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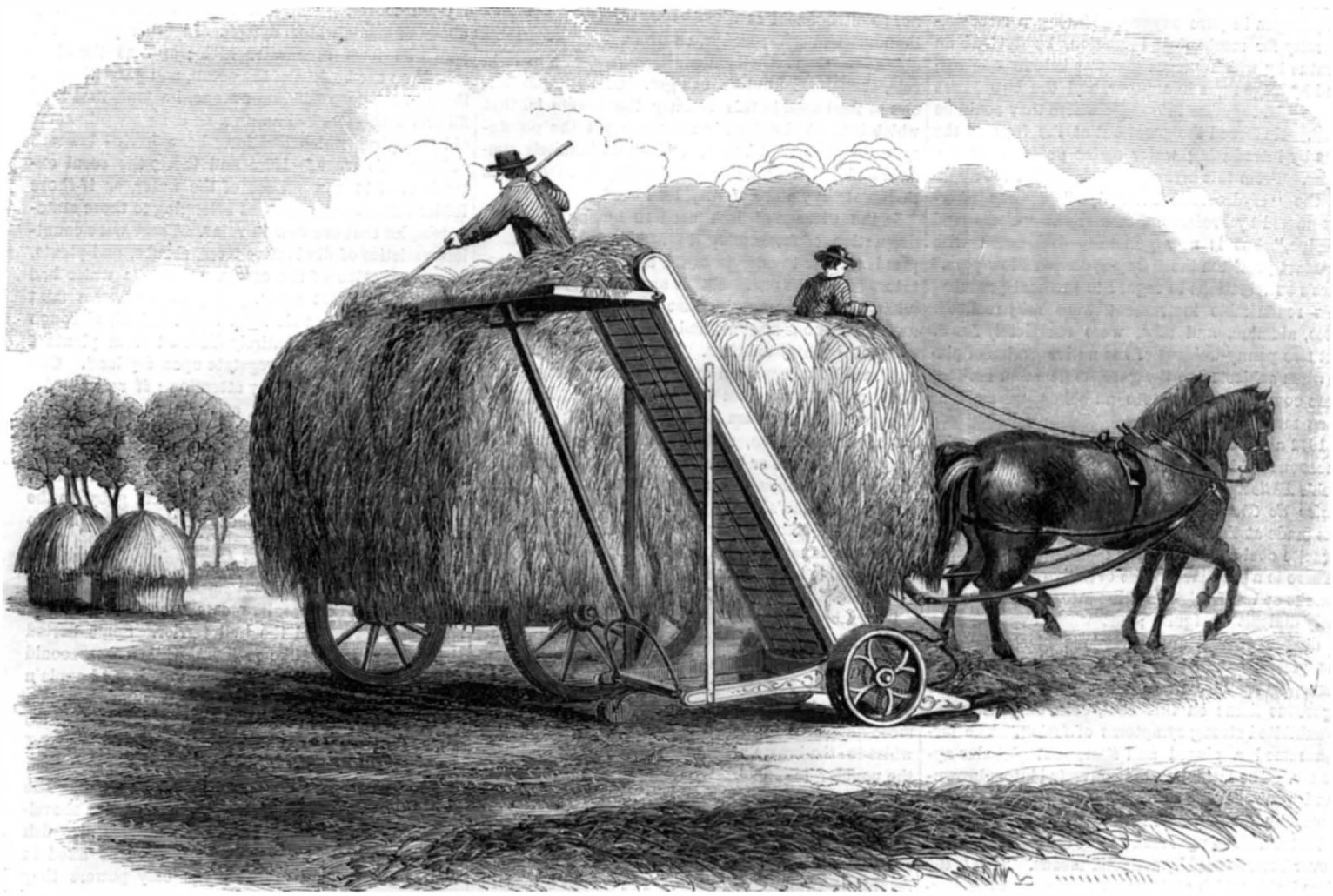
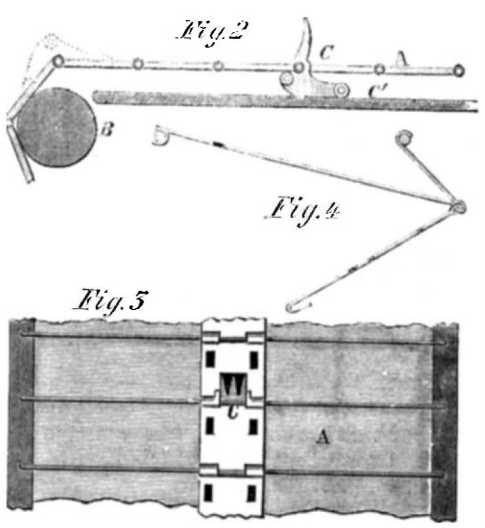


BENTLEY'S HAY-LOADING MACHINE.

The labor of loading hay in the field is very fatiguing on a hot summer's day, and on large farms, where heavy crops are grown, the labor is very severe. It is desirable that this work should be done by machinery, not only to exempt the farmer from hard work, but to facilitate the operation, and thus greatly lessen the cost of production. By the use of the self-loading arrangement herewith illustrated the farmer or his assistants can ride from one end of the field to the other, as the machine is operated by the progress of the team. One man trims the load on top as it is delivered so as to preserve the balance, and the only other assistance required is that of the driver to control the horses.

This machine will be easily understood by referring to the engraving. The elevating apparatus consists of an endless apron, A, running over two rollers at the top and bottom of the machine ; one of these rollers can be seen at B', in Fig. 2. At regular intervals there are self-adjusting forks, C, fastened to the endless apron as shown in Figs. 2 and 3 ; these run on ways, C', beneath. The apron receives motion from the rollers, and the rollers themselves are driven by the gears, D, one of which is on the axle of the pair of wheels the machine runs on, and the other upon the roller axle ; thus as the team or wagon advances, the loading apparatus being connected with it by the arrangement shown in Fig. 4, the apron revolves, and the forks, coming in contact with the hay, carry it up to the top where it is discharged into the



wagon beneath. There is a platform above, on which the workman stands, this can be folded up out of the way when the machine is not in use. The forks before-mentioned fold down, as shown in Fig. 2, in passing over the top roller, so that they do not catch in the hay at all ; were it not for this the hay would be drawn over and scattered on the ground, thus defeating the object. As the machine advances the hay is lifted first by the chute end of the elevator and carried to the forks on the apron, and by these latter the hay is elevated to the top of the machine in the manner alluded to. By the arrangement in Fig. 4, the machine is drawn along with the wagon at a regular speed, and the other parts enabled to perform their functions in the proper manner ; it can be detached in a moment if required. In addition to the self-loading arrangement the machine also rakes after the wagon, the rake being so adjusted that the teeth do not catch in the ground. This is accomplished by having a spring in connection with the castor wheel behind. This machine is very highly spoken of, and is claimed to be a great improvement on the slow and laborious plan of loading hay by hand. It can also be used to unload the wagon in the barn, and for elevating straw or fodder to the scaffolds or mow above.

This machine was patented by Wm. H. Bentley, of Westford, N. Y., through the Scientific American Patent Agency, on the 17th of November, 1863 State rights to manufacture are for sale ; for further information address the inventor as above.

THE MOST IMPORTANT AMERICAN DISCOVERIES AND INVENTIONS.

No. 3.

THE OXY-HYDROGEN BLOW-PIPE AND CALCIUM LIGHT.

Hare---1801.

Robert Hare was born in Philadelphia in 1781. His father was the proprietor of a brewery, and for a time the son, Robert, assisted in the conduct of the business. He early showed a fondness for scientific studies, and before he was 20 years of age he joined the Chemical Society of Philadelphia. Soon after he joined, before he had reached his majority, he announced the discovery which has immortalized his name.

From the little that was then known in relation to heat and combustion, he conceived the idea that the most intense heat ought to be produced by burning pure hydrogen in pure oxygen. Having a remarkable faculty for mechanical invention, he devised an apparatus by which oxygen gas was held in one vessel and hydrogen gas in another, and the two gases were brought together in one jet where they could be kindled. He forced the gases out at the tops of the vessels by introducing water under pressure at the bottoms. From this arrangement he called the apparatus the "Hydrostatic Blow-pipe." It was afterwards named by Professor Silliman the "Compound Blow-pipe," but is now generally designated with more exact precision the "Oxy-hydrogen Blow-pipe."

Hare's anticipations in regard to the heat produced by this remarkable instrument were fully realized. Barytes, alumina, and silex were completely fused. About two penny-weights of the native grains of platina, when subjected to the gaseous flame on carbon, became completely fused into an oblate spheroid as fluid as mercury.

In 1802 a full description of Hare's apparatus, with an account of his experiments, was published in Tilloch's *Philosophical Magazine*, in England, and in *Annales de Chemie*, in France. The following remarks made at that time by Dr. Hare in relation to anthracite coal are interesting :—

"There is a peculiar species of native coal found on the banks of the Lehigh in this State, which it is extremely difficult to ignite ; but when exposed to a high degree of heat and a copious blast of air, it burns, yielding an intense heat without either smoke or flame, and leaving little residue. By exposure to the gaseous flame on this coal, both magnesia and lime exhibited strong symptoms of fusion. The former assumed a glazed and somewhat globular appearance. The latter became converted into a brownish and semi-vitreous mass."

It was by heating lime in the flame of his blow-pipe that Dr. Hare produced a more intense light than had ever been formed by artificial means. This is the calcium light, which still has no rival except the electric light.

In 1816, 14 years after the publication in London of Hare's account of his experiments, a Professor Clarke, of Cambridge, England, published a book on the blow-pipe, and quietly ignoring Dr. Hare, represented himself as the discoverer of the oxy-hydrogen blow-pipe. And the *Encyclopedia Britannica*, a very voluminous and very pretentious work, recently published, is guilty of the despicable injustice of awarding, in opposition to the plainest and most unquestionable proof, the credit of the discovery to this English pretender. This is an exception, however, to the mass of English authorities—all of the others that we have been able to consult assigning the credit without any question, where it properly belongs, to the American experimenter.

In 1818, Dr. Hare was appointed Professor of Chemistry in the Medical School of the University of Pennsylvania, and he occupied this position till 1847, when he resigned. He died in Philadelphia on the 15th of May, 1858.

His long life was devoted to the study of science and the accounts of his investigations were generally contributed to *Silliman's Journal*. He was especially noted for his ingenuity in devising philosophical and chemical apparatus. In his old age he became a convert to spiritualism—this being the single instance, so far as we are aware, of a man who had been trained to original scientific investigation, becoming the subject of this wonderful delusion.

Dietary of the Working Classes.

A great deal has been written on the subject of the food of the working classes, and a great many suggestions for its improvement have been made, which dietetic experience and progress in science afterward proved to have been injudicious. Nothing is more common at the present time than the recommendation of pseudo-scientific or semi-scientific men to increase the amount of nitrogen in the food of the laborer. Supplement, say these wise-acres, the bread which the workman eats, and which is deficient in nitrogen, with the highly nitrogenous substance—meat. They also recommend the poor man to invest his money in brown bread, because it contains a higher proportion of nitrogen than is found in the white loaves, and to leave the latter to the rich, who prefer quality to quantity. But these recommendations are all based upon fallacious conclusions, deduced from defective information. Fesh, as it comes into the butcher's stalls, is *not* so nitrogenout as wheaten bread, and far less so than oatmeal cake; and when the vegetable-eater is able to purchase a little meat, he prefers, as a general rule, the fattest kind he can get. Of all staple articles of food used in this country the potato is that which is most deficient in nitrogen; yet the potato-eater delights in fat bacon, and would infinitely prefer a little "dripping" to *moisten* his dry tubers with than a stringy piece of very lean beef.

In the average of flesh used as human food, the proportion of fat-forming to muscle-forming principles is as four to one, in bread as five to two, in potatoes as four to one. Milk is an excellent and proper addition to potatoes, because it supplies both fatty and nitrogenous matters, and it is the cheapest source of fat in country districts. From skimmed milk or buttermilk the workman may derive his nitrogen at a cheaper rate than from any other source. Eggs are cheaper in proportion to the amount of nutriment than beef or mutton, and they form an excellent adjunct to potatoes or bread. Kitchen garden vegetables, such as cabbages, are not desirable additions to the workingman's food. They contain a high proportion of semi-elaborated products, which are likely to exercise a laxative effect upon the bowels. They are only suitable in the case of a mixed animal and vegetable diet.

Brown bread is richer in nitrogen than white bread; hence our semi-enlightened lecturers and writers recommend the poor man to purchase the former in preference to the latter. But the poor man knows better than his self-constituted teachers what is the more nutritious for him, and accordingly prefers the white to the brown article. We have great faith in the popular instincts. Whatever practice is founded on instinct is generally correct. Workingmen instinctively find that there is more work in a pound of white bread than a pound of brown bread, though science tells that the latter is richer in nitrogenous or muscle-forming materials. The reason of the inferiority of brown bread in nutritive power is easily explicable; its nitrogen is partly in the husk of the grain, which confers the brown hue on the bread, and the husk is almost indigestible. Brown bread is also a luative food, so that a portion of it is sure to pass unchanged through the body. The fact is that the rich prefer the brown bread to the white because of this very laxative property; but the poor, who rarely suffer from indigestion or constipation, select the food which furnishes the largest amount of available nutriment at the smallest cost. Oatmeal is slightly but only slightly superior to wheaten flour. Peas and beans are an excellent addition to potatoes. Indian meal is inferior to both wheaten flour and oatmeal On the whole the diet of the agricultural laborer and small farmer is more nutritious and more wholesome than the sloppy food upon which the lowest classes of the city population subsist. Potatoes and milk, with a little butter and meal occasionally, is in every respect more substantial and healthful nutriment than the bad-bread and hog-wash tea, occasionally varied by a salt herring or dish of bacon and cabbage, which form the pabulum of the thousands of tailors, shoemakers, and such like craftsmen, who swarm in the bye-streets, lanes, alleys, closes and purlieus of the cities. *Irish Agricultural Gazette.*

Each charge of the 20-inch gun recently cast at Pittsburgh, will cost $75. The cost of the gun will be about $30,000.

Curiosities of the Ocean Bottom.

Mr. Green, the famous diver, tells singular stories of his adventures, when making search in the deep waters of the ocean. He gives some new sketches of what he saw at the "Silver Banks" near Hayti :—

"The banks of the coral on which my divings were made, are about forty miles in length, and from ten to twenty in breadth. On this bank of coral is presented to the diver one of the most beautiful and sublime scenes the eye ever beheld. The water varies from ten to one hundred feet in depth, and is so clear that the diver can see from two to three hundred feet when he is submerged, with but little obstruction to the sight. The bottom of the ocean, in many places, is as smooth as a marble floor ; in others it is studded with coral columns, from ten to one hundred feet in height, and from one to eighty feet in diameter. The tops of those more lofty support a myriad of pyramidal pendants, each forming a myriad more ; giving the reality to the imaginary abode of some water nymph. In other places the pendants form arch after arch ; and as the diver stands on the bottom of the ocean, and gazes through these in the deep winding avenue, he finds that they fill him with as sacred an awe, as if he were in some old cathedral, which had long been buried beneath 'old ocean's wave.' Here and there, the coral extends even to the surface of the water, as if those loftier columns were towers belonging to those stately temples that are now in ruins. There were countless varieties of diminutive trees, shrubs, and plants, in every crevice of the corals, where the water had deposited the least earth. They were all of a faint hue, owing to the pale light they received, although of every shade, and entirely different from plants I am familiar with, that vegetate upon dry land. One in particular attracted my attention ; it resembled a sea fan of immense size, of variegated colors, and the most brilliant hue. The fish which inhabited those 'Silver Banks,' I found as different in kind as the scenery was varied. They were of all forms, colors, and sizes—from the symmetrical goby, to the globelike sun-fish ; from those of the dullest hue to the changeable dolphin ; from the spots of the leopard to the hues of the sunbeam ; from the harmless minnow to the voracious shark. Some had heads like squirrels, others like cats and dogs ; one of small size resembled the bull terrier. Some darted through the water like meteors, while others could scarcely be seen to move. To enumerate and explain all the various kind of fish I beheld, while diving on these banks would, were I enough of a naturalist so to do, require more than my limits will allow, for I am convinced that most of the kinds of fish which inhabit the tropical seas, can be found there. The sunfish, sawfish, starfish, white shark, blue or shovel-nose shark, were often seen. There were also fish which resembled plants, and remained as fixed in their position as a shrub ; the only powers they possessed was to open and shut when in danger. Some of them resembled the rose in full bloom, and were of all hues. There were the ribbon fish, from four to five inches to three feet in length ; their eyes are very large, and protrude like those of the frog. Another fish was spotted like the leopard, from three to ten feet in length. They build their houses like beavers, in which they spawn, and the male or female watches the egg until it hatches. I saw many specimens of the green turtle, some five feet long, which I should think would weigh from 400 to 500 pounds."

Vial's Process of Engraving.

On page 176 of the current volume we published an account of Mr. Vial's new process of etching steel plates, by which a plate of any size is completely engraved in five minutes by a single immersion in a bath of sulphate of copper and nitric acid. The London *Art Journal* speaks as follows of the artistic effects produced by this process :—

"To begin with a fine line engraving. There is a small plate, of which the subject is a sportsman shooting a hare, in every respect like a proof from a plate engraved by a masterly hand ; every blade of grass, every weedy tuft, is there, with the same precision that distinguishes the print taken from the plate in the usual way. Perhaps even clearer than this, is a print of a fawn in a thicket, which it is impossible to fancy other than a finished proof from a

highly-wrought copper-plate. To artists, the most interesting capability of the invention is its power of transferring, in a few minutes, impressions of a drawing or sketch to a steel plate, line for line, touch for touch. M. Gerome, the celebrated French artist, made, in the presence of the French Commissioners of Fine Arts, a sketch of the head of a dromedary, which was prepared and printed from in a few minutes The sketch was drawn with lithographic chalk. There is by Jules David a sketch—something between an etching and a wood-cut : the subject, a French cottage girl hearing a child read ; also a dog by another artist, drawn with chalk and touched with India ink, wherein the spirit and manner of the drawing are so perfectly maintained that it is difficult at first to determine it other than the drawing itself."

Patent Extensions before Congress.

We notice that applications are now pending before Congress for the further extension of certain well known patents, of which the prominent ones are the famous india-rubber patents of Charles Goodyear, deceased—the Woodworth planing machine—Sherwood's Janus-faced lock—and Fitzgerald's fire-proof safe. The three last-named patents have each been extended, the patents have since expired, and are now, if we mistake not, the property of the public. Goodyear's rubber patents were extended by Commissioner Holt, under provisions of the general law of patents, made and provided, and will expire in June, 1865, unless Congress can be induced to prolong the term for another seven years.

It strikes us that, after an invention has received all the protection the laws afford, and has become the property of the public, Congress is not justified by any equitable principles in depriving the public of the indisputable right to continue such use; and it is a questionable proceeding, to say the least, on the part of Congress to interfere to extend patents by special act. The india-rubber patents of the late Mr. Goodyear are acknowledged to be the most valuable in existence.

Immense manufacturing establishments have grown up under the protection afforded by law to these patents, and the public have been compelled to pay enormous profits to those concerns without the right to participate in the manufacture of the goods. This is a monopoly of which (so long as the principles of the patent laws have been carried out) we do not complain, but it seems to us now that, after a monopoly of twenty-one years, the people should be allowed to avail themselves freely of the right to use these inven tions without let or hindrance. We have not the statistics before us of the receipts and expenditures under these Goodyear patents, but observation satisfies us that they are among the most valuable franchises now existing; and, so long as they exist, the people must be taxed to support the wealthy monopolists who control them, and have no power to check their rapacity; not only this, but protected by extended patents, they can not only exact their own tariff of prices, but can effectually crush out all attempts on the part of other inventors to make improvements in this branch of the art.

This point is one which we urge as a very strong reason why Congress should decline to listen favorably to the prayer of the petitioner.

We all recognize the utility and value of patents; the prosperity of the whole country is due in a great measure to the influence of invention in all the industrial arts. We all recognize also the justice of affording protection to all good improvements, and our patent system is acknowledged to be in this respect a model of excellence, but it is not designed to hedge up the field of discovery by perpetuating patents beyond a reasonable limit; and the people consented, under the act of 1836, to allow protection to inventors for a period of fourteen years, with the right of extension for a further term of seven years, under certain conditions, after which the right to use the invention belongs to the public.

Now unless Congress respects the laws of its own making, and regards with care the interests of the people in such matters, there is no telling what abuses may arise. If the Goodyear patent is extended by Congress, the heirs are to have five per cent of the net sales of goods, to which must be added the enormous manufacturing profits. We submit that this system of taxation is one against which the people have a just right to complain and we trust that Congress will set its seal of disapprobation upon the whole scheme by refusing the application.—*Bridgeport (Conn.) Standard.*

MISCELLANEOUS SUMMARY.

Deaths from Chloroform.—"Out of fifty-one cases of death from chloroform, thirty-eight declared their danger by sudden stoppage of the pulse; twenty-five of these showed in addition, as a chief sign, pallor of the countenance. In two deaths the symptoms have occurred thus:—sudden vomiting, instant cessation of the pulse (food had been taken just before). In six cases congestion of the face was the most marked symptom. In eight cases cessation of the breathing was the most noticable symptom. What is to be done in cases of threatened death? There is only one perfect stimulus to the failing heart—the stimulus of aerated blood; and the only means of producing this is by the excitation of respiration. Artificial respiration may be practiced by one or two postural methods—that of Dr. Silvester, or that of Marshall Hall; or by mouth to mouth insufflation, or by galvanism of the phrenic nerve. Before any means for artificial respiration are adopted, the tongue should be well drawn forward. A great error would be committed if a patient *in extremis* were wheeled round to an open window. Dr. Richardson has well established the value of warmth as an adjunct to the respiratory efforts."—*Dr. Sansom in Medical Times and Gazette.*

Dr. Ziegler, one of the editors of the *Dental Cosmos*, adds:—"Arterialization and respiration can be most readily induced in asphyxia, by nitrous oxide, either in its gaseous form through the lungs, or condensed in water and introduced into the alimentary canal by the mouth or bowels."

The Maple Sugar Crop of 1864.—From present indications there is little doubt that the maple sugar crop of 1864 will vastly exceed that made in any previous year. The season thus far has been a good one, and favorable for the early commencement of operations. We have had for the past two weeks a succession of sunshiny days and freezing nights. In all probability the crop of maple sugar at the north for the present year will reach 25,000,000 pounds, worth, at the low estimate of 15 cents per pound, $3,750,000, an important item in the sugar product of the country. This will be but a small amount of the sugar consumed in the whole country, yet it will go far toward supplying the deficiency caused by non production at the South. Few people comprenend the great amount of sugar annually used in the United States. In 1862 it is estimated that the total consumption of sugar, both of the North and South, was 482,411 tuns, or nearly 29 pounds to every man, woman, and child. This consumption was largely decreased in 1863, and will be still more so during the present year. By the manufacture of sugar from the maple and from sorghum, the North will soon be independent of all foreign sugar-producing countries. —*Detroit Tribune.*

White Beeswax.—Have a hard-wood board made in the shape of a shingle, then put the wax in a pot of hot water over the stove. While the wax is melting soak the board in warm water to prevent the wax sticking to it, then dip the board into the pot of water and wax as you would to dip candles, and you will have a thin sheet of wax on the board. This you can loosen with a knife so it will slide off. Then dip as before, and so on until you have dipped all the wax off. Take these thin sheets of wax and spread them on a white cloth in the hot sun until they are white, afterwards melt and cake.

To Restore Faded Photographs.—The prints should be unmounted by soaking in water for a time, and then immersed in a saturated solution of bichloride of mercury, in which they may be left for two or three minutes, and afterwards thoroughly washed. The change takes place directly they are in the bichloride solution.—*Br. Jour. Phot. Almanac for 1864.*

The new planet (No. 70), discovered by the American astronomer, Mr. Watson, on Sept. 19, 1863, has received the name of Eurynome, a daughter of Oceanus and Thetis, and according to Hesiod, the mother of the Graces, by Zeus.

Bees and Honey of Greece.—The honeys of Hybla and Hymettus are at this day almost as celebrated as they were in the time of the classical Greek poets; the honeys of Cerigo, of Zante, and many other places, continental and insular, are all fine, and each has its admirers. The honey of Leucadia is, perhaps, almost as good as any, and the descendants of the bees that fed Ulysses deserve some consideration. I was interested, then, in the little bee-garden on the site of the city of Leucas. It was a rocky, barren-looking spot, and did not at first sight seem promising, for the whole ground for a great distance around looks naked and without vegetation; but it is not really so. Every little crevice or interval between two stones, whether large or small, and not a few holes made by vegetation in the solid rock itself, contain some little flowering plant especially patronized by the honey bee. Rosemary and sages abound. I was not much surprised, therefore, to see the bees, but the hives rather puzzled me at first. They consist of small oblong boxes placed on end on a low stone, each box being covered by two or three tiles, evidently to keep off the heat of the sun in the summer. Two round holes, each about half an inch in diameter, sufficed for the bees, to enter and emerge, and it did not seem to matter much where the holes were pierced. The boxes were constructed in the roughest manner, and seemed to be not two feet apart, and each box was about twenty inches high, and nine inches square. The bees were exceedingly busy and perfectly good-tempered.—*Ansted's Ionian Islands in* 1863.

At the last sitting of the French Academy of Sciences, M. Coombes described a new system of locomotives now in use on the Northern railway so constructed as to surmount considerable declivities and to describe curves of a small radius. These engines have four cylinders and six axle-trees divided into two groups of three each, moved by the pistons of one pair of cylinders. The wheels are so small that the fire-place of the boiler extends beyond them, whereby the fire requires the unusually large surface of 3·33 square metres. [A metre is about 39 inches $\frac{3}{8}$ths.] The engines are provided on starting with 8,000 kils. [a kilogramme is $2\frac{1}{2}$ pounds] of water and 2,200 kils. of combustibles; their total weight is then 60,000 kils. equally divided on the six axle-trees. In order to facilitate the describing of small curves, a little play is left between the flanges of the wheels which keep the train within the rails and the rails themselves; moreover, the axes have some play in their sockets. By these various contrivances combined, the new engines have mounted gradients of 25 millimetres, (a millimetre is ·03937 of an inch) and described curves of 80 metres' radius.

The "Berkshire Sand Company," of Massachusetts, which for many years has been doing a very large and prosperous business, has recently purchased a most valuable property in Bennington county, Vt., in and about Dorset, and lying on the Western Vermont railroad, containing a series of sand beds said to surpass any in New England, the sand being of the softest and finest quality for glass purposes. These beds formerly belonged to and were worked by the "Brooklyn Flint Glass Company," and from which the com pany obtained its supply.

The Danish engineers have discovered an ingenious and simple (?) contrivance for keeping their opponents exposed to a heavy fire, by a sort of invisible fence made of strong wire, supported at stated distances by timber posts inserted in the ground. It must take, at all events, some precious minutes to overcome this obstacle, during which the attacking troops would be open to a destructive fire without any shelter. The entrenchments at Duppel are surrounded by these formidable barriers.

The Goodyear Patent.—Before the House Committee on Patents on the 25th of March, Messrs. Clarence A. Seward and James T. Brady appeared for the extension of the Goodyear Patent, and Messrs. Fuller and Horace Day of New York, E. S. Day of Connecticut, Parsons of Providence, and Spofford of Boston, appeared against it. The petition and remonstrance were filed, and the hearing then adjourned to April 7th.

Eight thousand school-houses have been erected in Russia since the emancipation of the serfs took place.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The Association held its regular weekly meeting on Thursday evening, March 17th; the President, S. D. Tillman, Esq., in the chair. From the President's summary of scientific and industrial news we select the following items:—

AGE OF THE EARTH.

The Rev. Prof. Haughton, in a paper recently read before the Dublin Geological Society, gave the result of some computations, based on the earth's rate of cooling, to determine the limits of the time during which animal life can have existed upon our globe. As the albumen of the blood coagulates at 122° Fah., he regards it as impossible that animal life can exist in an atmosphere above that temperature. He therefore attempts to calculate the time from the period when the polar regions of the earth were at a temperature of 122° down to the period when the mean temperature of the British isles was 77°, the latter being the London clay tertiary epoch of tropical mollusca. His computations give the time between the two periods as 1,018,000,000 years.

UTILIZATION OF SEA-WEED.

It is estimated that 21,000,000 tuns of sea weed are annually thrown upon the coasts of the British isles, and that only 1,000,000 tuns are used for kelp and for green manuring. It is proposed to dry it by the process for burning wet fuel, by which a portion of the weed will be burned to dry the rest.

Mr. Garvey—"Does any one present know the process by which sea-weed is made into artificial horn?"

Mr. Maynard—"I believe that the Indian sea-weed is used for that purpose."

The Association then passed to the consideration of the regular subject of the evening—

SURFACE CONDENSERS.

Mr. Root—"There is one plan of surface condensation which I have tried and found to work very well. It was suggested, I believe, first in some German publication. The end of the exhaust pipe was enlarged in funnel form, and closed with a thin sheet of metal. Then a jet of cold water was thrown with force against the outside of the thin sheet. With a plate only a foot square, I condensed successfully the steam from a 20-horse-power engine. I found that the rapidity of the condensation depended very much upon the force with which the cold water was thrown against the plate."

Mr. Stetson—"I should like to ask the gentlemen present who have devoted much time to the study and practice of surface condensation, if the plan has ever been tried of exhausting into open air down to the atmospheric pressure, and then condensing the remainder of the steam. It is manifest this would economize the cold water, permitting a smaller air pump to be used with a jet condenser, or a smaller number of pipes in surface condensation."

Mr. Root—"I built an engine a few years ago at Madison, Ind., on that very plan. It was for a river boat, and would not work for the same reason that no condensing engine will work on the Western waters."

Mr. Sewell—"One advantage of this plan would be that the steam exhausted into the open air might be used to heat the feed water. In the ordinary condensing engine the advantage of the vacuum is balanced to a considerable extent by the necessity of feeding the water to the boiler at a lower temperature than is obtained in the non-condensing engine. Every 11 degrees is equal to one per cent., and if you have to feed at 100 degrees lower temperature it costs you nine per cent. of your fuel. I think this idea of partial condensation is well worthy of attention."

Mr. Fisher—"The reason why it will not be introduced is that no patent can be secured. The idea has been published, and no man can now claim to be the first inventor, and if any one goes to the expense of the necessary experiments to reduce the idea to practice, he will work for the public, and will have no means of remunerating himself."

Mr. Stetson—"The idea thrown out by Mr. Fisher is correct, and is very important. Still there is an erroneous impression prevailing in relation to patents of these original principles. Though the thing itself cannot be patented, the means of carrying it out generally can be, and in most cases patents on these methods can be obtained which will secure a man the business."

Mr. Sewell—"I was going to remark that though the idea of carrying the water through the pipes, and having the steam outside of them, was not *first* suggested by me for a surface condenser is was original with me. This plan has the great advantage of making all the joints water-joints, which are much more easily kept tight than steam-joints. The Pacific Mail Steamship Company's steamer *Golden City* has one of my condensers in use. She is 340 feet long, 45 feet wide, and draws about 18 feet. Her engine has a cylinder 105 inches in diameter with 12 feet stroke. Her regular schedule time, one day with another, is 280 miles per day, and she burns 32 tuns of coal in 24 hours. I think that performance will challenge the world."

The President—"There is one branch of the subject that we have not yet considered—the effect of surface condensers on the durability of the boilers."

Mr. Sewell—"It is supposed that the copper tubes of the surface condensers cause the rapid corrosion of the boilers, but the Government had an engine in Philadelphia for pumping out the dry dock, in which no copper was used, and the boilers rusted out very rapidly indeed."

Mr. Giffin—"I am running an engine in Brooklyn which is supplied with two boilers, one having a feed pipe of iron and the other of brass. The boiler with the iron pipe is perfectly sound and good, and the other is pitted with corroded spots, extending both above and below the water line."

Several other members made remarks on this branch of the subject. "The Constitution of Iron" was selected for the next evening's discussion. and the Association adjourned.

The Danish Iron-clad "Rolf Krake" in Action.

The first trial of a "monitor" in Europe took place when, on the 18th of February, the Danish iron-clad turret battery *Rolf Krake* went to Ekensund to attempt the destruction of the Prussian bridge into Broager. The *Rolf Krake* was under a constant fire from the land batteries on three sides for nearly two hours, yet when she returned to Sonderborg, the ship, turrets, artillery, machinery, and everything was uninjured, and fit to go under fire again at any moment. There were about 100 marks about her, where the shot had hit the plating, and some of the crew had been wounded by pieces of shells bursting just over the gratings in the top of the turrets. The reason why she had to return was that the water being so shallow she could not get near enough to see the bridge, which was protected by a projecting piece of land, and consequently she had to fire at the bridge at random, without being able to judge of the result. She however succeeded in doing considerable damage to the enemy.

[If we knew the range, projectile and charge used, the above account would have more interest. A description of the *Rolf Krake* is here appended:—She is 185 feet long, 35 feet beam, and 16½ feet deep, having two cupolas or revolving turrets, 4½ feet above deck, and 21 feet in diameter. She is clad with 4½ inch solid plates, all round, increased to 7½ inches at the gun-ports. The engines are 240 horse-power. She is a sea-going vessel, and attained a speed of 10 knots per hour.—EDS.

Nativity of our Population.

The census returns of 1860 give the following totals of the birth-places of the free inhabitants of the United States:—

Born in the United States	23,301,403
Born in foreign countries	4,136,175
Birth-place not stated	51,883
Total free population	27,489,461

The different races and nations of foreigners in the United States are represented as follows:—

Ireland	1,611,304	China	35,565
Germany	1,301,136	Holland	28,281
England	431,692	Mexico	27,466
British America	249,970	Sweden	18,625
France	109,870	Italy	10,518
Scotland	108,518	Other countries	60,145
Switzerland	53,327		
Wales	45,763	Total foreign born	4,136,175
Norway	43,995		

NEW EXPERIMENTS IN WORKING STEAM EXPANSIVELY.

We made a brief announcement, some months since, that our Government was about to initiate a series of experiments for the purpose of fully and fairly testing the value of working steam expansively. So much has been said for and against this theory and the practical adaptation of it, that any thing tending to increase the common stock of knowledge in this branch of engineering, will no doubt be gladly welcomed by the intelligent and unprejudiced reader.

The engine chosen is a simple vertical cylinder working upward with a connecting rod, cross-head and slide valve; and the cylinders (for there are several of various diameters) are, respectively, one of 12 inches by 24 inches stroke, one of 14 inches adapted to the same frame, &c., one of 26 inches, and one of 30 inches. These are capable of being worked at either high or low pressure by a simple arrangement. The duty done by the engine must, in order to measure the relative economy at different grades of expansion, be constant, and therefore the following plan has, after due deliberation, been determined on:—

"This plan depends on the use of fans, having vanes of same area, run at same velocity and under the same circumstances, to furnish the required resistance. A single line of shafting, of adequate length and suitably supported, is to carry all the fans, to be run together, if need be twenty in number. This shaft is to pass through an inclosure twelve by forty-eight, formed by sides and ends fifteen feet high, and this inclosure is divided by partitions fifteen feet high, into compartments three feet wide. In each of these compartments, thus 3x12x15, open at the top, the shaft is prepared to receive four arms on each of which is a vane, the centers of the vanes being two to three feet from center of fan shaft. The structure and dimensions of the arms and vanes of the fans to be in every particular the same in all the fans. The inclosure of the fans (12x48) is to be within a building 30x90, so that all outside currents of air are shut out. At each end of each compartment a door gives access to the fan in that compartment. The shaft carrying the fans will receive its motion by a pinion on it, from a mortise wheel on engine shaft, of such proportions that 50 revolutions of engine produce two hundred revolutions of fan shaft. For the resistance required for a full stroke cylinder, it is proposed to use ten fans, placed in alternate compartments. The vanes on these ten fans to be, at the commencement, of larger area than necessary, and then cut down on trial until that area of vane (all the vanes being reduced to precisely the same area) is obtained, which at two hundred revolutions will furnish the resistance, which will require all the power developed by the full stroke cylinder at fifty revolutions, and full pressure of steam throughout the stroke. As each of these fans will be of precisely same dimensions, will of necessity be run at same velocity, and will in every respect be under the same circumstances, any one of the ten will require one-tenth of the power required to revolve the ten. On removing the full stroke cylinder, and substituting an expansion cylinder, having a capacity of one cubic foot at the point of cut-off, such additional number of fans of exactly the same dimentions and structure will be attached to the shaft, in compartments adjacent to those already occupied by the ten, as the power furnished by the expansion cylinder may prove able to drive. The dimensions, revolutions, and circumstances of the additional fans being the same in every particular with those of the standard ten, the total number driven by the full stroke cylinder will embrace the facts by which to compare the two developments of power. In both cases the power required to drive the shafting, without the fans, will be common to both performances. It will therefore be necessary to determine what that power is. An additional fan driven, with the allowance referred to for friction of apparatus, will show ten per cent. more power developed; two additional fans twenty per cent. and so on.

"For cases where the increase of development of power is more than one more fan will measure and less than two more fans can measure, resort must be had to vanes of less area on one fan, and to deduction, based on the area for the relative power. The use of fans for the source of resistance presents the advantage of the easy and favorable introduction of some form of dynamometer between the engine shaft

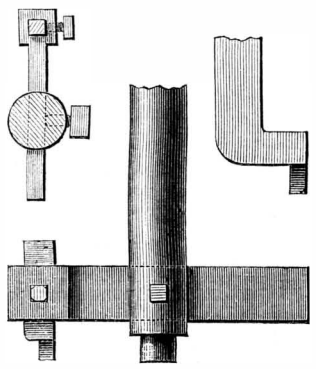
and fan or resistance shaft. The Commission are under the belief that they will be able to determine with sufficient accuracy the actual power to drive the fan shaft, without any fans on it, and the power to drive one or more fans, up to twenty, and that they will therefore be able, not only to determine the relative economy of using steam with different measures of expansion, but the actual power developed, expressed in pounds, raised at an ascertained velocity, and therefore expressible in horse-power—the conventional unit of po wer."

The commissioners are Horatio Allen and B. F. Isherwood. The engine is now well under way at the Novelty Works, in this city. The experiments will be conducted in a building on Fourteenth street, New York. When they take place we hope to be present.

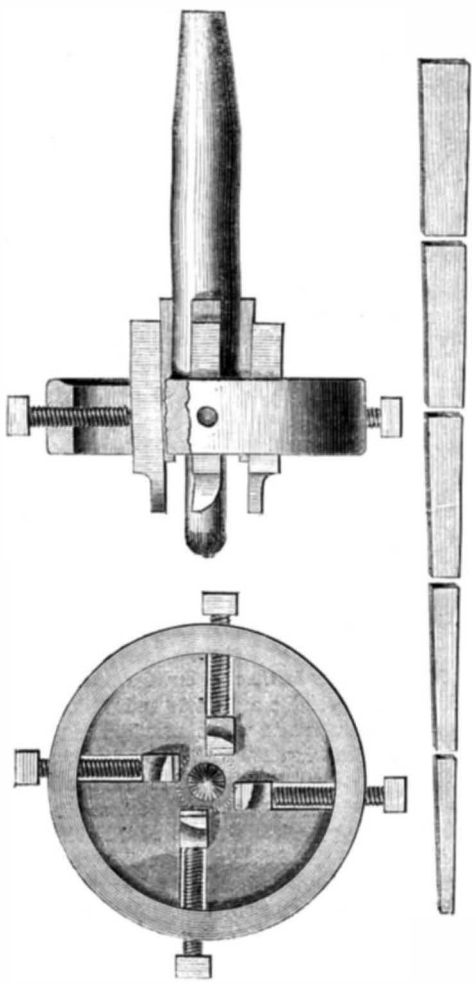
THE DRILL AND ITS OFFICE.

[Continued from page 181.]

Here is a plan for an expanding or an adjustable tool by which holes in flue sheets can be made of any size, varying only with the plan of the cutters. The apparatus is very simple and by altering the shape of the cutters, a hole but little larger in diameter than

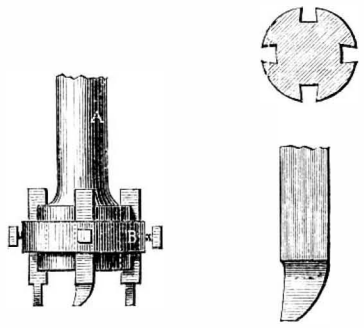


he rod or shaft that carries the arm can be made. The advantages of this appliance over an ordinary drill, such as is frequently used, are that the cutter, which breaks often even with the utmost care, can be



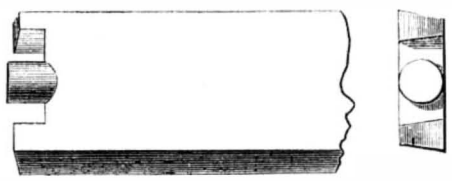
easily dressed when broken in much less time than the counter-borer could, thus making it cheaper to use both in point of execution and cost of repair when injured. We are indebted to Mr. Herman Winders, an accomplished engineer, now with Donald McKay, Esq., of Boston, Mass., for the plan of the tool presented above. It is, as may be seen, adjustable, and will cut holes of varying diameters, according to the sizes it is constructed for. The arrangement is simple and consists of a central head forged solid on the shank. This head is planed out for the reception of the tools or cutters and has further a wrought iron ring shrunk over it. This ring is tapped out to receive the set screws which hold the tools fast. Behind the tools are wedges which, when driven or slacked off, advance or retract the cutters with great nicety, the taper is planed in the shank for the wedges, so that the cutters always stand vertically. The wedges should all be planed at once so that there will be no variation in them, and several sizes should be provided so that holes of any diameter can be made. The cutters need not all travel in the same track, but each may set a little inside of the one that forms the size; in this way they cut freer and are less liable to break. This tool is useful not only in the boiler-shop but also in the finishing department, for by changing the character of the cutters, work of almost any kind can be done.

Here is another plan for a boring tool or tube sheet-

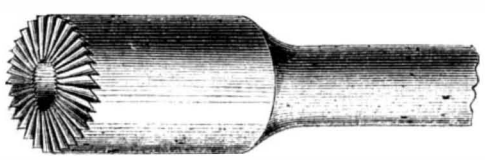


borer more properly, for this is the object it was designed for. It is not so good a tool as the first one for some purposes, but as all persons may not have the same opinion we give it place. It is not adjustable except limitedly, it costs more to make at first but it will work faster and do equally as good, if not better work than the ordinary adjustable cutter. The bar, A, is merely forged with a larger portion on the end, and is grooved on four sides to admit the cutters; these are simply square nosed, offset on one side and the cutting part, of course, curved to suit the circle it works in; a wrought-iron ring, B, is then slipped over the cutters to hold them firmly in place and adjust them so that all the points may work at once; this ring has set screws for each cutter and one of the cutters may be made to countersink the sheet at the same time if it is preferred to do it on the side drilled from. The burrs or ragged edges left on the under side of the sheet by this tool will be very slight indeed if it is properly made, and can be rubbed off with an old file.

Still another drill for boring tube sheets is given herewith. It is one commonly used and is a very ef-



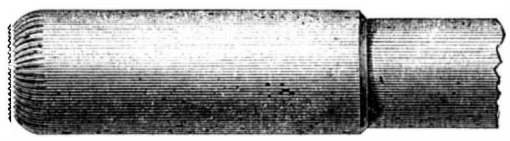
ficient tool when well made. It is costly to construct, however, and requires to be turned in the lathe by an experienced workman and afterwards filed up so as to cut properly. The spaces between the pin and the cutters are very troublesome to cut out in the lathe with an ordinary tool, as the work in revolving strikes square and suddenly on the lathe tool and soon dulls it or else breaks off the end and throws the drill out of the centers. A useful cutter for making these drills is shown below. It is simply a steel bar turned up and bored out the size of the tit or pin on the drill, and has teeth cut all round the circumference as shown below. The pin of the drill being slipped in



the hole in this cutter, the radiating teeth cut away the central portions so difficult to remove in the lathe. The drill may revolve in the steady rest, or the barrel cutter may be so used and the work screwed up to it by inserting the center in the dead center of the lathe; by employing this tool much time may be saved and better work done.

A work might be specially devoted to this detail or part of the mechanic's tool-chest; the drill is one of the most indispensable of the minor instruments employed by mechanics and it is only reasonable to add that the tool most in use, simple though it be, deserves all the attention that can profitably be given to it.

Although the rose bit is not in any sense a drill, it is of the same class, and is indispensable to good work in the drilling machine, for if a man does not know how to grind a drill or make one, and the holes he makes are neither round, square, nor oval, then he has only to use the rose bit and he will have a perfectly round straight hole. This is the bit. It may



be made wholly of steel or the shank may be iron, and the cutting end only of steel. The end is composed of a series of fine cutters arranged regularly all around, and the body is a shade smaller at its upper end than at the lower. When the hole is drilled in the work to nearly the right size, the drill is taken out and replaced with this bit, which cuts regularly and steadily all around and corrects any untruth in the first hole. There should be but very little metal left for it to work on, and the job must be well oiled during the process. If these conditions are observed the hole will be a true cylinder.

Antidotes for Strychnia.

The *British Medical Journal* says "Professor R. Bellini, after conducting a long series of experiments on poisoning by strychnia and its salts, arrives at the opinion, that the best antidotes are tannic acid and tannin, chlorine and the tinctures of iodine and bromine. Chlorine, he maintains, attacks the strychnia even when it is diffused through the system, for he found that in rabbits poisoned with the sulphate of the alkaloid, on being made to inhale chlorine gas in quantity, such as was not sufficient in itself to kill, the convulsions were retarded, and were milder when they occurred; death, also, was less rapid. The author further observed, that when strychnia was exhibited with pyrogallic acid, the convulsion was retarded for the space of half an hour, by comparison with other experiments in which the alkaloid was given by itself. Professor Bellini believes that this arrest in symptoms is not dependant on the acid acting chemically on the strychnia, but only through the astringent effects produced by the acid on the mucous membrane of the stomach, whereby the absorption of the poison is rendered difficult. The same author, dwelling on the frog-test for strychnia, asserts that this test is not be trusted, inasmuch as other poisons produce the tetanic symptoms, although in a lesser degree."

SPECIAL NOTICE.

Lewis Moore, of Ypsilanti, Mich., has petitioned for the extension of a patent granted to him on July 2, 1850, for improvements in seeding apparatus of seed planters.

It is ordered that the said petition be heard at the Patent Office, Washington, on Monday, June 13, 1864.

All persons interested are required to appear and show cause why said petition should not be granted. Persons opposing the extension are required to file their testimony in writing, at least twenty days before the day of hearing.

Business done in the Patent Office.—From a report communicated by the Commissioner of Patents to Congress, it appears more business has been transacted than during any year in the history of the Government, excepting 1859 and 1860; 6,014 applicants have been received; 4,170 patents have been granted; 787 caveats have been filed; 40 applications made for extensions have been granted. Of the issues, 48 were to English inventors, 37 to French, and 27 to persons of other nations. The funds on hand January, 1863, were $38,400; the amount received during the year, $195,600; expenses, $189,400, of which $143,000 were for clerk hire. Balance on hand January last, $44,600.

Correspondence

Iron-framed and Wooden-planked Ships.

MESSRS. EDITORS:--The combination of wood and iron for ship-building, as adopted by me in constructing the propeller *Niphon*, is a subject of some interest on which I have to offer a few remarks and suggestions for the information of others. Iron ribs and wooden plank, in combination, were used by R. F. Loper, about fifteen years ago, when he constructed a propeller which has been, and perhaps now is, in the employ of the United States as a transport. More than a year ago he informed me that she was still quite a good vessel and had cost so little for repairs during that period, that I am really afraid to quote him for fear of being more than suspected of drawing a "very long bow." I think however, that he said it was only four per cent; if this statement be correct, she is a very remarkable vessel, and it is very wonderful that he has not constructed more of them, especially as he owns or controls the rolls wherein her ribs were made. Her ribs are not of "angle iron," but are in shape like the old-fashioned plate-iron keels, similar to a gutter, giving the plank more bearing than can be obtained by the use of angle iron, but leaving a considerable surface represented by the hollow side of the gutter, out of sight and exposed to rust without the possibility of painting it. Mr. Loper proposed to lubricate this surface by pouring on oil; this shape of rib was considered by me objectionable, and I substituted angle iron in building the *Niphon*. I also stiffened her by diagonal strapping on the inside of the frame—these modifications of Mr. Loper's original plan (secured by patent which he has lately renewed) are all the originality I claim in the matter. I may say in this connection, that I ascertained, some time after I began the *Niphon*, that the French and English had built several vessels of this kind, beginning about eight years ago, and that a number were then under construction in England and Scotland. In correspondence with A. & J. Inglis, of Glasgow, I found that iron-framed vessels with teak plank were considered the best compromise between wood and iron, insuring capacity, durability and lightness; and I doubt not that some of the fast blockade-runners are built on this plan.

I have quite recently obtained further information on this interesting subject from Mr. J. Wilson Green, of Liverpool, under date Dec. 29, 1863; he says substantially:—"There are many vessels of this class belonging to Liverpool, built there and in Scotland during the last six years, of which there are no complaints, and in some cases the classification stands as high as others; galvanized iron bolts will not do, under metal sheathing they should be copper or composition. Copper bolts through iron frames will not affect the frames without other agency; salt water will produce corrosion; it may be relied on, however, that years will elapse before the iron frames in a dry part of the ship will be materially affected by copper bolts. In 1819, my father built the ship *Duke of Lancaster*, the iron knees in the lower hold were fastened with copper bolts, in 1832 the knees showed no sign of galvanic action or injury from the copper bolts."

At the present time, with copper at 50 cents per pound, it would not do to fasten plank to iron ribs with copper, and I doubt if it would be expedient to do so at any time, because no ship can be said to be so dry in her bottom on the inside as to preclude galvanic action; steamers which are letting water into the hold by watering bearings, trying gage cocks, &c., can never be very dry in the most important part, the engine-room. I therefore dismiss the idea of fastening plank to iron ribs by copper or composition for the present, and will go on to the consideration of the general subject.

The *Niphon* came here to repair after her collision with the iron steamer *Ella and Anna*. At my suggestion the Honorable Secretary of the Navy ordered a survey on the hull with a view to ascertain if there was any sign of yielding in her peculiar mode of construction, or any deleterious action going on between the galvanized iron fastenings and the metallic sheathing on the bottom. The result of this survey shows that while the method of construction is found to be good, there is more or less destructive action going on between the oak plank and the galvanized fastenings, not the necessary consequence of iron rib and wood plank, but the inevitable result of contact between the said oak and iron, just as would be and is the case with all iron fastenings in oak, whether above or below the water-line in ships of the usual construction. The bolts taken out below the metallic sheathing showed, if anything, less corrosion or galvanic action than those removed from above the metal sheathing. I account for this from the fact that the tarred felting and the metal itself, with careful plugging, furnished more protection than the bolts had from simple plugging and paint above the sheathing. I was on the survey, and it was conclusively proved to my mind, that no serious corrosive action takes place by reason of the metallic sheathing, and this was the only doubtful point in my theory of the value of this mode of building when I commenced the *Niphon*.

Now comes the question as to whether the galvanized iron fastenings and iron ribs are equal, all things considered, to the usual fastenings of ordinary vessels, such as iron bolts and spikes and treenails above the copper line, and treenails and composition or copper fastenings below the same; this is an important question when comparing the new with the old mode of construction—time only can fully answer it. Meanwhile I would remark, that the increased carrying capacity, lightness, buoyancy, rigidity, superiority in a sanitary point of view, ease for discovering and stopping a leak from the inside (there being no necessity for ceiling in merchant vessels) facility for examining and replacing bad fastenings and planks, all concur in a remarkable degree in making the iron-rib vessel much superior to the ordinary wooden vessel, and in some respects superior to the iron shell, inasmuch as the former can be coppered as well as any wooden vessel. For merchant vessels carrying grains, especially rice in warm climates, and for vessels navigating our lakes where shoal draft is important, this mode of construction is much superior to the old wooden rib and ceiling, and this superiority will be much appreciated in fresh water, where wooden vessels rot very rapidly. It must be admitted, however, that the iron shell for fresh water is much better than either of the other modes of building. In a commercial point of view, and taking carrying alone into the account, the iron shell and the iron rib with wood plank, stand on the same footing; they afford a carrying capacity of about 15 per cent. over the ordinary wooden ship; this fact in the life-time of a vessel will make a very important element of success and ought to settle the question at least for the lakes; the interest on the increased prime cost and the insurance on the enhanced value of the iron rib, or on the entire iron vessel, being the only elements against the increased capacity as estimated. Supposing a wooden hull to cost $16,000 and an iron-rib hull $20,000, the extra expense of insurance and interest on this excess—say $240 each at 6 per cent., or $480 in the aggregate—would soon be made up by carrying 15 per cent. more cargo with the advantage of much greater durability. If I am rightly informed, wooden vessels suffer greatly on the lakes by rot, caused by the deleterious effects of grain sifting down among the timbers and ceiling, and there decaying, as well as from the absence of salt water. If this be true, and I cannot doubt the fact, iron-ribbed vessels, or entire iron vessels, are the most appropriate for the great lakes, and it is very wonderful to my apprehension that they have not been generally adopted in that region. A light iron vessel, costing even fifty per cent. on the hull more than a wooden one, would last one hundred years in fresh water, if occasionally painted, this increased cost would soon be paid for, as I have endeavored to show by the greater capacity for carrying, to say nothing of advantages already enumerated, and others not mentioned, such as the greater facility for constructing water-tight bulkheads for stowing grain in separate compartments, and greater general safety from the effect of fire and other casualties, both of which ought to make a difference in the rate of insurance.

Since the above was written I have been informed that in Sweden, vessels were built with iron frames and oak planks in 1842; they were planked with oak fastened by common iron, then doubled by plank fastened by copper. If the first layer of plank can be made of teak or yellow pine, this mode of construction would be made very perfect by putting tarred felt between the two layers of plank.

In conclusion I would cite another very important advantage of the iron rib and wooden plank over the iron shell, and this is the absence of condensed vapor whereby iron vessels are kept damp inside and are hot in warm weather and cold in cold weather. This would be an important element in a grain-carrying vessel.

R. B. FORBES.

Boston, March 16, 1864.

Names for the French Weights and Measures.

MESSRS. EDITORS:—I was pleased to see in your issue of March 5th [page 147], a few words urging Congress to establish the metric system of weights and measures in this country. A movement of such great importance should not be allowed to drop from want of urging; and I write this to call your attention to a concise and practical article on the subject which can be found on page 19 of *Chambers's Journal*, for January, 1863. One suggestion is so novel that I will copy it here verbatim. It is as follows:—

"In looking at the probability of the system being adopted here, a most important question arises; namely, what should be the names employed? It has been suggested that our present names should be retained with the new measures, weights, &c.; but it has been judged, and we think rightly, that such a step would involve increased confusion, and that it would be far better to give new names to new things. Indeed, the ill-success of a similar experiment tried in Holland is pretty decisive against such an attempt. But it is allowed that the French names would be alarming to English ears, and that our general population would have an invincible dislike to change their short words, as foot, yard, ounce, pound, &c., for kilograms and hectolitres. To meet this difficulty a very ingenious system has been devised by one of the witnesses, Mr. Fellows, of Wolverhampton, whose evidence is well worth consulting by any who wish to examine the question minutely. He recommends that the one-thousandth part of a metre be called *Th-o-m* or 'Thom;' but a thousand metres, *Th-e-m* or 'Them;' so also a hundredth part of a gram, *H-o-g* or 'Hog;' and a hundred grams, *H-e-g* or 'Heg.' It will be readily seen that the principle of this nomenclature is to take the initials of the number and of the measure or weight, inserting the letter *o* in the case of sub-multiples or parts of the unit, and the letter *e* in the case of the multiples. This certainly secures not only the briefest names that could be devised, but it explains the value of the quantity expressed in a manner which can hardly be mistaken by a person of the most ordinary capacity."

This project has been agitated considerably in England; and if we would adopt the system, the conservatism of that country would probably give way to the spirit of progress, and the system would soon become universal.

I intended to personally call the attention of the Congressional committee to the above-mentioned article, and endeavored to procure one of your papers in order to send a *marked* number with my letter to Washington; but was told that every number of the SCIENTIFIC AMERICAN dated March 5th was sold.

H. EDGAR JOHNSON.

Baltimore, Md., March 18, 1864.

What our Friends say of Us.

MESSRS. MUNN & CO.:—I enclose fifteen cents, for which please send me Nos. 16 and 19 of Vol. IX., SCIENTIFIC AMERICAN, which were lost from my file in the Post-office when I moved. I take good care never to lose a number after it gets into my hands. I am neither a mechanic nor a scientist, and hence have none of the practical reasons that nearly all your readers must have for taking the SCIENTIFIC AMERICAN; but, beside the pleasure I take in reading it myself, and in addition to its educational influence upon my ten-year-old boy, who always studies it with more interest than he reads his juvenile paper, it has every year taught us some household economy or improvement worth more than the annual subscription.

SAMUEL WILLARD.

Springfield, Ill., March 14, 1864.

How to Teach Geography.

MESSRS. EDITORS:—It seems strange that the idea has never occurred to teachers and others of orna-

menting the walls of school-rooms with maps, where they will be ever present before the eyes of the pupils. Not only would the monotony and bareness of the white-washed [?] walls be thus relieved; but by painting thereon large-sized maps of the globe, the continents, and even of the States and more immediate localities, they would soon become "familiar as household words" to the pupils. Then, by devoting a little time each day to the subject, by the whole school in concert, as was done with Mitchell's "Outline Maps," all could be taught much more thoroughly and rapidly than by the present system; and the knowledge thus obtained would be far more lasting.

N. C. D.

Washington, D. C., March 18, 1864.

Peculiarity of the Vision.

MESSRS. EDITORS:—Experience has convinced me that all kinds of eye-glasses should be circular and large, that is, larger than those ordinarily worn; a small oval glass with bright frame will confuse many a nervous person, and probably without the cause being known, or perhaps it is ascribed to coffee or dyspepsia, &c. French surgeons have produced insensibility in a patient by holding a bright object for a few minutes at six or seven inches in front of the eyes, while fixed upon it. Any of your readers desirous of testing it will hardly consummate the experiment. I have heard (but not seen) the doctrine illustrated thus:—Draw a distinct straight chalk line on the floor; then take a hen—I suppose a quiet one—and chalk a distinct line over her bill; hold her steadily a few moments with the line on her bill on that on the floor, and she cannot, when left to herself, move to the right or left. I have no hens and cannot test it; it is easy for those who have to do so.

R. H. A.

Baltimore, Md., March 21, 1864.

Poisoning of Water by Lead Pipes.

We have received from Professor H. Dussance, of New Lebanon, N. Y., a detailed statement of a series of experiments on the action of several different kinds of water on lead, under various conditions. The lead was subjected to the action of the water for 29 days, and the experimenter draws the following conclusions:—

"I conclude from the above detailed experiments—1. That distilled water has no action whatever on lead by three days of contact; after that time the dissolving action begins. 2. That the lead is dissolved by distilled water in proportion increasing every day; the distilled water exposed to the open air dissolves more of this metal than distilled water in close vessels, or than distilled water deprived of air and gas. 3. That creek water, containing small proportions of lime, has no action on lead. 4. That distilled water, containing 1-3500th of a salt in solution, prevents the dissolving action of the water on lead. 5. That water dissolves lead till the saturating power of the acid is exhausted. 6. That, in ferruginous water, all of the iron is precipitated by lead; then lead pipe must not be used to convey mineral waters. This fact has never been noticed before. To render these facts more interesting, another series of experiments must be made to ascertain the quantities of lead dissolved daily in the water, and what compound it forms, and to see if the action will be the same in lead pipes. This will form the subject of another communication."

Extraction of some of the Permanent Teeth of Children.

At the fifth annual meeting of the Central Society of German Dentists, held at Frankfort-on-the-Main, July 7th, 1863, the President opened the meeting by reading the sixth question in the programme, namely—"Does experience justify the removal of the four first permanent molars at an early period?" Several gentlemen joined in the discussion which ensued, from which we may gather, that while some advocated in all cases the extraction of the first permanent molars, on the ground that these, frequently hindering the proper expansion of the front teeth, were the most liable to disease, and the most difficult to save permanently, and that their removal would often avert unsightly irregularities; others considered that no special rules could be laid down with regard to their extraction, and that the expedience of the operation depended much on the state of the development of the jaws, and must be left to the judgment of the dentist. The general opinion prevailed that if these teeth were not to be permanently retained, they should be extracted as early as possible.

China and its Resources.

The resources of the Chinese empire, and the vast field it affords for commercial enterprise, now that its principal ports are open to the commerce of the world, are daily acquiring more importance. In this country alone the pecuniary interests engaged in Chinese traffic are enormous; and, although the seas surrounding China, as well as the great rivers running into the heart of the country, are alive—so to speak—with American steamers, our ship-yards and machine-shops are full of orders for more vessels for the same trade. To the people at large the resources of this great empire are comparatively unknown, and some account of them will no doubt be acceptable.

Tea is, of course, the great staple; the principal productions of China being tea, cotton, rice, and silk; the western provinces are also rich in minerals. Cotton was not cultivated in China until the thirteenth century; but tea, a more important feature in their trade, was known about the fourth, and introduced into general use about the ninth. From that time it has been the universal beverage, so that a Chinaman of tolerable position shrinks from unmixed water with horror. Tea is cultivated more or less throughout China proper, but its chief districts are in the maritime provinces and on the western hills. The most necessary qualifications for its culture are good drainage, moderate moisture, and rich sandy earth, with fair proportion of vegetable mold. These requisites are best obtained on the slopes of hills. The tea plants produce leaves when two or three years old, and last with care some ten or fifteen years. No less than four crops can be obtained from them. The first and best is in April, when the leaves are young; the second, and most plentiful, in May; the third, a smaller crop, is picked in July; and the fourth, whose larger and coarser leaves are destined to supply the wants of the poor, is gathered in August. During the year 1862 the export of tea from China to Great Britain was 108,523,000 lbs., 81,000,000 lbs. of which were retained for home use, and the rest was re-exported to the continent of Europe, to which the direct supply is very small, not exceeding 1,000,000 lbs. annually. Yet this large export is reckoned as but a fractional part of the Chinese consumption. It is drunk at all meals and in all places, by every rank and class, and to insure freshness and quality is taken in small quantities, very weak, and without milk or sugar. This description does not seem very attractive to an American tea-drinker; but tastes may differ in different quarters of the globe. It would certainly appear so, since the stalks and refuse are compounded into small square cakes, and sent to Mongolia for the benefit of the wandering Tartars. It is conjectured that the amount of tea consumed in the Chinese empire is somewhere about 1,000,000,000 lbs. It holds, in fact, a position in China corresponding to that of rice, though the latter is the more vitally important, since the very existence of the population depends in a great measure upon it. The chief rice-producing districts lie in the south-eastern provinces, where it is not unusual for the field adjacent to the rivers to yield five crops in two years—two good crops a year being the regular supply. To the north of the Yang-tse-kiang only one crop is obtainable; and, in the mountainous countries, where the inhabitants depend on the import of rice from the south, great privations are common. It is, therefore, a matter of vast importance that the supply of rice should be good, liberal, and all details connected with it receive the most careful attention from the Government. The rice harvest is, it has been said, the most momentous question with which the Emperor and his advisers have to deal.

The writer of an able article in the *Quarterly Review* remarks, that it is a great mistake to look upon China only as a country that exports tea and imports opium. Such exports and imports are comparatively unimportant. The greater part of the cultivated land is employed in the production of the food necessary to supply the wants of an excessive population. The Chinese people are unanimously represented by those who know them best as cheerful, thrifty, and ingenious, but selfish and materialistic to a degree. They are jealous of foreigners, though kind and hospitable, and deceitful, in common with all other Eastern nations. They are prudent and quick-sighted as to their own interests, and shrink from a military life as unprofitable.

Home-sickness as a Malady.

The *Medical and Surgical Reporter* has an interesting article on this subject, in the course of which it says:—

"Nostalgia is an affection of the mind. It must be treated with that view. Any influence that will tend to render the patient more manly will exercise a curative power. In boarding schools, as perhaps many of us will remember, ridicule is wholly relied upon, and will often be found effective in camp. Unless the disease affects a number of the same organization, the patient can often be laughed out of it by his comrades, or reasoned out of it by appeals to his manhood; but of all potent agents, an active campaign, with its attendant marches, and more particularly its battles, is the best curative. When men have passed through the baptism of fire together, they feel that they have something in common. They have a common name, a common fame, and a common interest which diverts their thoughts away from home. When I took charge of the One Hundred and Twentieth New York Volunteers, about one year since, they were losing men by death daily. That it was not due to local causes was proved by the fact that adjoining regiments, exposed to the same local influences, lost none, and of the patients at our division hospital, with the same diseases (typho-malarial fever and camp dysentery), those from the One Hundred and Twentieth died under the same treatment that the others got well on. The regiment is from one of the river counties of New York State. Nearly all who died were farmers. Those who were sent on furlough got well, while those who remained died. Battle is to be considered the great curative agent of nostalgia in the field. The One Hundred and Twentieth was a new regiment, comparatively. They, without ever having been in battle, were brigaded with the veteran 'Excelsiors'—they had no *esprit-du-corps*—they were home-sick. Nearly one-half of the express boxes sent to the division at Falmouth were for that one regiment. The regiment was but a regiment in name—its thoughts were all at home, while its members were here. At Chancellorsville they fought nobly—they won a name—they had something to be proud of—they gained an *esprit-du-corps*—their thoughts were turned from home, and they felt they were men and soldiers; peers of the veterans with whom they associated; and from that day to this, there has been but little or no sickness, and but two or three deaths. But when nostalgic patients in the field cannot be granted furloughs—cannot be laughed out of it, and there is no campaign in progress, they should be kept at work. Idleness is a provocative of home-sickness. Let the patient be hard at work all day, and he will have a relish for his rations, and will sleep soundly at night, having little time to think of home. If his nostalgia is co-existent with some other disease, use every endeavor to keep him cheerful, and divert his thoughts from home; but if he is suffering from chronic dysentery, or typho-malarial fever, or is inclined to phthisis, and he becomes decidedly nostalgic, be extremely guarded in your prognosis. The patient will very probably die."

A MAMMOTH DOCK—The New Orleans *Times* states that an enterprising firm belonging to that city and Algiers has now a mammoth dock nearly completed on the Ohio river. It is 300 feet long, with 90 feet floor, built almost entirely of white oak. Over 300 men have been at work on it for a long time, and three saw-mills are employed in turning out the necessary lumber and timber. This dock is to be completed and delivered by June 1st. It is large enough to take on a ship of 5,000 tuns, drawing 22 feet of water. The *Pensacola*, *Brooklyn*, *Hartford* and vessels of that class can be admitted readily, or it can accommodate any two vessels of 700 tuns at the same time. The cost of the dock will be over $250,000.

THE ruler of Cashmere has recently taken stringent measures to prevent the further manufacture of the inferior shawls which are now sent in such large quantities to Europe, so poorly made as to be nearly unsaleable. In the city of Siree Nugger, or Cashmere, there are seventy thousand persons engaged in the manufacture.

Improved Grist Mill.

This excellent mill is intended for general grinding, both for the farmer and mechanic. It is constructed of iron in its principal parts, and is not only strongly made but is powerful in its operation and very durable; it is not at at all liable to derangement and may be operated by almost any one. By the adoption of this mill the farmer can do all his meal and feed grinding at home, and save both time and toll in going to mill. These mills possess new features in the construction of the grinding plates, a view of one of which is given in Fig. 2. The inventor says:—

"The teeth, A, are all formed in shape like the letter, Y, the lower part of each tooth in its row connecting with the upper part of the next below, and so on through the whole series in each radiating row of teeth, the extreme point of each arm of every tooth alternating in its circle with those in the next row in the next circle. By this arrangement and the shape of the teeth the pulverized stuff in the mill is forced, as well as ground, toward the periphery or discharging edges, and this occurs whether the motion is fast or slow, the mill grinding faster as the motion is increased. The teeth being all raised up over an eighth of an inch from the plane of the plates gives exceeding durability to the mill, which grinds freer as the teeth becomes worn, so that by reversing the motion the teeth are sharpened —one side of all the teeth are continually sharpening while the other sides are becoming dull, this being a self-sharpening mill, running either way equally well. The frame is cast in one piece, giving firmness and strength to the mill, and the grinding plates are easily removed and replaced by removing the hopper from the hopper-bed and placing the cob tube in its place with the open slot at the descending front corner of the crusher. Corn in the ear or any large substances can be put in by hand, such as ginger, mace, cut stalks of tobacco, calcined bones, rhubarb and drugs in general. The 'Nonpareil Mill' has been tested thoroughly, having been in use for custom grinding nearly three years; it has ground as high as twenty-five bushels of feed per hour, and yet no renewal of plates is required.

Fig. 1.

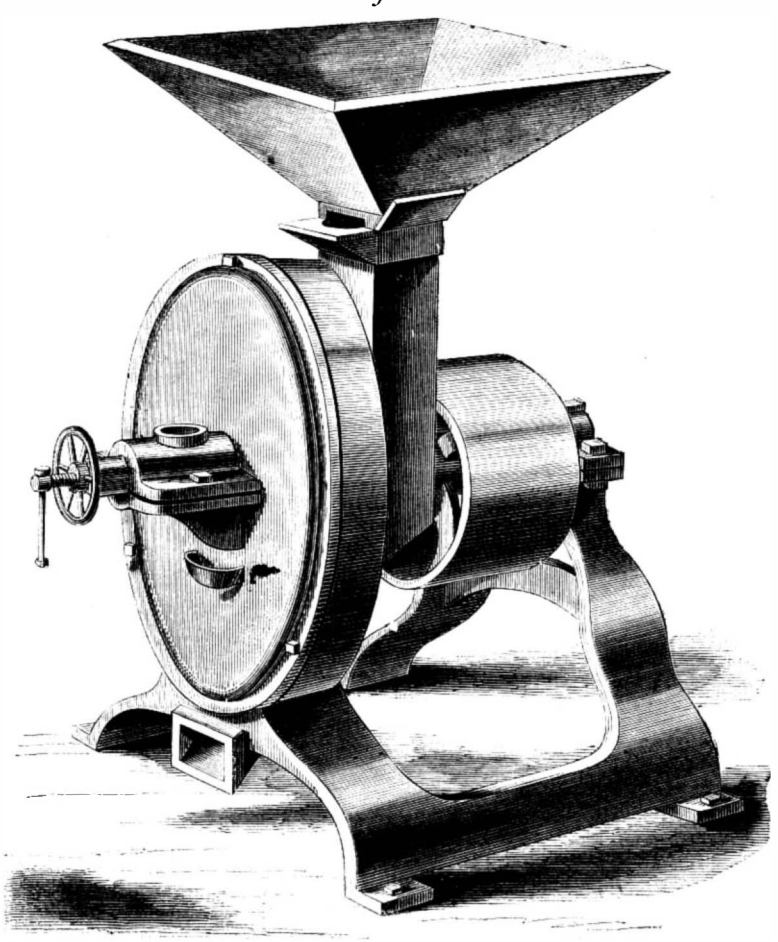


Fig. 2.

"The highest premiums for the best farm mill were awarded to these mills at the two last Ohio State Fairs, and also at the Indiana State Fair of 1862. Believing that this principle for iron grinding mills will eventually supersede all others made from iron, from the smallest coffee and spice mill to the largest custom-feed mill, the inventor solicits a thorough trial and test of his mills by any parties interested in iron grinding mills, whether manufacturers, millers, manufacturing druggists, coffee and spice grinders, or farmers. State rights for sale."

The inventor is confident that he has obtained the proper form for the teeth of his grinding surfaces, and the large number of testimonials and certificates which have been received by him show, at least, that those who are using them are well satisfied. This, it will be admitted, is the main point with them, and is good evidence in the inventor's favor.

SEDGEBEER'S NONPAREIL MILL.

Patented July 8, 1862, by J. Sedgebeer, Painesville, Ohio, from whom further information may be had by addressing him as above.

PATENT EXTENSION SCHEMES.

We print in another column [page 211] a candidly-written article from the Bridgeport *Standard*, against the applications now pending before Congress for the renewal of certain well-known patents. The article referred to, takes substantially the same view of the matter as has been held by the Scientific American; and we are glad to recognize its justice. The press is beginning to wake up on this subject; and we trust that all our cotemporaries will come out boldly against these unrighteous schemes. There is great danger that they may succeed; and nothing but a bold opposition on the part of the people will defeat them.

Coast Signals.

Some public-spirited individual writes the appended letter to the Stoughton (Mass.) *Sentinel*. Apparatus similar to that mentioned by the writer alluded to is now in use; but he advances some original ideas which are worthy of attention:—

"Having been impressed with the idea that some kind of a trumpet or whistle might be made that would be very useful to give warning to seamen when located on dangerous rocks and shoals, to ease my mind I have concluded to give some of my ideas for you to dispose of as you may think proper. The trumpet for this purpose should be like the common ones, except in size, with a shell attached to the mouth-piece like a small egg-shell, with a whistle or reeds, as scientific men versed in such instruments may determine, with another larger shell over it, with space between sufficient to blow through. I should think when blown this would be a sufficient warning in fogs. Not knowing what sounds are produced by the wind, rigging and waves, I suggest none, for I never heard them. Some of the methods of blowing are by a pipe (the right length and dimensions of which would depend on the size of the boat to which it was attached), to rise and fall perpendicularly in the water with the motion of the boat, with a tube leading from the pipe to a trumpet. Any one wishing may see the principle on which it works by taking a keg, knocking out one head, bore a hole in the other and passing it up and down perpendicularly in the water. Another way may be possible by a ball fitted inside of a tube to roll back and forth by the motion of the boat, with valves inhaling and exhaling as the case may be, and tubes leading to the trumpet. Possibly weights might be suspended so as to swing and blow a bellows, or perhaps weights to run on a trundle to be passed back and forth by the motion of the boat, with a rod entering one end of a tube and a piston on the end to pass back and forth in the room of a ball; or perhaps the waves, in passing a boat, might turn side wheels and blow a bellows. May not such a one be sufficient for calms, and cannot one be blown in storms by wind? and may not the sound be increased by the bigness of the trumpet and the number of whistles blown in it? Now, cannot some of your readers study out and put in operation an invention of this character which will be of so much value to sea-faring men?"

Adepts in Commercial Puffing.

From the advanced sheets of Appleton's forthcoming work of "Business Anecdotes" we extract the following:—

"By universal consent the world has accorded to the late George Robins the palm for commercial puffing. His advertisements were really artistically written. He did perhaps go beyond the yielding line of even poetical license, when he described one portion of a paradise he was about to subject to public competition, as adorned, among other charms, with a 'hanging wood,' which the astonished purchaser found out meant nothing more nor less than an old gallows. But then he redeemed slight maneuvers of this kind by touches which displayed a native and overflowing genius for puffing. On one occasion he had made the beauties of an estate so enchanting, that he found it necessary to blur it by a fault or two, lest it should prove too bright and good 'for human nature's daily food.' 'But there are two drawbacks to this property,' sighed out this Apostle of the Mart, 'the litter of the rose leaves and the noise of the nightingales!' Certainly the rhetoric of exquisite puffing could no further go."

The English "Blakely" Gun.

Captain Blakely (whose large guns have proved so successful) has received orders from the British War Office to manufacture an "800-pounder gun," which is to be fired at the Royal Arsenal, Woolwich, with increased charges, up to "destruction point." The experiment is looked forward to with much interest. The English system of rating guns is so peculiar that we derive very little information from the term "800-pounder." There is a rifled gun in this country only 2 inches bore, which might, with equal propriety, be called a "10-pounder," for the bolt is 12 inches long and weighs about $10\frac{3}{4}$ pounds, yet it would be no test of the endurance of a 10-pounder to fire this weapon until it burst.

The Ames Iron Works at Falls Village, Conn., are running a strong force of hands upon its contract for wrought-iron cannon, and will complete the first one in April. These guns are a novelty to our Ordnance Department.

THE

Scientific American.

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Contents:

(Illustrations are indicated by an Asterisk.)

WATER AS FUEL.

There are before the community several schemes for employing water as fuel, and some of them are recommended by authorities which command the attention and respect of large numbers of persons.

It is well known that the burning of hydrogen produces a more intense heat than the burning of any other substance, and as hydrogen is one of the two elements which combine to form water, the idea has naturally occurred to many that if water could be cheaply decomposed, it would furnish an inexhaustable supply of the very best fuel. The cheapest mode yet discovered of decomposing water is by means of carbon. If water in the form of superheated steam is thrown upon charcoal or coke at a white heat—about 1,800°—the oxygen of the water combines with the carbon, forming either carbonic acid or carbonic oxide, and the hydrogen is set free in the form of gas. When the hydrogen thus set free is brought into contact with the atmosphere and set on fire, it burns, combining with the oxygen of the atmosphere, and again becoming water. One pound of hydrogen takes from the atmosphere eight pounds of oxygen to form nine pounds of water.

When the idea was first suggested of obtaining fuel by decomposing water, it immediately occurred to all who believe in the conservation of force, that the heat consumed in decomposing the water would be precisely equal to that produced by the re-combination of its elements, and investigations were commenced by several eminent chemists to ascertain by actual experiments whether this is the case. These experiments, conducted by different persons and by different methods, have fully established the law, that the heat absorbed or consumed in decomposing water is precisely the same as that which is produced by the burning of its hydrogen. All schemes, therefore, for obtaining an increase of heat by decomposing water belong to the class of delusions which are grouped under the name of "perpetual motion."

In actual practice, indeed, there is a considerable loss of heat. The water must first be heated to 212°, then about 1,000° are consumed in converting it into steam, and a further quantity of heat in raising it to the temperature at which it escapes into the chimney. All of this heat expended upon the water is simply thrown away.

Notwithstanding this inevitable loss, however, in the aggregate quantity of heat, there may be an advantage under certain circumstances in throwing a steam jet into a furnace. The fuel may be carried along so as to effect the combustion nearer the place where the heat is wanted, or the ashes may be blown from the coals and the combustion made more constant. As in the best steam engines nine-tenths of the heat is wasted, it is even conceivable that in some cases these advantages may more than counterbalance the loss in heating the water to the boiling point, in evaporating it, and in heating the steam to the temperature at which it escapes into the chimney. The necessity, however, of encountering this additional loss makes this one of the most unpromising of all conceivable plans for effecting an economy of fuel.

SPARE THE CENTERS.

The practice of knocking off the centers of turned work is a mischievous one. It is merely doing work that is not only needless, but that at some future day will have to be done over again. When a center is once properly made in a shaft, or any other part, it is unalterable except by chipping or purposely changing its position, and work once turned true on good centers will always be true, provided no damage occurs to it. It is just in this particular that the true center is useful, for if a shaft is bent or an arm on one thrown out of line, the old centers are available and the injured piece can be made as good as new in a short time. Suppose, however, that the journal of a shaft is worn oval, or that the collar is battered and jammed up, how is it possible to find the true center of the shaft? It never can be found; the shaft may be made to run straight but not by its old centers if they have once been cut off. When shafts are forged too long in cutting them to the right length great "tits" are left on the ends, which are both ungainly and in the way. This is the blacksmith's fault, and must be remedied by the machinist; cut the shaft to the right length first, knock off the centers if they are too long, and then re-center the job and finish it according to the drawing. In steam-engine work especially, the centers of shafts are essential to nice adjustment, and they should never be removed.

A foolish notion prevails among some mechanics that centers injure the finished appearance of the work, but it seems to us that this is an erroneous view which ought not to be tolerated. Drill every center, and drill it deep; counter-sink it so that it will have a good bearing on the centers of the lathe, and the workman will have the satisfaction of knowing that, all other things being equal, he will have a good job, and one that can at any time be easily repaired if damaged.

THE "DICTATOR."

On the 16th of August, 1862, we stated that Captain Ericsson had just signed a contract to build two iron-plated vessels on the *Monitor* pattern, designed to be the fastest and most formidable ships-of-war in the world. These vessels have been named the *Dictator* and the *Puritan*, and the progress of their construction has been noted from time to time in our columns. They are now both drawing rapidly to completion. The *Puritan* is still on the stocks at Greenpoint, but the *Dictator* is afloat alongside of the wharf at the foot of 13th Street, North River, with her machinery on board; and the carpenters are at work on her cabins and berths.

The *Dictator* is an iron ship, iron-plated, carrying one turret with two large guns. She is propelled by a screw driven by two engines, each having a cylinder 100 inches in diameter with 4 feet stroke. There are 56 furnaces which supply the power for driving the fabric through the water. There are 12 engines on board, 2 for propelling the ship, and 10 smaller ones for ventilating the vessel, turning the turret, and performing other subordinate offices.

The inner shell of the turret is now being dragged along the wharf from the house where it was built to its place on board the vessel. It is slid along on greased ways by means of an immense pulley-block, the rope being wound on a windlass by horse-power. The turret rests stationary on its ways till the rope is stretched to a certain tension, when it slips forward a foot or more at a step. This interior shell is formed of 4 plates, each one inch thick. When it is in place on the vessel it is to be surrounded from top to bottom by hoops, each 5 inches thick and 11 inches wide; these hoops being formed in quarter sections so that four pieces reach round the turret. These hoops are not pierced by bolt-holes, but are held in place by the outer shell of the turret which is 6 inches thick, built up of plates each 7-8ths of an inch in thickness. This outer shell is to be put together just above the turret, and then lowered into its place with the aid of hydraulic presses.

C. H. Delamater is the constructor of the *Dictator*, but several shops in different parts of the country have contributed work in their respective departments. The large forgings were all done at Bridgewater in Massachusetts. The most massive of these is the propeller shaft, which is 21 inches in diameter.

All of the materials used in the construction of this ship appear to be of the very best quality, and the workmanship is faultless in every respect. A thorough examination of the vessel impresses one with the conviction that she is an exceedingly staunch, swift and comfortable craft, and a most powerful instrument of destruction.

MUDSILLS.

Before the outbreak of the present war, when open hostilities were unknown, the grandees of the South could find no more bitter reproach for the mechanics of the North than the term "mudsills." Senseless as the appellative was to intelligent men, it served to show the estimation in which traitors held labor and those who live by it, and was expressive of their utter scorn.

A just retribution has fallen upon these traitors to their country, for through the want of those despised "mudsills" their railroads are in ruins, their factories, such as they have, short-handed, and only worked by "Northern men with Southern principles," and their steamers, for all offensive purposes, useless. Though the fields of the South at this moment require all the cultivation that can be bestowed upon them, there are none but slaves to plant the crops or to reap them if they were sown. The North is equally short-handed, but when men disappear from the homestead or the factory, dumb assistants supply their place, and the crops are not only gathered in cheaply, but are, or might be, increased in quantity by the employment of the useful agricultural machines which are now in market.

All other callings and trades are equally prosperous at the North, and only in the war-ridden South is the voice of labor hushed in the field, the hum of the factory replaced by solitude and ruin. The Southern journals, such as still exist, are full of demands for "mudsills;" they lament bitterly the loss of machine shops and foundries, and are inconsolable in being debarred the privileges of certain manufacturing towns which have recently been wrested from them in Georgia and Mississippi. It is, of course, the products of labor that they miss so greatly, but these products are the fruits of the skill and ingenuity of Northern "mudsills," whom they once derided, but now mourn and refuse to be comforted therefor.

Let them take this unction to their souls:—One day the Southern factories, mills and machine-shops shall be busy again; and a peaceful and smiling land acknowledge with gratitude the benefits which "mudsills" confer upon them.

COPPERING IRON SHIPS.

WE publish herewith some account of an English invention for coppering the bottoms of iron ships. The prospectus of the patentee (Mr. Warren) says:—

"The question of the day, in connection with iron ships is how to preserve them from fouling, and prevent galvanic action, where copper is used. Many expensive and troublesome plans have been adopted, but all are more or less failures. By order of the Lords Commissioners of the English Admiralty a vessel has been coppered at Portsmouth, England; she has been visited, while coppering, by officers of station and influence, engineers and ship-builders, by whom the plan has been reported on, in the most satisfactory manner. The price for a 'royalty,' including the cost of the materials for preparing the ship for the reception of the copper, is 1s. 6d. per superficial foot."

Appended is a description of the process:—

"The upper edge of the copper is secured with the ordinary coppering nails to a batten, which batten is secured to the side of the ship with screws; and above, or on the batten, a rubbing piece is worked, to prevent boats, &c., from injuring the upper copper. The sheets of copper are fastened together by Mr.

Warren's patent rivets, prepared expressly for this purpose. Holes are punched in the edges and butts of the sheets of copper to receive the rivets, and when placed through the holes, and struck with a light hammer, the points (being split and slightly turned out) coming in contact with the insulator, are opened, and form a most perfect clinch. After the rivet-holes are made in the copper, the copper must be warmed, then carefully covered on the side to be placed next the insulator, with Hay's glue (a patent preparation). The bottom of the iron ship is covered all over with a material such as felt, which, being coated with Hay's glue, or other suitable composition, is to form an insulator; this is made to stick or adhere to the ship in the following manner, viz.: —Place the felt or other material, against the ship, and turn back a small part of the end of it, say about 12 inches, then well saturate with glue the part of the felt turned back: cover also the bottom of the ship with glue, and as quickly as possible, whilst the glue is hot, place the saturated part of the felt against the glued part of the ship, and press it hard home; then proceed to glue small portions of the felt and bottom of ship, pressing the felt home quickly, until the ship is entirely covered with felt. The outside of the felt must then be carefully covered all over with glue, which will then form a most efficient insulator between the bottom of the iron ship and the copper. It is then ready for coppering. Proceed to secure the copper to the insulator, in the following manner, viz.—Place some sheets of copper, either the upper or lower tier, against the insulator on the bottom of the ship, and temporarily secure them with small shores; then place the second tier either above or below, as the case may be, allowing the usual amount of lap for the edges or butts, and clinch them with the prepared rivet. Then put a hot plate over each sheet of the first and second tier, and force them home with a piece of backing and small shores, place the third tier on the insulator, in a similar manner to those, and proceed in this way, tier after tier, until the bottom of the ship is entirely covered with copper."

R. B. Forbes, Esq. of Boston, Mass., (to whom we are indebted for this paper) says:—"The inventor gives certain figures to show the advantages of coppering iron vessels, compared to those not coppered. My experience teaches me that figures generally lie when applied to the estimated cost of ships, especially steam ships; they very seldom tell the truth when treating of the speed, and never as to distances run in a given time with a certain number of revolutions, and a certain amount of steam; and as to consumption of fuel it is very seldom actually tested during trial trips. Nevertheless, Mr. Warren's figures show a gain of nearly $10,000 in six years with ships coppered by his method over others not coppered. In order to arrive at this result he assumes that the copper will last pretty well for that time, and that he will get off old copper sufficient to pay for the new, within £423, or about three-fourths of the original value. Admitting what my own experience has never yet warranted, that copper will last six years and only deteriorate 25 per cent., Mr. Warren makes a poor show for the new system, and illustrates forcibly how greatly his figures lie, by making no account of that never-sleeping element, interest, which begins in his case to eat up his substance from the date of coppering. As he gets no returns from old copper until the end of six years, the cost is about £3,580, and on this the interest for six years may be safely called 33⅓ per cent., so that he will have nearly expended £4,773 (nearly) against £4,062 and interest, which leaves the advantage whittled down to a very small sum.

"Mr. Warren enumerates, but leaves out of the account, sundry advantages to be secured, which would seem to be of some importance; they are as follows: —If the vessel was well painted originally, the damage by cleaning would be slight; fouling is the most serious evil. The estimate in Mr. Warren's prospectus for docking a ship of 3,668 tuns at £100 for 14 days is very small. But supposing the figures to be true, and the steamship to have cost $125 per tun, or $458,500 the gain—£1,787 at $5—gives only $8,935, or less than 2 per cent. on the cost of the ship, and less that 2½ on a valuation of $100 per tun. The never-sleeping interest account reduces this slight gain to a nominal sum.

"When I come to estimate the difficulty of bringing the 'insulator' to the 'sticking point,' and the difficulty in making copper stand six years in a fast ship, I cannot but be very skeptical as to Mr. Warren's mode of coppering iron vessels. I can scarcely believe that, in the damp climate of Great Britain and in the damp docks, an iron ship can be so completely dried as to make a perfect contact between the hull, the felt, and the metal—a contact so perfect as to preclude all danger of stripping off the metal sheathing, by the various strains and vibrations of machinery.

"I am inclined to think that well-braced iron ribs, covered with teak plank, or well-fitted yellow pine, will furnish a combination of great durability and capacity, costing less than a complete iron vessel. The iron-rib vessel is more especially adapted to commercial uses that for a vessel-of-war, because in the latter much of the interior is ceiled over, rendering it difficult to clean and paint the iron frames, which is an essential element of durability, whereas, in a merchant vessel, nearly the whole of the interior may be exposed to view whenever the cargo is discharged."

NEW BOOKS AND PUBLICATIONS.

THE PRACTICAL METAL-WORKERS' ASSISTANT. H. C. Baird, Publisher, 406 Walnut street, Philadelphia.

It is a matter of much importance to know that the mechanics and working-men generally, of this country, are so zealous for education and anxious to be informed on all that relates to the advancement of their special trades. None know this or can better testify to the truth of the observation than ourselves; for there is scarcely a day that passes in which we do not receive earnest inquiries for some mechanical work of the kind previously alluded to do. No man can hope to become eminent, or, indeed, maintain his position in his trade, who is contented to remain in ignorance of the improvements daily occurring about him; and, while his limited knowledge may have been useful at at one time, in these latter days he finds himself left behind by the great mass who are anxious to achieve something more than a mere common existence—who burn to not only distinguish themselves, but earn a competence by availing themselves of the researches and investigations of others.

Mr. Henry Carey Baird, the publisher of the work here alluded to, has devoted himself for years expressly to this class of mechanical literature; and his stock now on hand and in course of preparation will no doubt exceed that of any other publisher or publishers in the country. We regard Mr. Carey as a benefactor in one sense; for, while we do not wish to be understood as saying that he is uninterested in the matter, we do say that his works are not only appropriate to the times and the country, but that they are low-priced, durable, and creditable specimens of the art of bookmaking. The type is large and clear; the paper is firm in texture and handsome in surface; the binding is serviceable; and the contents of the books are all that he asserts them to be. We have said this much in Mr. Carey's favor because he is deserving of it, and not from a desire to laud him over others.

"The Practical Metal-workers' Assistant" is a book that is much needed by mechanics in general, since it contains a large number of lucid articles on practical subjects, which are in the highest degree instructive. We cannot begin to enumerate the subjects treated on in a mere notice; the reader will find a long advertisement in the SCIENTIFIC AMERICAN for March 26th [page 207], which will give him some idea of the work. Suffice it to say here that "The Practical Metal-workers' Assistant" comprises metallurgic chemistry, and the arts of working all metals and alloys; forging of iron and steel, hardening and tempering, melting and mixing, casting and founding, works in sheet metal, the processes dependent on the ductility of the metals; soldering and the most improved processes and tools employed by metal-workers, with the application of the art of electro-metallurgy to manufacturing processes. This information is collected from original sources, and from the works of Holtzapffel, Bergeron, Leupold, Plumier, Napier, and others. The author is Oliver Byrne. A new revised and improved edition, with additions by John Scoffern, M.B., William Clay, William Fairbairn, F.R.S., and James Napier, has just been published. The work is embellished with five hundred and ninety-two engravings, illustrating every branch of the subject, and forms one volume 8vo., price six dollars. It is sent by mail, free of postage, to any address.

Mr. Baird is about to issue a new catalogue shortly, which will contain the announcement of some other mechanical works he has in press.

RECENT AMERICAN PATENTS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week; the claims may be found in the official list:—

Magnetic Globe.—This invention consists in the production of geographical globes with magnetic powers, by making them of a metal possessing magnetic properties, so that small objects, also possessing magnetic properties, will be attracted and adhere to the surface of the globe and thus enable the illustration to the eye of the principle of the power of the earth's attraction—a physical fact which teachers have heretofore found difficult to demonstrate successfully to the minds of the young. Any information regarding this invention may be obtained of the inventor, Elbert Perce, 71 Hicks street, Brooklyn, N. Y.

Marine Log.—This invention consists in a certain novel arrangement of a dial, indices, gearing and springs in combination with a slide which has attached to it, by a line of suitable length, a chip, bucket or float, which, by dragging in the water astern of a vessel while the instrument is arranged upon the taffrail, is made to produce a greater or less draft upon the slide and tension upon the springs according to the speed at which the vessel passes through the water, thereby causing the slide so to act through the gearing upon the indices as to indicate upon the dial the speed of the vessel in miles and fractional portions thereof. In order that the draft of the line may be always direct upon the slide, the case of the instrument containing the springs, gearing, dial and slide, is balanced on journals or between centers. The invention further consists in so arranging the several working parts of the instrument as to permit the whole to turn within the case, that when the vessel is making lee-way the slide may be drawn by the line and chip or float to a position oblique to an imaginary line passing longitudinally through the vessel and to indicate the lee-way upon a graduated scale provided on the case of the instrument. A. E. Lozier, of No. 322 Pearl street, New York city, is the inventor of this improvement.

Grain Drier.—This invention consists of a series of perforated revolving cones arranged in the interior of a tower or suitable shell, and applied in combination with a series of conveyers, perforated platforms, chambers for receiving and for discharging hot and cold air, and one or more suction blowers, in such a manner that grain, introduced through a suitable spout or hopper in the upper part of the tower, will be scattered successively over the cones and spread by this action, combined with that of the conveyers, on the platforms and finally discharged through a perforated chute being exposed throughout its whole course to a current of hot or cold air, which can be regulated by equitable dampers or simultaneously to a current of hot and of cold air, and by the action of the shell or tower the moisture is expelled with the spent air, while the grain is cooled by the cold air. R. T. Sutton, of Rochester, N. Y., is the inventor of this improvement.

Percussion Fuse for Rifle Shells.—This invention consists in the construction of the metal plunger which is employed in a percussion fuse plug for explosive projectiles to effect the explosion of the percussion cap or other percussion priming, with one or more small longitudinally projecting columns or prongs are bent aside or twisted off, and so caused to leave the plunger free to move lengthwise and thereby effect the explosion of the percussion cap or priming when the projectile strikes. Robert P. Parrott, of Cold Spring, N. Y., is the inventor of this improvement.

Condenser for obtaining Fresh Water in Steam Vessels at Sea.—The object of this invention is to obtain a plentiful supply of fresh water on board of steam vessels, and to this end it consists in the employment of one or more pipes leading from the steam chimney or steam chamber of one or more of the boil-

ers to one end, or nearly so, of the vessel, thence up through the bottom to any part or parts of the interior of the vessel where fresh water is required. By this means a copious supply of fresh water is obtained by condensation or distillation and forced to where it is required for use by the boiler pressure without the necessity of a donkey pump for such purpose. This invention will be very advantageous on board of steam vessels of war or transport or passenger steamers, which carry a large number of persons who necessarily require a large quantity of fresh water. G. R. Vanderbilt, of Mount Vernon, N. Y., is the inventor of this improvement.

Artificial Limb.—This invention relates particularly to an improvement in the mode of securing artificial limbs to the stumps remaining from the natural limbs. The invention consists in the use of one or more rollers in the bottom of the cup intended to receive the stump in combination with a strap secured to the covering of the stump and under its center in such a manner that by placing the stump over the mouth of the cup, passing the strap through under the roller at the bottom of said cup and pulling it, said stump is drawn into the cup entirely by the strain exerted by the strap on the covering, and consequently the slipping back of said covering and of the flesh under it is effectually prevented; the invention consists, further, in a wooden disk combined with the canvas covering of the stump and with the strap used for pulling the stump into the cup in such a manner that by inserting a staple into said disk a firm connection can be effected between the strap and covering, and by straining the strap the end of the stump and the bone protruding from the same is entirely relieved from pressure. Joshua Monroe, of No. 560 Hudson street, New York city, is the inventor of this improvement.

ISSUED FROM THE UNITED STATES PATENT-OFFICE

FOR THE WEEK ENDING MARCH 15, 1864.

Reported Officially for the Scientific American.

☞ 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.

41,898.—Calculating Machine.—Joseph B. Alexander, Baltimore, Md.:

I claim the combination of the separate levers with the separate sets of wheels so that the speed of calculations is gained from right to left, or from left to right, by arithmetical progression as described and represented.

I also claim in combination with the wheels, A, the spring cogs, i, substantially as and for the purpose set forth.

I also claim so combining a set of figured drums with suitable means of operating them as that they will show subtraction working in combination with those which record addition, substantially as herein described and represented.

I also claim the combination and arrangement of figured drums, wheels, face-plate, and levers, so that addition, subtraction, multiplication, and division may be worked out on one machine, substantially as described.

41,899.—Cultivator.—John Austin, Rockford, Ill.:

I claim, first, The combination of the shifting driver's seat, D′, with the main frame, A, and laterally shifting plows, K, in the manner described, for the purpose of enabling the driver to balance the machine, and control both the vertical and the lateral movements of the plows, as set forth.

Second, The combination of the main frame, A, and compound lever-frame, F G, with the plows, E K, when the several parts are arranged and operate as described, for the purposes set forth.

Third, The combination of the adjustable driver's seat, the foot-levers, N, and the laterally adjustable plows, K, when severally arranged (relatively to the main frame, A) and operating in the matter and for the purpose described.

41,900.—Buckle.—Isaac Banister, Newark, N. J.:

I claim the double buckle with the joint bar of one tongue forming the loop for the other's strap, while the one joint bar forms the stop or bearing for the lower tongue, when constructed and arranged substantially as herein specified.

41,901.—Water Elevator.—M. C. Bignall, Seneca Falls, N. Y. Ante-dated March 14, 1864:

I claim the cross board, E, provided with the opening or passage, k, when said board performs the double office of guiding the counterpoise rope, belt, or chain, and thrusting the lower part of the bucket toward the spout or trough, as arranged with the chain, C, and reel, B, substantially as herein set forth.

41,902.—Flax and Hemp Machine.—George W. Billings, New York City. Ante-dated March 5, 1864:

I claim the cleaning of flax and hemp by passing the fibre between stationary knives or slats in combination with the scraping knives, the lifting bars and feed rolls, the whole being constructed, arranged, and operating substantially as described and set forth.

41,903.—Machine for breaking Flax and Hemp.—George W. Billings, New York City. Ante-dated Feb. 28, 1864:

I claim the knives or scrapers, k, having the compound motion herein described, in combination with the stationary aperture or throat, o, and smooth feed rollers, l l, the whole constructed substantially as and for the purpose set forth.

41,904.—Mode of cutting Boots.—George A. Brown, Milford, Mass.:

I claim forming a boot upper by means of two curved cuts, J J, of increasing radius and interposed pieces, C D, all as herein shown and described.

41,905.—Grain Dryer.—Lewis S. Chichester, Brooklyn, N. Y.:

I claim, first, A series of parallel or nearly parallel tables, in combination with a rocker, whereby the grain is passed alternately from end to end over such tables in consequence of the rocking movement, substantially as specified.

Second, I claim the metallic tables formed with mortices and overhanging lips, as and for the purposes specified.

Third, I claim the arrangement of the tables, a a, and air passages, f f, for the purposes and as specified.

41,906.—Grain Weigher.—Lewis S. Chichester, New York City. Ante-dated March 14, 1864:

I claim, first, Hanging the box, d, on which the bucket swings or turns, by a link taking the centre, 3, on the scale-beam, b, for the purposes and as specified.

Second, I claim the crutch, d′, and screws, x, in combination with the box, d, and scale-beam, b, for the purposes specified.

Third, I claim the bucket frame, e, receiving the bucket, e′, in the manner substantially as specified, in combination with the counterpoise, f, for the purposes set forth.

Fourth, I claim a spring or springs applied to the weight or weights substantially as specified, for allowing a gradual movement to the scale-beam and grain bucket, for the purposes specified.

Fifth, I claim the arrangement of the cut-offs, p q r, in combination with the swinging or oscillating bucket, e′, and frame, e, for the purposes specified.

Sixth, I claim the deflector, n, at the delivery mouth, m, of the hopper or spout to check the momentum of the grain, as specified.

Seventh, I claim the stop, 13, in combination with the incline, s, to retain the bucket as it comes up to position for securing the grain, as specified.

Eighth, I claim the spring roller, 14, in combination with the stop, 13, for the purposes and as specified.

41,907.—Collarette.—C. O. Crosby, New Haven, Conn.:

I claim the collarette herein described as a new article of manufacture.

41,908.—Saw-mill.—Pearson Crosby, New York City:

I claim the method of connecting or securing the tubular side pieces, B B, to the cross-heads, A A, to wit, having rods, C, welded into the ends of the tubular side pieces to serve as screw bolts for the same, which pass through the cross heads, and either with or without the plates, D, or other equivalent bearings, at the inner edges of the cross-heads, substantially as herein set forth.

[This invention relates to an improved mode of securing tubular side-pieces to the cross-heads of the gate and sash, whereby a very firm and durable connection of the above-named parts is obtained, and consequently a light and durable gate or sash. The invention further relates to a novel and improved mode of strengthening the cross-heads of the gate or sash, whereby the same are prevented from springing under the strain to which the saw or saws are subjected, and comparatively light draw-heads allowed to be used.]

41,909.—Balanced Slide Valves.—Henry Davies, Portsmouth, Ohio:

I claim the rocker, F, bar, G, levers, H H, stud, J, diaphragm, D, and radial bars, L L, applied and operating in combination with a valve, A, having the induction of steam under its face, substantially as herein specified.

[This invention consists in a novel mode of applying a flexible diaphragm in combination with a slide valve, whereby the pressure of steam on the diaphragm is made to counteract that on the valve, and the valve is enabled to work with the least possible amount of friction upon its seat. We expect shortly to publish an engraving of this invention.]

41,910.—Wood-sawing Machine.—Morris Dewey, Clarendon, N. Y.:

I claim the special arrangement of the machine, constructed substantially as described, consisting essentially of the reverse saw and shank, D′ D, rock lever, C, pitman, E, lever, I, with notch or notches, m, pawl, K, and the lever, M, provided with pawl, p, and the ratchets, o o and q q, substantially as and for the purposes herein set forth.

41,911.—Railroad Car Window.—Thomas W. Emery, Buffalo, N. Y.:

I claim the combination of the jointed screens, b b b, with the pane, B, or its equivalent slide, and a frame, A, the whole so arranged that when unfolded, the screens serve as a ventilator and dust excluder, but when folded, they are in compact form out of the way, substantially as herein specified.

I also claim in combination with the folding screens, b b b, the cover or roof, b′, arranged and operating substantially as described.

41,912.—Folding Saw-horse.—C. J. Fay, Hammonton, N. J.:

I claim a folding or expanding and contracting saw-horse constructed in the manner substantially as herein shown and described.

[This invention consists in constructing the horse in such a manner that it may, when not required for use, be folded in compact form, and to effect this the cross-bars at each end of the horse are allowed to work or turn on the bar which connects them at their junction, each pair of cross-bars being connected by a folding brace.]

41,913.—Rock-drilling Machine.—Joseph S. Foster, Virginia, Nevada Territory:

I claim the tube, H, with the drill-rod, I, fitted within it, in combination with the rack, M, pinion, L, pawl, N, wheels, O P, and spring, Q, all arranged to operate in the manner substantially as and for the purpose set forth.

I further claim the combination of the bed, A, plate F, set screws, B, slides, D, tube, H, drill-rod, I, wheels, O P, pawl, N, shaft, K, and spring, Q, all arranged to form a new and improved device for the purpose specified.

[This invention relates to an improved device for holding the drill and rotating the same, and also for adjusting the drill in a more or less inclined position as may be required.]

41,914.—Portable Oven.—John A. Frey, Washington, D. C.:

I claim, first, The arrangement of the inside and outside case of the oven with the partitions, N and O, and fire-box, J, with its flanges to support the roasting racks, return pipes, M, and removable plate, T, as described for the purposes set forth.

Second, The combination of a fire-box having a smoke-pipe connection at each side thereof, with a portable oven having double walls to provide flues with which the smoke-pipes connect, substantially as shown.

41,915.—Melodeon.—Reuben Goodrich, Pittsfield, Mass.:

I claim, first, The employment in a melodeon or other reed musical instrument, of a sound board of glass or other sonorous material interposed between the socket-board and the air-receiving chamber of the exhaust bellows, substantially as and for the purpose herein specified.

Second, Causing the air after passing through the reeds to pass through one or more slots or narrow openings, d d, provided at the edge of the sound-board, substantially as herein specified.

[This invention consists, first, in interposing between the socket board containing the reeds and the air-receiving chamber of the exhaust bellows, in a melodeon or other reed musical instrument, a sound-board of glass or other sonorous substance; secondly, in causing the air after it has passed the reeds, to pass through one or more slots or narrow passages at one edge of the sound-board instead of through a hole or holes in the foundation-board directly under the valves, as in most reed instruments now manufactured.]

41,916.—Sewing Machine.—Wm. S. Guinness, Mount Vernon, N. Y. Ante-dated March 9, 1864:

I claim the combined arrangement of the needle-arm, C, the feed arm, N N′, the shuttle-holder, G, the carrier, g g, and the thread regulator or governor, V V, moving simultaneously in the manner and for the purpose substantially as described and shown in the drawings.

41,917.—Railroad Car Brake.—O. J. Harrington, Manchester, Pa.:

I claim the combination of the cord, s, weight, u, friction pulley, m, drum, n, shaft, 2, levers, o g and j, chains, y h and r, pulleys, 6 7 q z t and v, when used in connection with brakes, k, each brake being operated by a separate lever, and made self-operative by the means herein described and set forth.

41,918.—Dipping-frame for the Manufacture of Matches—Darwin Helmer, Mohawk, N. Y.:

I claim, first, The longitudinal channels, b b, Fig. 2, on the upper surface of the slats (without restriction as to the number and location of said channels on the upper surface of the slat) when the said longitudinal channels are used in connection with corresponding longitudinal elevations on the lower surfaces of contiguous slats, in the manner and for the purpose substantially as set forth.

Second, I claim the longitudinal elevations, c c, Fig. 3 (whether formed as part of the slat or by additions thereto) on the under surface of the slats when said longitudinal elevations are used in connection with corresponding longitudinal channels on the upper surface of contiguous slats, in the manner and for the purpose substantially as set forth.

Third, I claim the improved slat formed by the combination of the longitudinal elevations on its under side with corresponding longitudinal channels on its upper side and the deepened transverse grooves for the reception of blank match sticks, or its equivalent, when used in the manner and for the purpose substantially as hereinbefore set forth.

41,919.—Trap Caster for Bedstead.—David Henderson, Boston, Mass.:

I claim, as a new article of manufacture, a furniture caster with the arms, B, liquid cup, G, and spindle, D, cast in a single piece, substantially as and for the purpose described.

41,920.—Opening and shutting Gas-cocks by Electro-Magnetism.—John A. Heyl, Boston, Mass.:

I claim the arrangement of the lever, G, which carries the armature of the electro-magnet and the pawl for operating the ratchet-wheel of the stop-cock, to work upon a pivot or fulcrum formed upon the plug of the stop-cock, substantially as and for the purpose herein specified.

[This invention relates to the opening and closing of the stop-cocks of gas pipes and gas burners by means of a ratchet-wheel on the plug of the cock and a pawl attached to a lever, which carries the armature of an electro-magnet, the pawl being made to operate upon the ratchet-wheel for the purpose of turning the cock, by repeatedly closing and opening the circuit in which the electro-magnet is placed, and so alternately allowing the armature to be attracted by the magnet and drawn back by a spring. The improvement consists in the arrangement of the lever to which the armature and the pawl are attached, to work upon the plug of the stop-cock, which is made to constitute the fulcrum of the said lever, and to obviate the necessity of a separate fulcrum and support, thereby simplifying the apparatus.]

41,921.—Tobacco Pipe.—Elijah Holmes, Lynn, Mass.:

I claim connecting the bowl and stem of a wooden smoking pipe by means of the knee, B, provided with an oblique conical socket for the reception of the stem, and a flexible flange, f, substantially as set forth and for the purpose described.

41,922.—Guard-finger for Harvesters.—A. A. Hotchkiss, Sharon, Conn.:

I claim forming the steel facings of guard-fingers with wings, M M, extending obliquely downward below the under face of the plane portion, C, substantially in the manner and for the purpose herein set forth.

41,923.—Sewing Machine Button-hole Stitch.—Charles Rogers Jackson, Brooklyn, N. Y.:

I claim the sewing machine stitch herein described suitable for stitching eyelet holes, button holes, or edges, by passing the thread or loops through and over the edge of a fabric, the same being formed with a single thread and by a succession of stitches or loops passing into each other, in the manner herein described.

41,924.—Car Coupling.—John T. Johnston & Newton T. Smith, Grand Rapids, Mich.:

We claim the combined arrangement of the obliquely pivoted plates, B, having apertures, d′, and projecting key-shafts, C, with the draw heads, D, and link, E, in the manner herein shown and described.

[This invention consists in the employment or use of a link or shackle provided at each end with a shoulder; in connection with catches placed within the draw-heads, and all arranged in such a manner as to render the coupling self-connecting, or "self-acting," as it is commonly termed, and admit of the draw-heads being readily disconnected when desired.]

41,925.—Tool for opening Boxes.—Wm. M. Keague, Brooklyn, N. Y.:

I claim, as a new article of manufacture, an instrument for opening boxes, constructed and operating in the manner described.

[This invention consists in a tool composed of a handle having on one side a toe and on the other a hammer, said toe being attached to the handle in an oblique direction, so that by entering the same between the cover and top edge of a box and depressing the handle the nails are forced out and the box is opened, and by the aid of the hammer the nails dan be readily removed from the cover or refastened as may be desired; the toe is prevented from slipping by V shaped notches cut into both surfaces of the same near its opposite edges.]

41,926.—Cattle Stanchions.—George A. Keene, Newburyport, Mass.:

I claim in combination with the frame, C, and sliding plate, F, the pin, m, rope, n, and lever, O, or their equivalents, substantially as set forth and for the purpose specified.

41,927.—Magneto-electric Machine.—Jerome Kidder, New York City:

I claim, first, The two helices or systems of helices, H H′, so combined and arranged that the induced current or currents of one may be added to the current or currents of the other, also that the current or currents of one may be made to run in opposition to the current or currents of another for the purpose of cutting off the power, substantially as herein specified.

Second, The combination of a metallic strip or wire, t, surrounding a helix and the arrangement for metallic connection, V V1 V2, to connect any desirable points upon the said strip, substantially as and for the purpose herein specified.

Third, The battery multiplier composed of a system of studs, k l m n k* l* m* n*, or their equivalents, and switches, P P*, with suitable battery connections, substantially as and for the purpose herein specified.

Fourth, Making the poles of the electro-magnet, p, and the armature or hammer, p′, relatively adjustable toward or from each other without altering the tension of the spring which draws back the armature or hammer, substantially as herein specified.

Fifth, The movable clamp, E, applied to the spring, K, which carries the vibrating armature or hammer, substantially as and for the purpose herein specified.

Sixth, The combination of the two bridges, Y Y′, screws, a* b* c* d* a′* b′* c′* d′*, and studs, a b c d a′ b′ c′ d′, the whole applied in relation to the several coils of the helices and to the electrodes, X and —, to operate substantially as and for the purpose herein specified.

[The object of this invention is to enable the character of the currents obtained by an electro-magnetic machine to be varied in a very great degree, more especially with a view to apply electro-magnetism to the cure of disease, though the variations produced may be advantageous for other than medical purposes.]

41,928.—Mill-stone Bush.—George W. Landon, Graham, Ind.:

I claim the journal blocks, b b b b, and keys, a a a a, when set in a

position diagonally opposite each other, the set screws, c c c, &c., the rim, f, the lid, E, the tube, d, and the damsel, D, when constructed with the lubricating apparatus, when used in combination for the purpose above described and set forth.

41,929.—Machine for heading Bolts.—William J. Lewis, Pittsburgh, Pa.:

I claim a recess or cavity in the griping dies so constructed as to embrace the bolt head on two sides only, and in combination therewith a header formed with "cheeks" or projections on its face or front end, so as to catch the bolt head on its opposite sides, whereby the "flash" or "fin" produced by the first stroke of the machine may be driven off, by turning the bolt one-fourth way round, so that the surplus metal will come against the solid portion of the dies, previous to the second stroke, substantially as herein set forth.

41,930.—Gas Regulator.—Charles C. Lloyd, Philadelphia, Pa., & Robert M. Potter, New York City:

We claim the combination of the two concentric chambers, E L, communicating at bottom through contracted apertures, d d, the central supply pipe, C, rising vertically within the chamber, L, the annular float, F, bridge, e, conical valve, B, small air hole, f, in chamber, E, and discharge aperture, b, in the upper part of the chamber, L, when the said parts are constructed and arranged and operate as herein specified.

[This invention consists in the arrangement of the liquid which supports the valve-float within two chambers commuuicating with each other only at the bottom, and a novel arrangement of the valve, the float, the inlet passage, and the liquid chambers, whereby greater steadiness of operation is obtained, and whereby the valve would be caused to close and shut off the gas in case of the exhaustion of the liquid.]

41,931.—Refrigerator.—Manoah C. Longacre, Cleveland, Ohio:

I claim the combination with the open frame, A E, of the rack, C, removable corrugated plate, F, trough, H h, and pins, h', all constructed and arranged in the manner and for the purposes specified.

41,932.—Marine Log and Lee-way Indicator.—A. E. Lozier, New York City:

I claim, first, The combination of the case, A, slide, E, springs, r r, line, v, chip or bucket, G, rack and gearing, j i k l m n, indices, h q, and dial, a, the whole applied, arranged, and operating, substantially as herein set forth.

Second, The balancing of the case, A, on pivots or journals, b b, substantially as and for the purpose herein specified.

Third, The attachment of the slide, E, gearing and springs of the log to a plate, C, or its equivalent, which is capable of turning within the case, A, in such manner that by the use of a suitable scale outside of the box, the slide may serve to indicate the lee-way.

41,933.—Boot and Shoe Heel.—Josis Miller, Antwerp, N. Y.:

I claim a shell or skeleton metallic heel, in combination with a metallic circular plate closely fitting to the inside of the shell, all constructed and arranged as herewith described.

41,934.—Artificial Limb.—Joshua Monroe, New York City:

I claim, first, The roller, a, or its equivalent, applied to the interior of the cup, A, of an artificial limb in combination with a strap, b, secured to the covering of the stump, substantially in the manner and for the purpose herein shown and described.

Second, The disk f, arranged in combination with the covering, c, of the stump and with the strap, b, and cup, A, substantially and for the purpose specified.

41,935.—Mode of Construction of Piers, &c.—George A. Parker, Lancaster, Mass.:

I claim, first, A portable constructing-pier supported upon and leveled or adjusted by or to the bed of the stream upon which it rests, substantially as and for the purpose described.

Second, I also claim, in combination with constructing-piers, either portable or permanent, the fastening of them to the bed of the stream by screws forced into the same from the top of the pier, substantially as described.

41,936.—Machine for picking and cleaning Wool, &c.—Stephen R. Parkhurst, New York City:

I claim, first, A toothed cylinder in combination with a receptacle or hopper, to act as a feeder to carding, picking, and cleaning machines, by conveying to such machines the fibers that are seized by and surround the teeth of such cylinder, substantially as specified.

Second, I claim a vibrating or oscillating comb or detainner in combination with the said feeding cylinder and receptacle, as specified.

Third, I claim the fluted roller, k, in combination with the toothed cylinder, h, and stripper, i, for the purposes specified.

Fourth, I claim the toothed cylinders, g h and l, and strippers, i and m, arranged substantially as specified, in combination with the feeding cylinder, d, and shell, f, for the purposes and as specified.

41,937.—Percussion-fuse for Explosive Shells.—Robert P. Parrott, Cold Spring, N. Y.:

I claim the construction and arrangement of the columns or arms, f, substantially in the manner herein shown and described; so that said arms will be longitudinally strong but laterally weak, and thus, when rapid rotation is imparted to the shell by discharge from the gun, the arms will bend or break, but at all other times will remain firm and rigid, as set forth.

41,938.—Geographical Globe.—Elbert Perce, Brooklyn, N. Y.:

I claim a geographical globe with magnetic properties so that small objects made of steel or iron will be attracted and retained by the force of magnetic attraction, in the manner and for the purpose above specified.

41,939.—Method of connecting Governors with the Gates of Water-wheels.—J. W. Pitt, North Adams, Mass.:

I claim the applying of a governor to the gate of a water-wheel, in the manner substantially as described, so that the gate in opening will move with an accelerated or gradually increasing speed, and in closing move with a corresponding diminution of speed to compensate for the varying force of the water at different heights of the discharge orifice, as set forth.

[The object of this invention is to apply a governor to the gate of a water-wheel in such a manner that the gate will be raised with an accelerated or gradually increasing speed, and lowered with a corresponding diminution of speed, whereby the movement of the gate will at all times be pro ortionate to the volume of water and power required.

41,940.—Elastic Carriage Wheel.—E. L. Pratt & John B. Thompson, Boston, Mass.:

We claim the application of the rubber or elastic cushion, e, to the outer surface of the metallic tire or hoop, d, (which surrounds and keeps in place the fellies) when such cushion is surmounted by a metallic protector or band, f, as set forth.

41,941.—Skimming Apparatus for Sugar Pans.—Thomas J. Price, Industry, Ill.:

I claim, first, The skimmer, A, in combination with the head blocks, B B, and rods, O O, substantially as and for the purpose set forth.

Second, The rockshaft, J, and levers, D D, and rods, S S, in combination with the head blocks, B B, and rods, O O, substantially as shown and described for the purpose specified.

Third, A skimming apparatus which elevates the skimmer above the boiling juice in its rearward movement until it gets in the rear of the deposit of scum, then drops into the boiling juices, and in its forward movement catches the scum and scrapes it up the inclined end, depositing it in the gutter, as shown and for the purpose set forth.

41,942.—Bee-hive.—John E. Richey & C. Hotchkiss, Van Wert, Ohio:

We claim the arrangement of the divisible hive, p p, and slide, D, with the ventilating and moth chamber, k, and boxes, d d, in the manner herein shown and described.

41,943.—Toy Pistol.—Reuben Shaler, Madison, Conn.:

I claim the combination and arrangement described of the barrel, B, hammer, C, spring, d, and trigger, E, in the manner and for the purpose specified.

41,944.—Saddle or Sweat Cloth.—Robert Spencer, Newark, N. J.:

I claim as a new article of manufacture a saddle cloth shaped to he back of the horse without seam and graduated in thickness, made or combined substantially in the manner and for the purposes described.

41,945.—Axle Box.—Wm. Stechschult, Glandorf, Ohio:

I claim the employment of the spreading noses, e e, in combination with the linch-pins, C C*, projections, d d*, groove, b, and axle, B, all in the manner herein shown and described, so that the grease or lubricating material will be caught and spread over the surface of the axle, as set forth.

[This invention consists in the arrangement of two projections or lugs rising from plates or brackets that are secured to the axle by bolts or other suitable means, one or both of said projections being provided with noses or scrapers, in combination with a circular groove in the rear end of the hub or box, and with an oil hole in front in such a manner that the oil contained in a circular groove at the rear end of the hub or axle box, is pushed out and spread on the axle by the action of the scraper or scrapers, and at the same time by having two such plates or linch-pins, one on either side of the axle, the strain of the wheel on the axle is equalized, and the friction reduced.]

41,946.—Mosquito Tent or Frame.—John Stewart, New York City:

I claim the telescope column, A, provided with a windlass, C, ropes or chains, d e, hinged arms, D, and ropes or chains, i, all constructed and operating in the manner and for the purpose herein shown and described.

[The object of this invention is a simple and portable device, capable of being raised and expanded to form a space enclosed by mosquito netting or of being lowered and folded up so as to occupy but little room when it is not used.]

41,947.—Grain Dryer.—R. T. Sutton, Rochester, N. Y.:

I claim the revolving perforated cones, D, conveyers, F, and perforated floors, B B*, in combination with the tower, A, air-supply chamber, G, with inlet and outlet openings, H H', and air discharge chamber, G', with openings, g', and suction blower, I, constructed and operating in the manner and for the purpose substantially as shown and described.

41,948.—Gate and Door-closing Device.—George Turner, Lansing, Mich.:

I claim a pulley device for the weight, cord or rope of doors and gates, composed of an arm, A, with a fixed vertical pulley, C, attached in combination with an adjustable plate, D, pivoted to, A, and having a horizontal pulley, E, fitted to it, all arranged to operate in the manner substantially as and for the purpose herein set forth.

[This invention relates to an improvement in the old and well-known weight and pulley attachment for closing doors, and is also designed to supersede the ordinary weight and chain attachment for closing gates. The invention consists in the employment or use of a fixed and a self-adjusting pulley, arranged in such a manner that the device may be applied to either a right or a left-hand door or gate, and operate equally well in either application, without the liability of the cord slipping from the pulleys in any position of the door or gate, the weight at the same time being entirely out of the way.]

41,949.—Condenser.—G. R. Vanderbilt, Mount Vernon, N. Y.:

I claim the employment for obtaining a supply of fresh water on board a steam vessel at sea, by condensation or distillation, of a pipe or pipes, a c, leading from the boiler to or nearly to one end of the vessel through the bottom and along the exterior thereof to or nearly to the other end, thence to the interior and to the point or points where the supply is required, substantially as herein described.

41,950.—Helical Spring.—Richard Vose, New York City:

I claim the use of a metallic bar, varying in width or thickness either from end to end or from center to ends, when it is coiled into a helical spring, substantially in the manner and for the purpose herein set forth.

41,951.—Gate.—D. R. Warfield, Muscatine, Iowa. Antedated March 9, 1864:

I claim the bar, C, with the weight, E, attached in combination with the catch, F, levers, G G, cords, s, and levers, q q, all arranged substantially as and for the purpose set forth.

[This invention relates to a new and improved means for opening and closing gates, to enable a person on horse-back or in a vehicle to open or close the gate without dismounting from the horse or getting out of the vehicle. The invention consists in suspending the gate on an angular pivoted bar placed in a suitable framing and arranged with a catch or fastening and levers.]

41,952.—Boot Crimp.—Oliver J. Warren, Chicago, Ill.:

I claim the wedge-formed yoke, E, enclosing the nut, E, and operating to spread the arms, h b', in the described combination with the crotch, A a a1 2, outer hinged jaws, B b B' b', and screws, C, arranged and operating substantially as and for the purposes specified.

41,953.—Washing and Wringing Machine.—Ephraim B. Wells, Uniontown, Pa.:

I claim in combination with the endless apron, C, the rollers, F J, the latter being elastic for the purpose of placing the moving of the apron, at the will of the operator as described, under the beaters for washing, or without the beaters for wringing only, as set forth and represented.

41,954.—Churn.—Amos Westcott, Syracuse, N. Y.:

I claim, first, The use of dasher paddles of the form above described.

Second, The use of stationary dashers of the form above described in combination with the other parts of the churn, as above described.

Third, The use of the dasher paddles marked a' a' a' a' Fig. 2, so constructed and attached to the shaft, B, Fig. 2, as to move close to the inner sides of the ends of the box of the churn, essentially as above described, in combination with the other parts of the churn as above described.

Fourth, The method of constructing, attaching and securing in place the shaft, B, Fig. 2, so that the same crank can be used upon either the driving wheel at one end of the churn or upon the shaft at the other end of the churn at pleasure, essentially as above described in combination with the other parts of the churn as above described.

Fifth, The use of the blower in combination with the other parts of the churn, essentially as above described.

41,955.—Machine for making Horse-shoe Nails.—Milton D. Whipple, Cambridge, Mass.:

I claim, first, The series of pairs of vibrating levers, L M N O, each pair in the series operating at right angles to the next preceding pair, and provided with dies for swaging the blank, substantially as set forth.

Second, In combination with the above series of levers and dies, I claim flattening and finishing the nail by passing it between the rolls, R and S, as described.

41,956.—Concealed Hinge.—Frederick Wood, Bridgeport, Conn.:

I claim the enlarged opening, O', in combination with the free hinge-pin, f, constructed and operating in manner as described, or in any other manner substantially the same.

41,957.—Mosquito Net, a portable article.—John Zengeler, Chicago, Ill.:

I claim a mosquito net for the head and neck, constructed of netting, B, attached to elastic hoops, A A, and secured to the wearer substantially as herein set forth.

[This invention consists in securing the fabric known as mosquito netting, to elastic hoops of wire, cane, or other material, and of such diameter as to admit of the device being placed over the head of the wearer; the netting being cut of such form as to admit of being snugly fitted to the shoulders and confined closely to the waist in front.]

41,958.—Mowing Machine.—Rufus Dutton, Brooklyn, N. Y., assignor to himself and Anthony B. Allen, New York City:

I claim changing the cutting apparatus from front to rear, and from rear to front of the right wheel of the machine, by means of detaching and reversing the parts of the gear casing, C D, draft-rod, C', cross-bar, A', substantially as set forth in the specification.

I also claim the bend or offset in the cross-bar, A', for depressing the crank end of the casing in rear cutting, and elevating the same in front cutting, substantially as set forth.

I also claim constructing the draft-rod with a bend at one of its ends, and made reversible to adapt it to front and rear cutting, substantially as and for the purpose set forth.

I claim also so attaching the line of draft in a mowing machine as to counteract the tendency of the gear casing to rotate on the axle as well as to prevent the finger-bar from rising above the ground in rear cutting, and pressing upon the ground in front cutting, substantially as set forth.

41,959.—Skate.—E. Otis Frink (assignor to himself and S. C. Frink), Indianapolis, Ind.:

I claim the ratchet, A, the cog-wheel, C, the guides, d and d', the spring lever, B, and pawl, g, when the same is operated, constructed, and arranged as described.

41,960.—Explosive Shell.—Ralph Graham (assignor to himself and Samuel Booth), Brooklyn, N. Y.:

I claim, first, Forming the shell of two parts, a and b, in the manner specified, and soldering them together, whereby the parts of said shell can be cast of type metal or similar alloys in molds with facility, and when united by soldering, said shell becomes as solid as if cast in one piece, for the purposes and as specified.

Second, I claim the case, g, formed as specified and connected to the rear end of the projectile, when said shell is of such a shape as to allow a space between the shell and chamber sufficient for the gases in the explosion to pass in and eject said shell after the projectile has passed out of the barrel as specified.

41,961.—Piston for Steam Engines.—John Hall & Henry Hall, Sen. (assignors to themselves and Henry Jones), Brooklyn, N. Y.:

I claim, first, The sliding blocks, H, wedges, G, and ribs, F, or their equivalents in combination with the annular plate, K, and its projections, m, or the equivalent thereto, the whole being constructed and arranged for action on the segments and rings of the piston, substantially as and for the purpose herein set forth.

Second, The arrangement within described of the sliding blocks, H, in respect to the segments for the purpose specified.

Third, The worm spindle, P, the screwed spindle, g, with its wheel, M, when the whole is combined with the annular plate, k, and arranged for operating the same, substantially as described for the purpose specified.

Fourth, The use of the single spring, R, for imparting an equal pressure and elasticity to the rings, substantially in the manner described.

41,962.—Hame Fastening.—John McLain, St. Mary's, Ohio, assignor to Joseph Chenoweth, Columbia City, Ind.:

I claim the arrangement of slides, B C, adjustable by a screw, d, and holes, e, or by ratchet teeth, f, and spring catch, g, in combination with the bows, a b, of hames, A, constructed and operating in the manner and for the purpose substantially as herein shown and described.

[This invention consists in the arrangement of curved slides inserted into the ends of the hames, one of said slides being made adjustable by means of a screw passing through the hame and fitting into different holes in said slide, and the other slide being provided with ratchet teeth and made adjustable by means of a spring catch, in such a manner that the hame can be opened and closed and adjusted to the necks of different horses, whenever it may be desired.]

41,963.—Machine for cutting up Fat.—Frederick Miller & J. N. McIntire (assignors to said Frederick Miller), New York City:

We claim the employment of the cutter cylinder, A, with its knives, a, the roll, C, and the cutter cylinder, B, with its knives, a', and roll, D, the whole arranged and operating as described.

We also claim the employment in combination with a cutting cylinder of the clearing plates, m, arranged to operate as and for the purposes described.

We also claim the arrangement of the lower cutter cylinder in such manner with the upper, as that the former will clear off the plates, m, of the latter, as described.

We also claim the use of the clearer bar, T, in combination with the cylinder, B, and its plates, m, the whole arranged and operating as specified for the purpose set forth.

We also claim the combination of the two cutter cylinders, one over or in advance of the other, when each is made with special knives and the knives of the two are twisted in opposite directions, as and for the purposes set forth.

41,964.—Vacuum Engine.—Isaac Newton, New York City, and Norman W. Wheeler, Brooklyn, N. Y., assignors to said Isaac Newton. Ante-dated Jan. 13, 1864:

We claim, first, The use of the single-acting air and circulating pumps, B B, and A A, in combination with each other, and with the surface condenser of a marine engine, when said pumps are connected and operated in relation [to each other substantially in the manner described.

Second, The combination of the receiving valves, c, bucket valve, d, and delivery valve, e, when said valves are arranged in respect to each other and to their respective seats and chambers, constructed substantially in the manner described.

Third, We claim the combination of the steam cylinder with the air and circulating pumps, when said pumps are arranged between separate channel plates and steadied by the action of a fly-wheel, substantially as shown and described.

41,965.—Lamp Burner.—Rodney L. Smith (assignor to Parkers, Snow & Co.), West Meriden, Conn.:

I claim the wire or rod, C, attached to the under side of the base, a, of the cone or deflector, and bent so as to form a hinge, stop, and a catch or fastening, substantially as herein shown and described.

[This invention consists in the employment or use of a fastening, hinge and stop, constructed, arranged, and applied to the burner in such a manner that the cone or deflector may be firmly secured down upon the burner, a hinge attachment for the cone or deflector obtained, and also a stop to prevent the cone or deflector being thrown or turned back beyond a certain position, the parts being all constructed out of a single piece of wire.]

41,966.—Lathe-rest for trueing Watch Wheels.—Samuel G. Twambley (assignor to Charles A. Shaw), Biddeford, Maine:

I claim, first, In combination with the staff, A, a file or stone mounted on a spring made adjustable by a screw, substantially in the manner and for the purposes set forth and specified.

Second, I claim in one piece of mechanism the combination of a file and stone when mounted substantially in the manner and for the purposes herein-before described.

41,967.—Lasting Machine.—Wm. Wells, Middleton, Mass., assignor to Alfred B. Ely, Newton, Mass.:

I claim, first, The combination of hinged or folding flanges with the end jaws, heel, and toe.

Second, The combination of hinged or folding heel-and-toe flanges with flanged side jaws.

Third, So constructing the parts that the hinged end flanges can be folded together over the last when in position by bringing up the side jaws or clamps.

Fourth, Constructing and combining the side clamps and side jaws so as to remove and replace the jaws, as may be required.

Fifth, So constructing the holding mechanism as to adjust the height of the last to the flanges or jaws, substantially as described.

Sixth, The combination of gages with the flanges for fitting on the outer sole.

RE-ISSUES.

1,634.—Breech-loading Fire-arm.—The Burnside Rifle Company, North Providence, R. I., assignees of George R. Bacon, Providence, R. I. Patented July 21, 1863:

I claim the method substantially as described of guiding the movements of the movable cartridge block in a breech-loading fire-arm by the combination of a stationary pin, e, with a compound groove, as herein specified.

1,635.—Self-loading Fire-arm.—Albert Ball, Worcester, Mass. Patented June 23, 1863 :

I claim the mode substantially as described of making the rear part of the barrel or cartridge chamber, and the front part of the charging carriage, that is to say, making the charging carriage with a recess or trough for receiving a cartridge and allowing of the ejectment of its shell in manner as explained, and so constructing the breech end of the barrel or the cartridge chamber thereof, that such recess or trough of such charging carriage may, when the cartridge is in place in the bore or cartridge chamber, form part of and complete such cartridge chamber, in manner substantially as described.

I also claim the combination of the ejecting spring, D, with the charging carriage, when constructed and combined with a magazine and barrel, substantially in manner and so as to operate therewith as hereinbefore explained.

I also claim the combination of the locking-piece, P, with its actuating mechanism (viz: the spring, g, and catch, f), with the tumbler, I, and the charging carriage, O, the whole being constructed and arranged in manner and so as to operate together, substantially as explained.

I also claim the charging carriage as made in manner and so as to operate with the magazine and the barrel as described, viz: to receive within it a cartridge from the magazine, to raise it up to the barrel or charging chamber thereof, to form part of and serve as a breech to such chamber, and finally to withdraw the shell of the cartridge therefrom, all as explained.

1,636.—Steam Boiler.—Wm. M. & Jonas B. Ellis, Washington, D. C. Patented Aug. 26, 1862 :

We claim connecting the water-legs, extending continuously from the front to the rear of the boiler, to the shell of the boiler at the point of the working water-line of the boiler, substantially as herein set forth.

1,637.—Steam Boiler.—Wm. M. & Jonas B. Ellis, Washington, D. C. Patented Aug. 26, 1862 :

We claim gradually increasing the area of the tubes from the highest to the lowest tubes, as herein described.

1,638.—Side Lights for Ships.—Enoch S. Hidden (assignee of Enoch Hidden), New York City. Patented June 21, 1853. Re-issued Sept. 8, 1863 :

I claim, first, The combination, substantially in the manner described, of a turning flange arranged, shaped, and operating substantially as specified with a glass frame and suitable interposed packing whereby the packing may be compressed and the frame held shut or have liberty to open under a mode of operation substantially as set forth.

Second, I claim in combination with a glass frame and a turning flange substantially such as are described, a pin and a stop, operating substantially as set forth.

Third, I claim a stationary frame with projecting lugs having long mortices therein in combination with pins projecting from a glass frame, both substantially such as herein set forth, so that the glass frame may be opened and shut, substantially as set forth.

Fourth, I claim in combination with a stationary frame attached to the side or deck of a vessel, a sleeve or ring of lead or other ductile metal, soldered or otherwise joined thereto, so that it can be flanged or turned over the edge of the opening through the vessel, thereby making the joint between the stationary frame, and the vessel water tight, substantially as described.

1,639.—Wheel Skate.—Orasmus M. Vail, Brooklyn, N. Y., and Thomas J. Vail, Hartford, Conn., assignees of Reuben Shaler, Madison, Conn. Patented Feb. 24, 1860 :

We claim a roller skate which is a combination of a foot-stock with rollers made elastic by india-rubber or gutta-percha, the combination operating substantially as herein set forth.

DESIGNS.

1,920.—Nut-cracker.—Eli W. Blake (administrator of the estate of Edward F. Blake), New Haven, Conn.

1,921 to 1,924.—Carpet Patterns (4 cases.)—Elemir J. Ney (assignor to The Lowell Manufacturing Company), Lowell, Mass.

EXTENSIONS.

Portable Furnace.—John T. Davy, Troy, N. Y. Letters Patent No. 7,159. Dated March 12, 1850 :

I claim combining with a portable furnace of the usual construction a surrounding heating chamber provided with apertures or slots to admit of the insertion or removal of the flaps combined with the door or flap at top, substantially as described.

I also claim providing the said air-heating chamber with a revolving top provided with a single small door or flap, which by the rotation may be brought directly over the slots in succession and the flaps inserted or removed, substantially as described.

Process of rolling India-rubber Cloth.—Francis D. Hayward & John C. Brickford, Colchester, Conn. Letters Patent No. 7,189. Dated March 19, 1850 :

We claim the new or improved process of applying and fixing rubber to cloth by means of rollers; the said improved process being a combination of the method of spreading the rubber by the pressure of rollers, and the method of grinding and fixing it at the same time against and into the substance of the cloth, all as specified.

TO OUR READERS.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and enclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

MODELS are required to accompany applications for Patents under the new law, the same as formerly, except on design patents, when two good drawings are all that are required to accompany the petition, specification and oath, except the Government fee.

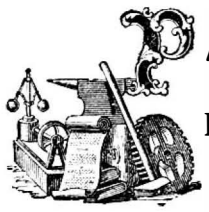
RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona-fide* acknowledgement of our reception of their funds.

Binding the "Scientific American."

It is important that all works of reference should be well bound. The SCIENTIFIC AMERICAN being the only publication in the country which records the doings of the United States Patent Office, it is preserved by a large class of its patrons, lawyers and others, for reference. Some complaints have been made that our past mode of binding in cloth is not serviceable, and a wish has been expressed that we would adopt the style of binding used on the old series, *i. e.*, heavy board sides covered with marble paper, and morocco backs and corners.

Believing that the latter style of binding will better please a large portion of our readers, we commenced on the expiration of Volume VII., to bind the sheets sent to us for the purpose in heavy board sides, covered with marble paper and leather backs and corners.

The price of binding in the above style is 75 cents. We shall be unable hereafter to furnish covers to the trade, but will be happy to receive orders for binding at the publication office, No. 37 Park Row, New York.



PATENTS

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FOR SEVENTEEN YEARS!

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In connection with the publication of the SCIENTIFIC AMERICAN, have acted as Solicitors and Attorneys for procuring "Letters Patent" for *new inventions* in the United States and in all foreign countries during the past *seventeen years*. Statistics show that nearly ONE-THIRD of all the applications made for patents in the United States are solicited through this office ; while nearly THREE-FOURTHS of all the patents taken in foreign countries are procured through the same source. It is almost needless to add that, after *seventeen years'* experience in preparing specifications and drawings for the United States Patent Office, the proprietors of the SCIENTIFIC AMERICAN are perfectly conversant with the preparation of applications in the best manner, and the transaction of all business before the Patent Office ; but they take pleasure in presenting the annexed testimonials from the three last ex-Commissioners of Patents :—

MESSRS. MUNN & CO.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the office, a marked degree of promptness, skill, and fidelity to the interests of your employers. Yours very truly, CHAS. MASON.

Judge Mason was succeeded by that eminent patriot and statesman, Hon. Joseph Holt, whose administration of the Patent Office was so distinguished that, upon the death of Gov. Brown, he was appointed to the office of Postmaster-General of the United States. Soon after entering upon his new duties, in March, 1859, he addressed to us the following very gratifying letter:

MESSRS. MUNN & CO.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you discharged your duties as Solicitors of Patents, while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and I doubt not justly deserved) the reputation of energy, marked ability, and uncompromising fidelity in performing your professional engagements.

Very respectfully, your obedient servant, J. HOLT.

Hon. Wm. D. Bishop, late Member of Congress from Connecticut, succeeded Mr. Holt as Commissioner of Patents. Upon resigning the office he wrote to us as follows:

MESSRS. MUNN & CO.:—It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency; and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully, your obedient servant, WM. D. BISHOP.

THE EXAMINATION OF INVENTIONS.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submit it to us, with a full description, for advice. The points of novelty are carefully examined, and a written reply, corresponding with the facts, is promptly sent, free of charge. Address MUNN & CO., No. 37 Park Row, New York.

As an evidence of the confidence reposed in their Agency by inventors throughout the country, Messrs. MUNN & CO. would state that they have acted as agents for more than TWENTY THOUSAND inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of inventors and patentees, at home and abroad. Thousands of inventors for whom they have taken out patents have addressed to them most flattering testimonials for the services rendered them; and the wealth which has inured to the individuals whose patents were secured through this office, and afterwards illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! Messrs. MUNN & CO. would state that they never had a more efficient corps of Draughtsmen and Specification Writers than those employed at present in their extensive offices, and that they are prepared to attend to patent business of all kinds in the quickest time and on the most liberal terms.

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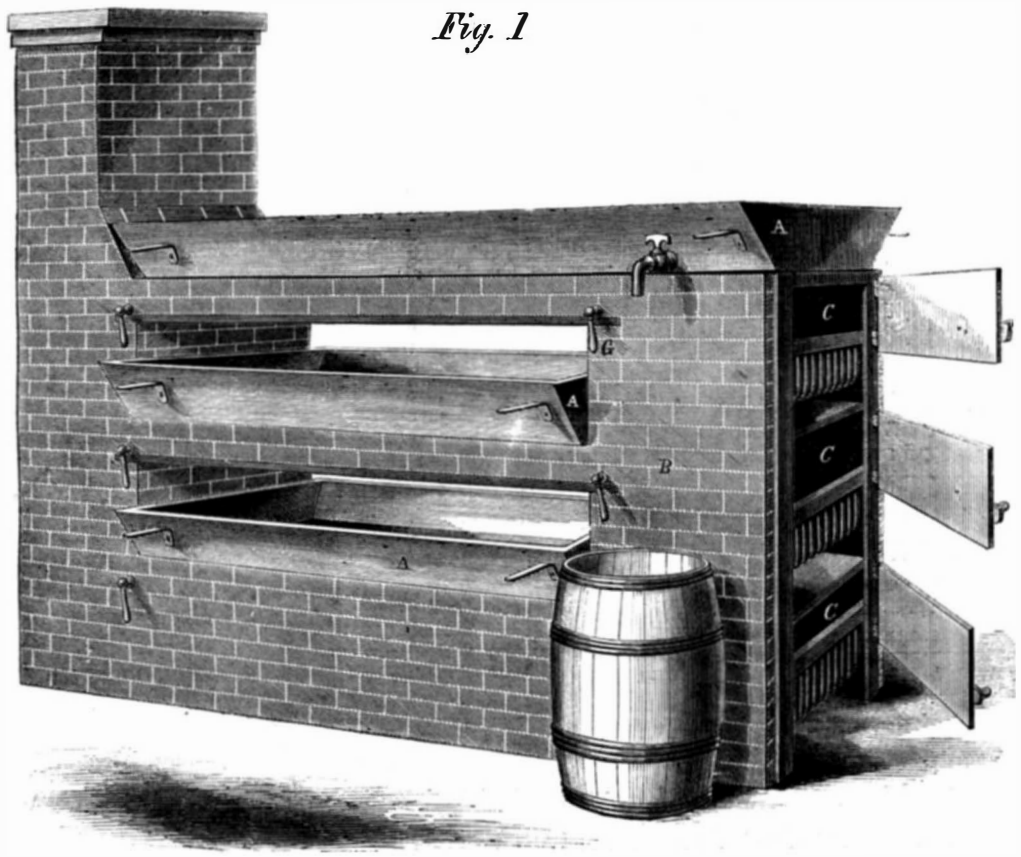
Fig. 1

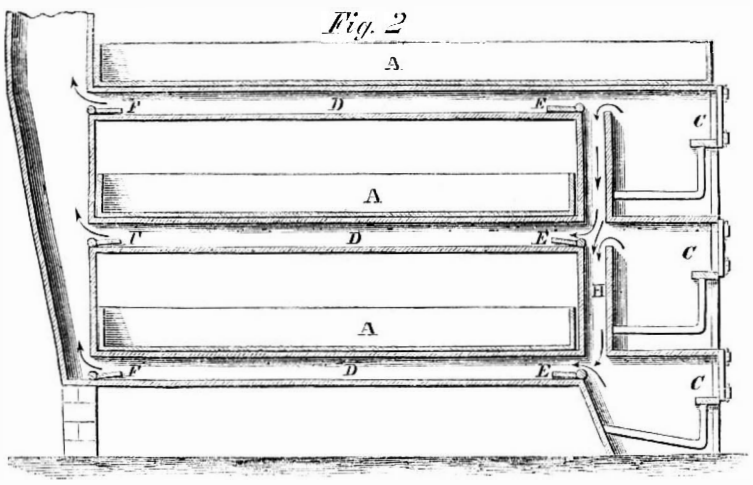


CHESNEY'S SORGHUM EVAPORATOR.

The evaporating apparatus illustrated herewith is intended to place the temperature of the liquid completely under the control of the operator, and this end is attained in the following manner:

The pans A, are set in masonry B, which is provided with furnaces C; one for each pan; these

Fig. 2



urnaces are all closed with doors and have grates and draft openings as usual. In Fig. 2, a section of this evaporator is shown, which will enable the reader to understand the principle clearly. In order to control the temperature of the heated juice, the flues D, which lead from each furnace, are fitted with dampers E and F, at each end; these are turned by handles rom the outside. When it is simply desired to boil he liquid or pass the heat under all the pans alike, all the dampers are turned down, as shown in Fig. 2, and the fire passes under them and up the chimney as shown by the arrows. Should it be desirable, however, to concentrate the heat on any one pan, either at the top or bottom, the dampers in the other flues are closed, and the heat from all the furnaces passes under the one required, and this does not in any way affect the draft, as the flue H, next the furnaces, remains open in any case, and connects with the chimney through the passage under the pans; whichever one is open at the time.

Any one of the pans can be removed without injuring the draft, as the dampers aforesaid close the openings effectually and send the heat from the furnace into the other channels. These dampers also afford a means for controlling the temperature under the pans without turning the heat off completely as they may be, but partially closed, thus allowing some of the caloric to enter while the bulk of it disappears up the chimney or under the other pans.

The inventor claims that his evaporator will burn wood as well, and coal better than those ordinarily in use, and that it is very economical in fuel. The scum and impurities can be removed before it is drawn off into the finishing pan. Also that the heat from the upper pans is reflected to the lower ones, and that from this reason and the heat below evaporation goes on more rapidly. The temperature is so completely under control that burning the juice is impossible except through carelessness, and by the adoption of a faucet for drawing off the liquid instead of using a ladle, as is generally practiced, much better and cleaner sugar is produced. This is an important and desirable feature.

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