABLES, COACH HOUSES AND MUSEUMS.

NO. II.

Among the many striking features which impress the tourist in Spain, and of which we spoke in our last week's article, are the great number of magnificent cathedral churches, chiefly of the Gothic order of architecture. Indeed, so prominent are these structures, that they have been made the subject of an elaborate work by George R. Street, a well-known English writer upon architecture; and yet, singular enough to an unprofessional mind, the author omits in his work, all mention of the majestic cathedral at Seville, which some writers have declared second only in magnitude to St. Peter's at Rome. With the possible exception of the Dom at Cologne, with its graceful springing arches; the cathedral at Milan, with its forest of spires and pinnacles; and the Metropolitan church at Amiens in France which has probably the finest Gothic interior in Europe, it appears to us that no other ecclesiastical edifices of this order are comparable to those in Spain; and it is a marvel how so much wealth and genius were ever combined to produce such grand cathedral churches as are found in the dull, sleepy old cities of Burgos, Leon, and Toledo; and what is still more singular is the fact that although Madrid is the capital of Spain and its most populous city, it is nevertheless the poorest in church edifices, having nothing in this respect worthy of notice.

The Spanish Cathedral, apart from its architectural character, is usually a place of deep historic interest. Within its precincts, the representatives of the nation often assembled, kings were christened, anointed, and buried. They were also museums of natural history and the fine arts, and to this day they contain not only valuable paintings of the Spanish masters but also stuffed animals of rare species, beside specimens of precious marbles, corals, elephants' tusks, and other natural curiosities either sent as presents by Eastern princes or successful navigators, whilst within the porches courts of justice sat to hear and decide causes in litigation. An example of this kind is witnessed once a week at Valencia, the water tribunal sitting in the cathedral porch to adjust the irrigating privileges of the *huerta*, which makes that spot a paradise of oriental beauty and luxuriance. In addition to these, the examples of wood carving, iron, silversmiths' work, and exquisite painting on glass, show that Spain at one time possessed artisans of the highest skill and ingenuity.

The late unfortunate queen was like her royal predecessors, a devout religionist, and especially distinguished for her singular devotion to the Virgin—a circumstance not to be wondered at considering her training, and being a woman she naturally looked to one of her own sex as the source of comfort and support in the many perplexities that surrounded her throne. The queen was accustomed, it is said, to ascribe all her blessings, both spiritual and temporal, as flowing from that source; and it was her habit, on every Saturday evening at six o'clock, to visit an old church called the Atocha, situated on the outskirts of the city—a building wholly destitute of architectural grace, but which possessed a black miracle-working image of the Virgin, carved, according to tradition, by the Evangelist St. Luke. This image, of life size, stands upon the high altar of the Atocha, and is dressed in most regal robes, and possesses a wardrobe equal in richness to many of the royal women in Europe—not as some declare of cast off clothing of the queen, but splendid robes of silk, satin, and velvet, embroidered in gold, silver, and other expensive laces. There are twenty-seven of these robes, carefully preserved in presses, any one of which would have dressed the queen for a state occasion, and are cheerfully shown to strangers by a very civil ecclesiastic, who takes a good deal of pains to point out their beauties and to name their donors. Soon after the birth of the first royal baby, and when the queen was able to quit the maternal couch, she proceeded in ceremony to the Atocha, for the purpose of presenting the infant and a suitable thank-offering at this shrine, and as she descended the staircase of the palace a desperado approached her feigning to present a petition, struck the queen with a stiletto, which, but for a gold lion embroidered upon the velvet robe, would probably have ended her life. The wound, however, proved to be slight, and nothing daunted by the fiendish assault, she went to her devotion, ascribing the providential interposition to the Virgin. As an act of special gratitude, after removing the gold lion to be kept as a household treasure, she left the blood-stained robe which cost \$19,000 as a thank-offering.

Independent of the rich wardrobe of which we have spoken, the Atocha church is a curious museum of votive offerings. The walls of the side chapels are literally covered with plaster or wax models of arms, eyes, breasts, hands, feet, legs, locks of hair, splints, crutches, coarse pictures, clothing, and other articles deposited there in acknowledgment of the miraculous power of the Virgin in healing disease and injury.

The churches in Spain, however, are not singular in these manifestations of pious faith. They are often witnessed in other parts of Europe. The Atocha, at the time of our visit, was so much revered for its saintly character and precious relics, that an armed guard was stationed at its doors, and a remarkable reverence was shown by all who entered within its precincts.

The royal stables and coach-houses are usually opened once a week to all who take the trouble to obtain tickets of admission. The stables contain a stud of upwards of two hundred

horses, nearly all thoroughbreds, and of varied colors, beside a hundred or more splendid mules. The queen and the royal children were accustomed, in bad weather, to ride after mule teams, and it was no uncommon sight on the streets of Madrid to see fine carriages drawn by mules in handsome harness. The Spanish horses have short necks, large barrels and clumsy legs, and are not considered equal to those brought from other parts of Europe. Therefore the stud in these stables are chiefly exotics.

The coach-houses are still more interesting, as they contain an endless variety of carriages—from the baby chaise to the ponderous state coach of Charles the Fifth—including the curious old machine in which Crazy Jane carried about the dead body of her Philip the Bel, said to be the first coach brought into Spain. Crazy Jane and her husband were buried in the cathedral at Grenada in the same tomb with her parents, Ferdinand and Isabella. In the upper rooms of the coach-houses are carefully preserved the harness, saddles, housings, liveries, and other elegant trappings of the royal equipage. The Spaniards have always been famous for their skill in making fine harness and saddles, and this collection is perhaps one of the richest in Europe, not only in historical association, but also in the exquisite quality of workmanship.

A recent letter from Madrid states that the whole of the carriages and harness are to be publicly sold, a measure that will be much regretted by all who are interested in preserving historical relics. French revolutions have always been marked by destructive excesses, and many are the beautiful objects of art which have thus disappeared, but in spite of all this they have contrived to preserve the antique equipages of their kings, which are carefully kept at Versailles.

The Armory and Military Museum possess many objects of rare interest such as kingly swords, arms, crowns, helmets, and suits in armor, of exquisite workmanship. Among the numerous objects which attract most attention are the complete armors worn by Columbus, weighing 41 pounds, and those of Charles the Fifth and Philip the Second, and the curious old litter used by Charles the Fifth in campaign, when gout prevented him from riding; also the magnificent field tent of Ferdinand and Isabella.

The Spanish, at one time, were a maritime, adventurous race, and hence the naval museum of Madrid contains a valuable collection illustrative of the ancient art of ship-building. What interested us most, however, were specimens of ancient caravels, or ships, exactly like those in which Columbus made his voyage of discovery. Here is also preserved the rude chart used by him on the voyage, the sight of which set in motion a train of reflection upon the wondrous chain of events and discoveries which have succeeded. The ocean is crossed several times every ten days by steam, and intelligence courses through its depths with the rapidity of the lightning flash.

## THE ENGINES OF THE "WAMPANOAG."

So much has been written about the engines of this ship, that what I have to say may seem superfluous, but still it may interest a few. Commodore Alden, in his report, finds fault with the engines on account of their want of "bed" plates, supposing that English engines, of large size, are provided with that part, and attributes the heating of the journals of the *Wampanoag* to their deficiency.

The English ship *Warrior* has been often compared with the *Wampanoag*, both as regards engines and speed. Now this ship, free as she may be from hot journals, has not the sign of a bed plate; therefore it is not possible that the good working of the *Warrior's* engines can be attributed to bed plates.

The engines of the *Warrior* are of the double-trunk variety, consequently the connecting rod acts directly from the piston to the crank pin, thereby making the engines much shorter across-ship, when the distance is measured from the center of the crank shaft to the center of the pistons at half-stroke. This being so, the framings are naturally reduced in length. At the ends of the framings, in the *Warrior*, three in number, come the condensers, firmly bolted to all of them, or at least connected by a short distance piece. The cylinders are bolted close together, within a few inches of one another, and form a combination almost as solid as a single casting. To the two cylinders the framings are bolted directly and in the strongest manner. It is evident, that, by the adoption of this plan, a stiff and rigid combination must be the result. The framings being connected together at one end by the two cylinders, and at the other by the condensers, forms, in itself, almost a solid mass. Diagonal strains cannot affect this engine in any appreciable manner, and it would be difficult for the shaft to have its journals thrown out of line, running as it does, through the bearings in the frame between the cylinders and condensers.

Let us now look at the general plan of the *Wampanoag's* engines. The two cylinders are placed on one side of the shaft, but are not bolted directly to one another, the large surface condensers being interposed, but this is not an element of weakness. In looking at the framings and comparing them with those of the *Warrior*, we notice this difference, that those of the English ship are firmly connected at both ends, while those of the *Wampanoag* are secured only at the end where the cylinders are placed, and in this difference of design the reason for the hot journals may be found. Where the front of the condensers are in the *Warrior*, we find, in the *Wampanoag* the engine shaft; the screw shaft being mounted in bearings placed on the top of three of the frames, and in about the middle of their length. In front of the condensers come the immense gear wheels by which the power of the engine shaft is

communicated to that of the screw. As these frames are bolted directly to the timbers of the ship, any diagonal strains coming upon the engines must of necessity elevate one end of the framings, and it will naturally be the weakest part that is moved, and that happens to be exactly where the shaft bearings are placed. The framings being long and disconnected, are susceptible of a small amount of spring—very small it must be—but sufficient to throw the journals enough from their proper line to cause them to heat. If, as in the *Warrior*, these frames had the additional support of the condensers, this thing would not happen, as the strength of the engines would be increased materially. The engines are heavy enough without the weight of an immense bed plate to perform an office, which, in the *Warrior*, from the advantageous position of the condensers, is performed in the most perfect manner.

ENGINEER.

## THE INDIANS—GENERAL SHERMAN'S OFFICIAL REPORT.

General Sherman's Report in reference to Indian affairs we regard as a very able document. He has been unable under existing circumstances to find any lasting remedy for the war. So long as opportunities are continually offered for depredations by settlers and gold hunters upon the frontiers, the Indians will commit them. Surveys of public lands progress, railroads are built, and mail routes are established. So long as these things continue, General Sherman thinks the maintaining of our military forces on the frontier will be necessary.

The whole thing is nothing more than the old war between civilization and barbarism. Either civilization must yield and cease to progress further, or the Indians must be summarily and thoroughly squelched. It is folly to reason with these savages or to ask them to agree to the terms which have been or may yet be proposed. Any concession made to them is attributed to fear on the part of the Government, and all parleying is simply a loss of time. The terms should be dictated by the Government and enforced by it in the most peremptory and vigorous manner.

The Government should not lay itself open to any charge of breaking faith in the future. It should not pledge itself to the Indians in any manner whatever. They should not be permitted to dispute, as they have done, the progress of important internal improvements. If they will not work as citizens, they should be scattered as vagabonds. If they will not submit to the impositions of the Government, they should be made to feel the strength of its arm.

The Indians have shown themselves incapable of keeping faith. They are the most treacherous, as well as the most inhuman, of all barbarous races.

General Sherman, in his report, shows the fallacy of the belief that the recent hostilities have sprung from the abuses of the Government agents, the agent at Leavenworth being the only one who is open to any such charge. Everything goes to show that the recent outbreaks were without provocation other than the gradual advance of civilization which these red skins hate.

Believing these facts to be true, we hail with satisfaction General Sherman's recommendation to take the whole matter of adjusting the Indian difficulties out of the hands of the Peace Commissioners and restore it to the War Department, which, he says, is also the desire of the Commission itself. We believe with him that the Indians will never accede to the plans and purposes of the Commission so far as to become self-supporting, and that the best that could be hoped would be to convert them into a race of paupers.

Disagreeable as is the necessity, much as our humanity may shrink from the task, we shall never see an end to these Indian troubles until a severer code of warfare is adopted with them. We must submit to see the families of our noble pioneers tortured with the most devilish ingenuity, their wives and daughters ravished and slain by these bloodthirsty fiends, or we must slay them. For ourselves we cannot hesitate. The Government has made large appropriations to the Pacific Railroad, which the danger from armed bands of hostile Indians will render worthless when completed, unless a prompt and vigorous policy compels them to go to the reservations set apart for them and to remain there. If the Government sees fit to support them upon these reservations as paupers, we shall not object, although we fail to see any good reason for so doing.

## Saving Trees Girdled by Mice.

At the February meeting of the Northern Illinois Horticultural Society, D. B. Weir, of Lacon, read a paper "On Saving Girdled Fruit Trees." He said he had over a hundred trees, seven years planted, completely girdled by mice. There had been for some time a heavy snow on the ground; and mice being plenty and in a starving condition, with nothing else to eat, they ate all the bark from the trees as far as they could reach; some of them for a foot up and down all around; and portions of the sap wood in some places half an inch deep. As soon as the damage was discovered, which was on the first thawing days, he banked the snow around the trees, and as soon as the soil thawed he banked that a foot high about the trunks.

This was all the attention they received; and to-day they have all the damaged parts covered by almost as thick a coating of bark as the uninjured portion of the trees. When the girdling is done high up on the trees, banking with soil will be impracticable. If the wounded parts are too high to reach by banking, clay may be bound on with a bandage. The sooner the surface is protected after injury the better. The death of the tree is caused by the seasoning of the sap-wood.



# OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING DECEMBER 1, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each application for a Patent, except for a design.....	\$10
On filing each original Patent.....	\$15
On appeal to Commissioner of Patents.....	\$20
On application for Extension of Patent.....	\$20
On granting the Extension.....	\$20
On filing a Disclaimer.....	\$50
On filing application for Design (three and a half years).....	\$10
On filing application for Design (seven years).....	\$15
On filing application for Design (fourteen years).....	\$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing **MUNN & CO., Publishers of the Scientific American, New York.**

**84,463.—WAGON BRAKE.**—H. Anderson, Shepherdstown, Pa. I claim the metallic semicircular ratchet, D, D', the bar, E, and the lever, F, joined thereto by the pin, G, the small upright, H, the bar, I, the rubber block, J, J', the part, K, the rubber bar, L, L', and the bar, M, all constructed and combined, in the manner and for the purpose herein set forth.

**84,464.—MATCH MACHINE.**—Emery Andrews, and William Tucker (assignors to Star Match Corporation), Portland, Me. We claim, 1st, The combination of the cam, d, with the receivers and conductors, m, m', in the receiving box, H, as and for the purposes specified.

2d, The combination and arrangement of the slides, o, and grooves, i, on the wheel, h, and the spring, h', in connection with the receivers and conductors, m, m', in the receiving box, H, substantially as and for the described purposes.

**84,465.—CAR COUPLING.**—John D. M. Armbrust, Apollon, Pa. I claim, 1st, Arranging within a draw head, A, a series of springs, C and C', D and D', when the same are secured by a single bolt, H, at the rear of the same, thus leaving their forward opening or mouth entirely free, substantially as described, and for the purpose specified.

2d, The combination of the keeper, F, spring, G, plate, B, and bolt, H, when the former is secured to and works upon the spring, C, substantially as described, and for the purpose specified.

**84,466.—BUREAU BEDSTEAD.**—Derk Arnaud, Boston, Mass. I claim, 1st, A folding bedstead, hinged to the bottom of the door of a case, when the side of the door is hinged to the case, so that the bedstead can be swung out to any angle, substantially as described.

2d, The arrangement of the washstand, G, and box, E, with a bureau bedstead, substantially as described.

3d, The arrangement of the several parts, A B C D E G S, and M, in one piece of furniture, substantially as described.

**84,467.—EAVES TROUGH HANGER.**—David Arter (assignor to himself and J. J. Kaufman), Ashtabula, Ohio. I claim the button, E, in combination with the crosspiece, D, and trough, A, in the manner and for the purpose set forth.

**84,468.—METHOD OF HOLDING AND ADJUSTING DIES AND PUNCHES.**—Phineas E. Austin, New Haven, Conn. I claim, 1st, The arrangement of the several dies, clamps, wedges, and screws with the frame, as described, and for the purpose specified.

2d, The spring guide pin, F, in combination with the dies, in the manner and for the purpose specified.

3d, Arranging the punches in the punch stock, and confining them to one another by means of the block, H, and to the stock by means of the dovetailed tenons fitted into the dovetailed groove in the stock, and the wedge, all substantially as described.

4th, The connecting block, H, placed between the two punches or male dies, for the purpose of holding them together, substantially in the manner and for the purpose specified.

**84,469.—BRIDLE BIT.**—A. P. Baldwin, Newark, N. J. Antedated November 21, 1868. I claim pivoting the two mouth pieces, a, b, and to the cheek pieces, C, the pivots of the one being at a distance from the other greater than that of the mouth pieces, substantially as described and shown.

**84,470.—ANTI-FRICTION BEARING FOR VERTICAL SHAFTS.**—Rufus P. Barnett, Charles P. Parinotto, and Nicholas Seibert, Nevada, Cal. We claim, 1st, In combination with the balls, H, and their guide, I, the universal joint formed by the convex surface, G, and the upper concave surface of D, substantially as described.

2d, In combination with the balls, H, and the above claimed joint, the screw, E, to adjust the same to the required elevation beneath the shaft.

**84,471.—PROCESS OF RECOVERING AND REWORKING BORAX FROM SOLUTIONS USED IN TREATING WOOD.**—Sigmund Beer, New York City. I claim utilizing the liquids employed in the process of Beerizing, seasoning, or preserving wood by precipitation, substantially as and for the purposes specified.

**84,472.—NEEDLE FOR KNITTING MACHINE.**—Dana Bickford, Boston, Mass. I claim a knitting machine needle, made from a wire, and having a swell, b, thereon, as and for the purpose set forth formed by giving a bend to the wire, and without cutting away or reducing the same.

Also, a knitting machine needle, having a swell, a, thereon, located between the latch and the end projection, and whose elevation is on the same side with the hook, as and for the purpose set forth.

**84,473.—PROCESS OF KNITTING FINE FABRIC.**—Dana Bickford, Boston, Mass. I claim the process herein described, of knitting tufted or piled fabric, the same consisting 1st, in laying between the regular course of stitches, after a course has first been knitted, a course of loose loops, formed from a continuous yarn, and then binding this last course in place by a succeeding course of regular stitches.

Also, as a new article of manufacture, a knitted fabric, in which, after a course of stitches is knitted, a course of loops, formed from a continuous yarn, is next deposited upon this row of stitches, and then another course of stitches knitted over the same, to bind and hold the loops or tufts.

**84,474.—ANNUNCIATOR.**—J. S. Birch, New York City. Antedated November 14, 1868. I claim the arrangement of the table boxes, A, having doors, a', the sliding tablets, C, operated by the weighted rods, B, the cashier's box, A, having a series of tablets, C, operated by the weighted rods, extended to connect with the bell hammer, H, each of said tablets connected with the cashier's box, by the means of the cords, D, and all operating in the manner described, for the purpose specified.

**84,475.—RATCHET ATTACHMENT FOR HARVESTERS.**—George E. Burr, and Stanley B. Hildreth, Harvard, Mass. Antedated June 2, 1868. We claim, 1st, A loose collar or ring, in combination with the pawl, when the pawl is connected to the collar or ring in such a manner as to be operated in and out of the surrounding or covering internal ratchet gear, by the resistance arising from the inertia or friction of the collar or ring, operating substantially as described, for the purpose set forth.

2d, The pawl, e, and tightening nut, f, in combination with the friction band, I, and hub, d, when said friction band is used to operate the pawl in and out, I, substantially as described.

3d, The combination of the pawl, A, the pivot ears, i', the link, n, and the friction band, I, substantially as described, for the purpose set forth.

**84,476.—FLUID METER.**—Edmund Augustin Chamerooy, Paris, France. I claim the combination, with the tapering valve chamber, the weighted valve, and valve rod, connected with the counterweight, O, as described, and the piston, M, and disk, P, mounted upon the shaft, I, of said counterweight, of the registering mechanism and the rotary plate, B, actuated by and clock work under the arrangement and for operation as herein shown and set forth.

**84,477.—HORSE HAY FORK.**—Alonzo M. Cheney and Handley B. Kimball, Charlotte, Mich. We claim, 1st, The bent fork shank, B, broadened at its lower extremity, b, for the connection of the ball stay bar, C, and overlapping detachable times, A, A', substantially as described.

2d, The pivoting of the detachable bent fork times A A', to the bent fork shank, B, at the foot, b, by the corrugated clamping bar, H, fastened by the shoulder, threaded, and nutted eye bolts, n, n', and forks of the stay bar, C, substantially as described.

**84,478.—RINSE HOLDER.**—James Chittoch, Chicago, Ill. I claim a clamp for fastening lines, consisting of the parts, A, A', spring, C, hook, B, and pin, H, as and for the purpose set forth.

**84,479.—APPARATUS FOR CONDENSING IN DISTILLING SPIRITS AND OILS.**—Henry C. Dayton, Mayaville, Ky., and James Christie, Cincinnati, Ill. We claim, 1st, The alternate chambers for water and vapor, which may be contained or supported indefinitely, thus securing much greater surface for the action of water in cooling.

2d, The concave surface of the bottom of the outer vapor chamber, which permits the flow of water, striking it at or near the center, to spread in every direction from the point of contact, thus cooling the entire bottom of said vapor chamber.

3d, The creation of a partial vacuum in the vapor chamber by our superior means of cooling, which causes the vapor from the retort to flow promptly and readily into the vapor chamber, substantially as described.

4th, The tubes, H H' I K L L', M, and their various purposes and uses in the manner substantially as set forth.

**84,480.—METHOD OF WORKING STEEL AND IRON.**—Henry James Dickerson, Appleton, Wis. I claim, 1st, The working of steel and similar substances, more readily and

with better results, by the assistance of the first-described compound, applied for the purpose substantially as described.

2d, The refinement of steel and similar substances, by the application of the second compound, in the manner and substantially as described.

3d, The refinement and hardening of steel and similar substances, by the application of the third compound, in the manner and for the purpose and substantially as described.

4th, The accurate attainment of the desired quality in many articles at once, by the use of the receptacle and instruments above described, in the manner and substantially as set forth.

**84,481.—PRESERVING MEAT.**—Julius Edmund Dotch, M. D., Washington, D. C. I claim the preserving of the body of animals, or parts thereof, by the use of aldehyde, in the gaseous or liquid state, or mixtures of aldehyde in glycerin and phospho glyceric acid, or acetate of soda and glycerin, or simply phospho glyceric acid.

**84,482.—FILTER AND COOLER.**—Nicholas Downes, Syracuse, N. Y. I claim, as an improved article of manufacture, the combined water cooler and filter, consisting of the ice chamber, B, with the rack, D, and operate cover, e, the perforated chamber, D, connected with the chamber, B, by pipe, C, and having an outlet, h, and the casing, A, having covers, f, f', and g, h, when said parts are all constructed and arranged to operate as herein described.

**84,483.—MACHINE FOR FINISHING CLOTH.**—John Earnshaw, East Greenwich, R. I. I claim, 1st, A flexible stencil belt in combination with a nap-raising device, substantially as and for the purpose set forth.

2d, A nap raising device, convex supporting bed and continuous stencil plate, substantially as described, arranged for conjoint operation, as and for the purpose set forth.

3d, The combination of a heated work-supporting surface, a stencil plate, and a nap raising mechanism, substantially as and for the purpose set forth.

4th, The combination of a supporting bed, a stencil plate, and a shearing device, substantially as herein described.

5th, Devices, substantially as described, for applying moisture, in combination with a continuous stencil plate, arranged and operating substantially as set forth.

6th, Devices for applying coloring matter to the cloth, in combination with mechanism for working and treating the same, substantially as herein set forth.

7th, The devices for applying the coloring matter, combined with the device for steaming or moistening the same, as herein set forth.

8th, The combination of the supporting bed, stencil plate, and nap raising device, with the shearing device, as herein described.

9th, The adjustable tension rollers, in combination with the stencil belt and the support, substantially as described.

**84,484.—DOOR LOCK.**—Monroe B. Foote, Northampton, assignor to himself, William M. Gaylord, E. N. Foote, New England Village, Mass. I claim the combination and arrangement of the lever, I, with the cam and stop, f, the spring catch, k, and with the slotted bolt and its case, substantially as described.

**84,485.—BRICK AND CONCRETE PRESS.**—George A. Frear (assignor to Charles Holland), Chicago, Ill. I claim the combination and arrangement of the knee-jointed levers, c, c', plungers, g, cam, e, the segments and racks, f, f', the rollers, i, i', and partitions, k, k', of the mold box, all constructed as described and to operate substantially in the manner and for the purpose set forth.

**84,486.—REED MUSICAL INSTRUMENT.**—Levi K. Fuller and Henry K. White (assignors to J. Estey & Co.), Brattleborough, Vt. We claim the improved arrangement of the valve hinge, viz., along the side of the valve instead of at one end of it, as heretofore practiced.

Also, the combination of the strip of leather, L, with the front valve, C, its spring, C', the back valve, G, and its lever, D.

**84,487.—WASH BOILER.**—Lewis Granger, Memphis, Mich. I claim, 1st, The slides, C, provided with ribs, D, or their equivalents, when connected and operating substantially as and for the purposes herein set forth.

2d, The combination of the slides, C, slotted grate, F, and hooks, I, in connection with any suitable boiler, and the damped projection, H, in connection with any suitable cover, when arranged and operating substantially as and for the purposes herein set forth.

**84,488.—WOODEN WASHER FOR CARRIAGES.**—Thomas M. Hart, New Bedford, Mass. I claim a wooden washer made of two or more thicknesses of board, fastened together by glue or any adhesive compound, in such a manner that the grain of one shall cross the grain of the other to prevent splitting as herein specified.

**84,489.—MODE OF PREVENTING CORROSION OF BOILER TUBES IN SEA GOING VESSELS.**—George Hawthurst, Somerville, Cal. I claim a protection from corrosion for the boilers of steamers using surface condensing, consisting of the solution herein described, and used substantially as set forth.

**84,490.—CAR BRAKE.**—John Hirst, Jamaica, N. Y., assignor to himself and Henry A. Dirkes, New York City. Antedated November 13, 1868. I claim, 1st, The rail brake shoe, H, attached by the connecting bar, e, to the crank, d, of the weighted shaft, D, hung in spring bearings, A, said shaft, D, being connected to the axle of the wheel, F, by the cords, f, all constructed, arranged and operating as described for the purpose specified.

2d, The combination of the brakes, G, G', heads, F, F', crank shaft, D, weight, I, cords or chains, h, c, rail brake shoe, H, connecting bar, e, and supporting cords or chains, f, all constructed and arranged to operate as herein described, for the purpose specified.

**84,491.—WASHING MACHINE.**—L. H. Hubbard, Canton, Ohio. I claim the peculiar arrangement and combination of the sliding boxes, I, I', with ratchet dials, k, secured thereto, the lifting levers, J, J', with spring pawls, l, l', and the gears, g, g', the frame standards, H, H', with coil pins, q, q', the several parts being constructed, arranged, and operating substantially in the manner and for the purpose specified.

**84,492.—CLASP FOR HOOP SKIRTS.**—John Ingraham (assignor to himself and Chas. E. L. Holmes, assignors to Chas. E. L. Holmes), New York City. I claim a clasp for skeleton skirts, cut out of a compound sheet of metal formed of zinc and tin, in the manner described.

**84,493.—WASH BOILER.**—Wm. F. Jenkins, Indianapolis, Ind., assignor to himself and James M. Myers. I claim the rivets, a' b' c' d' e' f' g' h' i' j' k' l' m' n' o' p' q' r' s' t' u' v' w' x' y' z' and the combination of the shaft, I, cog wheel, M, and arm, X, the latter provided with a dog or pawl, O, and connected in a suitable manner with an engine for the purpose of feeding the saw while the machine is in operation, substantially as herein set forth.

**84,494.—MACHINE FOR MAKING NUTS.**—Edward Kaylor, Perryville, Pa. I claim a machine for making nuts from hot bars of iron, a die box, either solid or made in separate pieces, with apertures and grooves for the admission and flow of water along the inner or working face of the die box, and a separate die of which it may be composed, substantially as hereinbefore set forth.

**84,495.—COAT SUPPORT.**—R. C. Kelly, West Meriden, Conn. I claim the within described coat supporter as a new article of manufacture, consisting of the arms, A and B, and the slotted connection, C.

**84,496.—HOISTING MACHINE.**—John Kennedy, Chicago, Ill. I claim the combination of the weighted pawl, P, cross tree, B, pulleys, D, rack lever, F, weighted rope, W, ropes, b, Z, friction wheel, E, and band, H, the whole being arranged as and for the purpose set forth.

**84,497.—MODE OF WORKING GOLD AND SILVER ORES.**—Guldo Kusel, San Francisco, Cal. I claim the ingredients or agents above enumerated, added to the ores, in the manner and in about the proportions herein specified, for the purpose set forth.

**84,498.—STAY FOR SHIRT BOSOMS.**—J. R. Little, West Roxbury, Mass. I claim the new article of manufacture or shirt bosom stay, as composed of the buttonhole strap, A, and the hook or attachment, C, as specified, the whole being substantially as and for the purpose set forth.

Also, the double hook attachment, C, made as and for the purpose above explained.

**84,499.—CULTIVATOR AND SEEDER.**—Calvin Lobdell, Fort Hill, Ill. I claim, 1st, The lever, K K', arranged to operate substantially as and for the purpose herein specified.

2d, The combination of the lever, K K', arms, I, wings, B, rods, M, G, and curved pin, H, all being constructed and arranged substantially as and for the purpose set forth.

**84,500.—MACHINE FOR CROZING BARRELS.**—John Maley (assignor to himself and Martin Dowd), Middletown, Ohio. I claim the curved frame, A B D, and vertical guide rolls, o, l, in combination with the feed rolls, i, j, and tools, a, f, g, for planing, crozing, and chamfering barrels, arranged and operating conjointly by the system of gearing, substantially as and for the purpose set forth.

**84,501.—ENVELOPE.**—George H. Mathews, New York City. Antedated Nov. 16, 1868. I claim an envelope or wrapper having one or more openings cut in the flap, and having marks on that portion of the body of the envelope beneath the flap, substantially as and for the purpose set forth.

**84,502.—FLOAT FOR BOILERS.**—Henry McGann, Cleveland, Ohio. I claim the globular frame, C, in combination with the shell, A, substantially as herein specified.

**84,503.—SEAL BOLT FOR RAILWAY CARS.**—Jasper P. Moore, Boston, Mass., assignor to Andrew B. Ulline, and said Ulline assignor to himself and Gardiner G. Kidder. I claim the combination of a bolt and a tongue pivoted to such bolt, the tongue having one or more notches to receive a seal for the purpose of holding the bolt and tongue together, and having one or more holes, as described, to receive a seal for the purpose set forth.

**84,504.—NASH HOLDER.**—John Obreiter (assignor to himself and Andrew Lettly), Lancaster, Pa. I claim the construction and arrangement of the each holder plate, A, with its open slot, b, and curved bearing, c, in combination with the drop latch, B, slide head, e, fulcrum arms, d, and side lever, f, substantially in the manner and for the purpose specified.

**84,505.—PAPER FILE.**—L. H. Olmsted, Brooklyn, N. Y. I claim the combination of the clasp, A, with the clamps, B, B', which said clamps are actuated by means of springs, substantially as shown and described and for the purpose set forth.

**84,506.—CORD COVERING MACHINE.**—Wm. H. Palmer, Jr., Middletown, Conn. I claim, 1st, The within described arrangement of the helms, M and N, so as to turn several bobbins, O, O', and their equivalents, by pulleys carried

on the shaft, B, from pulleys mounted concentrically within the mechanism, substantially as and for the purpose set forth.

2d, The covering bobbins, H, H', mounted on horizontal axes, the revolving ears, A, or their equivalents, and the open bared eyes, D, carried on the frame, D, all combined and arranged substantially as and for the purposes herein specified.

3d, The bevel gears, M G D, the revolving frame, D, and guides, O, the twisting spindles, G, and covering devices, H, in combination with the concentric shaft, B, revolving in the direction opposite to the revolutions of the frame, D, and arranged to impart opposite motions to the twisting and covering mechanism, all substantially as and for the purposes herein set forth.

**84,507.—HARVESTER.**—L. F. Parker, Davenport, Iowa. I claim, 1st, The pole, C, pivoted at the rear end of the main frame, and having its front end arranged to move laterally in a guide bar, D, located in front of the wheels, in combination with the cords, h, o, pulley, s, and windlass, n, substantially as described.

2d, The yoke, J, attached to the main frame, A, and having the pole, C, provided with the sliding bolt, f, working therein, and operated by the cord p, arranged substantially as set forth.

3d, The rake, R, carried by the chains, K, and having the arm, w, working in the groove, x, and against the guides, k and l, when said parts are arranged as shown and described.

4th, The combination of the grain receiving reel, I, the rock shaft, b', with its arm, b'', to be operated by the rake, R, and the locking bar, a', all constructed and arranged to operate as herein described.

5th, So arranging the rake, R, as to impart to it a lateral movement from the side as it passes from the upper side of the platform, and a return movement toward the side, as it rises to the top of the platform, substantially as described.

**85,508.—BENCH VISE.**—James Pickering, New Hope, Pa. I claim the two inclined planes or slides, when combined and arranged in the manner and for the purpose substantially as herein described and set forth.

**84,509.—MACHINE FOR ROUNDING BARREL HEADS.**—Owen Edmond, Rochester, N. Y. Antedated Nov. 19, 1868. I claim the combination of the loop or staple, c, and lever, c', with the spring latch, F, when arranged and operating substantially as described, for the purpose of causing more than a complete revolution of the clamps, c, c', to be made during the time that each barrel head is being sawed.

**84,510.—GRAPPLING HOOK.**—E. J. Riker, Lewiston, Me. I claim the grappling hook as described, combining the rod, c, cross bar, a, arms, h, h', hooked arms, f, f', all arranged to operate as described.

**84,511.—HEATING STOVE.**—Isaac N. Ross, Worcester, Mass. I claim in a stove, in which the magazine is arranged with relation to the fire pot, and combined with an annular surrounding its lower end, and its supply pipe, leading from the top of the stove as described, the formation of the air discharge apertures or perforations in the bottom, in contradistinction to the sides, of said annulus, substantially in the manner and for the purposes shown and set forth.

Also, the combination and arrangement of the auxiliary annulus, X, and its supply pipe, and discharge holes, with the fire pot, the magazine, and the annulus, L, and its air supply pipe and discharge holes, the whole being in the case as specified.

Also the combination of the inner annular air chamber, P, and its foraminous fire-proof side, R, with the fire-pot and the boiler annulus, L, applied thereto, as and for the purpose specified.

**84,512.—FARM GATE.**—O. E. Seymour, Madison, Ill. Antedated September 18, 1868. I claim the above described combination, consisting of the hand lever, G, G', rods, s, s', bars, a and c, and lever, b, used in connection with the triangular bell crank, F, or its equivalent, substantially in the manner and for the purposes set forth.

**84,513.—FASTENING FOR WHIP SOCKETS.**—Benjamin N. Shellenbaker, Newark, N. J. I claim a whip socket, having connected with it a fastening consisting of the hook, a, and the screw, d, constructed and operating substantially as and for the purpose specified.

**84,514.—SAW GUMMER.**—A. R. Silver (assignor to himself and John Deming), Salem, Ohio. I claim the saw gummer bar, B, herein described, constructed with a head, D, in which is a die socket, e.

**84,515.—LET-OFF MECHANISM FOR LOOMS.**—T. S. Smith, Charlestown, assignor to Alfred B. Ely, Newton, Mass. I claim, 1st, The combination of the brake or pawl, J, with the shaft and finger, H, when the parts are constructed and arranged to operate together, substantially as described.

2d, The adjustable lug or finger, H, when arranged and operating in connection with the brake or pawl, J, as a positive let-off to the yarn, substantially as described.

3d, The whip roll, D, supported by sliding arms, d, in combination with the spring, c, and adjustable collar, b, constructed and arranged substantially as and for the purposes described.

4th, The whip roll supported in spring bearings, in combination, and arranged and operating in connection, with the brake or pawl, J, so as to relieve the same, and let off the yarn by means of the tension thereof, substantially as described.

5th, The whip roll, supported in spring bearings, in combination or connection with the shaft and finger, H, when the latter are arranged to operate with the pawl or brake, J, substantially as described.

**84,516.—PUMP VALVE CHAMBER.**—Michael C. Taylor, Grass Valley, Cal. I claim, 1st, The diaphragm, B, in a valve chamber, and the valves, C, C', operated by the levers, D, D', substantially as and for the purpose specified.

2d, A double valve chamber, having one ingress and egress pipe, constructed substantially as and for the purposes herein described.

**84,517.—CLOCK.**—Silas B. Terry, Waterbury, Conn. I claim the anchor escapement, constructed as described, with one pallet, D, having a danger, d, and the other pallet, E, bent out, whereby one pallet is made dead beat and the other recoil, for the purpose of equalizing the vibrations of larger or smaller pendulums, produced by unequal motive power, as herein shown and described.

**84,518.—MACHINE FOR SAWING MARBLE.**—P. J. Torney, Washington, D. C. I claim, 1st, The shafts, a, a', with cog wheels, B B', and pulleys, b, b', in combination with the endless chains, D D', and pulleys, d, d', all constructed and arranged substantially as herein set forth.

2d, The arrangement of the shaft, I, with pulleys, J, and L, L', and pinion, H, operating in combination with the pinion, G, and screw thread, a on the shaft, C, to raise or lower the saw frame, substantially as herein set forth.

3d, The combination of the shaft, I, cog wheel, M, and arm, X, the latter provided with a dog or pawl, O, and connected in a suitable manner with an engine for the purpose of feeding the saw while the machine is in operation, substantially as herein set forth.

**84,519.—DEVICE FOR ATTACHING VINES TO TRELLISES.**—Edward F. Underhill, New York City. I claim the vine lock herein described, as a new article of manufacture, the same being adapted to be applied upon the vine and the trellis wire, and to be secured by a simple movement thereof, substantially in the manner and for the purposes herein set forth.

**84,520.—MACHINE FOR PAINTING WIRE CLOTH.**—Charles H. Waters, Groton, Mass. I claim, 1st, The combined arrangement of wire cloth and mechanism, herein described, for painting wire cloth, consisting of a trough of paint in which the wire cloth is immersed, and adjustable pressure rollers, between which it is passed, and a mechanism by which the cloth, after being painted, is drawn from the adjustable pressure rollers, substantially in the manner and for the purpose specified.

2d, In connection with the combined arrangement of wire cloth and mechanism, just described, the employment of a drying room in which the cloth is suspended vertically while being dried, substantially as herein specified.

3d, In combination with the adjustable rollers, which determine the quantity of paint applied to the wire cloth, the employment of a brush, by which the paint is cleared, substantially as described.

**84,521.—MACHINE FOR PRINTING FIGURES ON WIRE CLOTH.**—Charles H. Waters, Groton, Mass. I claim the combined arrangement of wire cloth and mechanism herein described, for printing figures upon wire cloth, consisting of a roller, having the figures to be painted engraved thereon, and a pressure roll, between which rollers the wire cloth is passed, a trough of paint, and the rolls by which the paint is applied to the engraved roll, and the mechanism by which the cloth is drawn away from said rollers after the figures are painted thereon, substantially as herein described and set forth.

**84,522.—SLATE FRAME.**—C. Joseph Wirth, Dansville, N. Y. Antedated November 25, 1868. I claim an attachment for school slate frames, consisting of a narrow oblong frame, D, hinged to the lower edge of the slate frame, and forming a cover therefor, said cover being provided with narrow flanges, attaching the same to the outer edge of the slate frame, for the purpose set forth.

**84,523.—BIT BRACE.**







84,601.—WAGON HUB.—Alonzo S. Woodward, Pepperell, Mass.

I claim, 1st, The hollow cast metal hub, composed of the parts, A, C, and B, the latter having the box cast thereon, and the whole fitted together as described, and held by bolts, a, all as set forth.  
2d, The packing rings, c, and packing strings, k, substantially as described, in combination with the hollow cast metal hub, as above set forth.  
3d, The part, B, of the hub, provided with the inclined lubricating hole, n, when said hole is closed by the perforated cap, p, and the elastic packing disk, q, as herein described, for the purpose specified.

84,602.—PROPULSION OF VESSELS.—Albert F. Yardell, San Francisco, Cal.

I claim, 1st, The bar or tank, C, capable of containing cargo, arranged and operating substantially as described, for the purpose of communicating motion to the propeller of a vessel.  
2d, In combination with the tank, C, the rod, I, segment, J, pinion, K, gears, L, I, 2, ratchets, P, and pawls, P', arranged and operating substantially as described, to give a rotary motion to the shaft, M.  
3d, Interposing a coiled spring, S, between the power shaft and the propeller shaft, for the purpose of equalizing or continuing the action of the power upon the propeller, substantially as described.

84,603.—WAGON SEAT.—Charles W. Aikin, Decatur, Ill.

I claim, 1st, The springs, C, with triangular blocks, e, formed at their lower ends, in combination with a wagon seat, substantially as and for the purposes set forth.

84,604.—CORN PLANTER.—J. M. Allison, Cranberry, Pa.

I claim a corn planter, having marking plows, A, rollers, B, D, and E, with pins, a, covering plows, b, casters, c, lever, d, rods, e, and g, and their duplicates, as described, and springs and pins, h, operating with slides at the bottom of the seed boxes, all constructed, arranged, and operating substantially as herein specified.

84,605.—WRENCH.—William Baxter, assignor to himself and William D. Russell, Newark, N. J.

I claim, 1st, An adjustable S-wrench, composed of two parts, mortised and tenoned together in the manner and for the purposes described.  
2d, The combination with the two mortised and tenoned parts of the S-wrench, of a right and left hand screw and thumb piece to operate it, substantially as and for the purposes set forth.  
3d, The construction and combination of the two parts composing the S-wrench, each being provided with a tenon and mortise, arranged on opposite ends, so that the plane of movement of the two parts shall be in the direction of the length of the wrench, and at right angles to the axis of the jaws, as set forth.

4th, The combination in an adjustable S-wrench, as described, of scales upon the divided wrench shank, with the right and left hand screw and thumb-piece, arranged within a recess formed in the two parts of the said shank, as and for the purpose set forth.

5th, The tenons formed upon and at right angles to the inner jaws, in combination with the corresponding mortises in the heads of the outer jaws, substantially as and for the purposes herein shown and set forth.

6th, The construction and arrangement of the larger and smaller jaws of the wrench, so that, when the smaller jaws are completely closed, the larger will be open to the maximum extent of the former, as and for the purpose set forth.

7th, The formation of the mortise and tenon in the body of the divided shank of an adjustable wrench, and upon that side of the division line between the two parts of the shank nearest the jaws, substantially as and for the purposes set forth.

84,606.—MODE OF PREVENTING THE COUNTERFEITING OF BANK NOTES.—Sigismund Beer, New York city.

I claim making a bank note or other printed article imitable, substantially in the manner and by the means described.

84,607.—STEAM GENERATOR.—George W. Blake, New York city.

I claim, 1st, The arrangement of the hollow headers, G and F, with the pipes M, heat as described.  
2d, The hollow headers, G and F, of corrugated construction on their sides to admit of the alternate triangular arrangement of the pipes, and to form a close joint with the adjacent header, as shown and described.

84,608.—VENTILATION.—George W. Blake, New York city.

I claim, 1st, The arrangement of radiators within the room flues, substantially as and for the purpose or purposes herein set forth.  
2d, The combination, with the fresh-air shaft and radiator, arranged within the room flues, as described, of a valve, operating automatically, to prevent an upward current being established through said shaft, but freely admitting of a downward one through the same, essentially as specified.

84,609.—APPARATUS FOR MAKING EXTRACTS AND DECOCTIONS FROM COFFEE AND OTHER SUBSTANCES.—Louis Brauer, Washington, D. C.

I claim, 1st, The apparatus herein described, composed of the two vessels, a and b, the latter vessel, a, surrounding the bottom and sides, or lower portion, of the vessel, b, substantially as described.  
2d, The vessels, a and b, united by means of flanges or their equivalent, so as to be united or detached at will, substantially as described.

3d, The funnel-shaped mouthpiece, n, with closely-fitting stopper, in combination with the vessels, a and b, substantially as described.

84,610.—CORN SHELLER.—James A. Cauldwell, Horseheads, New York city.

I claim the corn sheller, as composed of the drum, F, with convex surface and armed with teeth; the concave sectional shell, K1 K2 K10, also armed with teeth, and perforated between the teeth; the springs, s, s'; the screw, T, with the attachment for shaking the same; the fan, P; all constructed for the purpose as specified.

84,611.—CULTIVATOR.—Isaac H. Chappell and James Montgomery, Decatur, Ill.

We claim, 1st, A cultivator, the draft pole and plow frame of which are pivoted on the draft-bar, substantially as and for the purposes set forth.  
2d, The attachment of the draft pole to the seat-bar, by means of the pin, a, pivoted in slot, c, and nut, d, substantially as and for the purposes set forth.

84,612.—SCABBARD FOR TROWEL BAYONET.—Felix Chillingworth, Springfield, Mass.

I claim a scabbard for trowel-shaped bayonets, constructed and arranged as described.

84,613.—APPLICATION OF CARBONIC ACID IN FIRE ENGINES.—Isaac H. Clark, Boston, Mass. Antedated November 27, 1868.

I claim, 1st, Combining with the discharge water of a force pump or fire engine, a stream, jet, or flowage of carbonic acid gas, for the purpose and to produce results before stated.  
2d, As one mode of producing and applying the said gas, the employment of the furnace constructed as before explained, and combined with the air-pump and discharge water of the engine, essentially as herein shown and described.

3d, The combination, with a force-pump or engine, otherwise of ordinary or well-known construction, of an air-pump for introducing or ejecting carbonic acid gas into the discharge water of such engine, after such water may have left the pump cylinders, for the purposes substantially as before explained.

84,614.—WINDMILL.—Saml. H. Halstead, Godfrey, Ill., administrator of the estate of Jesse R. Clough, deceased.

I claim the triangular vane, L, arranged substantially as described, so that their narrow faces, P, are exposed to the direct action of the wind on entering the wheel, and the adjoining faces, Q, are exposed to its action when leaving the wheel.

84,615.—STEAM ENGINE VALVE GEAR.—Joseph Crampton, New York city.

I claim the combination of the reversing lever, G, link F, and valve operating beam, E, the whole arranged relatively to each other, and to the cylinder trunk and valve, substantially as and for the purpose herein specified.

84,616.—CARTRIDGE BOX.—Silas Crispin, New York city.

I claim, 1st, The removable carrier block, B, when provided with its own flap, and adapted to fit an outer case or cartridge box, substantially as and for the purposes described.  
2d, In combination with the cartridge carrier block, B, and the outer case or cartridge box, the ledges or battens, a', applied in the manner and for the purpose described.

84,617.—STEAM, GAS, AND WATER STOP COCK.—W. H. De Vallin, Sacramento, Cal.

I claim, 1st, A stop cock in which the valve or plug is arranged within the case in the manner described, the combination of the valve with a disconnector flange valve stem having its seat or bearing against the cap by which the valve chamber is closed, and held in place by means of a handle, arranged and operating substantially as herein described.  
2d, The combination and arrangement of the valve stem and cap for closing the valve chamber, with the handle for operating the stem, and the cap and spring for retaining the handle in place, and holding said stem up in its seat, substantially as herein specified.

3d, A stop cock, such as described, having the valve stem formed in two parts, hinged together above the point where the stem bears or fits against the cap, for closing the valve chamber.

4th, The recessed and grooved handle and knob, and the flanged or winged cap, in combination with the valve operating stem, said parts being constructed and arranged to operate as herein shown and specified.

84,618.—TABLE.—Jean C. Drouhard and Adolphe L. Roye, New York city.

We claim, 1st, The divided center pillar, C, so constructed and combined with the legs, a, as to form the central support of a center table, one of the three legs of which is herein described.  
2d, The combination of the jointed brace, G, hinged arms, d', fixed legs, a, and movable legs or dividers, e, c, of the divided center pillar, substantially as and for the purpose herein set forth.

84,619.—CHURN.—Samuel S. Elder, Springfield, Ill.

I claim, 1st, The within described construction and arrangement of agitators, F.  
2d, The combination of the driving mechanism, arranged as described, with the agitators, F and C.

84,620.—MORTISING MACHINE.—W. L. Epperson, Louisville, Ky.

I claim, 1st, A treadle or lever for operating a mortising machine, the short arm of which is lengthened automatically as the lever is moved, to operate the machine.  
2d, The combination of the cogged lever, F, and the segment, E, and connecting rod, H, substantially as shown and described.  
3d, The arrangement of the adjustable tool carrier, A, screw, O, and connecting rod, H, substantially as shown and described.

84,621.—ROPE BEARING ATTACHMENT IN MACHINES FOR SEAM CULTURE.—Max Ryth, New York city.

I claim curving the arms or "outstrippers," a, upward, so that the same will clear the growing crops, as herein shown and described.

84,622.—STEAM ENGINE REGISTER.—Joshua Garsed, Frankford, Pa. Antedated Nov. 21, 1868.

I claim, 1st, The disk, M, D, cross piece, C, P, arms, A, and A', shaft, S, and worm, W, flange, F, L, wheel, T, W, cap, C, and its boss, L, lever, L', and its worm, W, shaft, U, wheel, T, W, and worm, W', shaft, S, and worm, W',

wheel, T, W, and hand, H, all arranged, constructed, and combined in the manner and for the purposes herein set forth.

2d, A register for steam engines or other purposes, arranged and operating substantially in the manner herein specified.

84,623.—LAMP.—John Gibbs, Brooklyn, E. D. N. Y.

I claim the pressure roller or rollers, d, supported in slots, e', when operated by the sliding stem, e, in combination with the feed roller, C, substantially as shown and described.

84,624.—BRICK MACHINE.—Henry H. Gray, Haverstraw, N. Y., assignor to himself and Moses B. Pardee, Norwalk, Conn.

I claim, 1st, The stair shaped stops, j, in combination with standard, l, cross bar, e, and plunger, F, substantially as and for the purpose set forth.  
2d, The yielding latch, b', in combination with the pusher bar, F, substantially as and for the purpose described.

84,625.—STAMP AND DIE FOR SHEET METAL.—W. D. Grimshaw, Newark, N. J.

I claim, 1st, The employment of four cylinders, y1 y2 y3 y4, combined with the main cylinder, F, to equalize the pressure upon the four corners of the guide rod, B, A, L, and A', depending on the four guide posts, z1 z2 z3 z4, constructed, adapted, and arranged substantially as set forth.  
2d, The top plate, C, with circular passages, x, w and y, in combination with the five cylinders, as specified and shown.

3d, The levers, o, m, n, and the treadles, p, q, when combined with the five cylinders for graduating the pressure upon the plate, H, as set forth.

84,626.—HEATING STOVE.—Elizabeth Hawks, Vineland, N. J.

I claim, 1st, The base, A, constructed as described, with a partition, B, dividing it into two chambers, and which partition is provided with holes, b, and slides L, L', substantially as and for the purposes herein set forth.  
2d, The arrangement of the cylinders, D and E, and upright plates, F, F', forming a flue for the passage of the smoke, etc., and leaving the balance of the chamber between said cylinders for hot air, substantially as herein set forth.

84,627.—PRINTING PRESS.—Richard M. Hoe and Stephen D. Tucker, New York city.

We claim, 1st, The combination of two feeding tables with the means described, or the equivalent thereof, for taking the sheets of paper alternately from the opposite feeding tables and conducting them to the impression cylinder, substantially as and for the purpose described.  
2d, Separating the sheets or pad attachment to a wash powder, so that they will be delivered in files, substantially as set forth and specified.

3d, The means, substantially as herein described, for clamping stereotype or other printing plates directly to the surface of a type cylinder, as set forth.

84,628.—TOY FISH.—Robert Hunter, New York city.

I claim the application of the vibrating tail as a propeller for mechanical fish, toy boats, etc., substantially as and for the purpose stated.

84,629.—BOOT CRIMPER.—F. C. Jackson, Peru, Ind.

I claim the slide, B, provided with two triangular frames, projecting inward, and operated as specified, to cause an equal pressure on the board, D, as herein shown and described.

84,630.—BUT HINGE.—George A. Jenks (assignor to himself and James Maguire), Chicago, Ill.

I claim the arrangement and construction of the two wings of the but, with their pivots on the upper and lower bowl pointing toward the center, with a recess for the other bowl, c, by which the hinge or but can be adjusted, substantially as shown and described.

84,631.—MACHINE FOR REDUCING LEATHER.—Wm. C. Joslin, Putnam, Conn.

I claim the combination with the receiving and delivering rolls, B, C, C', bed, D, and reciprocating knife or reducer, E, of the sliding blocks, I, I', and cranks or eccentrics, with their pitmen or rods, H, H', arranged for operation together essentially as specified.

84,632.—MECHANICAL MOVEMENT.—Moritz Laemmel Bay Ridge, N. Y.

I claim the arrangement of an adjustable shaft, B, in combination with the lever segments, C, operated alternately by ratchets or hand levers, and connected to the shaft, B, by clutch pulleys, or other equivalent mechanism, substantially in the manner and for the purpose shown and described.

2d, The arrangement of a dog, E, and friction strap, I, in combination with a pulley, b, lever segment, C, and shaft, B, substantially as and for the purpose set forth.

84,633.—WASH POUNDER.—P. A. La France, Elmira, N. Y., assignor to himself and Oliver B. Gray, New York city.

I claim the combination of a wash powder with a wash pounder, in general form and device substantially as and for the purposes described.

84,634.—GANG PLOW.—James B. Logan, Richview, Ill.

I claim the combination and arrangement of the beams, H, swinging beam, O, and G, the handles, F, and lever, E, the arrangement being such that the plow is drawn by the levers, O, which are attached to the forward ends of the levers thereof, substantially as shown and described.

84,635.—EXPLOSIVE PROJECTILE.—Jacob Long, Shaver's Creek, Pa.

I claim the combination of a loaded shell with the barrels, A, each containing several charges of powder and ball, arranged so as to discharge their contents in succession after the bursting of the shell, substantially as described.

84,636.—MANUFACTURE OF ILLUMINATING GAS.—Charles B. Leveles, Syracuse, N. Y.

I claim, 1st, The combination of the battery, b, as constructed with the oil reservoir, a', containing perforated lead pipe, n, and gasometer, a, and float, b, for generating hydrocarbon gas, as herein set forth.  
2d, The combination of the pipe, k, lead pipe, n, with perforations, pipes, l, and o, with gasometer, a, and float, b, gas pipe, r, w, gasometer, a, and pipe, d, with gas burner, also the rod, q', with pipe, g, for guiding the float in the gasometer.

3d, The perforated lead pipe, n, with oil reservoir, a', as described and for the purposes set forth.

4th, The header, g, constructed substantially as described, and operating as and for the purposes set forth.

5th, The combination of the pipes, k and k', as described, and for the purposes of an oxyhydrogen blowpipe, as set forth.

84,637.—REVOLVING STAY LOG FOR CUTTING VENEERS.—John N. Lyman, New York city.

I claim a revolving stay log, constructed as described, and for the purposes herein set forth.

84,638.—CEMENT.—E. V. Machette, Jr., and E. M. Cray, Philadelphia, Pa.

We claim, 1st, The composition of the above named ingredients, in or about the proportions aforesaid, for the purpose specified.

84,639.—GRATE FOR BRICK KILNS.—John Maltress, Edgerton, Wis.

I claim the movable grates, B, B', constructed as described, in sections, and provided with dampers, a, said dampers being operated by levers, b, b', for the purpose of increasing or diminishing the gas flow, or a part of a brick kiln, substantially as and for the purposes herein set forth.

84,640.—APPARATUS FOR REDUCING WOOD TO PAPER PULP.—Henry Marx, Pikeville, Md.

I claim, 1st, The stone, O, employed for regrinding fragments separated from the blocks by the stone, B, substantially as and for the purpose explained.  
2d, The chain, E, employed to hold or press the blocks to the surface of the stone, B, substantially as explained.

3d, The counter chain, H, for retracting the chain, D, for the insertion of fresh blocks.

84,641.—FLUTED TRIMMING.—L. H. Maudebaum, New York city.

I claim the within-described compound flutings, made of muslin or other suitable material, and composed of large, regularly formed flutes, e, e', divided by straight line depressions, e, e', and bounded on either side by numerous and smaller flutes, b, b', having fluted borders, a, a', exterior to them, substantially as shown and described.

84,642.—AUTOMATIC BOILER FEEDER.—Henry McGann, Cleveland, Ohio.

I claim the combination of the slide valve, F, with the arm, D, shaft, a, float, B, cage, A, and chest, C, substantially as specified.  
2d, The supplementary chest, C, in combination with the shell, A, as set forth.

84,643.—MARTINGALE.—Patrick J. McGuinness, N. Y. city.

I claim, as a new article of manufacture, an ornamental elastic standing martingale, consisting of the leather loop, A, rubber elastic strap, D, metallic flat tube, B, and swivelled snap hooks, I, all constructed and arranged as herein described.

84,644.—MODE OF PRODUCING STEEL.—James Myers, Jr., Brooklyn, N. Y., assignor to Barron's Steel Manufacturing Company.

I claim, 1st, The conversion of cast iron into steel, by the combination of the two processes of decarburization and re-carburization as above stated, in the manner and for the purpose of articles of malleable cast iron, produced by any known process, into steel, by the application of gases produced from any solid or liquid carbonaceous substances, in the manner substantially as described.

2d, The production of cast steel, by remelting steel formed from malleable cast iron, then made in the manner above described.

84,645.—HOOK AND CORNICHE FOR SUSPENDING PICTURES.—William Potts, Handsworth, England.

I claim a metallic picture rail, that is to say, a metal strip or bar, whose lower or inner edge is turned upward, so as to constitute a rail upon which the picture supporting hooks can freely slide, provided with an ornamental covering or casing of a metallic or non-metallic substance as described, and operating as and for the purpose herein set forth.

84,646.—LOW WATER INDICATOR.—John W. Richards, Newark, N. J.

I claim the fixed valve, E, constructed of a tubular character as described, and hung so as to be capable of swinging away from its seat, for action in concert with the tube, D, substantially as described.

84,647.—LAST BLOCK ELEVATOR AND INTER STRETCHER.—Sesley Richmond, Annapolis, Md.

I claim, 1st, The inclining slot, b, in the rear part of the last block, H, in combination with the nut, D, substantially as and for the purpose set forth.  
2d, The combination of the slot, b, nut, D, short screw, C, and nut, F, when operating as a last block elevator, substantially as described and shown, and operating in a last, substantially as and for the purpose set forth.

84,648.—CAR COUPLING.—Ephraim Russell, Waynesburg, assignor to himself and Heyward Yost, Honey Brook, Pa.

I claim an open link, A, and the sliding handle, B, in combination with a slotted draw head, all constructed and operating together, substantially as and for the purpose described.

84,649.—CULTIVATOR.—Roger Sandiford, Joliet, Ill.

I claim, 1st, The segmental oscillating coupling clavis, shown in figs. 1 and 2, consisting of the parts, a, d, n, and its parts, o, shown in fig. 3, when applied to a cultivator in the manner and for the purposes set forth.

2d, The metal cross piece, A, in combination with the post or frame, c, and supporting arms, B, B', constructed and arranged in the manner described.

84,650.—WATER PROOF SHOE.—Frederick M. Shepard, New York city.

I claim a boot, shoe, or other such like article, made of vulcanized India rubber or allied gum, with a plate, or section of a plate, or the equivalent thereof, made of metal or equivalent material, embedded in the India rubber sole while in the green or plastic state, to which, after vulcanization, an outer sole can be secured, substantially as and for the purpose specified.

84,651.—CARTRIDGE HOLDER.—J. S. Smith, Brooklyn, N. Y.

I claim the casing or holder herein described, adapted to receive cartridges, and to support them with firmness by the springs, n, formed of the same metal as the respective pieces, B and C, substantially as and for the purposes herein set forth.

84,652.—GANG PLOW.—Andrew Smith (assignor to T. J. Carter, and W. P. Watson, Portland, Oregon).

I claim, 1st, The combination of the lever, O, having the offset, e, with the ratchet, P, rod, R, having the tooth or shoulder, r, and lever, T, the whole operating substantially as and for the purpose described.  
2d, The arrangement of such frame, when constructed as herein described, in combination with a downward acting axle, D, the box strap, e, the braces, H, H', the draft pole, G, and the wheels, F, F'.

3d, The arrangement of the clevis, K, braces, H, H', king bolt, C, cross bar, A3, and axle, D, the axle being behind the king bolt, and the latter being supported by the braces and the cross bar, substantially as herein described.

4th, The braces, u and v, attached at their lower ends respectively, to the mold board and standard, and at their upper ends provided with screw threads, upon which are fitted, above and below the plow beam, through which the braces pass, adjusting screw nuts, substantially as and for the purpose specified.

84,653.—FARM GATE.—Byron Snyder, Clinton, Wis.

I claim the rigid lever, E, eccentric lever, D, and latch bar, F, in combination with the pulleys, I, I', cranks, I', endless band or chain, K, K', claws, a, a', gate, A, posts, F, C, and latches, F, and g, when constructed substantially as described, to operate as specified.

84,654.—CONSTRUCTION OF RUBBER AND OTHER ELASTIC SPRINGS.—Daniel E. Somes, Washington, D. C.

I claim, 1st, A spring, composed of a series of elastic tubes, one within another, substantially as set forth.  
2d, A spring, composed of a series of elastic spheres, one within another, and their attachment or perforated, substantially as set forth.

3d, A spring, composed of elastic tubes or spheres, surrounded by elastic bands or rings, substantially as set forth.

84,655.—BOX TO CONTAIN CIGARS, MONEY, ETC.—Nathan Thompson, Brooklyn, E. D. N. Y.

I claim the combination with the box or shell, A, of the lid or cover, B, pivoted, by or through side arms, b, b', to the sides of the box, for operation in relation to the mouth thereof, substantially as shown and described.

84,656.—REVOLVING HARROW.—William R. Toby, Nunda, and Myron J. Harato, Mount Morris, N. Y.

We claim, 1st, The combination of the shaft, d, with the weighted rollers, D, arm, b, and beam, B, arranged as described, and operating substantially as and for the purpose described.  
2d, The draft rod, g, and gate bearing, h, in combination with the beam, B, and friction roller, i, arranged and operating substantially as and for the purpose herein set forth.

84,657.—BOX FOR LARD, BUTTER, AND SIMILAR SUBSTANCES.—Charles L. Tucker, Chicago, Ill.

I claim, 1st, As a new article of manufacture, a box for packing lard, butter, and other similar substances, made by coating wood pasteboard, or other suitable material, with a stiffening cement of glue and starch, with or without earthy materials, substantially as described.  
2d, A cement for packing boxes composed of glue or gelatine, combined with starch or its equivalent, with or without the addition of earthy materials, as described.

84,658.—CHURN.—William B. Tucker, Columbus, Ohio.

I claim a churn dasher, of a diamond form, as herein shown and described, as an improvement to my Letters Patent, bearing date March 12, 1868.

84,659.—COMBINATION LOCK.—A. B. Vandemark, Phelps, N. Y.

I claim the combination and arrangement, with the disk tumblers, E, E1 E2 E3, provided with spring bearings, E, k, of the cam, D, D', on the spindle, having an end motion to engage in one position with two of the tumblers and, in opposite position with the other two, said tumblers, by two, being set by the reverse turn of the spindle, as herein set forth.

84,660.—OPERATING CAPSTAN.—W. W. Vanderbilt, New York city.

I claim, 1st, The arrangement and combination of the engines, A, A', capstans, A, pumps, C, C', rear wheels, F, F', capstan, E, and friction cone, j, all constructed and operating substantially as and for the purpose herein set forth.  
2d, The regulating screw, s, in combination with the lever, g, friction cone, j, cog wheels, f, g, and capstan, E, substantially as and for the purpose described.

3d, The arrangement of the back gear, n, o, in combination with the cog wheel, i, bevel wheels, f, g, capstan, E, crank shaft, D, and engines, A, A', all as and for the purpose described.

84,961.—BLIND FASTENER.—Frederick Veazie, Worcester, Mass.

I claim the construction and arrangement of the blind fastener, having the raised surface, d, the shoulder, e, and cavity, B, to hold the spring, E, and the pin, D, arranged and operating substantially as and for the purpose described in the manner and for the purposes above set forth and described.

84,662.—WAGON BRAKE.—William T. Ward, Indianapolis, Ind.

I claim,



as thereon, as aforesaid, by means of jaws opened and closed at intervals, to seize and pinch the fabric when at rest, and then release it as the same is moved along intermittently by a suitable feeding mechanism, as set forth.

3d. The combination, with the jaws arranged as aforesaid, for action on a fabric, of a bed plate or plate of jaws, substantially as set forth, and in which the longitudinal movement of the jaws is substantially as set forth, and in which the jaws are brought down in contact with and made to impinge upon the fabric by a pivoting mechanism, substantially as set forth, and in which the jaws are brought down in contact with and made to impinge upon the fabric by a pivoting mechanism, substantially as set forth.

4th. The combination, with the jaws arranged as aforesaid, of a truck marker, substantially as set forth.

5th. The combination, with the jaws arranged as aforesaid, of a truck marker, substantially as set forth, and of a truck marker, substantially as set forth, and of a truck marker, substantially as set forth.

6th. A truck-creasing mechanism, substantially as set forth, and in which the upper and lower parts connected, and together adjustable, as to its relation with the needle of a sewing machine, and operated by the sewing machine, substantially as set forth.

7th. The spring, G, for carrying the upper half of the trucking device away from the cloth after each trucking action, when relieved by the needle arm, substantially as set forth.

8th. The combination, with a truck marker, having upper and lower parts, substantially as set forth, of a truck marker, substantially as set forth, and of a truck marker, substantially as set forth.

21,268.—HORSE RAKE.—Dated August 24, 1858; re-issue.

3,119.—Adam R. Reese, Phillipsburg, N. J., assignee of Ann Morgan, administratrix of the estate of Mirick Morgan, deceased.

1. Claim, 1st. In a two-wheeled wire tooth hay rake, having a stationary axle with teeth separately hinged, the combination of a spring to each tooth to assist in holding it to the ground, and attached to the rake head by a certain bolt which attaches to the teeth, at a point betwixt and within the periphery of the wheels and a lever, operated by the driver while riding on the pithy of the wheels and raising and lowering the teeth.

2d. In combination with a two-wheeled wire tooth hay rake, the teeth of which are each separately and independently hinged to a rake head, a device, strain at a point betwixt and within the periphery of the wheels, and operated by the attendant while riding on the seat, for raising the teeth, and stationary cleaner rods for holding the hay down in the upward movement of the teeth.

3d. Hinging the teeth independently to each iron plate or head, which are in turn, connected to a common rod rising on the seat.

4th. In combination with a two-wheeled wire tooth hay rake having a stationary axle, with the teeth separately and independently hinged to a rake head, a device, strain at a point betwixt and within the periphery of the wheels, and operated by the attendant while riding on the seat, for raising the teeth, and stationary cleaner rods for holding the hay down in the upward movement of the teeth.

5th. In a two-wheeled wire tooth hay rake, having a stationary axle, the combination of teeth hinged separately betwixt and within the periphery of the wheels, and a stop to each tooth, to prevent it from falling below a certain point, and for holding it while being raised by the operator while riding on the seat.

6th. The combination, in a two-wheeled wire tooth hay rake with a stationary axle, of a support for the teeth, betwixt and within the periphery of the wheels, that will admit of an upward and downward motion to each tooth, without the movement of the head that supports them against backward strain, and a stop for limiting its downward motion, and for enabling the attendant to raise the teeth from the ground by means of a device operated while riding on the seat.

7th. Independently hinged wire teeth, each provided with a sustaining spring, strain at a point betwixt and within the periphery of the wheels, and a stop for limiting its downward motion, and for enabling the attendant to raise the teeth from the ground by means of a device operated while riding on the seat.

8th. In combination with a two-wheeled wire tooth hay rake, the teeth being supported against their backward strain betwixt and within the periphery of the wheels, a device, strain at a point betwixt and within the periphery of the wheels, and a stop for limiting its downward motion, and for enabling the attendant to raise the teeth from the ground by means of a device operated while riding on the seat.

9th. In combination with a two-wheeled wire tooth hay rake with stationary axle, having the teeth separately hinged to a rake head, betwixt and within the periphery of the wheels, a hand lever attached to said head and operated by the attendant, for raising the teeth while riding on the seat.

10th. In combination with a two-wheeled wire tooth hay rake, the teeth being supported against their backward strain betwixt and within the periphery of the wheels, a device operated by the attendant while riding on the seat, for raising the teeth, and stationary cleaner rods, supported at the inner end only, for holding the hay down while the teeth have their upward movement.

11th. Supporting the stationary elastic wire cleaner rods of a two-wheeled wire-tooth hay rake, betwixt and within the periphery of the wheels, for the purpose of holding the hay and straw down, by a device for raising the teeth, operated by the attendant while riding on the seat.

10,498.—MACHINE FOR CLEANING AND ASSORTING BRISTLES.—Dated February 7, 1854; extended seven years; re-issue 3,230.—Division A.—Nathan H. Spafford, Boston, Mass., assignee, by mesne assignments, of George Edward Burt.

1. Claim, 1st. A machine for combining bristles, combining in its construction the following elements, viz: a comb, a clamp for holding the bristles while subjected to the action of the comb, and suitable mechanism for passing the comb through the bristles, and for combining the same substantially as set forth.

2d. In combination with the comb, a movable clamping apparatus, by which the bristles are brought into proper position to be acted upon by the comb.

3d. The combination of the movable combs, T and U, with the clamping belts, E and L, F and M, combined and operating substantially as described.

4th. In combination with the clamping and conveying mechanism, the double brush belts, arranged to act as conveyors, substantially as set forth.

5th. A machine for cleaning and assorting bristles, combining in its construction the following groups of elements, viz: mechanism for combining the bristles, a conveying mechanism, for carrying the bristles after being subjected to the action of the comb, and mechanism for successively taking up the bristles of different lengths, substantially as described.

6th. A conveying mechanism, for carrying the bristles after being subjected to the action of the comb, and mechanism for successively taking up the bristles of different lengths, substantially as described.

7th. The spring board, P, and hammer, R, combined and arranged to operate substantially in the manner and for the purpose specified.

8th. The combination of the combs, U and V, with the grooved delivering rollers, arranged to operate substantially in the manner and for the purpose specified.

9th. The combination of the staff, G, attached, as above described, at one

end, to the frame, C, the box, 2, the crank, K, and the comb or rake, T, when combined to operate substantially as described.

10th. The combination of the comb or rake, T, to the main frame with three movable junctions or joints, constructed and arranged to allow the staff to assume freely any angle caused by the revolutions of the crank, substantially as described and set forth.

11th. The arm, B, or its equivalent, when attached to the main frame, and so constructed and arranged as to hold in position the upper end of the staff, G, and admit the staff to play freely in all the various angles of the same, caused by the revolutions of the crank, K, substantially as described.

12th. The combs or rakes, T and U, composed of any number of teeth, and attached to staves actuated by crank-shafts, and held in position by mechanism so arranged that, by revolving the crank-shafts, there shall be imparted to the forks a curvilinear motion, substantially as described.

13th. The cranks, K and L, in such relative position with each other that they will cause the combs or rakes that are attached to them to act alternately, substantially as described and set forth.

14th. Supporting or sustaining the combs or rakes upon fulcrum which move in the arc of a circle, and having also a rocking or back-and-forward motion upon said moving fulcrum, substantially as described and for the purpose set forth.

66,785.—METHOD OF CONVERTING IRON INTO STEEL.—Dated July 16, 1867; reissue 3,222.—The Barons Patent Steel Manufacturing Company, New York city, assignees of John F. Boynton.

We claim, 1st. In carrying the above described method into effect, the use of gas saturated with carbon by being passed through a carbonized vessel, as above described, and mixing or combining the gas, so produced, with hydrocarbon vapors, by any known means of producing that result.

2d. Also, in carrying the above described method into effect, the use of other gases, heretofore mentioned, when charged with hydrocarbon vapors.

3d. Also, in carrying the above described method into effect, the use of atmospheric air charged with hydrocarbon vapors, by any known means of producing that result.

4th. Also, in carrying the above described method into effect, the heating of heavy hydrocarbons, to cause their vapors more readily to mix or combine with the gases or air, and be carried through a carbonized compound, after it has been cooled into steam, by the above described method, and thereby converting it into cast steel, as described.

5th. Also, in carrying the above described method into effect, the use of hydrocarbon vapors without admixture with gas or air, as and for the purpose set forth.

6th. Also, in carrying the above described method into effect, the use of iron into steel, coating a portion of any piece of iron with a wash, as described, to prevent the portion so coated from being converted into steel.

7th. Also, converting the oxides of iron directly into steel by one heating, by passing carburized or carbonized hydrogen gas over and through the same when in a highly heated state, according to the method or process herein described.

## DESIGNS.

3,255.—TRADE MARK.—Leonidas L. Coleman, Nashville, Tenn.

3,256.—AXLE BOX FOR RAILWAY CARRIAGES.—John Corri-rigan, Charlestown, Mass.

3,257.—CARPET PATTERN.—Benjamin Crabtree, Jr., Philadelphia, Pa.

3,258.—CARPET PATTERN.—Israel Foster, Philadelphia, Pa.

3,259.—BRIDLE FRONT, etc.—Charles Frazer, New York, city.

3,270 to 3,271.—PRINTERS' TYPE.—Hermann Henburg, (assignor to Mackellar, Smiths, and Jordan), Philadelphia, Pa. Two Patents.

3,272.—PRINTERS' TYPE.—Peter A. Jordan, (assignor to Mackellar, Smiths and Jordan), Philadelphia, Pa.

3,273.—PRINTERS' TYPE.—Andrew Little, New York city.

3,274.—CLOCK CASE.—Nicholas Miller, New York city.

3,275.—SPOON OR FORK HANDLE.—Charles F. Richers, New York city.

3,276.—FORK OR SPOON HANDLE.—George Wilkinson, Providence, R. I.

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U. S. PATENT OFFICE, WASHINGTON, D. C., Nov. 24, 1868.

Norman W. Wheeler, of Brooklyn, N. Y., having petitioned for an extension of the patent granted to him on the 31st day of July, 1855, for an improvement in a "Method of operating Steam Valves," it is ordered that said petition be heard at this office on the 15th day of February next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing. ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE, WASHINGTON, D. C., Nov. 25, 1868.

Noble T. Greene, of Providence, R. I., having petitioned for an extension of the patent granted him on the 13th day of March, 1855, for an improvement in "Cut-off Valves for Steam Engines," it is ordered that said petition be heard at this office on the 15th day of February next.

Any person may oppose this extension. Objections, depositions, and other papers, should be filed in this office twenty days before the day of hearing. ELISHA FOOTE, Commissioner of Patents.

U. S. PATENT OFFICE, WASHINGTON, D. C., Nov. 25, 1868.

G. W. N. Yost, of Corry, Pa., having petitioned for the extension of a patent granted him on the 20th day of March, 1855, for an improvement in "Cultivators," it is ordered that said petition be heard at this office on the 15th day of February next.

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Vol. XIX.—No. 26.  
[NEW SERIES.]

NEW YORK, DECEMBER 23, 1868.

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## Hydrostatics Applied to Revolving Iron Forts.

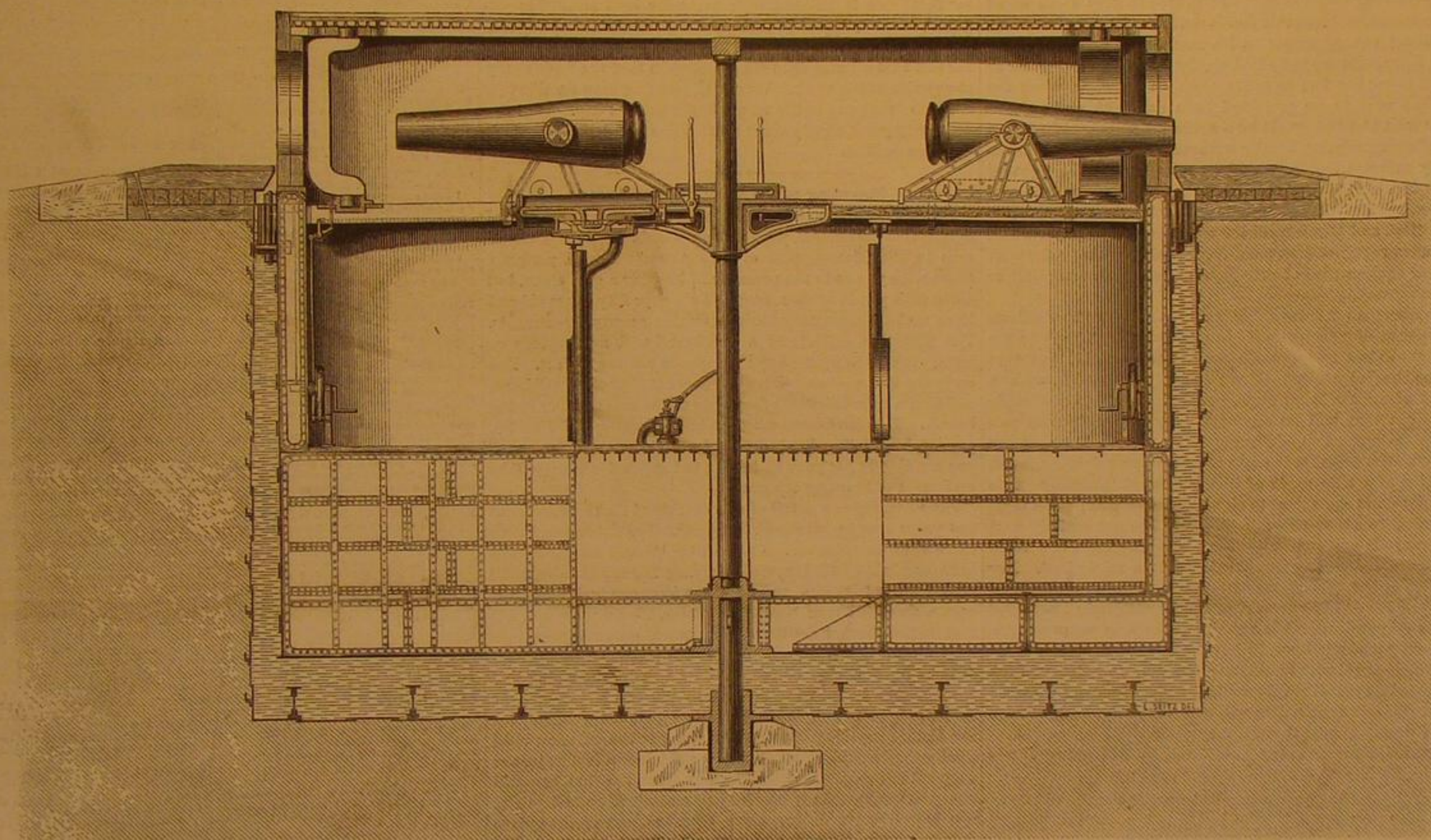
So long as human nature is governed by ambition and the pursuit of gain, whether in individual enterprise or for national aggrandizement, so long shall we be subject to wars with their attendant calamities; and while these results are inevitable we should guard against the consequences by being on the alert for the foe.

We now see all the most enlightened nations of the world constantly experimenting, planning, and devising the best means of defence and offence; we see the best moral, military, scientific, and mechanical minds more or less brought to bear upon these two problems: How best to defend ourselves

and are surrounding them with iron-clads, floating batteries, and torpedoes. One writer says that the British Admiralty have made a "lamentable failure of the Plymouth forts and Gibraltar shields," and it is well known that in some cases they plate the tops of the fort, leaving the base exposed, when they know by actual experiment that a single shot has "splintered" granite blocks fifteen feet back from the face, or point of impact. Naval tactics are being reversed; forts were formerly used to protect ships, but now ships have to protect forts, such as they are. Doubtless the true theory is mutuality; one auxiliary to the other.

In view of these facts it is claimed that the Revolving Hy-

drostatic fort heretofore held by ships under steam and constantly in motion while in the act of bombarding; for this fort can also be kept in constant motion, so that the lateral range when got, need never be lost on a moving ship—overcoming the most difficult part of gunnery in fortifications. This fort can also be located in positions where it would be almost impossible to erect an ordinary fort; as for instance, in low marshy land or on quicksand, this fort may be set up in a few days by simply excavating a pit large enough to receive the iron tank, when the foundation is ready for an eight gun fort, equivalent to a 50 gun fort of the present construction; and if it be exposed to attack from land, it still



RYAN & HITCHCOCK'S REVOLVING IRON FORT.

against an enemy's ships; how best to assail an enemy with ships.

Of late the science and skill in the manufacture of large guns is so far in advance of the power of resistance in ships when they are clad up to their maximum load, that they are not at all reliable; and the old fortifications are still more unreliable; hence the necessity of corresponding improvements in forts and other means of defence. When our largest guns consisted of 68 pounders, it was but pastime for the brick mason and stone cutter to construct fortifications. But now 600 or 1000 pounders have reduced all such fancy structures to worthlessness. It is now guns *versus* forts, iron and steel against iron and steel. But the iron-clad is now more than a match for the old fort, and iron plating has heretofore proved a failure, therefore we see great energy and anxiety exhibited by foreign nations to protect their fortifications. To preserve their guns in barbette they mount revolving turrets on the top, and in the angles of their forts, but this as a naval defence will probably prove a useless experiment. Other experiments are proposed, such as adopting "rifle pits" on a large scale, with guns so mounted that they "get themselves up and fire over the top of the pit and then get themselves down again to be reloaded;" and, lastly, it is proposed to mount a miniature fort on trucks to be propelled by a locomotive engine; this locomotive fort to travel on an annular inclined railway, coming round from behind a shield or casement moving up the incline and firing over the embankment, and then gracefully retiring. These somewhat novel devices tend to show the drift of the practical mind, the utter incapacity of the present mode of constructing fortifications, and the consciousness that something must be done, and that soon, to solve these two great problems; yet no two engineers can agree, but leave them, as they found them, unsolved. We know, too, that the very existence of some Governments depends on the solution of one or the other of these problems. We know that Governments that ve the most forts, really have the least confidence in them,

drostatic and Pneumatic Fort satisfactorily solves the first problem; how best to defend ourselves against an enemy's ships. Accompanying this article will be found a plan, reduced from working drawings drawn to a scale, to admit of eight 15-inch guns, and is 58 feet diameter on the gun deck. It gets its flotation by being inclosed in an iron tank, say two feet greater in diameter than the bottom section of the fort, having the intermediate space filled with water, or, in very high latitudes where there is danger of freezing, oil may be used. The upper section of fort proper is constructed entirely of iron or steel plates of any given thickness; in this plan it is proposed to use three thicknesses of six-inch plates, which are now considered sufficient to resist any projectile that has been contemplated. It is only a question of buoyancy, whether this fort be one foot or four feet in thickness, which is governed by the superficial area of the base or lower section immersed, so that, it will be seen, this system is unlimited in its capacity. The lower section is divided into store rooms for provisions and ammunition, and into quarters for officers and men.

A fort of this kind weighing 1,500 or 2,000 tons may be revolved easily with three or four men by simply turning a crank, thus enabling us to handle eight 15-inch, 20-inch, or 30-inch guns.

Suppose science and mechanical skill should produce wrought iron or steel guns of 50 tons or more, with a 24 or 30-inch caliber, which may be considered at least possible, they could not be used on board of ships, nor do we think they would be practical in the present fortifications; but on this hydrostatic principle such guns can be trained as expeditiously as guns weighing only ten tons; and by an ingenious arrangement of compressed air, which takes up the recoil of the monster pieces and runs them again into battery by the power of a single arm—together with other appliances to facilitate loading, opening and closing the port stoppers—Captain Ryan's system insures a great saving of men and time. And it will be borne in mind that this revolving fort effectually counteracts

maintains its permanence as a defensive work, as nothing short of insanity could induce infantry to assault such a fortress; for so long as provisions and ammunition hold out a garrison of fifty men in its iron shield could never be made to surrender. The attack of a siege train would be quite as futile; starvation or treachery might capture one of these forts, but powder and ball never.

All the advantages pertaining to the revolving fort may be transferred to a floating battery by constructing a solid timber platform or shield 150 feet square, more or less, from 12 to 20 feet deep, with proper fastenings, and plated with iron, to be ram and shell proof, leaving in the center a well-hole through the shield of requisite diameter to receive the fort, in which case it will be seen that the timber shield is a substitute for the iron tank, with this difference that it has no bottom but the sea. In case of necessity this immense shield is towed into position and securely moored. To an obstruction of this kind rams and iron-clads will give a wide berth. With a few of these eight-gun batteries moored in the Narrows and East River, well supported with the revolving forts on either shore, New York can safely defy all the rams and iron-clads of the world. "In peace let us prepare for war," but in time of peace it is not necessary to construct these timber shields, but it would be prudent to construct the iron battery or turret so far as fitting it up, then taking it down and storing it for future use. Beside the intrinsic value of this battery, it gives additional facilities for using torpedoes or other submarine works.

War is expensive at best, and war machinery is growing more and more expensive, but expenses are not taken into consideration as against a nation's existence, safety, or means of defence; in fact it is maintained by some of the most enlightened minds of the day that the more expensive and elaborate the defensive works required, the greater the safety against invasion, therefore the cheapest, which is doubtless the true theory, especially for iron-producing states.



But this does not prove that cheaper engines of war may not be devised, and still be more effective. That this system of defence is the cheapest may be demonstrated by comparison with the cost of one of the British iron-clads. Let us take the *Minotaur*, which was built as a model war ship, fully up to the times. The weight of her hull alone is 7,586 tons—five times more than this fort. Armor and backing 6,124 tons—four times more than the fort; engine and coal 2,540 tons—more than half as heavy again; making, exclusive of armament, 16,250 tons, within a fraction of ten times the weight of this fort. The hull alone cost £365,365; with double armor and backing, would cost £757,350—equal to about \$3,750,750. But the *Bellerophon* is claimed to be an improvement, though smaller and lighter, with a saving of a quarter of a million pounds. These statements are taken from a paper read by Mr. Reed before the Royal Society, London. We are not prepared to say just what this fort will cost, but other things being equal, it will be nearly in proportion to their respective weights, not exceeding \$400,000, or about one tenth of the *Minotaur*; and it would be safe to say that our Government could build ten forts and equip them for action, for every single iron-clad of this type that any foreign Government could build and send against us, at the same time the commander of such iron-clads might hesitate to attempt to pass two of these forts and one battery properly located in the Narrows below this city.

But the construction account is not the only or most unfavorable comparison, the cost of maintaining these sea monsters on a war footing is simply enormous, to say nothing of the deterioration, even when laid up in ordinary. It requires a strong detail of officers and men to keep them afloat and in repair, whereas this fort is never in danger of sinking, or getting out of repair in its machinery, and in time of peace these forts are to be laid up, by drawing off the water and allowing the fort to settle down on its ways, when the iron has only to be protected from oxidation, and a detail of one man to a fort would be a sufficient guard. When in a case of emergency, by having connection with a reservoir, in twenty minutes the fort could be set afloat, all in fighting trim. Neither is this all the saving by this system, as in case of the batteries they may be manufactured to order (exact duplicates), and stored in all the arsenals and seaports, when, if occasion requires, they could be put into working order with all their equipments in thirty days, more or less, according to the emergency.

The discrepancy between their respective powers of offence and defence, may be presented in a few words. The forts are to be absolutely impregnable against any and all shot that can be hurled against them; each one armed with a battery of eight or more guns, double, or perhaps quadruple the weight that will be carried by any iron-clad; with projectiles in proportion, delivered with almost the accuracy of a rifle marksman, at the rate of one every minute, against the sides of a ship made of iron and wood, probably in its strongest parts equivalent to eight inches of iron; for it must be remembered that ships of this type are not entirely clad with iron, the exposed parts being of about the same value for defence that a cigar box would be to a minie ball. Nor would their iron plating amount to much more in resisting projectiles of 500 or 1,000 pounds, propelled with from 100 to 200 pounds of powder; and it remains to be seen what effect a thousand pound shell would have, exploded alongside of an iron-clad, charged with fuming powder, gun-cotton, or nitro-glycerin. Doubtless the ship would be relieved of some of its iron plates. Of course no nation will ever send ships to fight such forts, but only to pass them, if they could.

Further information may be obtained by addressing James T. Ryan, St. Nicholas Hotel. Patent pending.

## Correspondence.

The Editors are not responsible for the Opinions expressed by their Correspondents.

### Is the Age of Invention at a Stand Still?

MESSRS. EDITORS:—A period of forty years past may be termed the "Age of Invention." We can compare the present with the past: the old stage-coach, or diligence, in Europe, with the steam locomotive of to-day; the old sail ships with the present steamships. We can find in our mother's list of old letters large foolscap sheets, sealed by wax—no envelopes—and bearing date four or five weeks from that at which they were received; and we can compare these missives with those transmitted by our present postage system and the telegraph. We call to mind, also, the great improvements in the art of printing. Then glance at the machinery used in the department of agriculture—mowing machines, horse rakes, reapers, thrashers, plows, cultivators, etc.—and consider the manual labor of forty years ago. The department of war, with ironclads, breech loaders, etc., furnishes a striking comparison. The household, with sewing machines, washing machines, and a number of minor labor-saving machines, still adds to the comparison. We could continue in this strain indefinitely, but we are led to the question: "Is the age of invention at a stand still?" That is, will there be, in the coming forty years, so great an improvement in the modes of transit as there has been in this past forty years? Will there be as wonderful an improvement in the means of transmitting messages? What improvements are we to have in the arts? Is the science of to-day to be still more revolutionized? Will the farmer be aided as much in the future as he has been in the past? Is the age of invention at a stand still? Forty years from now will tell! Inventors, have you among you a Stephenson, a Watt, a Jacquard, a Morse, a Fulton, and a Howe? Will there be with you, forty years to come, an Ericsson or a Hoe? Your deeds are to be inscribed on the tablet of time. Will your names stand in the list alongside of these illustrious ones? The field is large, and it is merely

fenced in—the space is open, and rich crops will repay the tilling!

We hazard an answer that the coming forty years will witness some marvelous improvements. That wonderful agent, electricity, is only yet half harnessed. We now, for a few cents, send word to, and hear from friends a thousand miles away, it being inconvenient only as regards time. Will we not, some day, sit down to a family telegraphing machine and send messages by lightning, without the bother of the mail, and the inconvenience of writing at all?

We speed over the ground, "rattling over bridges," whizzing through the forest, journeying from New York city to San Francisco in seven days; but will it be done in seven hours? No! is the answer of to-day. An old authority on railroads, Wood, in 1825, wrote in his able work: "Nothing can do more harm to the adoption of railroads than the promulgation of such nonsense as that we shall see locomotive engines traveling at the rate of 12, 16, 18, and 20 miles per hour!" A later authority on this subject has added, "an express train on the Great Western Railway, drawing 59 tons, has traveled, for three hours, at the rate of 63 miles per hour!" (Ritchie on Railways). Comment is unnecessary. Will the Pneumatic process of transmission effect the coming great stride from seven days to seven hours, for time across the continent? Why not? No running off the track; no collisions! Really, the "coming man" need not drink in going from New York to California!

Look around you, inventors, and see the endless labor yet to be saved. A thousand and one wants stare you in the face. Steam is yet to be half utilized. Who is the coming man for this? Is it Ericsson with the solar heat and "Sun engines?" Why, almost at the moment of writing, a sewing machine is being bothered with, because it pulls the work, from the fact that all machines are defective in that the feed is only at one side of the work. Who is the coming man for this?

There is no end to the wants of the present day. Will the next forty years supply them all? Time will tell. N. F. P. Paterson, N. J.

### Burning of Powder in Fire Arms.

MESSRS. EDITORS:—I notice in No. 21, current volume of SCIENTIFIC AMERICAN, page 330, an article headed "Carefulness in the Management of Fire Arms." Now, I perfectly agree with you as to the necessity of keeping a gun clean, but differ with you in other respects. I am over fifty years old and have made gunnery my business, making many experiments. The dirt that collects in a gun barrel will not explode or burn, even by bringing a red hot iron in contact with it. You carry the idea that only a limited amount of powder will burn, and that a gain twist will foul more at the muzzle than at the breech. This is the case with the breech loader, but with the muzzle loader the dirt is driven down at each loading, and if you are able to get your ball down to the powder there will be no danger of bursting the gun.

Now I will give a detail of an experiment that I made about ten years ago in Marshall, Michigan. I spent one day with three men to assist me. I had a heavy target rifle, cast steel barrel, weighing 32 lbs., and carrying 120 round balls, or 50 conical slugs to the lb., and the slugs were one inch long. It was a fine, still morning in the winter, after a snow that fell that night without drifting. I measured accurately one half mile on the ice of the Kalamazoo millpond, and commenced with a light charge of powder after first driving a slug ball through the barrel with the breech pin out, and saving the ball in order to compare it with those fired at the target, but not hitting anything but skipping along in the soft snow until finally they would stop without a scratch or a bruise, just as they left the rifle. After finding one from the first or small charges, I increased my powder half an inch more in depth in the barrel, and throwing clean snow in front of the gun in order to detect if any powder was thrown out unburnt, and then adjusting my sight until I could hit the target. I kept on in this way until I used six inches of powder in depth, measuring from the breech at each charge. The result was that each half an inch of powder raised or carried the ball about three feet higher at each increase of charge, and no more dirt in front of the gun; and each successive ball or slug was stove up, or more properly "upset," and showed the impression of the grooves or rifling still further up, until the last filled them from butt to point. Now this proves not only that all the powder burns, but burns instantly before the ball starts, or else it would not upset it any more with a large charge than a small one. I think it impossible to throw out a single grain of powder if you filled the barrel full with a ball on top of it to confine it; for before the pressure of the gas comes against the ball the fire has found its way between the grains to the utmost extremity of the place of confinement; and for this reason, in blasting rocks every grain must explode before anything gives or else there would be no need of more powder for a deep heavy blast than for a light one. But powder when not confined acts differently, for when the first grain ignites it has plenty of room to escape without being forced through the other until it catches from one grain to another, except what resistance the atmosphere produces.

There is one thing I forgot to mention, viz., that by using a very small charge of powder and by wetting the wad or patch very wet there will a few grains stick to the wad or patch unburnt, for the heat is not intense enough to dry it before it gets out of the gun, but with a large charge it will not only dry the wet powder but burn the patch as if a red hot iron had been pressed against the butt of the ball with a patch drawn over it.

Denver, Col.

M. L. ROOD.

THE strain of belts is always in the direction of their length; thus holes cut for the reception of lacings should be either oval, the long diameter in line with the belt, or placed in the line of a double or V-shaped angle across the width.

## OFFICIAL REPORT OF PATENTS AND CLAIMS

Issued by the United States Patent Office.

FOR THE WEEK ENDING DECEMBER 8, 1868.

Reported Officially for the Scientific American.

PATENTS ARE GRANTED FOR SEVENTEEN YEARS, the following being a schedule of fees:—

On filing each application for a Patent, except for a design	\$10
On filing each original Patent	\$15
On appeal to Commissioner of Patents	\$20
On application for Reissue	\$20
On application for Extension of Patent	\$20
On granting the Extension	\$20
On filing a Disclaimer	\$10
On filing application for Design (three and a half years)	\$10
On filing application for Design (seven years)	\$15
On filing application for Design (fourteen years)	\$30

In addition to which there are some small revenue-stamp taxes. Residents of Canada and Nova Scotia pay \$500 on application.

Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required, and much other information useful to Inventors, may be had gratis by addressing MUNN & CO., Publishers of the Scientific American, New York.

84,670.—PUNCHING MACHINE FOR TIN AND SHEET METAL.—John Anear, Philadelphia, Pa.

I claim the rotary bed plate, C, the punch, D, and the "former," E, the same being constructed and arranged to be operated together, in any suitable frame, A, B, substantially as and for the purpose described.

84,671.—DEVICE FOR PREVENTING INCrustATION IN STEAM GENERATORS.—Robert Breckenridge Baker and Charles James Adolphus Dick, Paris, France, assignors to the American Anti-Incrustation Company.

We claim an insulated mass or block of carbonaceous matter, suspended within a boiler, near one end of the same but connected by a wire to the shell of the boiler, near the opposite end of the latter, all substantially as set forth.

84,672.—SHAFT COUPLING.—Charles Bennett, Bristol Station, Ill.

I claim the combination of the band, H, Journal, G, pulleys, E, E, jaws, C and D, with the rods, B, A, and for the purpose herein specified and shown.

84,673.—MACHINE FOR CUTTING EYELETS.—George B. Brayton, Providence, R.I.

I claim an apparatus for cutting tubing into sections, for eyelet blanks or other purposes, consisting of a series of revolving cutters, A, a surrounding revolving jacket, B, for holding and conveying the tubing, and a pressure cylinder, C, all in combination, substantially as described, for the purposes specified.

Also, making the openings, D, in the jacket or casing, B, for holding and conveying the tubing inclined to the axis of the series of cutters, A, as herein set forth, for the purposes specified.

84,674.—SELF-REGULATING AIR VALVE FOR STEAM HEATERS.—Moses P. Breckenridge, Meriden, Conn.

I claim inserting the frame, B, which holds the spring, C, into the case or cylinder, A, by this means allowing the said cylinder to be constructed in one piece, and thereby doing away entirely with the use of packing.

84,675.—GAS BURNER.—Julius Bronner, Frankfurt-on-the-Maine, Prussia.

I claim, 1st, The use of a slit as aperture to a gas burner, the top exterior surface of the head of which is concave or funnel shaped, substantially as and for the purposes set forth.

2d, The combination of the two gas burners thus made, in other words, of two fish tail slit burners, to form a compound economic or double burner, or of one such fish tail slit burner, with an ordinary burner, substantially as described.

3d, The use of the fish tail slit burner head or insertion, C, constructed and applied substantially as herein set forth.

84,676.—RUFFLING DEVICE FOR SEWING MACHINE.—Reuben Brooks, Jr., and William N. Manning, Rockport, Mass.

We claim, 1st, The combination of the bar, B, slotted plate, H, and screw, G, all constructed substantially as described, and for the purpose set forth.

2d, The rubber presser, D, combined with the bar, B, and tension plate, E, substantially as specified.

3d, The adjustable spring guide, F, in combination with the tension plate, E, and presser, D, as specified.

84,677.—FASTENER FOR LISTS.—Hiram Brown, Burton, O.

I claim the slide, D, so arranged in such relation to the last, B, that the lower end of said slide is received directly into the last, in the manner as and for the purpose set forth.

84,678.—MECHANICAL MOVEMENT.—A. R. Buffington, U.S.A.

I claim the improved mechanical movement, consisting of devices herein described, by means of which angular motion may be transmitted from one body to another, increased in velocity to twice, or reduced to one half, the power varying, but the motion uniform, according as the one from which the initial motion proceeds acts upon the other, by means of surfaces on which slide or roll parts connect with the other body, or through the intervention of projections, axles, hubs, or pins simply, or these with blocks or wheels fitted on them, sliding, rolling, or moving in contact with surfaces of said other body, as substantially herein described.

84,679.—GAS RETORT.—Mills L. Callender, New York, assignor to himself and Sidney L. Holdridge, Greenburg, N. Y.

I claim a double retort, made, arranged, and operated in the manner and for the purposes substantially as described.

84,680.—WEATHER STRIP.—E. Carpenter, Carbondale, Pa.

I claim, 1st, The arrangement of the weather strip, A, having the two projections, a, a', with the joints, e, e', in the plates, E, E, attached to the jamb, or in the jamb itself, substantially as herein described and shown.

2d, The combination of the strip, A, levers, B, D, and door, when the several parts are constructed and arranged to operate in the manner described and shown, and for the purposes specified.

84,681.—FRICTION CLUTCH PULLEY.—Andrew B. Clemons, Ansonia, Conn.

I claim, 1st, The screw-threaded levers, E and E', in combination with the friction plate, D, and threaded hub, C, of the pulley, for the purpose of drawing the two parts together, substantially in the manner and for the purposes specified.

2d, The slide, F, in combination with the levers, E and E', and pins, a, a', for the purpose of operating the said levers upon the hub, C, of the pulley, substantially as herein set forth.

84,682.—WAGON TONGUE SUPPORT.—N. A. De Long, New Scotland, N. Y.

I claim the combination of the tongue and axle with the slotted adjustable plate spring, embracing the standard, F, and having four points of support, and for the purpose set forth.

84,683.—LEVER GRAPNEL.—Edwin B. Dewey, Pontiac, Mich.

I claim the bearing lever, F, provided with suitable hook, G, when connected with curved and pointed levers, A and B, and constructed and operating substantially as and for the purposes herein set forth and described.

84,684.—HORSESHOE.—Fordice W. Edison, Port Huron, Mich.

I claim the arrangement of the expanding springs, C, C, on the toe piece, B, to which the wings, A, A, are pivoted, substantially as and for the purposes set forth.

84,685.—MAGAZINE GUN.—W. R. Evans, Thomaston, Me.

I claim the combination of the fluted shaft, D, which contains one or more flutes, with the fixed spiral thread or partition, B, substantially as specified.

84,686.—APPARATUS FOR DEODORIZING, DESICCATING, AND MIXING MANURES.—Henry S. Firman, New York city.

I claim, 1st, Arranging a close desiccating and mixing pan, constructed substantially in the manner described, and provided with mixers, as set forth, in a close heating chamber over a furnace or heating due fitted with dampers, and constructed substantially as described.

2d, The combination of the supply hopper, constructed substantially as described, with a close desiccating pan for the purpose of introducing the material to be treated in the pan, as set forth.

3d, Combining, with a close desiccating and mixing pan, a deodorizing or absorbing chamber for the purpose of utilizing the offensive gases, and avoiding the nuisance occasioned by their escape from the pan.

4th, Creating a circulating of the air and gas in the desiccating pan by means of an air pump affixed thereto, through the agency of pipes, arranged substantially as described.

84,687.—FASTENING FOR HORSE COLLARS.—James P. Force, and John E. Force, Constantine, Mich. Antedated November 21, 1868.

We claim the combination with the collar A, A', of the flexible straps or leashes, B, and catches, C, constructed and employed as and for the purpose described.

84,688.—CAR SPRING.—Perry G. Gardiner, New York city.

I claim the arrangement of an india rubber spring, H, surrounded by steel spring rings, A, B, and W, and india rubber springs, J, enclosed in a suitable casing, E, in combination with a plunger, P, acting upon the central india rubber spring, H, the whole being combined and operating together, in the manner and for the purpose substantially as described.

84,689.—GAS-LIGHTING DEVICE.—E. P. Gleason, New York city.

I claim, 1st, Charging or filling an elastic gas-tight receptacle with gas, and then applying the same to a burner connected thereto for lighting purposes, whether the same shall be accomplished in the precise manner shown, or in an equivalent manner.

2d, The combination with an elastic gas-tight reservoir, B, of a suitable case, A, and an exit pipe, D, constructed and operating substantially as described for the purpose specified.

3d, The combination of an elastic gas-tight reservoir, B, case, A, and exit pipe, D, with a spring, G, placed either within or beneath the receptacle, B, for the purposes fully described.

4th, The combination of the case, A, receptacle, B, exit pipe, D, and spring, G, with the cord, E, for the purposes set forth.

84,690.—MACHINE FOR STRETCHING HAT BODIES.—William C. Griswold, Brooklyn, N. Y.

I claim the combination of the tip-stretching mechanism consisting of the spokes, C, and star, M, with the brim-stretching mechanism, consisting of inclined stationary arms, A, and the expansible or spreading arms, I, all constructed arranged, and operating substantially as herein specified.







which rests upon springs, d, below the plate, the whole being constructed and operating substantially as and for the purpose described.

**84,757.—WAGON BOX.**—H. W. Persing, Centralia, Ill.

I claim the combination and arrangement of the eccentrics, e, e', the staples, f, f', and the screw, g, attached to the rods, c, c', substantially in the manner described, and for the purpose set forth.

**84,758.—GRINDING.**—Edward B. Phelps, New York city.

I claim, 1st, The combined frames, F and F', with the central axle, E, in connection with the trough, K, and stop, N, operated and vibrated in the manner and for the purpose substantially as herein shown.

2d, Providing reversible gratings with a trough, K, to operate and to be used for the purpose herein described.

**84,759.—WASH BOILER.**—D. A. Porterfield, New Paris, Ohio.

I claim, in combination with the boiler, the conical or pyramidal spout, as described, i. e., their axes resting in the bottom of the boiler, without the aid of a horizontal partition, and so arranged as to admit the intervention of water by spanning the sunken pit, or by means of an opening at the bottom, as set forth.

**84,760.—HORSE RAKE.**—Adam R. Reese, Phillipsburg, N. J.

I claim, 1st, The teeth, N, provided with the return arm, arranged relatively to and operating in connection with the rake head, substantially as described.

2d, The shafts, E, E', when provided with the gains or notches, as set forth.

3d, The standard, A, in combination with the transverse bars, H, H', arranged upon opposite sides of the shafts, E, E', said bars being provided with gains, and operating as set forth.

4th, The bars, H, H', when provided with the gains as set forth.

5th, The combination of the notched shafts, E, E', plates, G, G', axle, B, and bolts, F, F', substantially as set forth.

6th, The combination of the notched bars, H, H', shafts, E, E', and bolts, K, K', all arranged and operating as set forth.

7th, The removable cleaners, adapted to be secured to the axle by means of screws or pins, and removable for transportation, as set forth.

8th, The spurs on the cleaner rods, for the purpose, and substantially as set forth.

**84,761.—STEAM ENGINE VALVE GEAR.**—Hugh Reid, St. Louis, Mo.

I claim, 1st, The arrangement of the balanced piston valves, D1 D2, with reference to the exhaust cylinder, C, steam port, a, and exhaust ports, E and F, substantially as set forth.

2d, The arrangement of the piston valves, D1 D2, with reference to the rod, foggies, G G', pin, c, slot, h, and rod H, substantially as described.

**84,762.—SEED PLANTER.**—Isaac Rexford, Malone, N. Y.

I claim, 1st, The combination of the side bars, D, bars or supports, G, seed box, H, dropping cylinder, E, and wheel, F, with each other and with the forward axle, B, and parts being constructed and operating substantially as herein shown and described, and for the purpose set forth.

2d, The covers, J, constructed as described, and draft bars or chains, K, in combination with the seed box, H, substantially as and for the purpose set forth.

3d, The combination of the levers, L, cross bar, M, standard, N, lever, O, and standard, P, with each other, with the cross bar of the thills, A, forward axle, B, dropping cylinder, E, and seed box, H, substantially as herein shown and described, and for the purpose set forth.

**84,763.—CONC FLOW.**—W. C. Rhinehart and Robert Gaston, Okaloosa, Iowa.

We claim the inclined fenders, b, b', for protecting the reins of the driver from the action of the wheels, in combination with the inclined frame, m, substantially as set forth.

**84,764.—REVERSE MOTION FOR WINDING ON BOBBINS.**—George Richardson, Lowell, Mass.

I claim the cam, B, yoke, C, reverse rod, E, springs, I I', detent, G, and reverse catch, M, all combined, substantially as and for the purpose set forth.

**84,765.—LUBRICATOR FOR JOURNALS.**—C. M. Ried, Greensborough, Ala.

I claim the screw, c, with its flange, C, frame, E, cog-wheel, D, cranks, G, plungers, e, e', and dipper, i, in combination with the "housing" or "grass box," when constructed and operating substantially in the manner and for the purpose set forth.

**84,766.—COMBINED HORSE POWER AND TRUCK.**—Cyrus Roberts and John A. Turpin, Three Rivers, Mich.

We claim, 1st, The revolved wheel, G, extended downward to the point, and in the manner represented for the purposes specified.

2d, A horse power, having cogged wheels, A, D, E, and G, staples, B, disk, C, friction rollers, e, e', and shaft, H, in combination with a truck, constructed and operating as herein specified, substantially as described.

3d, A truck, having V-shaped bottom, as described, bolsters, O, P, and Q, and rear V-shaped frame, as described, in combination with the horse power herein described and shown, substantially as specified.

**84,767.—DOOR FASTENER.**—William J. Ross, Worcester, Mass.

I claim the slotted bar, A, in combination with the catch, B, and hooked sliding bar, D, provided with the thumb or set screw b2, all constructed, arranged, and operated substantially as and for the purpose set forth.

**84,768.—GAS BURNER.**—Edwin P. Russell, Manlius, N. Y.

I claim, 1st, The hollow cylindrical gas cock, B, constructed substantially as described, and operating as and for the purpose set forth.

2d, The combination of pipes, b, and h', pipe or hole, z, and small cock, g, chamber, p, all as constructed with the gas cock, B, substantially as described, and for the purpose set forth.

3d, The way bar, C, in combination with rods, W, W', arms, f, f', for operating the cock, B, constructed substantially as described, and for the purpose set forth.

**84,769.—TRUSS.**—Woodbury Sanborn, Chelsea, assignor to himself and Bailey West, Chicopee, Mass.

I claim, 1st, The shell, A, having a frame or spider attached to the inner side thereof, and provided with knobs attached to said spider, either with or without the cover, C, the whole constituting a truss pad, and constructed of the material and substantially in the manner set forth.

2d, The combination of the shell, A, the metallic frame or spider rigidly attached to said shell, and the T-shaped piece, F, pivoted to said spider, and mounted with knobs or buttons, the whole constructed substantially as specified.

3d, The construction and arrangement, in combination with a truss pad, substantially of the kind herein described, of the flexible body strap, D, and thigh strap, E, applied to said pad, substantially as set forth and shown.

**84,770.—SALVE FOR BURNS AND SCALDS.**—Andrew Schmitt, California, Mo.

I claim the formation of a salve for the cure of burns, etc., in the manner and of the materials herein described.

**84,771.—HINGE.**—William Shannon, Allegheny City, assignor to himself and Joseph Graff, Pittsburg, Pa.

I claim providing a hinge with a pin, consisting of parts, C and D, the inner ends of which are upset, in the manner herein described and for the purpose set forth.

**84,772.—HINGE.**—William Shannon, Allegheny City, assignor to himself and Joseph Graff, Pittsburg, Pa.

I claim, providing hinges with a pin, C and D, made in two parts, the inner ends of which are beveled off at f, and provided with hooks, i, substantially as herein described and for the purpose set forth.

**84,773.—STEAM ENGINE CONDENSER.**—Joseph Shirt, and Charles Briggs, Tamworth, Great Britain.

We claim a condenser, constructed and operating as herein described.

**84,774.—BEE-HIVE.**—John Shoe, Pleasant Hill, Ohio.

I claim, 1st, The adjusting hinged inclined bottom, C, operating substantially as set forth.

2d, The top, B, provided with supports or strips, h, h', to which are attached hooks, catching two apples on the hive, for the purpose of removing the said top, substantially as described.

**84,775.—LAMP BURNER.**—A. G. Smith, Jersey City, N. J. Antedated November 7, 1868.

I claim, 1st, In combination with the burner, A, and the cylinder, C, the ribs or projections, H, H', substantially as and for the purpose set forth.

2d, The insulating ring, C, constructed with the flange, I, substantially as and for the purpose set forth.

3d, In combination with the burner, A, and elastic ring, C, the detachable plate, E, or its equivalent, for the purpose of rendering the ring, C, easily removable.

4th, The plate, E, secured to the wick tube, F, by a detachable device, substantially as set forth.

5th, Keeping the plate, E, always in contact with its detachable fastenings, by means of the elasticity of the material of the ring, C, as set forth.

**84,776.—CULTIVATOR.**—Garland B. St. John, Brooklyn, Mich.

I claim the securing of the standard, G, between the two beams, C, C', by means of the bolt, m, arms, n, n', and braces, H, H', all arranged substantially as and for the purpose set forth.

**84,777.—HORSE RAKE.**—George E. Sutphen, Louisiana, Mo.

I claim the connecting rod, D, with seat, d2, when used in connection with spring, d1, upon rod, c3, as shown and described, and combined with the prop, C, having the foot piece, e, and lever, D', the whole being operated, in connection with the handle, B, and rake, A, as and for the purpose described.

**84,778.—AUTOMATIC STOP FOR MINING CARS.**—James Tam-lyn, Virginia City, Nevada.

I claim the projection or stops, E, E', arranged with the levers, C, F, and spring, H, connected with the chain, G, and all applied to operate in the manner substantially as and for the purpose herein set forth.

**84,779.—PILE FOR RAILROAD RAILS.**—Thomas R. Taylor, Broadhead, Wyo.

I claim the improved pile for forming railroad rails, when constructed and arranged as herein described.

Also, as a new article of manufacture, railroad rails, when produced from the improved pile herein described, as and for the purpose set forth.

**84,780.—TIMBER GRAPPLE.**—Moses N. Ward (assignor to himself, Benjamin B. Grant, and Thomas H. Hays), Bangor, Me.

I claim the combination and arrangement of the double eye and shoulder, A, A', pivoted to each plate, as set forth.

**84,781.—NUT MACHINE.**—Francis Watkins, Birmingham, England. Antedated Nov. 28, 1868.

I claim the combination, with each other, of the reciprocating frames, D and E, stationary die, I, punches, F and G, slide, G, punch, H, and stop, L, in shown and described, and operating substantially as and for the purpose herein set forth.

**84,782.—BOLT MAKING MACHINE.**—Francis Watkins, Birmingham, England. Patented in England, December 28, 1868.

I claim the arrangement, herein shown and described, of two bolt heads, namely, as set forth.

**84,783.—GUIDING ATTACHMENT FOR SEWING MACHINES.**—James Wensley New Brunswick, N. J.

I claim, 1st, The pivoted gear, E, and pivoted transparent presser, G, in combination with the attachment, B, arranged and operating as described, for the purposes specified.

combination with the attachment, B, arranged and operating as described, for the purposes specified.

**84,784.—CHURN.**—Amos Westcott, Syracuse, N. Y.

I claim, 1st, The combination and arrangement of the segment hoop, c, socket, h, h', with its projecting arms, k, k', and the vessel for the reception of the material to be operated upon, substantially as shown and described.

2d, The combination of the segment hoop, c, and segment, b', substantially as shown and described.

**84,785.—REFRIGERATOR.**—Simeon Wheat, Middletown, and David B. Wheat, New York city, assignors to Frances M. Wheat and Ellen A. Wheat, Middletown, N. Y.

We claim an improved refrigerator, formed by the combination of the double-walled case or body, A, detachable ice-box, B, waste pipe, C, cup, D, drip pan, E, hinged shelf, F, middle shelf, G, having its middle part cut away, and plaster of Paris lining, K, with each other, substantially as herein shown and described, and for the purpose set forth.

**84,786.—TRACK CLEARER FOR HARVESTERS.**—George W. N. Yost, Corry, Pa., assignor to the Corry Machine Co.

I claim the combination of the track clearer, V, and the finger-bar shoe, W, a curved or bent part of the track clearer lying within a vertical mortise in the transverse part of the shoe, made and used as described, for grass and grain-cutting machines.

**84,787.—SHOULDER BRACE.**—Alexander Adamson, Washington, D. C.

I claim the shoulder brace, consisting of a single elastic strap crossing its centre (where it is fastened), and forming the double loops, B B', as herein described, and for the purpose set forth.

**84,788.—BEE-HIVE.**—Thomas R. Allen, Syracuse, N. Y.

I claim, 1st, The frame holders, F F', separately, and also in combination with the sills, a, a', substantially as and for the purposes described.

2d, Also, the same parts, in combination with the comb frames, c, c', substantially as described, and independent of and detached from the outside covering, D.

3d, Also, the frame holder, F, constructed as described, in combination with the outer covering, C, and top, D, as set forth.

**84,789.—CAR MOVER.**—Fortune L. Bailey, Freeport, Ind.

I claim the arrangement of lever, A, bars, I I', and clamp, B, when combined with the gripping devices on the lower ends of the rods, I, I', as and for the purpose set forth.

**84,790.—MOWING MACHINE.**—L. D. Bidwell, Birmingham, Conn.

I claim, 1st, The arrangement of the revolving cutters, d, in a revolving head, so as to give to the said cutters a double movement, substantially as herein described.

2d, In combination with the above, the finger bar, P, constructed and arranged so as to operate in conjunction with the said cutters, substantially in the manner set forth.

**84,791.—APPLE QUARTERER.**—Clark E. Billings, Warren, Vt.

I claim the arrangement herein described of the fixed knives, F, placed at right angles to each other, and having the central point, g, the plunger, B, hollowed out upon its under side, the plunger rod, C, guides, h, slotted lever, D, pin, i, spring, E, and stand, A, as herein set forth, for the purpose specified.

**84,792.—COMPRESSION COCK.**—G. E. Boisselier, St. Louis, Mo.

I claim the valve, D, having a screw thread cut upon its outer surface, and furnished with a smooth jacket, J, in which the squared end of the valve stem, C, is fitted, said stem having a disk, I, bearing against the inner surface of the packing placed in the recess of the cap, B, and resting upon the lower packing disk, secured to the shell, A, by the screw cap, all arranged and operating as described, for the purpose specified.

**84,793.—DRESSER COPPER** FOR WARP DRESSING MACHINES.—W. H. Boyden, Rockland, R. I.

I claim, 1st, The combination of the rack, B, and wires, m, m', in a frame, A, substantially as and for the purposes specified.

2d, The arrangement of the rack, B, frame, A, wires, m, m', thumb-screws, n, n', and cap, I, substantially as shown and described.

**84,794.—ELEVATOR.**—William D. Brooks, Bethany, Pa.

I claim the cap, b, and rod, a, for sustaining the scrieved pulley, C, and a series of pulleys, D, in combination with a frame, and arranged, with relation to the adjustable flexible gravity track, as herein set forth and shown, for the purpose specified.

**84,795.—BOTTLING MACHINE.**—Henry Carse, Pittsburg, Pa.

I claim the screen, I, when the closing thereof is controlled by the downward motion of the filling head, and its opening by the receding motion of the corking piston or its carrying frame, through suitable mechanism, substantially as herein set forth.

**84,796.—MEDICINE.**—M. Cary, Racine, Wis.

I claim the ingredients herein named, compounded and pressed substantially as and for the purpose specified.

**84,797.—SPADE.**—Michael Connolly, Newark, N. J.

I claim the described construction of the spade, consisting of the blade, A, bent at its center, so that the two parts, a, b, shall form an obtuse angle with each other, and provided upon its upper end, next the handle, with the wide, end, rest, C, as herein described for the purpose specified.

**84,798.—PLOWHARE.**—George W. Cooper, Ogechee, Ga.

I claim a cast-iron plowshare, A, made as described, without a landside plate, and with a concave front edge, substantially as and for the purpose set forth.

**84,799.—FLUTING MACHINE.**—William D. Corriester, New York City.

I claim the described arrangement of the operating screw, C, spring, i, nut, h, and bent bar, D, as herein set forth, for the purpose specified.

**84,800.—HAY SPRADER.**—Thomas C. Craven, Albany, N. Y.

I claim, 1st, The combination, with the ends of the central support, M, and caps, m, of the ears, N, substantially as and for the purpose set forth.

2d, The combination of the bars, N, having irregular shaped ends, with the heads or disks, L, and central support, M, substantially as and for the purpose set forth.

3d, The combination of the caps, m, with the central support, M, substantially as and for the purposes set forth.

4th, The combination, with the frame or bearings which support the reel shaft of the eccentrics, E', substantially as and for the purposes set forth.

5th, The combination, with the eccentrics, E' and side rail, A, or their equivalents, of the arms, p, springs, s, and pins, r, substantially as and for the purposes set forth.

6th, The combination of the driving gears, K, with the wheels, F, substantially as and for the purposes set forth.

7th, The combination, with the frame which supports the reel and the frame which connects the journals of the wheels, F, of adjusting screw, R, and nuts, v, v', substantially as and for the purposes set forth.

8th, The combination, with the frame of the machine and the driver's seat, of a table or other suitable guard or shield, W, arranged substantially as and for the purposes set forth.

9th, The combination, in a hay tedder, of a triangular or three-barred reel, with caps, m, constructed substantially as shown and described.

**84,801.—ARTICLE OF PREPARED CODFISH.**—Elisha Crowell, New York city.

I claim a new article of prepared codfish, made substantially as described.

**84,802.—STEP COVER AND WHEEL FENDER FOR CARRIAGES.**—John Curtis, Cincinnati, Ohio.

I claim the bracket, F, depending rigidly from the carriage door, in combination with the hinged flap, G, arranged and adapted to operate in conjunction with a carriage step, in the manner and for the purposes set forth.

**84,803.—SCOOP.**—Thomas B. Davis, New York city.

I claim a scoop, having its body, A, constructed out of a single piece of sheet metal, B, cut and bent in the form, and soldered, substantially as herein shown and described.

**84,804.—LABEL HOLDER.**—Chauncey A. Dickerman, New Haven, Conn. Antedated Nov. 30, 1868.

I claim the frame, A, through which is formed an opening, B, and upon the under surface, upon three sides of the opening, a, a', a'', a frame, is formed, and so as to leave an opening through the end, C, for the insertion of the card, and having combined therewith a convex plate, D, the whole constructed and arranged so as to be applied and operate in the manner set forth.

**84,805.—BEE HIVE.**—A. P. Durant, Athens, Ohio.

I claim the combination of the base or bottom, A, bars, B, B', and frames, C, D, E, F, connecting bars, G, G', frame, H, and cap, I, all constructed and arranged substantially as herein set forth.

**84,806.—ELECTRO-MAGNETIC RELAY INSTRUMENT.**—Charles Durant, Jersey City, N. J.

I claim, 1st, The curving of the shifting or sliding bolt, L, and also the curving of the opening in the armature or armature lever, through which opening said bolt moves and operates, substantially as for the purpose herein shown and described.

2d, The spring, U, in combination with the adjustable lever, V, or its equivalent, adapted to the shifting or sliding bolt, L, moving through and upon the armature lever, substantially as and for the purpose set forth.

**84,807.—HARROW.**—O. W. Edwards, Bluffdale, Ill.

I claim, 1st, The combination, with the beam, C, and shafts, B, of the harrow, D, of the spring, F, substantially as and for the purpose described.

2d, The combination of the bushes, H, beam, C, shafts, B, and spring, F, as herein described, for the purpose specified.

**84,808.—SAFETY BRIDGE FOR RAILWAY CARS.**—Albert J. Elger, Kansas City, Mo.

I claim, 1st, Two plates, B, B', one provided with a headed bolt, D, and the other with a slot, when hooked to the opposite ends of two railroad cars, substantially as and for the purposes herein set forth.

2d, The plates, B, B', held in place by the stirrups, I, I', and secured to the plate, B, to operate substantially as herein set forth.

3d, The combination of the plates, B, B', with the headed bolt, D, passing through the slotted plate, B', hooks, E, and C, stirrups, I, and eyes, F, all substantially as shown and described.

**84,809.—FEATHER RENOVATOR.**—William H. Elliot, New York city.

I claim, 1st, The arrangement and combination of the draft pipe, r, steam pipe, e, and perforated shaft, f, and diaphragm, g, as specified.

2d, The combination of the bearings, k, diaphragm, g, and draft pipe, r, substantially as herein described.

3d, The combination of heater, e, central pipe, r, with its tubes, r, diaphragm, g, and draft pipe, r, substantially as set forth.

**84,810.—WIRE FENCE.**—George William Ensminger, Richmond, Iowa.

I claim, 1st, A portable wire fence, formed in sections, composed of the wires, A, movable posts, A1 A2, slats, B, supports, C, and corner posts, D, all constructed as and for the purpose specified.

2d, The rods, K, and plates, k, and the screws, E, and nuts, e, in combination with the movable posts, A1 A2, and corner posts, D, all constructed and operating in the manner herein described, and for the purpose specified.

3d, The wires, H, and the screws, B, and nuts, b, in combination with the movable posts, A1 A2, and corner posts, D, all constructed and operating in the manner and for the purpose herein described.

**84,811.—SHUTTER AND BLIND FASTENER.**—W. B. Farrar, Gr-enaborough, N. C.

I claim, 1st, The tumbler, E, in combination with the stop, G, both operating in connection with the bolt, B, as and for the purpose specified.

2d, The combination and arrangement of the springs, F and G, plate, E, shoulder, n, plus, m, knob, e, and bolt, B, having the notch, o, when constructed to operate substantially as and for the purpose set forth.

**84,812.—BEEHIVE.**—James T. Fife, Tynner city, Ind.

I claim, 1st, The lid, C, when so arranged as to cover the main hive, A, as well as the side boxes, B, B', and to lock the door to the main hive and the end doors to the wings, substantially as and for the purposes herein set forth.

2d, The chamber, F, constructed as described, and provided with the entrance, k, for the bees to enter the chamber when hiving them, and with entrance, k, for the passage of the bees from said chamber to the different honey boxes, substantially as and for the purposes herein set forth.

3d, The combination of the side boxes, B, B', chamber, F, honey boxes, D, D', and E, ventilating chamber, o, frame, f, f', and robber catcher, J, to make and constitute a complete beehive, substantially as and for the purposes herein set forth.

4th, The arrangement of the case, A, and wings, B, B', with the chamber, F, honey boxes, E, E', and cover, C, all constructed and combined in the manner specified.

**84,813.—KNEE BOOT FOR HORSES.**—James Finlay, N. Y. city.

I claim, 1st, The knee boot, A, constructed and provided as described, with pads, a, a', and adjustable pads, c, c', to slide upon fixed or sliding straps, b, b', substantially as herein specified



arranged as described, in combination with the pin C, and cross head, B, substantially in the manner and for the purpose set forth.

25. The peculiar method, herein described, of attaching and supporting the side springs, D, consisting of the plates F, and hooks, A, in combination with the cross head, B, and loops, E, as and for the purpose specified.

84,832.—CLOTHES BOILER.—D. Kellough, Ypsilanti, Mich.  
I claim the removable caps, D, with their branch spouts, F, when combined with the perforated and slotted plates, A, B, as herein shown and described.

84,833.—HARVESTER RAKE.—Wm. A. Kirby, Auburn, N. Y.  
I claim, 1st, A combined rake and reel, the arms of which are capable of having a rolling motion on their axes, and in which any arm acting at the time as a rake, or all of the beater, can be raised or lowered while acting as such, by the operator, by the means of the mechanism, so that it or they may pass over the grain on the platform at any desired height, substantially as described.

2d, Also, in a combined rake and reel, in which any arm thereof may be a rake or a beater, at the will of the operator, the so constructing and arranging the arms so that the arm that acts as a rake shall pass over the platform at a uniform fixed height, while the arms that act as beaters may be raised or lowered in parallel lines, to pass over the grain on the platform at such height as the operator may desire, substantially as described.

3d, Also, having the arms of a combined rake and reel at points remote from the center of motion of the wheel or head that carries them, so that in dropping or rolling the rake or beater arms into their working position they shall do so in a direction contrary to that in which the wheel, frame, or head that carries them is moving, and so that they may roll into a position to reach the adjustable lifting and lowering cam way, when used as described.

4th, Also, uniting a series of rakes and beaters to their journals, respectively, by curved or bent axles, crossing each other, one bent upward and the other downward, for the purpose of getting the centers of motion of the beater or arms all in the same plane, so that they may all receive a uniform motion from the cam ways that guide or influence them, substantially as described.

5th, Also, the combination of the sleeve with its hinged dogs, the forked latch K, and the cam way L, for the purpose of enabling the operator on the machine to throw the arm that has been acting as a rake out, and hold it out, or to allow it or any other arm of the series to run into action as a rake while the remaining arms of the series act as beaters, substantially as described.

6th, Also, in combination with a series of arms that have a revolving, rising-and-falling, and a rolling motion on their journals, a hinged cam way that may be raised or lowered, to raise or lower the beaters, by means of a lever extending therefrom, so as to be within the reach of the driver upon the machine, substantially as described.

7th, Also, in combination with a series of arms, one of which acts as a rake, and the others as beaters, a series of hinged dogs, G, one of which shall serve as an arm specially to raising, while the others shall adapt the other arms specially to reeling in the grain, substantially as described.

84,834.—HORSE SHOE.—Rudolph Laporta, New York city.  
I claim the combination of the screw bar, C, with the fork, I, nut, E, cross bar, H, having the fork, I, with the shoe, A, when constructed and arranged to operate together substantially in the manner and for the purpose specified.

84,835.—APPARATUS FOR MAKING PAPER BOXES.—Francois Leclerc, Boston, Mass.  
I claim for the purpose specified, the described process of using thin pulp in high columns over previous forms, substantially as set forth.

Also, the combination of the wheel, B, with cylinders, R, arranged to rise and fall over the forms, M, substantially as and for the purpose set forth.

Also, the combination of the wheel, B, and slides conveying the forms, M, with inclines to move the slides outward and inward, as the wheel revolves, substantially as and for the purpose set forth.

Also, the combination with the cylinders, R, and their conveyer, B, of the valves, O, and the incline, C, operative thereon, substantially as and for the purpose set forth.

Also, the process of condensing the pulp on the former, and expelling the water therefrom against atmospheric pressure by covering the pulp-covered former with a close vessel, G, and admitting therein air under pressure, substantially as and for the purpose set forth.

Also, the process of removing the paper from the pervious former by covering the pulp on the former with a cap fitting thereon, and admitting an air-blast into the cap, substantially as and for the purpose set forth.

Also, the process of removing the paper from the cap which received it from the former, and for transferring the paper to a receiving block, by covering the receiving block with the cap, and admitting an air blast into the cap, substantially as and for the purpose set forth.

84,836.—BOTTLE-FILLING APPARATUS.—John Matthews, Jr., New York city.  
I claim, 1st, The combination of a sirup pump or charging device with the filling head or corking plunger of a bottling machine, in such manner that said pump or charging device is operated automatically by the filling head or its corking plunger, to admit sirup or other flavoring mixture to the bottle, while the sirup or water, or other liquid to be sweetened or flavored is separately supplied to said bottle as it remains under the filling head, substantially as specified.

2d, The arrangement, essentially as described, of the sirup pump or charging device made adjustable, to regulate its charge, as specified, with the filling head or corking plunger, for operation together, substantially as herein set forth.

84,837.—ROTARY HORSE BRUSH.—W. W. McKay, Ossian, Iowa.  
I claim, 1st, The combination, in a frame of a rotary brush, and a slide arranged for communicating rotary motion to the brush, alternately in one direction and the other, as and for the purpose specified.

2d, The brush, D, arranged in combination with the frame, A, so as to be readily attached to and detached therefrom, substantially as and for the purpose set forth.

3d, The combination with the brush, D, of the adjustable scraper, F, substantially as and for the purpose specified.

4th, The arrangement of the brush, D, frame, A, pulleys, E, cords, D', and slide, C, substantially as and for the purpose specified.

84,838.—BRIDLE.—John McKibben, Lima, Ohio. Antedated December 1, 1898.  
I claim the reins, E, provided with the stops, H, in combination with the bit, having its side bars, G, provided with guides, F, for the reins to pass through, and the tubes, E, at the rear edges of the bit, through which the reins also pass, all arranged substantially as and for the purpose set forth.

84,839.—EXTENSION LADDER.—Warren Morehead, Parkersburg, W. Va.  
I claim the arrangement of the sliding ladder, B, constructed as described, triangular ladder, A, with its slides, D, and the latch, D, and slide, E, all constructed and operating as shown and described.

84,840.—ENVELOPE.—Charles R. M. Pohle, Richmond, Va. Antedated November 30, 1893.  
I claim the closing of the envelope by the action of the double seal, substantially as described.

84,841.—WATER ELEVATOR.—L. Raymond, Greene, Ohio.  
I claim the combination of the swing or trapeze, F, the inclined guide, G, and the cords and pendants, D, E, all substantially as and for the purpose set forth.

84,842.—FLOUR COOLER.—Joseph S. Reynolds, Wauconda, Ill.  
I claim the arrangement herein described, of the shaft, B, and agitators, D, with the cooling pans, A, provided with apertures, A', near their peripheries and screw conveyers, C, as and for the purpose set forth.

84,843.—BRIDLE BIT.—William S. Robbins, New Bedford, Mass.  
I claim, 1st, The inner bit, B, attached to the outer concave bit, A, by means of the curved end springs, U, whereby the inner bit is adapted to be drawn out of the bit, A, its entire length, and parallel with said outer bit, as herein described for the purpose specified.

2d, Attaching the bridle to the outer bit, A, and the driving reins to the inner bit, B, as herein described for the purpose specified.

84,844.—HAND SUPPORTER FOR PIANOS, ETC.—Charles Sanzani, New York city.  
I claim the apparatus hereinabove described, or its equivalent, suspending the hands or resting the hands on the hand blinder the free movements of the fingers, and keeping thereby the hands or wrist, and in consequence thereof, the fingers upon the key board in the position desired, at the same time unobstructing all the motions required to be made to use the same, and to play upon an instrument, as above described.

84,845.—DIES FOR MAKING CARRIAGE AXLES.—W. W. Simmons, Birmingham, Conn., assignor to himself, R. M. Bassett and T. S. Bassett.  
I claim the dies, E, constructed as shown and described, for the purpose hereinbefore set forth.

84,846.—PUMP.—Oscar Snell, Williamsburg, Ohio.  
I claim, in combination with the pump proper, A, the valve chest, F, constructed also as an air chamber, the side valve, G, tube, K, and discharge pipe, L, when constructed and arranged to operate in the manner and for the purpose herein set forth.

84,847.—PLANING MACHINE.—Henry D. Stover, New York city.  
I claim the frame of a planing machine, constructed in the manner described, so that the arm cutters, F, F', may operate simultaneously with the cylinder, D, substantially as and for the purpose set forth.

2d, The oscillating clamp, R, when constructed in the manner and for the purpose specified.

3d, The adjustable brackets, N, in combination with the frame, E, for supporting the driving shaft, O, and tighteners, when constructed and arranged as described.

4th, The clamp, R, when provided with a single hook at each end, to take hold of pins inserted in the ends of the carriage, as described.

5th, The iron uprights, E, in combination with a bed, A, when such bed is used for the support of the vertical and horizontal cutters, D and F, F', in the manner described and for the purpose set forth.

84,848.—HYDRANT.—Solomon Tice, Cincinnati, Ohio.  
I claim the combination, substantially as described, of the open-ended and perforated cylinder, A, a chamber, B, a float pipe, C, discharge pipe, D, collar, E, valve seat, F, packing G, stem, K, plunger, M, in valve, F, and the expanded passage, P, all substantially as described, and for the object explained.

84,849.—CLOTHES DRYER.—Jarvis B. White, Detroit, Mich.  
I claim the clothes dryer, consisting of the standard, A, part, C, hinged near the foot of standard, A, and carrying the clothes rack, D, E, F, straps, G, and the foot of standard, H, all arranged and operating substantially as and for the purposes set forth.

84,850.—APPARATUS FOR CLEANING RAGE.—George L. Witell, St. Louis, Mo., assignor to himself and T. L. Bates, Philadelphia, Pa.  
I claim an apparatus for the uses specified, consisting of the cylinders, pipes, stopcocks, and air pumps arranged for operation substantially as set forth.

## REISSUES.

77,476.—MACHINE FOR MAKING NUTS.—Dated May 5, 1868; reissue 3,242.—Matthew H. Foster and Hubert C. Hart, Unionville, Conn.  
We claim, 1st, The combination of the sliding bed, B, with the mechanism for cutting the mechanism for forming, and the mechanism for punching and awaging, substantially as described.

2d, The arrangement of the formers, F, the blocks, K, the set, L, the die, A, and the punch, P, constructed and operated as described.

3d, The peculiar arrangement of the cans, A, B, C, D, E, F, by which the several parts of the machine are made to operate at the proper time, substantially as herein set forth.

4th, The improved nut machine, consisting of mechanism constructed, combined, and arranged substantially as herein set forth.

82,983.—CHILDREN'S CARRIAGE.—Dated Oct. 6, 1868; reissue 3,234.—Francis Boylston, New York city.  
I claim, 1st, The combination and arrangement of the fixed axle, A, having two revolving wheels, B, C, and D, or supports, B, B', when the same are attached to the front part of a children's carriage or perambulator, substantially in the manner herein shown and set forth.

2d, Attaching the fixed axle, A, to the supports, B, B', by means of the brackets, C, C', and secured by the screws, A, or their equivalents, the whole of the parts being made and combined with a children's carriage or perambulator substantially in the manner herein shown and described.

3d, The combination and arrangement of the fixed axle, A, having three or more wheels, D, D', brackets, C, C', and supports, B, B', the whole being made and combined, with respect to each other and to a children's carriage or perambulator, substantially as and in the manner herein shown and set forth.

49,903.—APPARATUS FOR CARBURIZING IRON.—Dated Feb. 7, 1893; reissue 3,235.—Edmon L. Mix, Rochester, N. Y., and the Monumental Automatic Gas Machine Company, Baltimore, Md., assignees by mesne assignments of Hugh L. McAvoy.  
We claim, 1st, An apparatus for manufacturing air gas and enriching other gas, in which the carbonaceous matter is included within an air forcing apparatus, consisting of a gravitating air holder and water receptacle, substantially as described.

2d, Manufacturing air gas by the described mode of using a holder, C, to contain air, receive the carbonaceous matter as it rises from the oil in the form of vapor, and force the gas into a pipe, wherein it is conducted off, as explained.

3d, The plate, E2, employed in connection with the pan, E, to cause the air to pass to the pipe, B, in contact with the oil, and in a state of compression, substantially as described.

4th, The sealing device consisting of the cap, F, cylinders, G, G', and a body of liquid between the latter, substantially as described.

5th, An apparatus for carburizing iron in which the vessel holding the hydrocarbon liquid is contained within the gasometer, in contact with the water in the cylinder thereof, substantially as and for the purposes set forth.

25,978.—TACKLE BLOCK.—Dated Nov. 1, 1859; reissue 3,236.—Isaac C. Baker, Hackensack, N. J.  
I claim the construction of a tackle block and pulley, whereby the rope or fall, when desired, may be clamped between a portion of the pulley and a portion of the surface connected with the block, substantially as herein described, by simply leading it in a direction oblique or lateral to the plane of revolution of the pulley, without tying, or the use of doors or movable stops, or any other means of fastening.

30,446.—MAGAZINE FIRE-ARM.—Dated Oct. 16, 1860; reissue 3,237.—Winchester Arms Company (assignees by mesne assignments of B. Tyler Henry), New Haven, Conn.  
We claim, 1st, In combination with the hollow breech pin, the spring catch, m, on the breech pin and the piston, arranged for central or rim fire, or both, substantially as and for the purpose set forth.

2d, A magazine fire-arm, in which the breech pin, E, and the spring catch, m, placed on top of the breech pin, L, the so forming of the top of the said carrier block, near the rear end, as shown at 45, fig. 4, as to strike the cartridge forward of the center, and thus raising the forward end of the cartridge, while the rear end is held down by the spring catch, tripping it over and forcing it from the spring, and ejecting it from the gun, substantially as described.

## DESIGNS.

3,277.—SNUFF BOX.—F. C. Heiser, Brooklyn, E. D., N. Y.

3,278 TO 3,290.—CARPET PATTERN.—Elemir J. Ney (assignor to the Lowell Manufacturing Company), Lowell, Mass. Thirteen Patents.

## EXTENSIONS.

MANUFACTURING LEATHER BANDING FOR MACHINERY.—George Miller, Providence, R. I. Letters Patent No. 11,902, dated Nov. 7, 1884.

I claim my improved manufacture of round banding, as made substantially as described, that is to say, by reducing a strip of leather or other suitable material to the shape desired in fig. 1, and subsequently rolling and cementing it together into that essentially as exhibited in fig. 2, of the drawings heretofore mentioned.

BUCKLE.—Stephen E. Booth, Orange, Conn., administrator of S. S. Hartshorn, deceased.—Letters Patent No. 11,292, dated Nov. 7, 1884; reissue No. 3,235, dated May 26, 1898.

I claim, 1st, A buckle in which the tongue are formed from a single piece of metal and constructed so as to clamp the divided side and turn freely thereon, substantially in the manner herein set forth.

2d, The combination of the two parts or loops, one side of one of which is divided, and the two parts or loops hinged together as described, and the tongue clasped and biased upon the divided side, as set forth.

SHINGLE MACHINE.—Harry H. Everts, Chicago, Ill.—Letters Patent No. 11,238, dated Oct. 31, 1884.

I claim the blocks to be moved into shingles in a rotating carriage, which is combined with inclined tables, P, P' (or a single table), and with saws O, O' (or a single saw), in such a manner that the blocks will be carried continuously forward and be automatically operated upon to convert them into shingles, substantially as herein set forth.

I also claim the arrangement of the weighted levers, H, H', the fastening teeth, I, I', and the inclined planes, L, L', with each other and with the inclined tables, P, P', and the other series of teeth in the ledge, R, substantially as herein set forth.

I also claim presenting the sides of the fibers of the wood to the action of the saws in the sawing of shingles, or equivalent articles, for the purpose of giving them smoother surfaces than can be produced by the usual mode of sawing, substantially as herein set forth.

DAQUERRETYPE CASE.—Eliza Mascher, Philadelphia, Pa., administratrix of John F. Mascher, deceased.—Letters Patent No. 9,511, dated March 8, 1855; additional improvement No. 184, dated Feb. 19, 1896.

I claim, 1st, A case for the daguerretype, in which the daguerretype is held in place by a screw, C, and the case is provided with a series of ordinary lenses, D, D', placed in it, by which, upon adjusting the flap or lid as shown, a stereoscopic image is formed of the case, and the two daguerretypes, E, E', by binocular vision, are apparently formed into a single figure.

2d, A case for the daguerretype, in which the daguerretype is held in place by a screw, C, and the case is provided with a series of ordinary lenses, D, D', placed in it, by which, upon adjusting the flap or lid as shown, a stereoscopic image is formed of the case, and the two daguerretypes, E, E', by binocular vision, are apparently formed into a single figure.

LOOM FOR WEAVING FIGURED FABRICS.—George Crompton, Worcester, Mass.—Letters Patent No. 11,933, dated November 14, 1884; reissue No. 639, dated December 28, 1893.

I claim combining with hook jacks which are connected with the harness, and with the mechanism for operating them to open the shed, substantially as described, a pattern chain, or cylinder, constructed with two or more patterns, and so arranged that the patterns can be made to act on the hook jacks to place them in the required position to be operated upon by the mechanism for opening the shed, substantially as described.

I also claim, in combination with a pattern chain, arranged with two or more patterns, and so arranged that the patterns can be made to act on the hook jacks to place them in the required position to be operated upon by the mechanism for opening the shed, substantially as described.

I also claim placing two or more patterns upon the rods of a pattern chain, side by side, and operating them in succession by vibrating the chain laterally, in the manner substantially as described.

I also claim pivoting the lifting and depressing rods, G, P at one end, the other being made adjustable, in the manner and for the purpose set forth.

I also claim moving the rods or jacks out of contact with the rollers on the pattern chain before the chain is moved, by means of what are termed vibrating fingers, or the equivalents thereof, substantially as described.

SEWING MACHINE.—Charles Farham, Philadelphia, Pa. Letters Patent No. 11,971, dated November 21, 1884; reissue No. 1,362, dated November 3, 1893.

I claim, 1st, So forming and constructing the shuttle driver of a sewing machine that, while it performs the required duty of driving the shuttle, it serves to maintain the latter in the desired proximity to the plate, C, as set forth.

2d, The combination of the driver, A, shuttle, B, and stationary plate, C, the whole being formed and arranged substantially as described, so as to retain the shuttle during its flight in its proper position for the purpose specified.

PRESSER BAR FOR PLANING MACHINE.—Clara M. B. Snow, of Independence, Iowa, executrix of Harvey Snow, deceased.—Letters Patent No. 11,984, dated November 21, 1884.

I claim combining the pressure bar, B, with the rotary cutters, so as to secure the same relative position of the inner edge of the bar, and the path of the cutting edge in holding and cutting the surface of a board throughout its varying thickness, substantially as described.

ANCHOR.—Samuel H. Miller, Dedham, Mass.—Letters Patent No. 9,608, dated Jan. 2, 1857.

The nature of my invention consists in having two separate shanks (marked A and B, in fig. 1 of the enclosed drawing) and flukes to them, C and D, the shanks being confined together near the rings by the bolt, E, secured at one end by a large head, and at the other by a strong nut or key, F, and separated at the other end by a screw or wedge the length of one of the shanks by a spur or cone projecting from the shank A. In the other shank, B, there is a hole through which the end of the spur, G, passes, and is secured by a nut or key at H. The flukes are pointed in opposite directions, and so disposed that it is impossible for the anchor to lie otherwise than with one of the flukes in the ground.

geared as in fig. 2 of the drawings, becoming in effect a double "mooring anchor," which sinks with certainty both flukes in the ground by attaching to the middle of the spur chain, I, which connects the two shanks, and is twice the length of one of the flukes, an empty reef b' reef, small water cask, or anything of sufficient buoyancy to insure the turning of the flukes down by its resistance to the sinking of the anchor. To this chain the buoy rope is also made fast. In many ports ships are obliged to be moored, and launch the anchor, being disposed as above, will take a double hold of the fluke which stands up from the ground catching the cables of the ships as they sheer about with the wind or tide. In my anchor this difficulty is entirely avoided, for, when the flukes are sunk in the mud, there is nothing above the ground which can catch a chain or hawser. In anchoring upon a lee shore, the anchor, being disposed as above, will take a double hold of the ground, thus rendering the anchorage more secure.

Specification 4.—If one of the flukes or shanks should be broken near the elbow or crown, (the place where they usually break), this anchor can yet be made available by lashing a spar of the length of the shank and one fluke, across the remaining shank, to the spur or brace, G, as in fig. 3. It then becomes the same as the common one fluke mooring anchor, and can be used in the same manner, or as the double anchor described in the third specification, by securing to the ends of the spar a temporary stock, a rope of twice its length, and from the middle or right of that extend another to the ring at the elbow, then at the right, or where the ropes are united, secure a buoy or small cask, and let go the anchor, the fluke will strike the point into the ground. Or it can be lowered down by a rope made fast to the elbow or crown, as is the mode with the mooring anchor now in use. In the old form of anchor, if the shank is broken, both flukes are lost, and the anchor is useless.

Specification 5.—It is frequently necessary to carry out anchors in boats; which service, if in the night time, or in a heavy sea, is always attended with great peril, because of the anchor stock lying athwart the boat's gunwale, overhanging the men in rowing, and its liability to turn, and the stock catching in the boat's quarter, when about to be let go. In carrying out this anchor of my invention, there is no such danger. There being no stock, it lies along the middle of the boat, with flukes over the stern; and when the hawser is run out, the anchor follows, without the possibility of fouling or catching in the boat.

Specification 6.—By the mode in which this anchor is made, greater strength is insured than can be obtained in the old one with the same weight, each shank and fluke being in shaft forged into shape, and then heated at the proper place, and bent into the form requisite, without the necessity of welding any part but the spur or brace of the stock. In the old anchor there must be a weld (and commonly there are two) at the crown; and there they most frequently break.

Specification 7.—While making a passage, this anchor can be readily stowed by withdrawing the key, H, and lifting the shank, B, from the spur, G, and laying it upon the shank, A. The anchor, thus closed, occupies a but little space. This can be done while the anchor hangs at the end-head, and with greater ease than when on the deck, by taking out the key, drawing of the shank, B, and allowing it to drop to its fellow. Then, by the tackle hooked to the spur chain, it is taken over the ship's side.

Specification 8.—In case of extremity this anchor can be separated and used as two, by lashing across the shank, A, at G, a spar for a temporary stock, and driving through the hole in the shank, B, at H, a hand-screw, and lashing thereto a spar, as on the shank, A; then rig them with buoys, as described in specification 4, and illustrated in fig. 3. Thus arranged, the anchor being provided with two rings, can be shackled to two chains or cables, thereby securing a greater safety to the ship than if moored with but one.

What I claim as my invention, and desire to secure by Letters Patent, is the above described anchor for holding ships.

Mrs. A. St. John, of Rochester, says that, during the past ten years, she has made more than three thousand five hundred vests with her Wheeler & Wilson machine, besides doing her family sewing, and that she has made over twelve hundred vests with the needle now in use.

## MANUFACTURING, MINING, AND RAILROAD ITEMS.

The Bennington and Rutland Railroad Company are to extend their road to the marble quarries at West Rutland.

A single rubber manufactory in Providence, R. I., employs five hundred hands.

The lumbermen at Burlington, Vt., have adopted the ten hour system.

Mill posts are now being erected on the line of the Concord Railroad.

The earnings of the Central Pacific Railroad for October exceeded \$300,000.

## Business and Personal.

The charge for insertion under this head is one dollar a line. If the Notices exceed four lines, an extra charge will be made.

A rare chance for business investment is offered in the sale of a foundry and machine shops at New Haven, Conn. The oldest in the State. Reputation established. See advertisement, back page.

Extension table—self-acting. All the leaves and means of operating them, contained in the frame of the table. Rights for sale. Send for circular, to Chas. F. Pease, Boston, Mass.

Send \$1 to Milton Bradley & Co., Springfield, Mass., for series No. 6, Zoetrope Pictures.

Peck's patent drop press. Milo Peck & Co., New Haven, Ct.

Wanted to purchase a set of pulley patterns, either in the rough or finished state, ranging from 6-in. to 48-in. diameter, with 8-in. faces. Any person having the same for sale will please address W. P. S., No. 31 Reed st., Pittsburgh, Pa.

Manufacturers and machinists wishing to purchase planing or shaping machines, drills, lathes, or steam engines, will find it for their interests to consult the advertising columns, back page, of this paper.

Wanted—A new or 3d-hand machine for finishing and putting up merinos and other piece goods. Send price and description to Teasdale Bros., Cincinnati, Ohio.

Look out for orders, manufacturers and machinists. See manufacturing news of the United States in Boston Bulletin, which will post you where to solicit them. The Commercial Bulletin, Boston, \$4 a year. Advertisements 17c a line.

Millstone-dressing machine, simple and durable. Also, Glaziers' diamonds, and a large assortment of "Carbon" of all sizes and shapes, for all mechanical purposes, always on hand. Send stamp for circular. John Dickinson, 64 Nassau st., New York.

Wanted—A good man, thoroughly posted in the working of spoke and wheel-making machinery, as foreman in a wheel factory at Marietta, Ohio. A good salary will be paid to one who can come well recommended. Address F. W. Minshall, Sec., Postoffice box 264, Marietta, Ohio.

See A. S. & J. Gear & Co.'s advertisement elsewhere. Keep posted.

For descriptive circular of the best grate bar in use, address Hutchinson & Laurence, No. 3 Dey st., New York.

For Hackle Pins, etc., address J. W. Bartlett, 569 B'dway, N. Y.

For solid wrought-iron beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for Lithograph, etc.

Portable pumping machinery to rent, of any capacity desired, and pass sand and gravel without injury. Wm. D. Andrews & Brother, 414 Water st., New York.

N. C. Stiles' pat. punching and drop presses, Middletown, Ct.

Prang's American chromos for sale at all respectable art stores. Catalogues mailed free by L. Prang & Co., Boston.

The paper that meets the eye of all the leading manufacturers throughout the United States—The Boston Bulletin.

Winans' Boiler Powder, N. Y., removes and prevents incrustations, without in any way injuring the boiler. Beware of imitations.



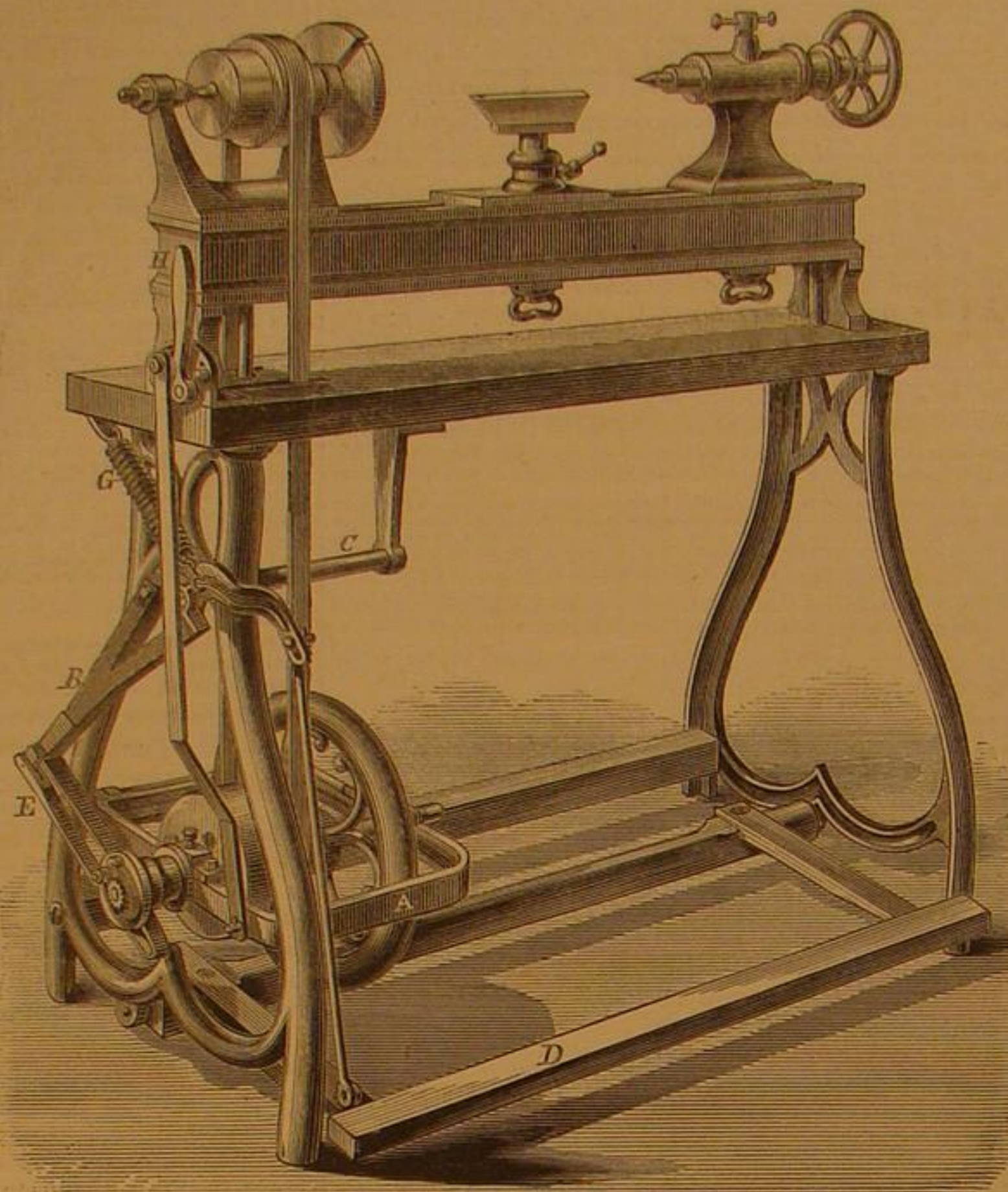
### Improved Lathe for Dentists, Model Makers, etc.

Dentists, amateurs, and others who use the foot lathe, experience more or less annoyance from their inability to stop the head spindle suddenly, the momentum of the fly wheel being difficult to overcome. This entails a great loss of time, particularly if the work is to be examined frequently. The lathe herewith represented is intended to obviate these objections.

The driving shaft, carrying the cone pulleys and a small fly wheel, is mounted in a frame, A, under the head stock of the lathe, and is pivoted on stands secured to the rear bar of the lathe, so that the frame, with shaft and wheels, may be raised or lowered to a certain extent.

The wheel shaft projects beyond the end of the lathe, and carries a fixed ratchet wheel at the extreme end. Between the ratchet and the box of the shaft is a flanged pulley, turning loosely on the shaft, sufficiently wide to receive two narrow belts side by side. One of these is attached to the long arm of a pendulum lever, B, the shaft, C, being its fulcrum. To the other, or short arm of the lever, is pivoted the rod that connects with the treadle at D. Another narrow belt, which the flanged pulley receives, is fastened at one end to a guide bar or bow, E, pivoted to the long or lower arm of the lever, B. The other end of both these belts is secured to the face of the loose-flanged pulley, in such a manner that when one is wound on the pulley the other is unwound, as when the foot of the lever is furthest from the shaft the strap secured to B is run out, while that secured to E is wound up. A spring, G, balances the weight of the treadle and its appurtenances. A pawl and light spring on the outer head of the flanged pulley serves to make connection between the loose pulley and shaft by means of the ratchet. A bell-crank lever at H connects by a rod with the pivoted frame, A, by which the frame can be raised to slacken the belt, or lowered to tighten it. When raised, the driving belt will be slackened, so that the spindle may be instantly stopped. The treadle stops as soon as the foot is removed, and always at the highest point, while the driving shaft continues to revolve. It is evident that a very high speed may be obtained by this contrivance, while the stroke of the operator's foot may be of any limit required.

E. P. Rider, 220 Center street, New York city, manufactures these lathes largely to order for model makers, mathematical instrument makers, watchmakers, etc.



FOOT LATHE WITH IMPROVED DRIVING ATTACHMENT.

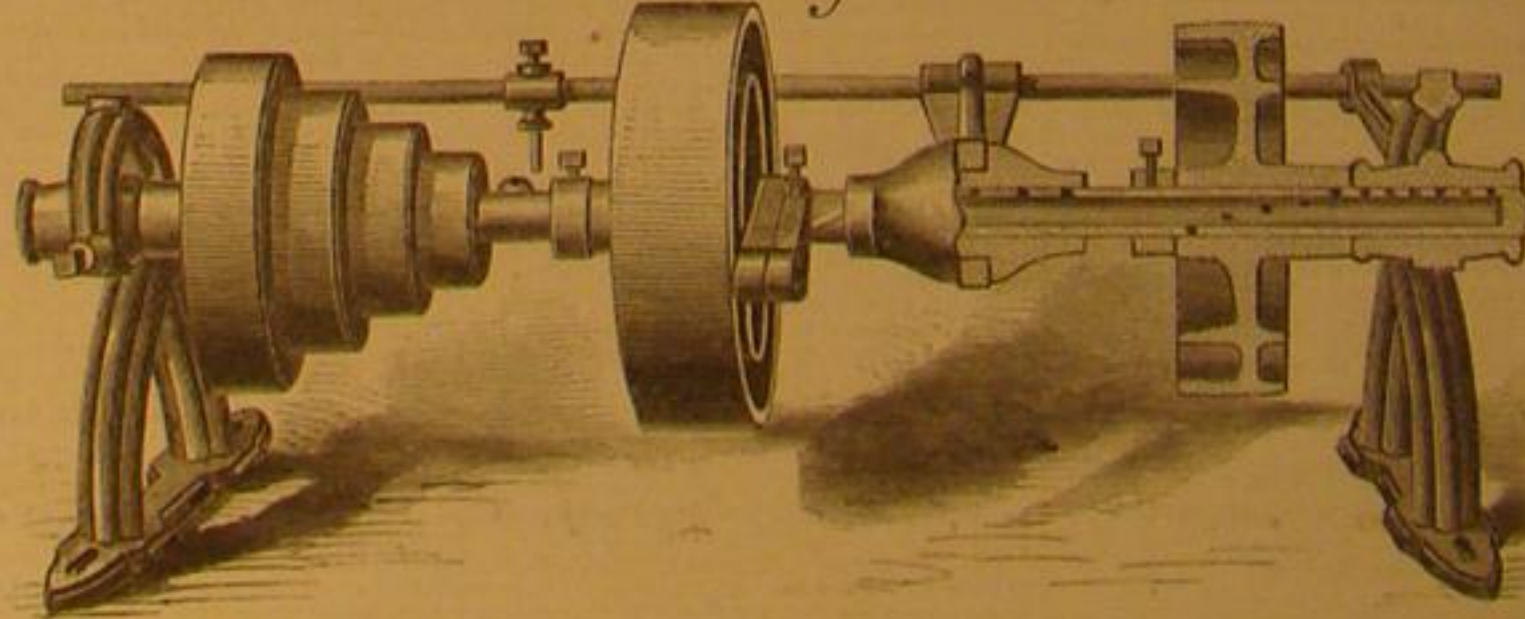
nature, by those who have made satisfactory tests of this method during the past four years, and are still using it, might be repeated. It is applicable to nearly all bearings and loose pulleys, and is in use on engines to oil crank pins, eccentrics, crossheads, etc. It is especially valuable on wood-working machinery which requires a rapid motion. The oil, being preserved from the air, does not oxidize or thicken, but remains pure and limpid.

There are some bearings in machinery where a hollow shaft is inconvenient or impossible. In such a case the inventor proposes a cup oiler as shown in Fig. 2. The globe is preferably of glass to exhibit the state of the oil. A stem of metal is inserted into the lower part of the globe, fitting by means of a gland of cork, the other end passing through the cap of a box, or the strap of a connecting bar or pitman, and reaching the surface of the shaft, or wrist pin. To hold the stem

Fig. 2



Fig. 1



OLMSTED'S PATENT SELF-OILER.

and half an inch in diameter. Other statements of a similar in the requisite position a moveable friction ring on the stem rests on the outside of the box, and the bottom of the stem or tube is plugged with a leather disk resting on an internal collar, as seen in the engraving.

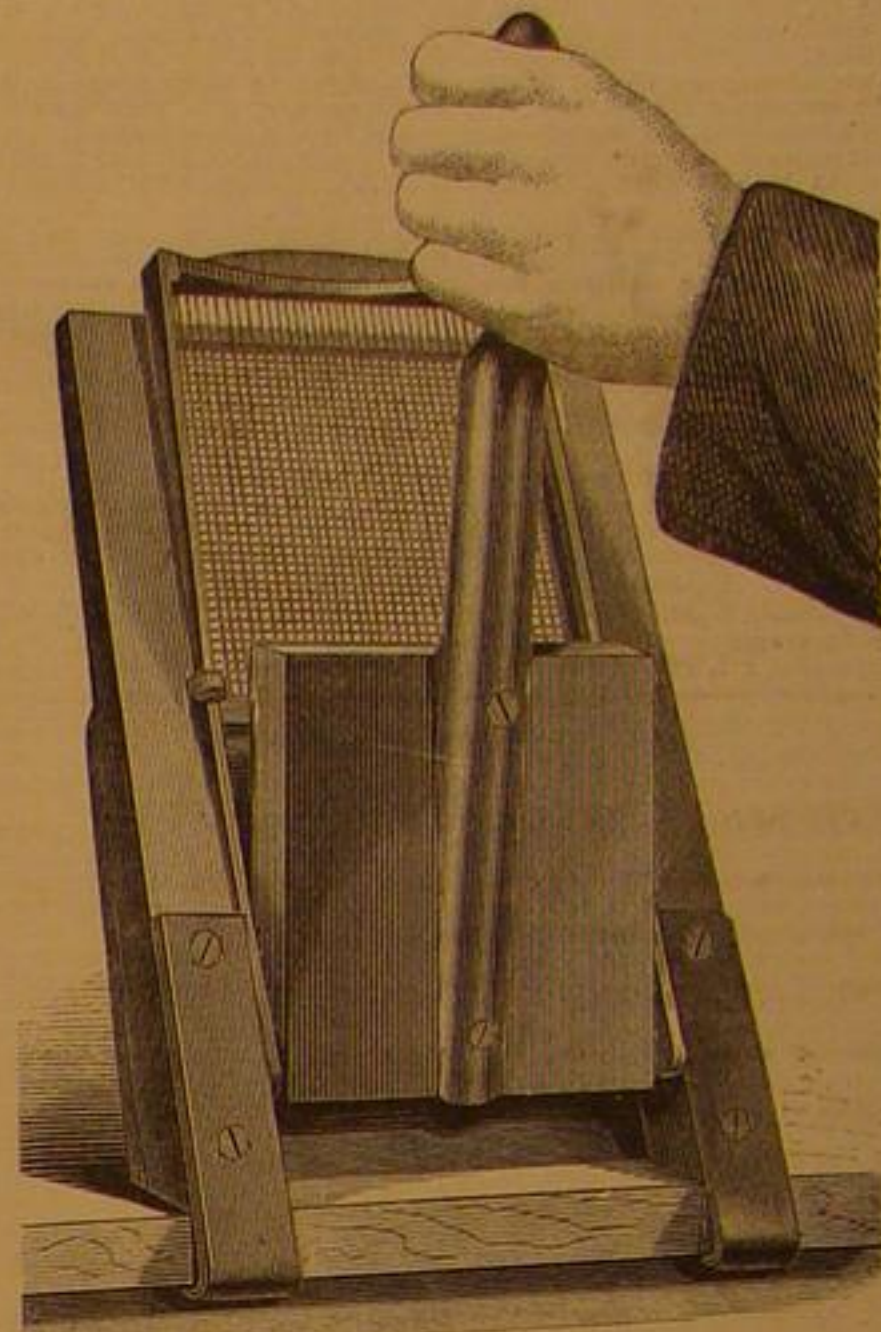
These oilers have stood a long and severe test, and been found to operate satisfactorily. The rotation of the shaft wipes the oil that exudes through the leather on to the shaft; but when the shaft is at rest the oil will cease to pass through and none will be wasted. There is nothing to get out of order, no screws to adjust, and no continual watching necessary.

Patented January 21, 1868, by L. H. Olmsted, manufacturer of fine machinists' tools, whom address at Stamford, Conn., or No. 1, Centre street, New York City.

### BROWN'S VEGETABLE MASHER.

The pulping of vegetables preparatory to cooking or serving on the table is somewhat laborious, and the necessity of removing the rind or skin before this can be done, demands considerable time. To save this time and avoid much of the labor, the implement seen in the engraving has been contrived. By it potato, turnip, squash, stewed apple, and other vegetables and fruits, may be mashed or reduced to pulp without removing the skin, which is rejected and passed to one side.

It is a simple frame consisting of two uprights, or inclines, connected at top and bottom by cross bars, and adapted, as seen, to fit on a table or bench. The upper portion of the main frame has a series of parallel rods or wires, the interstices of which are



small enough to prevent the passage through of parings or skin. Directly over this is another similar frame with wires running transversely to those of the main frame, so that the two combined form a sieve. A crusher, consisting of a block fitting the sieve, and a handle, has pivots or projections on its lower end traversing in slots in the sides, by which it may be moved up and down or to and from the sieve.

The operation is perfectly simple. In mashing potatoes, for instance, the potato is fed in with one hand while the masher is worked by the other; the pulp passing through the sieve, and the peel dropping down from the front of the sieve into a pan or other receptacle. The implement may be used in any position—horizontal, inclined, or vertical. Its parts may be easily separated for cleansing.

Patented through the Scientific American Patent Agency, May 19, 1868, by E. Brown. For further particulars address E. Brown, or Geo. D. Wright, at Burlington, Vt.

### Excitement and Short Life.

The following, by an unknown writer, accords with our observation: The deadliest foe to a man's longevity is an unnatural and unreasonable excitement. Every man is born with a certain stock of vitality, which cannot be increased, but which may be husbanded or expended rapidly, as he deems best. Within certain limits he has his choice, to live fast or slow, to live abstemiously or intemperately, to draw his little amount of life over a large space, or condense it into a narrow one; but when his stock is exhausted he has no more. He who lives abstemiously, who avoids all stimulants, takes light exercise, never overtasks himself, indulges no exhausting passions, feeds his mind and heart on no exciting material, has no debilitating pleasures, lets nothing ruffle his temper, keeps his "accounts with God and man duly squared up," is sure, barring accidents, to spin out his life to the longest limit which it is possible to attain; while he who lives intemperately, who feeds on high seasoned food, whether material or mental, fatigues his body or brain by hard labor, exposes himself to inflammatory disease, seeks continual excitement, gives loose reign to his passion, frets at every trouble, and enjoys little repose, is burning the candle at both ends, and is sure to shorten his days.

MR. A. L. HOLLEY, Engineer of the Pennsylvania Steel Works, at Harrisburg, has also been appointed engineer of the Bessemer Steel Works of Messrs John A. Griswold & Co., Troy. These works, originally built by Mr. Holley, and consisting of a two ton converter and a pair of five ton converters and plant, were partially destroyed by fire in October. The small converter is already in operation and the works will be immediately rebuilt and considerably extended.

### Improvement in Oiling Shaft Bearings and Loose Pulleys.

Some months ago we took occasion to speak, through our columns, on the enormous waste of lubricating oil in shops and manufactories, referring not only to oil used for tapping, cutting bolts, turning, and polishing, but to the waste in lubricating journals and bearings. The ordinary way of filling the cup on the top of a box, eccentric, or strap of a connecting rod, must of necessity entail a large percentage of waste. Centrifugal force throws the oil from the shaft, and it escapes from the box of a shaft at the ends and drops to the floor or is received into drippers. If contained in a cup on an eccentric, or strap embracing a wrist pin, the oil is thrown, in the same way, from the shaft rather than toward it. Loose pulleys, especially, waste the oil intended for their lubrication. At every revolution the oil is thrown out through the holes made for its reception.

If cotton waste or other porous material is used to retain the oil and conduct it to the frictional surface, it soon becomes foul and needs to be frequently changed and fresh oil introduced. All the usual methods of oiling introduce the oil to the surface of the shaft from the outside; but the plan represented in Fig. 1 of the engravings is entirely different; the oil is placed in the center of the shaft and is fed or thrown outward to the surface. The engraving represents the ordinary counter shaft for a screw-cutting engine lathe, part of it in section and part in perspective. The shaft is hollow, plugged at the end by a screw. At the points where the journals come, a series of small holes are drilled from the outside to the central cavity; so, also, where the loose pulleys run and the clutch works.

These holes may be drilled in line or on a spiral, as may be considered most advisable. The internal cavity of the shaft



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NEW YORK, WEDNESDAY, DECEMBER 23, 1868.

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## TO CITY SUBSCRIBERS.

The SCIENTIFIC AMERICAN will hereafter be served to our city subscribers either at their residences or places of business, at \$3.50 a year.

Theodore Tusch, a very energetic and reliable young man, and for many years employed in this office, is authorized to deliver the paper, and to collect subscriptions and receive orders for advertisements.

We propose during the coming year to devote more attention to the illustration and description of leading branches of manufacturing. We are prepared to send our artists, and competent writers to points within reasonable limits to take the necessary sketches, and prepare the descriptions. The advantage of such illustrated articles in a journal so widely circulated as the SCIENTIFIC AMERICAN, must be apparent to every enterprising manufacturer.

ONE of our associate editors has recently visited Pittsburgh, and we are now preparing illustrations of the largest iron works in that city, to be published soon, with an account of the operations and processes carried on at the works.

THE present number closes the volume. We are aiming at a subscription list of at least fifty thousand. This can only be accomplished by the co-operation of our present patrons, who have always generously responded to our appeals. We urge them now to speak a good word for the SCIENTIFIC AMERICAN. By so doing they can induce some of their neighbors to join in making up a club. If ten or more names are sent, the subscription is \$2.50 a year. Any one who will send us twenty names and \$50, can add his own name to the list.

AGENTS who receive their weekly supply of the SCIENTIFIC AMERICAN through news companies, are urged to canvass their localities. By a little effort among intelligent mechanics and manufacturers, they can add largely to their lists. We will send specimen numbers, when desired, for that purpose.

WHAT more valuable present can be made to young mechanics than a year's subscription to the SCIENTIFIC AMERICAN? Employers will be doing their employees a great service by acting on this hint, and we feel sure that at the end of the year they will consider the investment a good one.

SUBSCRIBERS who wish to have their volumes bound, can send them to this office. The charge for binding is \$1.50 per volume. The amount should be remitted in advance, and the volumes will be sent as soon as they are bound.

THE Index, the Patent Claims, and Advertisements occupy so much of the present issue, that we are obliged to defer the publication of several interesting letters and contributions until our next number.

SUBSCRIBERS who forward their subscriptions, may consider the receipt of the paper as evidence of payment, as we cannot undertake to acknowledge such payments by mail.

## PERMANENT WAYS versus LIGHT TRAINS.

When houses are properly built the foundation is the first and most important consideration. If the "hard pan" is not reached piles are driven to give a proper foundation. So with all structures built by men and growing out of the earth, the foundation is the first and main object of concern. To secure this foundation, in any particular locality, is possible even un-

der very adverse circumstances; but, although it is intended mainly to support a constant weight, not subject to frequent or extensive variations in amount, it is, not seldom, very costly. Where the imposed weight, is liable to sudden and frequent change, either of increase or diminution, it has been found that a rigid structure is not so lasting as one possessing more or less elasticity. Such are bridges, especially those of a large span, and we always hear of the amount of deflection caused by a stationary or a passing load when a bridge is described.

Unyielding sub-structure for the rails of a road, would be very costly. To prevent displacement by atmospheric agencies—frost, heat, snow and rain—the bed or foundation would have to be settled and located below the reach of these disturbances. That this would be hardly possible, at whatever expense, is evident when the nature of the beds of our railroads are considered. They are cut through hills and dense forests, carried through swamps, and over causeways, the material being rock, loose stones, gravel, loam, soil, sand, and even decaying vegetation. Such materials, under such circumstances, cannot make a permanent way. A foundation of gravel, stone, mortar, and cement would be altogether too costly, and make railroads an impossible luxury. Substituting stone for wooden sleepers has been tried and failed. A portion, at least, of the Boston and Lowell railroad was laid with granite sleepers. Each sleeper became an anvil and the jar of the successive blows of the wheels was immensely injurious to the rolling stock, while the stone sleepers were broken by the frost or the percussion of the trains. "Shims" or cushions of wood were introduced between the rails and the stone sleepers and thus the difficulty was partially remedied. If a permanent or rigid way is to be attempted it is evident that either the support of the rails must be continuous, or the rails must be made much heavier, or higher, giving a longer vertical section than those at present used.

As at present constructed and used, railroads are costly enough; they are anything but permanent ways, and as making them so would seem to be financially difficult if not physically impossible, we must look to the reduction of the weight the rails are compelled to bear. Between the supports (sleepers) the rail is a stringer like that of a bridge, and subject, like that, to deflection, as anyone may see who notices the movement of a train, a locomotive, or a heavily loaded car. Why not reduce the weight of the locomotive and of trains, running trains of ten or twelve together? Is there any insuperable obstacles to this, and would it not be cheaper than to make a long road, passing over and through all sorts of soils and all descriptions of country, a permanent way? It seems to us that altogether too much attention has been devoted to the introduction of steel rails, steel tires, and improvements in the permanent way, and too little to the proper utilization of our roads as they now exist, or as they may be cheaply made to be. Let the road be properly ballasted, placing the sleepers two instead of three feet apart, and then replace the enormous thirty, forty, and fifty ton locomotives by those better adapted to the road, of course reducing the weight of the trains (and if necessary, of the cars), and we should hear less about accidents from broken and worn out rails, broken axles, and defective sleepers.

## CONDITION OF THE PATENT OFFICE.

The Secretary of the Interior, in his annual report to Congress, states that during the year ending September 30, 1868, there were 20,112 applications for patents; 14,153 patents (including reissues and designs) were issued; 1,692 applications allowed on which patents did not issue owing to the non-payment of the final fee; 3,789 caveats filed; 180 applications for the extension of patents received, of which 133 were granted. The receipts were \$696,786, being \$171 less than the expenditures. The Secretary also renews his former suggestion in favor of repealing so much of the law as allows an appeal from the decisions of the Commissioner on applications for letters patent and in interference cases, and respectfully refers to the views on the subject presented in his former reports.

The Commissioner of Patents reports to the President of the Senate as follows:

By an act of Congress passed July 20, 1868, all the receipts of the Patent Office were directed to be paid into the Treasury, and the sum of \$250,000 was appropriated to pay its expenses.

In pursuance of said act, I transmit herewith to Congress a detailed account of the receipts and expenditures of the Patent Office during the period from the passage of said act up to the commencement of the present month.

The payments of salaries and wages at the Patent Office are usually made at the end of each month. Those, therefore, that were paid after the 20th of July were for the services of the whole of that month.

The accounts of expenditures include about \$35,000 paid for debts that had accrued before the commencement of the term. Other portions of such past indebtedness, amounting to about \$27,000, still remain due and unpaid.

The Agricultural Department, during the past summer, has been removed from the Patent Office building. The fitting up of the rooms thus vacated, and furnishing them for the uses of the Patent Office have involved considerable expenditures beyond the ordinary expenses of the office.

Of the \$250,000 appropriated by the act of July 20th, \$43,400 remain unexpended. This sum, it is estimated, will about meet the expenditures of the present month.

The receipts of the Patent Office, since the 1st of July last, that have been collected and paid into the Treasury, exceed all its expenditures during the same period, ordinary and extraordinary, by the sum of \$29,494 85.

## THE VELOCIPEDE MANIA.

The excitement on the subject of velocipedes is on the increase, and improvements are being made every day. But inventors are not confining their genius to velocipedes to be used on land; a number of plans and models have been submitted to us for aquatic use, some of which possess much novelty.

A riding school for giving instruction in the art of riding and driving the two-wheeled velocipede has been opened in the large hall, 932 Broadway, where large numbers of gentlemen congregate every evening to receive instructions.

The sport of velocipede riding is very fascinating, and is becoming quite fashionable. It is likely to take the place of skating to a great extent. Persons may be seen practicing on our streets and avenues every afternoon. One gentleman in the country who does business in the city is said to have sold his horse and wagon and substituted the velocipede, on which he rides back and forth from the railroad station to his house every day. He claims that he goes quicker and without fatigue. He enjoys the exhilarating ride, and is delighted with the change. His oats are for sale and stable to rent. No more harnessing, shoeing, or horse feed required by this gentleman. Other incidents of interest on the new mania are deferred for lack of space this week.

## HORSE AND FOOT.

From the above heading it might be inferred that we intend to write a military essay, but such is not the case. Our desire is simply to call attention to a nuisance, and to suggest a remedy. The nuisance to which we refer is this: In all our overcrowded cities, New York, for instance, all streets are free to vehicles of whatever character, and are also pedestrian thoroughfares. It is true the sidewalks are the exclusive prerogative of the pedestrians, but, as they are forced to cross other streets to get from block to block, the nuisance remains, to the peril of life and the utter despoilment of broadcloth and patent leather.

Nine tenths of all the accidents from collisions occur at crossings. This city employs a large number of policemen to assist ladies in fording rivers of filth and preventing them from being run down by reckless drivers. It is no uncommon sight, in the midst of sludge which winter always brings us, to see some shipwrecked daughter of Eve stranded upon some island of frozen filth in the middle of the street holding frantically to her soiled crinoline, her pretty gaiters filled with an ice-cold solution of high fertilizing value, and looking appealingly around to find somebody whose bravery and boots are sufficient for an attempt to rescue her. Meanwhile along come the omnibuses and express wagons, carts and trucks, whose drivers seem to take a malicious pleasure in bespattering her velvet cloak and her snow-white feathers, regardless of the feelings which wring her heart-strings, or the damage which wrings her husband's purse strings.

Now there is but one remedy for this uncivilized state of affairs. The horse must be separated from the foot. In order to effect such a separation we advocate first, the erection of a screen along the edge of the sidewalk next the street, the screen to consist of an iron frame, with a curtain of canvas that can be raised or lowered, to suit circumstances. In fair weather it would of course be unnecessary to keep it up, but in sloppy weather it would add greatly to the comfort of all who are compelled to pass through our principal thoroughfares. Second, the crossings should be tunneled. The experiment of the Fulton Street Bridge has proved that bridges are not the thing wanted. They require to be too high to accommodate the loaded vehicles and omnibuses, and for various other reasons are not tolerated. Tunnels at crossings, on the contrary, need not be deep, and the steps leading into them can be made of easy grade. They can be lighted day and night with gas, for one-fourth the expense of keeping policemen to guard the principal crossings, and on the score of cleanliness are preferable to bridges. Their expense need not be much greater than bridges, but if it were five times as much we should still advocate them as the only feasible method of correcting the nuisance we have described.

## CLEANLINESS IN SHOPS.

In our visits to different manufacturing establishments we are often shocked at the confusion and want of order which seems to prevail. Cleanliness, the virtue which has been said to rank next to godliness, seems to be entirely disregarded in many otherwise well conducted establishments. Now we regard order in the arrangement of tools, the avoidance of confusion attendant upon misplacement, and the frequent and thorough removal of the litter upon floors, as more important in an economical point of view, than with reference to the comfort and health of workmen, although the latter consideration is important enough.

The want of attention to this point is costing many a shop in this country more than is imagined. In one shop we visited lately we saw a workman search for a mislaid tool longer than it took him to use it after he found it. The incident did not seem an unusual one but one of ordinary occurrence, as we inferred from some remarks of the foreman, who saw the whole matter and even suggested some places where the missing tool might probably be found.

The floor of this shop was covered with a mass of useless lumber. The removal of any bulky object from one end of the shop to the other, would have necessitated a previous removal of rubbish to clear a way that would have consumed a considerable time. Such a slovenly state of things must inevitably breed carelessness on the part of employees, and greatly facilitate accidental misplacement of tools, nuts, and other small objects liable to be dropped. The reflexive effect upon hands, of strictly enforced order in the replacing of tools and cleanliness in a shop, is always in the highest degree beneficial and should never be overlooked by an intelligent foreman.

Nothing is more refreshing than to pass from one of these ill-regulated slovenly shops into one where order and cleanliness prevail. Even the workmen seem to be more cleanly in their person and tidy in their attire, and to feel the elevating tendency of the discipline which prevails. Everything moves on quietly, rapidly, and surely to its accomplishment. No time or material is wasted. Everything is in its place when wanted and ready for use. A comparison of two such shops is a demonstration that there is no such thing as perfect manu-



facturing economy when order and cleanliness are overlooked.

#### THE JONVAL VS. THE FOURNEYRON WATER-WHEEL.

It has long been a mooted question with both engineers and manufacturers whether the Jonval or the Fourneyron water wheel utilized the greater amount of power from a given quantity of water and fall. This problem seems to have been at last solved in a very satisfactory manner in favor of the Jonval turbine, as the accompanying letter from a disinterested party, prepared agreeable to contract, will show.

The wheels in question are from 125 to 150-horse power, and were expressly constructed to test the respective merits of the principle of which each is a type. The builders of the different wheels are well known to be eminent in the construction of the wheels they produce; and the builders of the beaten wheel—the Fourneyron—it is reasonable to suppose, used all their skill in the construction of the wheel upon which so much depended, hence the result must be attributed not to a faulty adaptation of, but to the principle itself.

We deem this a very important result; and as it is evidently no accidental or forced result, but a matter of deliberate contract and agreement between all the parties interested, the builders, as well as the users of the wheels, we take pleasure in calling the attention of engineers and manufacturers to it.

WILLIMANTIC, CONN., Oct. 31, 1868.

MUNN & Co. Gents:—When our new thread mill was being constructed, we made a contract with Mr. J. P. Collins, of the Troy Turbine and Machine Works, to build one of his improved Jonval Turbine Water Wheels, to be tested with a Fourneyron or "Boyd" Turbine, as built by Messrs. Kilburn, Lincoln & Co., of Fall River, Mass.

The test was to be a comparative one, i. e., each wheel to drive the same machinery, and the relative amount of water measured which each should require to do it.

About one year since, the builders of both wheels met here and, assisted by ourselves, conducted the test. Messrs. Kilburn, Lincoln & Co. were much dissatisfied with the result, and claimed that their wheel was badly injured by some sticks or stones getting into it. Upon this ground they claimed the privilege of putting in a new wheel, preparatory to another test. This request was granted them, and the final test was made on the 15th inst., both builders again being present.

The Fall River wheel drove 12 1/2 per cent more machinery than the Collins wheel, but in doing so required 38 99-100 per cent more water, thus leaving a result of over 23 per cent in favor of the Collins wheel (being about the same comparative difference as in former test). In the last test the water used by each wheel was measured over the same weir, the same depth being retained by contracting the ends. The gates were fully open in each test, and the Collins wheel was not changed after the first test.

Our contract with Mr. Collins was that we should give a certificate of the result, no matter which wheel should prove the best, for publication in your useful journal, and we now hereby comply with the same.

Yours, very truly,

WILLIMANTIC LINEN CO.  
A. B. BURLISON, Agent.

#### THE TELESCOPE.—A LECTURE DELIVERED BEFORE THE AMERICAN INSTITUTE BY PROF. ALEXANDER.

Reported for the Scientific American.

The second lecture of the regular course of scientific lectures before the American Institute, was delivered on the evening of the 4th December, by Prof. Alexander of Princeton College.

The lecture was opened by an allusion to the figure in Bunyan's Pilgrim's Progress, in which the senses are considered as gates to the soul. The speaker dwelt in the most eloquent manner upon the beauty of the mechanism of the "eye gate," and the mysterious agent by which impressions of remote objects are conveyed to the mind.

He next proceeded to explain the mechanism of the telescope, that "artificial eye" bestowed upon man by optical science, illustrating this part of the subject with numerous diagrams. It is quite impossible to reproduce in a report of this kind this part of the lecture. One part, however, can be made clear to our readers. People often imagine the magnifying power of a telescope depends upon the size of its object glass. This is a mistake. An instrument with a small object glass may magnify as much as a larger one, the magnifying power depending upon the eye-pieces. The limit of the power of the eye-pieces which telescopes can carry, and give a distinct image, depends upon the object glass which determines the illuminating power. In other words, we behold objects clearly only when their size and illumination are together sufficient to produce a distinct impression upon the retina. The larger the object glass of a telescope is, the more light it will collect from objects towards which it is directed, and hence the advantage of large lenses.

The lecturer next dwelt briefly upon the early history of the telescope. Roger Bacon, in the thirteenth century, made use of such language with reference to what "may be performed by refracted vision," as to render it somewhat probable that he was at least acquainted with the theory of a refracting telescope, though there is no sufficient proof that he constructed one; and Baptista Porta is said by Wolfius to have made a telescope, but the description of the instrument given by the inventor is very defective, and the instrument, whatever it was, does not seem to have been used in any celestial observation. Indeed, we have no distinct evidence that such an instrument was used before the beginning of the seventeenth century. Descartes ascribes the invention of the telescope to James Metius (Jacob Adriaens) of Alkmaar in Holland; but Huygens, as well as Borellus, to John Lippensheim, or Lippersey (Hans Zans, or Jansen), a maker of spectacles, of Middelburgh. Prof. Moll, after an examination of official papers preserved in the archives of the Hague, comes to the conclusion that on the 17th of October, 1608, Jacob Adriaens was in possession of the art of making telescopes, but from some un-

explained cause concealed it; and that on the 21st of the same month, Hans Zans, or Jansen, was actually in possession of the invention; but there is little reason to believe that it was devised by either him or his son Zacharias, though one of them invented a compound microscope about the year 1590.

One of the earliest of the telescopes made by the Jansens was presented to Prince Maurice, to be used in his wars. It was in April or May, 1609, that Galileo first heard of this, and the instrument was then described to him as one which had the property of making distant objects appear as though they were near. Galileo thereupon devised how that might be effected, and the next day, according to Delambre, was in possession of a telescope magnifying three times. Galileo's second telescope magnified about 18, and his third about 33 times.

The remainder of the lecture was an elegant and graphic description of some of the wonders of the heavens revealed to us by the telescope, and it was closed by a strong argument in favor of natural and revealed religion based upon the evidences of an intelligent Creator to be found in the study of the material universe.

#### THE MANUFACTURE OF IRON.—A NEW PROCESS.

A new process for manufacturing iron, which seems to give considerable promise, is now on its trial at one of the iron mills of Pittsburgh. The process obviates the necessity of puddling. The pigs of crude iron are melted, and, while in a fused state, a quantity of crushed ore is intermixed. The oxygen of the ore combines with the carbon of the crude iron. The mixed mass is called a pig bloom. Upon re-heating these pigs and squeezing them in the usual manner, and rolling, iron of a very good quality is obtained. More rolling is required than in the ordinary process, but notwithstanding this fact, the iron is produced, so it is claimed, at a saving of six dollars per ton over the old method.

Some specimens which we have seen tried, indicate that the iron is slightly red-short, but not so much so as to seriously impair its quality. When cold it is remarkably tough, enduring very severe tests of bending, twisting, and so forth. We have not obtained analyses of the ores used in the process and cannot therefore give any further details. We shall, however, watch the progress of this method, and hope at a future time to give a minute description of it.

#### The Siemens Furnace.

During a recent visit to Pittsburgh, our attention was called to the operation of one of the Siemens regenerative gas furnace, and we are satisfied that among the many modern advances in the manufacture of iron and steel, this deserves to rank among the most valuable. The furnace alluded to was applied to the melting of steel in pots, and we were told that the saving in fuel effected by it was enormous. It would be difficult to conceive how a more intense heat on so large a scale could be reached, than in one of these furnaces. The *American Railway Times* contains the following interesting facts in regard to this furnace, and its applications:

One of these furnaces used in Bolton, England, since November, 1867, in puddling iron, shows some remarkable results in competition with the ordinary puddling furnace, which may be summed up briefly as follows: an increase of from thirty-five to fifty per cent in the amount of work done; greatly improved quality of the iron produced; great saving in the waste metal; and a saving of from twenty-four to fifty per cent in the amount of fuel used. When to these facts is added that the Siemens furnace will last much longer than the ordinary furnace, and that it occupies much less room, it makes out a pretty strong case in favor of its general adoption for puddling iron. The Siemens Furnace is now being rapidly introduced into the United States, for melting steel in pots, being used for this purpose at Nathan Washburn's works at Worcester, Mass., and at the works of Messrs. Anderson & Wood's, and Singer, Nimick & Co., of Pittsburgh, Pa., while several other furnaces are being built at other places for like purposes. In melting steel in pots it is found that one half ton of slack coal of poor quality will melt one ton of steel in three hours, while the pots will last two melts more than by the old process. In Great Britain the manufacturers are now successfully using clay pots at the cost of about fifty cents each, while the lead crucibles commonly used, cost about three dollars each. These pots are now being introduced into Nathan Washburn's works, and in other steel works, and this item of economy is of no mean importance in favor of the Siemens furnace. It is found at the Lenox Plate Glass Works, at Lenox, Mass., that this furnace will melt the same mixture in nine hours, that in the old furnace it takes thirteen hours to melt. For heating iron and steel, the Siemens furnace is now used at the Nausa Iron Works, and the Rensselaer Iron Works; and it is found that four hundred pounds of poor coal are found sufficient to heat one ton of iron. These furnaces are likewise now being erected for heating, melting, and puddling purposes, by the Washburn & Moen Manufacturing Company, by Messrs. Burden & Sons, by the Trenton Iron Works, by Messrs. James Wood & Sons, of Pittsburgh, the American Silver Steel Company, and by several other parties in different sections of the country.

#### Chemical Action of Light.

The interesting researches of Professor Tyndall as to the action of light on certain vapors and liquids may have no immediate effect upon the practice of photography, but it is impossible to say at what point in his discoveries a practical application may become obvious. Let us illustrate by a speculation upon the possibilities attending his recent discoveries. In his paper before the Royal Society he states that actinic light decomposes the vapor of nitrite and nitrate of amyl. Amyl is a radical analogous to ethyl and methyl, the hydrated oxide of amyl being known as fusel oil, as the hydrated oxide of ethyl is known as ethylic, or common alcohol, and the hydrated oxide of methyl is known as methylic alcohol. Fusel oil is known to be a common impurity in ordinary alcohol, and its presence in collodion has long been regarded as injurious, and conducive to fog, without any knowledge of the reason why it should produce mischief. Professor Tyndall's experiments suggest a series of possibilities. When fusel oil is in collodion, and comes in contact with nitric acid, either free in the bath or liberated by action of free iodine in the collodion, a trace of nitrate of amyl may be formed, and this body, being present in the film when exposed to the action of light, and possibly de-

composed, would, under some circumstances, yield, as a product of decomposition, valerianic acid, a substance answering to acetic acid, as the product of the oxidation of common alcohol, or formic acid in methylic alcohol. Or, possibly, in the decomposition, intermediate bodies, analogous to acetone or aldehyde, might be formed, with a well-known tendency to produce fog when present in a collodion film. Such a series of possibilities exist, and might furnish a clue to the fogging action of fusel oil when present in collodion, which, arguing from ordinary analogies, ought not to be more inimical to success than the ordinary alcohol employed in the manufacture of collodion.—*Photographic News*.

### PATENT OFFICES, American and European, OF MUNN & CO., No. 37 PARK ROW, NEW YORK.

For a period of nearly twenty-five years MUNN & Co. have occupied the position of leading Solicitors of American and European Patents, and during this extended experience of nearly a quarter of a century, they have examined not less than fifty thousand alleged new inventions, and have prosecuted upwards of thirty thousand applications for patents, and, in addition to this, they have made at the Patent Office over twenty thousand preliminary examinations into the novelty of inventions, with a careful report on the same.

This wide experience has not been confined to any single class of inventions, but has embraced the whole range of classification, such as Steam and Air Engines, Sewing Machines, Looms and Spinning Machinery, Textile Manufactures, Agriculture and Agricultural Implements, Builders' Hardware, Calorifics, Carriages, Chemical Processes, Civil Engineering, Brick Making, Compositions, Felting and Hat Making, Fine Arts, Fire Arms, Glass Manufacture, Grinding Mills, Harvesters, Household Furniture, Hydraulics and Pneumatics, Illumination, Leather Manufactures, Mechanical Engineering, Metallurgy, Metal Working, Navigation, Paper Making, Philosophical Instruments, Presses, Printing and Stationery, Railroads and Cars, Sports, Games, and Toys, Stone Working, Surgical Apparatus, Wearing Apparel, Wood Working.

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**To Apply for a Patent**, a model must be furnished, not over a foot in any dimensions. Send model to Munn & Co., 37 Park Row, New York, by express, charges paid, also a description of the improvement, and remit \$16 to cover first Government fee, revenue and postage stamps.

The model should be neatly made of any suitable materials, strongly fastened, without glue, and neatly painted. The name of the inventor should be engraved or painted upon it. When the invention consists of an improvement upon some other machine, a full working model of the whole machine will not be necessary. But the model must be sufficiently perfect to show with clearness, the nature and operation of the improvement.

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**Patents can be Extended**.—All patents issued prior to 1861, and now in force, may be extended for a period of seven years upon the presentation of proper testimony. The extended term of a patent is frequently of much greater value than the first term, but an application for an extension to be successful, must be carefully prepared. MUNN & Co. have had a large experience in obtaining extensions and are prepared to give reliable advice.

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American inventors should bear in mind that, as a general rule, any invention that is valuable to the patentee in this country is worth equally as much in England and some other foreign countries. Five Patents—American, English, French, Belgian, and Prussian—will secure an inventor exclusive monopoly to his discovery among ONE HUNDRED AND THIRTY MILLIONS of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. MUNN & Co. have prepared and taken a larger number of European Patents than other American Agency. They have Agents of great experience in London, Paris, Berlin and other cities.

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On filing each application for a Patent, except for a design	\$15
On issuing each original Patent	\$20
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On application for Reissue	\$25
On application for Extension of Patent	\$25
On granting the Extension	\$25
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The SCIENTIFIC AMERICAN is not the organ of any sect or party, and its columns are therefore kept free from mere partisan questions. Nevertheless, its opinions upon all questions of public utility will be freely expressed. It would be impossible, within the limits of a prospectus, to specify the wide range of subjects which make up the yearly contents of the SCIENTIFIC AMERICAN; a few only can be indicated, such as

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will find in each number an official List of Patents, together with descriptions of the more important inventions. We shall also publish reports of decisions in Patent Cases and points of law affecting the rights and interests of Patentees.

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commences JANUARY FIRST; therefore, now is the time to organize clubs and to forward subscriptions. Clubs may be made up from different post-offices, but not less than ten names can be received at the clubbing rates. Additional names, however, may be sent in afterward at the same rates, to be designated as belonging to the club.

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37 Park Row, New York.

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