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IMPROVED SLIDE VALVE.

The valve of the steam engine has probably been the subject of more thought than any other piece of mechanism of equal size and simplicity. Several improvements in it have proved of great value to the inventors; and a firm in Providence, R. I., are just now accumulating a large fortune from an arrangement of valves which they patented a few years since. The invention here illustrated is of a novel character, and will attract the attention of engineers. It relates to the sliding D-valve, and its object is to relieve the valve from the downward pressure of the steam. The plan adopted is to make the back of the valve parallel with the face, and then to secure a smooth *stationary* plate in steam-tight contact with the back of the valve; the plate thus receiving the pressure, and allowing the valve to run freely under its lower surface.

Fig. 1

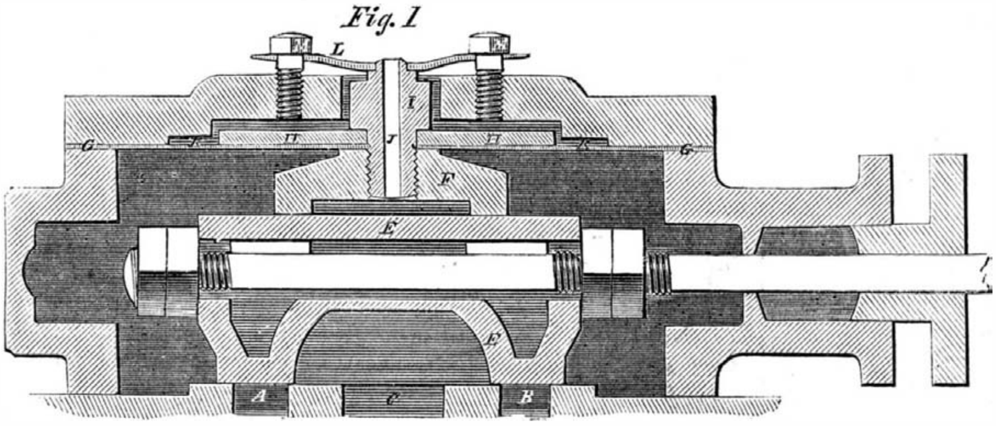
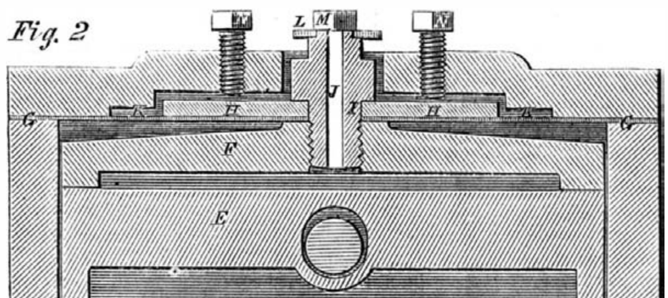


Fig. 2



STODDART'S IMPROVED SLIDE VALVE.

In the annexed cuts, Fig. 1 is a longitudinal and Fig. 2 a cross section—both sections being vertical. The most darkly-shaded parts are the interior of the steam chest filled with live steam; A and B are the induction ports, and C, the eduction or exhaust; E is the valve; F, the balance plate; G, a sheet of copper; H, a circle of boiler iron; I, a screw to fasten the iron circle and sheet copper to the balance plate; J, a hole drilled through the screw, I; K, a circular cavity in the steam chest cover; L, a spring; M, set screws for the spring; N, preventive screws.

The iron circle stiffens the copper, and receives the upward pressure of steam inside the steam chest. Steam pressure keeps the copper in contact with the cover, except where the cavity, K, exists; hence, there is a certain upward pressure which is received by the screw, I, tending to lift the balance plate off the valve. Now, the area of the cavity, K, and of the circle, H, are so proportioned to the area of the balance plate, F, that the upward pressure on screw, I, is counterbalanced by the downward pressure of steam on the balance plate, and the spring, L, insures contact. The flexibility of the copper plate permits the balance plate to accommodate itself to the back of the valve under all circumstances. The area of the balance plate should not exceed the width of the valve by the distance between the steam ports and one-half the width of one steam port. Having determined the size of the balance plate, find the diameter of a circle of area equal thereto; and to this diameter add $1\frac{1}{4}$ inches, which will be the diameter of cavity, K. The diameter of circle, H, will be $2\frac{1}{2}$ inches less than the diameter of cavity, K. These are appropriate dimensions for a valve of 10 to 15 square inches of steam port area. The balance plate should be placed truly over the center of the valve seat. The screws, N, are set within 1-16th of an inch of touching the circle, H; if the balance plate becomes unseated, the screws will receive the strain; they are simply preventives, and are also of service in first using a new valve, by screwing them home till the valve has worn a little. It may be thought that the hole through the screw, I, is unnecessary,; but it is not so, because if we drill through to the exhaust cavity in the valve, and thus draw off any leakage of the balance plate, it is plain that the sudden pressure when the engine exhausts would be felt by the balance plate and its equilibrium destroyed. Another reason for not drilling through to the exhaust is this: if the balancing arrangement becomes disordered, then, by simply shutting a small cock screwed in screw, I, the valve would continue to perform its function, precisely as a common unbalanced valve, without stopping the engine. And, further, the hole through screw, I, is a continual test of the condition of the balance plate, as, if any steam leaks between the balance plate and the valve, it will escape through the hole, I, and thus give notice of the leak.

This valve is in practical operation on a steamboat and in a flouring mill in California, and works satisfactorily.

Patents for this invention have been secured (through the Scientific American Patent Agency) both in this country and Great Britain (the United States patent bearing date August 16, 1859); and further information in relation to it may be obtained by addressing the inventor, David Stoddart, at San Francisco, Cal.

CLARIFYING SUGAR.—We recently gave an account of a new process practiced in Europe for clarifying sugar by means of lime and carbonic acid. Messrs. Meschelynck and Lionnet have communicated to the Academy of Sciences of Paris an improved mode of obtaining pure carbonic acid for this purpose. They heat chalk only to dull redness, and then let on to it a current of steam. The carbonic acid gas is collected in gasometers, and preserved for the sugar process.

WHAT WAS LEARNED BY THE OBSERVATIONS ON THE LATE ECLIPSE.

The solar eclipse of July 17, 1860 was more thoroughly observed than any other that ever occurred. In addition to the great number of trained observers who were scattered along the line of its path, from the State of Oregon to Egypt, the new art of astronomical photography leant its powerful aid towards obtaining a complete history of the phenomenon. In former total eclipses, when the sun was completely hidden by the moon, a bright halo or corona was observed surrounding the moon, while still brighter objects, appearing like protuberances on the edge of the moon, were seen extending into the corona. There had been much discussion among astronomers in regard to these appearances, some believing that they were produced by the action of the earth's atmosphere on the sun's light, others attributing them to the moon, and others still to the sun. Hopes had been for some time entertained that the eclipse of this year would afford observations which would settle these questions. These hopes have not been disappointed. The corona is a luminous atmosphere of the sun, brighter than the face of the moon, gradually becoming fainter as its distance from the sun increases, till it fades away in the sky without any defined limit, but visible at least 500,000 leagues from the body of the sun. The red protuberances are luminous clouds floating in this shining atmosphere, all of them pretty near the surface of the sun. It is a curious fact that some of these clouds impressed their image on the photographic paper, though they could not be seen through powerful telescopes. This fact is explained on the supposition that they may have emitted a deep violet light, mostly composed of chemical rays.

The application of photography to observations of the heavenly bodies was first made our by American astronomers, a fact admitted by the English and French.

COAL TAR AGAIN.—The gas-works in France have been obliged to employ additional clerks to attend to the sale of coal tar, in consequence of the new demand which has arisen for the article from its extensive use in the artificial preparation of fuel. Waste coal dust, sawdust, tan bark, &c., is mixed with coal tar and pressed in molds, when it is found to make an excellent fuel. The *Journal de L'Eclairage au Gaz*, published at Paris, has an illustrated description of a large apparatus which is used in this new manufacture.

THE FASTEST SAWING YET.—Lewis T. Hamilton, of Madison county, Ill., says that he sawed 31,270 feet of one-inch stuff, from 100 logs of white oak, hickory and elm in 12 hours, with a single 58-inch circular saw.

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TALK WITH THE BOYS.

No. 4.—Carbonic Acid in the Steam Engine—The Difference between High and Low Pressure Engines.

"In the engine which I described to you last week, the steam, after it has done its work, is allowed to escape into the atmosphere. The atmosphere extends up from the earth about 45 miles, and a column of it an inch square, and the whole 45 miles in hight, weighs about 15 lbs. As the air is a fluid, flowing freely in all directions, the weight of the column of air presses sideways with the same force that it does directly downward—pressing, in fact, near the earth in every direction with the same power of 15 lbs. to the square inch. Consequently, as the piston moves along, driving out before it the waste steam from the cylinder, it has to push this steam against the pressure of the atmosphere. The early inventors of the steam engine understood this matter perfectly, and to get rid of the back pressure of the atmoshere, they kept the eduction valve closed and condensed the steam by spirting into it a jet of cold water."

"I do not see how that gets rid of it, sir?"

"A cubic inch of water converted into steam occupies 1,700 cubic inches of space; consequently, if the steam which fills a cylinder containing 1,700 cubic inches is condensed into water, it will occupy only one cubic inch of room. The steam is not entirely got rid of, but the cylinder is almost emptied."

"I should think, though, that if it got a little water in at every stroke it would soon get full of water."

"It would, unless the water was taken out. Instead of going through with the early history of the contrivances, let me describe to you the present arrangement of the low pressure engine. The main cylinder is placed to stand upon a second cylinder directly below it, called the condenser. Into this condenser is constantly spirting a jet of cold water, filling it with spray. As soon as the upward stroke of the piston is completed, a valve is opened by the machinery from the lower part of the engine into the condenser. As the steam flows into this cold vessel it is rapidly condensed into water, leaving the whole cylinder below the piston entirely empty of either steam, air or anything else. A pipe leads from the upper end of the cylinder into the condenser, and when the downward stroke of the piston is completed, a valve is opened into this pipe from the upper end of the cylinder, allowing the steam which has just pushed the piston down to flow through the pipe into the condenser, where it is quickly turned into water."

"I should not think it would flow fast enough to get out of the way of the piston."

"It is surprising to learn how rapidly it does flow. But steam or air passing into a vacuum moves with astonishing rapidity. A cylinder 12-feet long empties itself in the twinkling of an eye. Now, we come to the subject which we have traveled such a roundabout road to reach, namely, the presence of carbonic acid in the steam engine. This is owing to the relations of carbonic acid to water. Water has the property of absorbing carbonic acid, the particles of the acid distributing themselves among the particles of water and forming a portion of the liquid. Now, when the steam in the cylinder is condensed, the carbonic acid which it contained is not condensed with it, but remains in the gaseous form; the absorption of the gas by the water being a slow process, while the steam is condensed instantaneously. In the high pressure engine, where the waste steam is blown out into the open air, the carbonic acid gas goes out with it and is not perceived; but in the low pressure engines, where the waste steam is boxed up tightly and condensed, it is found that the condenser becomes rapidly filled with carbonic acid gas, stopping the engine unless it is removed. Low pressure engines are accordingly supplied with large air-pumps for sucking out the carbonic acid and other gases contained in the water. This part of the machinery is generally in sight on our Sound and North river steamboats. If you go upon one of these boats which has a beam engine, you will see a stout connection rod attached to the beam, part way between the end and the fulcrum, and at the lower end of this rod a piston working into a cylinder. That is the air-pump."

"What did you say about other gases?"

"There are other gases besides carbonic acid which are absorbed by water, the principal one being atmospheric air. It is this air in the water that is breathed by fishes. A fish does not procure the oxygen supports his life by decomposing the water, separating the atom of oxygen from the atom of hydrogen and appropriating the former to his own blood: his gills have not the power of effecting this separation. But he breathes the air which has been absorbed by the water. A fish will die in water which has no air in it, just as quickly as be will on dry land. You can easily try this by putting a fish into water that has recently been boiled."

"While the water is hot?"

"No; as soon as it has had time to cool. Boiling drives the air out of water, but in time it is slowly absorbed again. In the condensing engine, the air-pump is used, not only to remove the carbonic acid and other incondensible gases, but also to pump out the water of the condensed steam and the water that has been employed to condense the steam, and which has been warmed by the process, so that it is unfit to use again. All these operations take a good deal of power, and counterbalance, to a considerable extent, the advantage gained by condensing the steam."

"The advantage! What advantage?"

"If, in the high pressure engine, the piston is always pushed against the pressure of the atmosphere, 15 lbs. to the inch; and if, by shutting out the atmosphere and condensing the steam, we get rid of this back pressure, do we not get more available power from the same steam?"

"I should not think that 15 lbs. to the inch would amount to much."

"Ha! Get your slate and see. I think the cylinder of the engine in the steamship *Metropolis* is 105 inches in diameter, but you may make the estimate for an engine 100 inches. What would be the area of a circle 100 inches in diameter?"

"7,854 inches."

"Now, if there was a pressure of 15 lbs. on each of those inches, how many pounds pressure would there be?"

"117,810 lbs."

"That is equal to the weight of 117 large oxen, weighing 1,000 lbs. a piece. And if the piston makes 24 strokes (counting both ways) in a minute, 12 feet to a stroke, the power lost by working such an engine against the pressure of the atmosphere would be sufficient to lift this large drove of cattle right up perpendicularly 288 feet every minute. Such is the power lost, but this power is not all saved by introducing the condensing apparatus. In the first place, a perfect vacuum is not produced, and there is generally a back pressure of about three pounds to the inch in the cylinder of the low pressure engine. Then the working of the air-pump and all the machinery connected with it takes a good deal of power. But there is another advantage of low pressure engines, greater than the saving of power; they are far safer. It is very seldom, indeed, that the boiler of a low pressure engine explodes."

"Are most of our engines, then, high pressure?"

"Yes; the high pressure engine is so much simpler, that it costs less and requires less skill in the engineer to manage it than the low pressure engine. For this reason, nearly all small engines are made of this class. It is seldom that you will see a low pressure engine excepting on large vessels, such as ocean-going steamers, and the large boats on the lakes, the North river and the Sound. Our manufactories and the boats on the western rivers are nearly all driven by high pressure engines."

"Well, father, we have followed carbonic acid through the steam engine, where shall we go with it next?"

"I propose, at our next conversation, to collect some of it in jars separate from everything else, and let you try some experiments with it. Here, Charles, is some 'change;' sometime during the week, you may get a small basket or pailful of marble dust and a little bottle of sulphuric acid. And John, can you not set your trap and catch a mouse, and have him alive next Saturday?"

FRENCH VIVACITY ON A MUD TRAP.

We translate the following sparkling account of a recent invention in Belgium, of a mud trap for collecting the impurities of water in steam boilers, from the Paris *Journal de L'Eclairage au Gaz.*

We often have the satisfaction of seeing inventors come to us whom we have, they say, made happy by a word which scarcely cost us anything; but we have never experienced a greater pleasure than to-day in seeing enter into our sanctum two citizens of Liege, bringing incrustations from their boilers and from those of the royal foundry of cannons.

"You do not recognize me perhaps?" said one; "I am Lambert Ghaye who came to consult you some time since, to know how I should get rid of that infernal deposit which attaches itself to steam boilers and which can only be removed by means of a chisel and hammer.

"You indicated to me several means well-known but costly, for changing these stones into mud, at the same time observing that not one of them was completely efficacious. You then gave me your idea; which was to cause all the impurities to deposit themselves in receptacles placed in a portion of the boiler where the water should be calm. You added that it would be possible, by fashioning the receptacles of the incrustations into suitable molds, to make every boiler a manufactory of bas-reliefs. This advice did not fall upon deaf ears. I attached a "paralithon" to my boiler and to several others, and they were all completely successful. Behold the stones and the pieces which I have gathered from them.

"A singular thing, and which I am not able to explain, is that no sooner is my apparatus attached to a boiler incrusted to the depth of half-an-inch or an inch, than this incrustation detaches itself and comes to lodge in my receptacle, so that the boiler plate becomes clean and bright, even the rivet heads yielding their caps of stone, and the water of the boiler, which is ordinarily salt and black, becomes limped and clear as distilled water. In a word, it is like a miracle before which engineers remain mute with astonishment. In seeing me withdraw my flakes from the man-hole, they say that electricity must have a great role in this affair."

If Mr. Ghaye's apparatus works as well as is here stated, it must be materially different from the mud traps which have been so long known in this country and England, and the fortunate inventor should lose no time in patenting and introducing it into these great steam engine countries.

BOILER EXPLOSION CAUSED BY SULPHUR WATER.

A correspondent at Sparta, Ga., writing us on business, adds the following:—"I have also a favor to ask you? We had a boiler explosion the other day. It was a tubular boiler, having one fire-box; it exploded by tearing loose one of the inside sheets forming the fire-box, the whole length of the box, up the sides, &c., pitching the boiler some 50 feet, smashing up everything badly, but fortunately not materially injuring any person. Now the question which I want solved is this: the boiler was new, and appeared to be well made. It was situated near a spring which is impregnated with what we term here 'sulphur,' and, when blowing off, the water would have a red appearance, yielding quite a quantity of red sediment. Could this have injured the iron of which the boiler or fire-box was formed?"

Remarks.—If iron is heated to a white heat in contact with sulphur, it combines with the sulphur, forming the protosulphuret of iron, which has very little tenacity. A bar of iron at a white heat may be cut off by holding a piece of roll brimstone upon it. Under some circumstances, the combination takes place at a lower temperature than a white heat.—Eds.

Silver Discoveries at Pike's Peak.—It will be remembered that, in the Scientific American of the 18th ult. (page 121), we described the silver-bearing rocks of the West, and prophecied the discovery of silver in the Pike's Peak region, and advised our readers in that vicinity to search for argentiferous rocks along the base of the Rocky Mountains. By the latest arrivals from Denver City, news has come to hand that the actual discovery of silver-bearing rocks has been made on both sides of the mountains, and much excitement is stated to exist, as a consequence, among the miners and others. A rich silver lead is stated to have been discovered near Tarryall—about sixty miles from Denver City—and the miners have flocked in large numbers to the diggings. The silver ore is stated to assay from $1,700 to $1,800 per tun; if so, it is pretty rich.

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INTERESTING CORRESPONDENCE.

GUTTA-PERCHA THE BEST INSULATOR FOR SUBMARINE TELEGRAPHS.

Messrs. Editors:—Allow me to correct a portion of the article published in your issue of the 18th ult. in regard to the cause of the failure of the Atlantic telegraph.

In your remarks you state that "several papers on the subject have been read before the British Association for the Advancement of Science, by some of the ablest and most experienced electricians in the kingdom, and it seems to be the general opinion that gutta-percha is absolutely worthless for this purpose, while india-rubber, from experiments extending over twenty years, promises to answer every requirement." This is a broad assertion; and in regard to any practical tests having been made, of a satisfactory character, with india-rubber as an insulator for submarine conductors, I would thank you, or any of the scientific contributors to the British Association, to name a single instance in which india-rubber has been used with success for a submarine telegraph line of any length, so as to warrant the statement, "from experiments extending over twenty years, that india-rubber *promises* to answer every requirement." On the contrary, it is known by those engaged in the manufacture of the article that sulphur, in combination with *metallic* bases, is necessarily used in the preparation of india-rubber, for the purpose of hardening and giving a proper consistency to the gum; this process is known as the vulcanizing or hardening process; therefore any material or compound having a *metallic* base must be a very imperfect insulation for submarine telegraph lines.

I am fully aware, however, that, in the preparation of india-rubber for telegraph lines, silex has been proposed to form a solid compound; this, however, is too imperfect an insulation for submarine lines, as it stands much higher as a conductor than other electrics used in the vulcanizing process, and which have been found defective, therefore the use of silex or ground glass will not improve the rubber insulation.

As to the use of gutta-percha as an insulation for submarine lines, we have the experience of the best electricians and telegraph engineers in this country and in Europe that there is no defect in *pure* gutta-percha, when properly prepared for the purpose, but that the defects in *long lines* are to be attributed, not to the insulation, but to the *wire* retaining or becoming saturated with the voltaic current during the working of the telegraph apparatus.

In regard to the *tests* made with gutta-percha, it is well known that within the last ten years gutta-percha has been universally used as the *only reliable insulator* for submarine telegraphs; therefore it is no longer an experiment, but a reality, as may be seen from the successful working of the following-named submarine lines: Dover to Calais, Danish Baltic Sea, Dover and Ostend, England and Holland, Holyhead and Liverpool, Irish Channel, Mediterranean, and other lines recently laid by Europeans; and if any better evidence of the perfect insulation of gutta-percha is required, I beg leave to refer you to the submarine line laid across the Black Sea by the British government during the Crimean war—the conductor used for the purpose being a small copper wire, 150 miles in length, covered with three coats of gutta-percha, and protected at the shore ends, from abrasion, by a covering of iron wire. This *tiny* strand was used, day and night, during the Crimean war, in transmitting the most important dispatches, involving the movements and safety of the armies and fleets of the allied powers in the Crimea; and I have yet to hear of a complaint being made against the working of that line—therefore I hold that the *practical use, for the last ten years*, of gutta-percha, clearly proves that it is the *only* material now known as suitable for insulating submarine telegraph wires.

Now, as you have quoted foreign electricians in the before-named article, permit me to refer to the same by making an extract from Bakewell's paper on the electric telegraph, published in London in 1859, in which he says:—"The use of gutta-percha as an insulating covering for wire has given rise to a new era in telegraphic communication. Gutta-percha is an excellent insulator, and wire covered with *two* coatings of that material, about one-sixteenth of an inch each, is so far protected that 100 miles of it, immersed in water, transmits an electric current from a powerful voltaic battery with very trifling loss. This perfection in insulation has greatly facilitated the establishment of telegraphic communication between England and the continent.

"The first attempt to establish a submarine circuit between Dover and Calais took place on the 28th of August, 1850. A single copper wire, about the thickness of a common bell wire, coated thickly with gutta-percha, was laid across the English channel experimentally, without any protection. It proved sufficient for the transmission of an electric current, and several messages were sent through it between Dover and Calais; but it was far too feeble to resist the action of the waves, and the following day it was cut through by friction against the rocks, and the communication was stopped.

"The plan afterwards adopted for a permanent submarine line was to enclose five similar wires in a hollow iron cable. The wires were first slightly twisted to prevent them from being broken when stretched. They were then covered with hemp yarn to protect the gutta-percha from attrition, and thus introduced into the hollow cable of twisted wire, of which they formed the core."

This cable was laid on the 17th of October, 1851, and has been in successful operation to the present time.

Saml. C. Bishop.

181 Broadway, New York, Sept. 1, 1860.

We present the following letters from our correspondents, and shall be pleased to receive any practical suggestions which any of our readers may have to make in regard to any of the statements or inquiries contained in them. Correspondents sending such suggestions, however, will please to particularly comply with the request embodied in the note published at the head of our column of "Notes and Queries":—

PURIFYING NATURAL COAL OIL.

Messrs. Editors:—Will you inform me what is the process used in refining the natural oils from the springs, in Pennsylvania or any other place, and what is the average cost per gallon; also the per-centage of waste, or the amount of refined oil derivable from a gallon of the crude material? How can the strong disagreeable odor be extracted from it? what would be the cost of an apparatus, sufficiently extensive to purify and refine about one thousands gallons per day? The process used in refining, at the oil wells in Canada, is simple distillation; but this does not in the least destroy the odor. I was told that the waste by distilling was only one-eighth.

J. M. G.

Port Huron, Mich., August 21, 1860.

[By corresponding with Mr. Joseph E. Holmes, of Newark, Ohio, our correspondent will obtain information respecting the price of oil-refining apparatuses. We have been informed that 82 per cent of beautiful oil (for illumination) is obtained from the natural coal oil of Pennsylvania, and it only undergoes one distillation. The peculiar odor of coal oil cannot be destroyed without changing its character. Caustic alkali removes its disagreeable odor in a measure, but it impairs its durable illuminating qualities. A skillful chemist should always be employed to superintend the process of oil distillation and refining.—Eds.

THE POROSITY OF GLASS.

Messrs. Editors:—I have had quite an argument with some persons of this place, in regard to the porous properties of glass. A gentleman asserted that if you "take a glass bottle and cork it, wire down the cork, seal it with wax, lower the bottle down into the ocean and let it remain for a little time, the bottle will, on being hauled up, be found filled with salt water." To give a "clincher" to his argument, he said he had performed the experiment scores of times. Now will you have the kindness to inform me as to the truth of such a statement. I simply want an "official" corroboration one side or the other.

J. F. Jr.

Columbus, Ga., August 21, 1860.

[On page 269, Vol. IV. (old series) Scientific American, was published an account of a series of experiments conducted by Dr. Nelson, on board the ship *Tarolinta*, on her voyage to California in 1849, to determine the porosity of glass, by sinking a tube to great depths in the ocean. When the tube was corked and sealed with wax, salt water universally passed through the pores of the wax, but when the tube was hermetically sealed by fusing the glass with a spirit lamp, not a drop of water found its way into the tube, even when sunk to a depth of 89 fathoms. However, there is no doubt that glass, as well as all other substances, *is* porous. Water has been pressed through solid gold; appearing as a fine dew on the other side. Indeed, it is now generally admitted that the particles of matter do not touch each other at all. If a solid brass ball (heated) is placed upon a ring which is a very little too small to allow the ball to drop through, and the ball be afterwards cooled, it will drop through the ring, showing that the ball had become smaller. It is said that, if the particles of the ball touched each other at the first trial, they could not have been brought any closer together, and consequently the ball could not have been made any smaller by being cooled. To our mind, the inference never seemed to follow with strict necessity from the premises. If we knew the particles of matter to be globular, the conclusion would indeed be inevitable that after they were once brought in actual contact, the body composed of them could never become any smaller. But, if the particles are cylindrical, or of any shape other than the globular, they might be in contact in certain angles or positions, and still the body which was composed of them might be reduced in bulk by a change in these positions or angles. Most of our great intellects, however, including such men as Sir John Herschel, regard it as demonstrated that, in the most solid substances, the particles do not touch each other.—Eds.

GALVANIZED IRON VERSUS LEAD FOR PIPES.

Messrs. Editors:—Among the answers to correspondents in your paper of July 28th, I notice one which speaks unfavorably of galvanized iron pipe for domestic purposes. I have been using it nearly five years for conducting water underground and a suction pipe to pumps, but have never observed any deleterious effects from its use. I have found it an excellent substitute for lead pipe in several instances, one of which I will mention. Several years ago, I put a lead suction pipe to a pump in a well belonging to one of McKeen & Quinn's cotton factories; after it had been in use nearly three years, I found it necessary to remove it, when it was found eaten through in several places. I then put in a galvanized iron pipe, which at the present time is apparently as good as when first put in, nearly three years since. I have found that when lead pipe is used to convey limestone water, it will in a short time be eaten through, while the galvanized iron pipe will not. Will you be so kind as to let me know through the columns of your paper what are the objections to its use?

W. Y.

Easton, Pa., August 25, 1860.

[In the answer published in our "Notes and Queries" of July 28th, the deleterious nature of lead or zinc was not alluded to at all. The answer was given with reference to the use of galvanized wrought pipe as a substitute for lead when laid under the ground. We had seen galvanized iron pipe become rusty and useless in a very short period, when placed under the ground, when lead pipe had endured for a great many years. The information which our correspondent furnishes respecting the corrosive action of lime-water on lead pipe is very important, because the prevailing opinion is that such water soon forms a crust in lead pipe, that *prevents* its corrosion and decay.—Eds.

CONSTRUCTION OF CIDER FILTERS.

Messrs. Editors:—I want to know how to cheaply make a capacious cider filter. I have a cider mill and numerous neighbors desire to have great quantities of cider filtered.

A. W.

North White Creek, N. Y. August 25, 1860.

[Take a square or round wooden box made of one-inch pine plank, well braced, three feet in diameter and one foot four inches deep. Make it with a bottom perforated with numerous one-quarter inch auger holes, over which should be laid coarse hemp bagging. Now fill in the box for eight inches, with pieces of charcoal (animal charcoal is the best, but it is expensive) about nut size, and on the top of this place a four-inch layer of clean washed sand, and over all with a coarse hemp bagging, and you have a cheap and good filter. Any number of such filters may be used according to the quantity of cider to be operated upon, and the top cloth can be frequently washed, without disturbing the sand and charcoal. Before running any cider through, pass a stream of clear water into the filter for fifteen minutes, so as to remove any fine loose particles of the charcoal that otherwise would be mixed with the cider.]—Eds.

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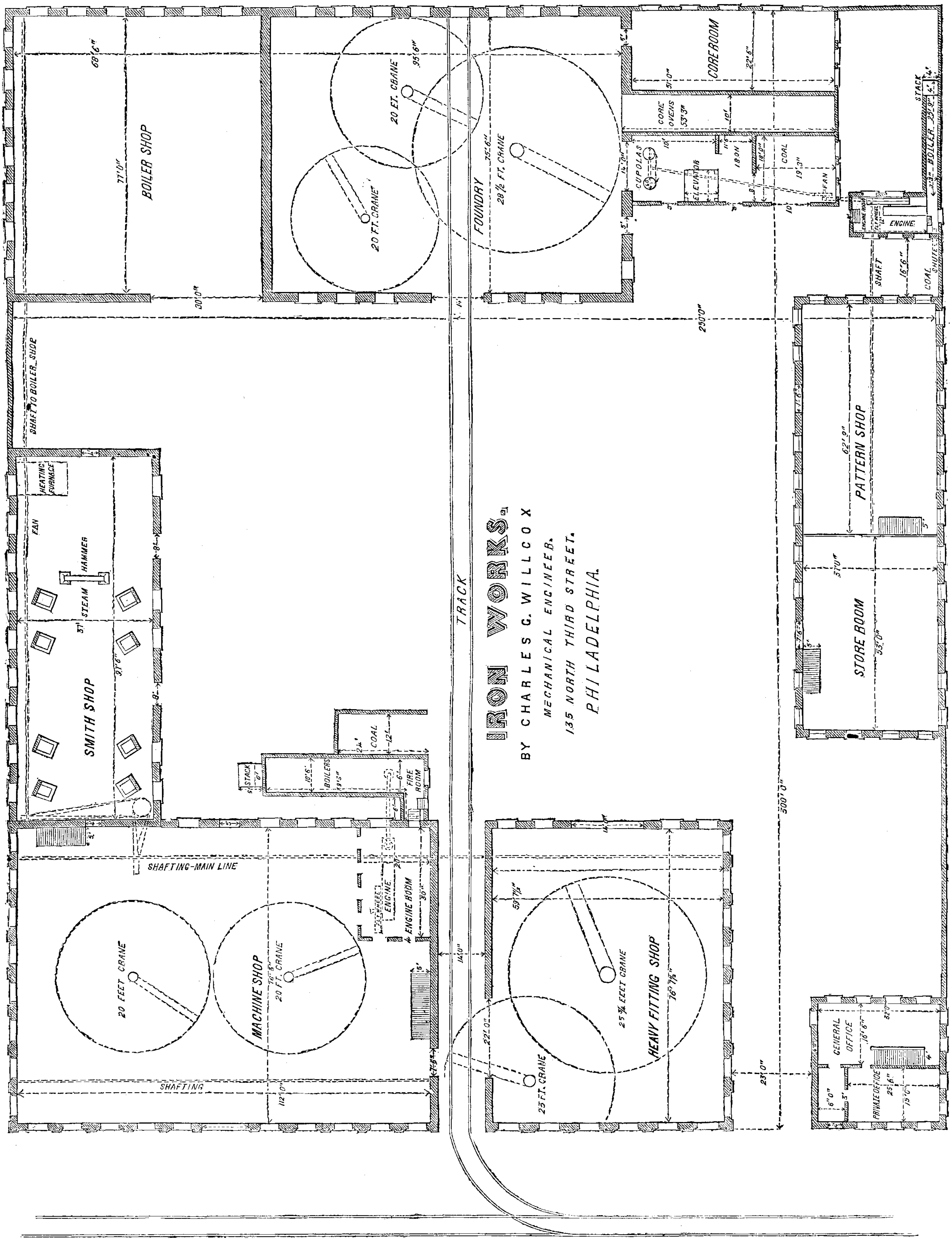

IRON WORKS—THEIR LOCATION, ARRANGEMENT AND CONSTRUCTION.

An Inaugural Essay; by Charles G. Wilcox, *Mechanical Engineer, No.* 135 *North Third-street, Philadelphia, a candidate for the degree of Bachelor of Mechanical Engineering in the Polytechnic College of the State of Pennsylvania. Presented June* 28, 1860.

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By the term "iron works" we do not mean the furnaces where ore is converted into pig iron, nor the rolling mills where this pig iron is deprived of its carbon and brought to the form known to us as wrought iron, but those establishments erected for the purpose of manufacturing iron into boats, buildings, engines, machinery and tools.

In the selection of a location for extensive iron works, several points are to be considered. Prominent among these is the supply of material and labor. The articles of material required in greatest quantity are coal and iron, and these can be supplied most cheaply in the vicinity of the mines whence they are obtained. It is impracticable, however, to locate ourselves at the mines, unless these are upon some great thoroughfare or upon the seaboard, or unless we design to make a speciality of machinery demanded in mining operations.

If it is anticipated to do much work for distant points, it is indispensable to be where shipment can be readily and cheaply made. Most regions where coal and iron are found, have some leading point of shipment to which these materials can be economically transported, and

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from which they can find their way to places where they are required. Such a place presents to every manufacturer peculiar advantages, and to none greater than to him whose work is of a heavy class.

A market for work produced, is of course necessary. All other things being the same, the community seek those establishments with which they can hold most ready communication, and to which they can have easy access for the repairs constantly demanded by machinery. For this reason it is not well to be too far removed from the great centers of travel. The motives which have led to the establishment of works at small towns eight and ten miles from the great points of shipment referred to, have been the lower price of land, and the cheaper rate at which *employés* could live. We think it has been the experience of most manufacturers, that more work has been lost by thus isolating themselves, than would many times over pay the interest on increased value of land. With regard to workmen, the large cities possess advantages for improvement and advancement which they too slightly appreciate, and which, if there is a disposition to make use of them, more than compensate for the increased cost of living. If a manufacturer is engaged upon some article of a staple character which is always made in the same way, he may locate his manufactory almost anywhere, and have his office and a stock of finished work where the public can easily reach them; but in works where every contract has a mass of detail to be adjusted, it is of great importance to be able to pass from office to factory, and to consult with those in immediate charge of work, without much loss of time.

The city having been decided upon, the best points within the city should be sought. If much local work is desired, we should seek the quarter of the city where manufactories are most abundant. If possible, we should locate upon a street through which a track would form a connection with the railroad lines, so that work could be loaded directly upon the cars at the shop, and coal and iron coming in car loads could be taken directly to the works. A water front is an advantage, and is almost indispensable if marine engine and boat work are sought.

A rectangular lot is best suited to the purpose, because it permits a more simple connection between the shafting of the various buildings.

The buildings required are foundry, light and heavy machine shops, smith shop, boiler shop, pattern shop, store house, office, and minor buildings, such as engine house, core shop and coal houses. We will speak of each of these separately.

The foundry may be placed in the rear of the other buildings, because there is little need of visiting it, and it has no calls to make upon the other departments in conducting its operations. There are comparatively few men at work in it, and the work is of such a character that it can be laid out for the day, and then left to the molders without much need of watching.

There should be abundant yard room close at hand to accommodate heavy and bulky flasks, which it would be inconvenient to carry a great distance. It is desirable also to make use of the yard to place large castings as soon as they are finished, and thus prevent encumbering the foundry itself. The space inside the building should be clear, so cranes may swing free and command as much floor surface as possible. This involves the construction of a roof which shall have its support entirely upon the walls. The cupolas should be outside the walls of the foundry, so as to give as much floor room as possible inside. This floor room is all-important, and other things should be so placed as not to abridge it. Cranes should be so disposed as to command nearly all parts of the floor, and so that two or three can be brought to bear upon a considerable portion of it. In using large flasks, and in making heavy castings, the work is done much better with their assistance. They must be supported from the trusses of the roof and upon a foundation below. As they are usually of large size, there is a great horizontal strain upon the trusses from the points of attachment. As this strain is to be taken up finally by the walls and is applied at the top of these, we require thick and well built walls to give us sufficient stability. To convey the strain to the walls without displacing the trusses, the tie beams should be horizontally braced throughout. In constructing the roof, provision should be made for abundant ventilation, because at the time of casting, the smoke and gases become almost suffocating in a close room. This ventilation should be so arranged that rain will be excluded, and heat may be retained in cold weather by closing the openings. Operations of molding require light, hence windows should be numerous. As all castings are to be taken to the fitting shops to be fitted up, or are to be shipped at once, we should have ready communication between the foundry and shops, and also be able to load heavy castings directly upon the cars upon which they are to be transported. This avoids handling, and of course expense. If possible, there should be a track running through the foundry, commanded by the cranes, which would form a connection with the street track and pass also to the fitting shops. Light castings can be easily taken anywhere upon trucks, and communication with the lighter fitting shops is not of great importance. The main doorway of the foundry, through which the track enters, should be large, to enable pulleys and fly-wheels of large size to be taken through upon their side, as they are handled thus with least danger.

As there is no machinery to be driven in the foundry, we need not pay any attention to transmission of power to the building.

The operations connected with fitting up work form a leading item of the cost of machinery, and it is best so to arrange shops that these can be conducted to the best possible advantage. Of course, suitable machinery is the first requisite; but much is accomplished by having properly arranged buildings for the reception of this. The boring of cylinders and of large wheels and pulleys requires considerable vertical as well as horizontal space, and should be done, therefore, in rooms with high ceilings. Setting up large engines also requires high ceilings. For the great mass of work, however, a low ceiling is no objection, and has a decided advantage in the greater facility with which belts can be adjusted and shifted on main and counter shafting.

These considerations will naturally lead to a division of the work, the first-mentioned going to a one story building with high ceiling and the other to a two story shop, in which, for the same ground space, we double our available room.

The first-mentioned shop, which we designate as the heavy fitting shop, should contain the large boring mills, heavy planers and slotting machines. The track from the foundry should pass directly to this shop, and cranes within should be so arranged as to command the track and the principal tools. A certain portion of this should be appropriated for the setting up of large work. A large beam engine cannot be set up without a high ceiling, and yet should not be sent out until it has been put together and adjusted. This part of the floor should have a crane at its service.

The other building, which is the principal machine shop, will contain all the lathes together with planers, drills, bolt and gear-cutting machines, and the numerous other tools required in fitting. Here also the great mass of vice work is done.

The light iron work, and usually all the brass work, is done in the second story, while the first story is reserved for turning heavy shafts, and other work in which the assistance of cranes is required. This building does not require immediate connection with the foundry, because castings worked are not so heavy as to be awkward to handle. It should be so placed, however, as to make loading upon cars or upon wagons in the street an easy operation.

The smith shop must be in close proximity to the machine shops, because to them goes the great bulk of its work, and because the machinists require the frequent assistance of the blacksmiths in making and altering tools. Communication should be so easy that little time need be wasted in going and coming. The building should be long, and made with a roof which will permit the free exit of smoke. The size depends upon the number of forges needed. Arrangements should be made so as to bring a line of shafting through the shop to drive fans and hammers. Yard room near the smith shop is an advantage.

The boiler shop must be roomy rather than substantial. It must be so located that power can be taken to it to drive punches, shears and rolls; and [illegible]t should be as far from the other shops as possibl[illegible] noise shall be heard as little as may be. It should have free opening into the yard, and be provided with a very large doorway. Machinery should not be located so as to interfere with the turning and handling of bulky boilers.

The pattern shop may be of two stories, and should be convenient to the office and foundry. It requires power. The store house, for patterns and finished work, may be combined with the pattern shop. The second story answers for the stock of patterns, and the first one for the storage and display of finished machinery and for packing. This should also be convenient to the office.

The office should occupy a building distinct from all the others for evident reasons. In it the books, papers and drawings of the establishment are preserved, and they are in less danger in case of fire than if in one of the shops. Again, the transaction of business is facilitated by quiet, and this is best obtained by a building a little removed from all the shops, and as far distant as possible from the smith and boiler shops. Further, the drafting should be done near the office, and the second story of the office building affords the very best position for it. Drafting requires light and freedom from jar and dust. These can be obtained nowhere so readily as in the second story of a substantial isolated building, where we have windows on all sides.

It is essential, in locating engines, to have them near their heaviest work, and so placed that power can be transmitted from them in all directions with the least possible expense of shafting. It is difficult, in extended works, to make one engine do all the work. It is generally necessary to divide it, and place two or three engines at points where they are most needed.

The boilers should be placed in buildings entirely independent of the main ones. Experience has shown that in explosions the large buildings suffer comparatively little if the boilers are somewhat removed from them.

One building adjoining the foundry may be made to answer the purposes of the core makers and cupolas. It should have ready communication with the foundry.

Places under cover should be provided for coal at various points near to where it is required.

Heating the buildings should be done by steam if possible.

In the plans which accompany this the foregoing arrangement has been sought. The description of the above will be published next week.

Great Grain Elevator.—A vast grain store with an elevator has just been completed at Buffalo, N. Y. The hight of the edifice, from foundation to peak, is 89 feet; its length is 180 feet, and its breadth, 134 feet. It is built adjoining the freight depot of the New York Central Railroad, and is so connected with it that a stream of grain may be poured into the railroad cars bound for the east, from vessels that have just arrived from the great West. The building and machinery were planned by S. H. Fields, Esq. One floor can contain no less than 553,600 bushels, held in 172 bins; the machinery is capable of elevating 4,000 bushels per hour.

Give the Prices of Advertised Articles.—A Sandwich Island correspondent, in forwarding to us a fine club of new subscribers, makes the following suggestion:—"The advertisers of new articles would find it to their interest to state the price. It would be a great help to your foreign subscribers, like myself. I have seen a great many things which I should like, but have declined to order, not knowing what they might cost."

Wisconsin State Fair.—The Tenth Annual Exhibition of the Wisconsin State Agricultural Society promises to be the finest ever held in the State. The grounds, situated within the limits of the city of Madison, and directly on the Mil. & Miss. R. R., are said to be unsurpased, for natural beauty, by any in the United States. We observe that Wiard's famous ice-boat is to be on exhibition, with its machinery in full operation. It commences on the 24th of this month.

Howe's Sewing Machine Patent was extended on Saturday last by the Commissioner of Patents, for seven years. The value of this extension to the patentee is variously estimated at from $500,000 to $700,000 for the whole term. A rich placer, indeed!

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JOURNAL OF PATENT LAW.

NECESSITY OF CORRECT SPECIFICATIONS IN LETTERS PATENT—THE ENTIRE SPECIFICATION AND DRAWINGS ARE TO BE CONSIDERED IN THE CONSTRUCTION OF THE DOCUMENT.

Much of the time of our courts of law is occupied with the construction or interpretation of written instruments which limit or define the rights of parties to them. Experience shows that, while they are valuable preservers of the rights of suitors when correctly drawn, they become oftentimes sources of injustice and of much unhappiness when inefficiently executed. This is especially the case when the subject-matter of the instrument is an invention, perhaps intricate in its details and needing an accompanying model to be properly understood. The omission of a colon or semi-colon; the improper joining, or improper separation of sentences, may overthrow all the golden results which long years of patient toil by some industrious inventor, may have made reasonably certain of realization! And yet there must be a correct method of writing specifications; and when an instrument, whatever its nature may be, is erroneously drawn, judges must say so, and the parties *must* suffer the consequences. If this were not the case, parties who really have their papers properly made out would be no better off than they who have them ever so bunglingly executed. Suffering for this cause is the penalty which men pay for their negligence, either in employing poor agents, or in attempting to do for themselves what the experience of the world has proved to require the skill of a professional man to properly manage. There are some men whose vanity is so sensitive that the mere idea that they cannot accomplish anything that may be suggested, of whatever nature or character, is positively painful to them. We do not think that this peculiarity is any more common to inventors as a class than it is to professional men; but it is natural for men who have been successful in a particular calling, to imagine that their natural abilities will carry them safely through the difficulties that they are momentarily called upon to encounter in another, and to save a trifling sum they are led to make the attempt.

Letters Patent imperfectly drawn upon their face will often induce infringements, and although the courts may ultimately pronounce them valid when liberally construed, yet this imperfection is a temptation to parties, especially if the patent is valuable, to infringe upon it, and the patentee is consequently compelled to incur the expense of litigation in order to maintain his rights, These thoughts have been suggested to us by the case of Kittle vs. Merriam. This case grew out of an original imperfection in the plaintiff's specification, and proves not only what we have just remarked; but it maintains the principle (favorable to inventors) that, in construing the language of a claim in Letters Patent, the *entire* specification and drawing are to be examined, and if the drawing affords means to correct a mistake, the error does not avoid the patent. The action was for an infringement of Letters Patent granted to the plaintiff for an improved door fastening.

Justice Curtis, of the United States Circuit Court, upon the construction of the specification, said:—"I disclaim altogether, the power to correct a mistake in Letters Patent. The power to do this is confided by Congress to the Commissioner of Patents. My duty is to *construe* the specification and claims as they stand and determine the legal effect of the claim. In doing this, one material thing to be adverted to is, what was in point of fact the invention? For there is a reasonable presumption that the *intention* of the inventor was to obtain, and the government to concede to him, the exclusive right to what he actually invented. Now it is conceded that the brace C, with its lip G, are essential parts of the invention; and it is therefore fairly to be presumed he intended to embrace them in his summing-up. Still he may have failed to do so, and we must look at the language employed and see whether he has or has not included these parts in his summing-up. Referring to the terms used in the claim, it is not doubtful that the patentee intended to include in his combination the lip G. He says so in express terms. No doubt exists on this subject. The doubt arises from the terms employed to show *how* the lip G, is to come into the combination. Taken by themselves, the words and letters of a part of the claim indicate that the rest B has two lips, F and G; and that the lip G, enters into the combination as part of the rest B. But, in construing a claim we cannot look to a single phrase only, to the exclusion of all the residue of the writing. On the contrary we must look at the entire specification and drawings, and view each part by the light thrown on it by the whole. If the specification taken as a whole leaves us no reasonable doubt concerning the intention of the patentee to include in the combination claimed, the brace and its lip G, then it is to be considered as included. It has already been stated that even the words of the claim relied on by the defendant show that the lip G enters into the combination; and the close of the claim also shows that the parts of which the combination consists are to be combined and arranged, that is, introduced into the combination, substantially as is described. And the descriptions and drawings clearly show that the lip G, is to come into the combination as part of the brace C, and that it is only in that way it can possibly be combined with the other parts. The case, then, is this: the lip G is to come into the combination—one part of the claim says, as one of the parts of B; another part of the claim, taken in connection with the residue of the specification and drawing, says it is to come in as part of the brace C. And no reasonable man can doubt that the latter and not the former is what the patentee intended."

Thus where the *intention* of the inventor can be gleaned from the Letters Patent themselves, the law will give effect to such intention; but it is not always that even the intention can be comprehended from them; and when this is the case the patentee is left without a remedy.

IMPROVED PLAN FOR GRADUATING THERMOMETERS.

From the mode of constructing thermometers, they have been very subject to imperfections which have rendered them inacurate in certain parts of the scale. The tubes are made by dipping the drop of glass from the crucible upon the end of the blow-pipe and a little cavity destined to form the bore of the tube is blown in the middle of the drop. The drop is then rolled into a cylinder some 5 inches in length, and the strip of colored glass being added, (when such is used) the tube is stretched down to the desired size, in the same way that molasses candy is stretched in working. These tubes are purchased by the thermometer manufacturers, The bulbs for the mercury blown upon one end, and the mercury introduced. Heat is now applied to the bulb and the mercury is expanded till it fills the tube, when the upper end is melted by a blow-pipe and hermetically sealed. Nature furnishes two invariable points of temperature for graduating the scale, the melting point of ice, and the boiling point of water. For the former it is only necessary to insert the bulb in ice water and when the mercury has had time to settle, the point is marked on the tube with a fine file. To ascertain the boiling point requires several precautions. As the temperature at which water boils depends upon the pressure of the atmosphere resting upon it, it will boil at a lower temperature, the greater its elevation above the level of the sea. And as the pressure of the atmosphere even at the same altitude, varies with the moisture which it contains, the comparative dryness of the air must be observed by the barometer. All proper steps being taken to avoid error, the bulb is inserted in boiling water, and the hight of the column marked as before. By the French centigrade scale, the freezing point is called zero, and the boiling point 100, the space between the two been divided into 100 equal parts, called degrees. But Fahrenheit, whose division has unfortunately passed into general use in this country, imagining that he had found the absolute absence of all heat at 32 degrees below the freezing point, made his zero there, and reached the boiling point at 212.

In making the scales, each tube has its scale graduated for itself. The tube is laid upon the plate and the two marks of the freezing and boiling points are pricked upon the metal. The space between the two is divided into 180 equal parts, and a fine line drawn for each division or, as it is called, each degree; divisions of equal extent being marked above and below the freezing and boiling points for the whole length of the tube.

It will be seen that this plan will make all thermometers correc[illegible] the freezing and boiling points, and correct [illegible]ts between, provided the bore in the tube is of the same size throughout its whole length; but, unfortunately, this is seldom the case, as will readily be supposed from the mode of its manufacture. As the tube is rolled and stretched down from its original size, inequalities in the texture of the glass, and, in fact, many other causes, expand the bore in some parts and contract it in others, very seldom permitting one to be of uniform size throughout. The late Thomas Kendall discovered a very beautiful process for graduating the scales of thermometers to correspond in their several parts to the various sizes of the different parts of the tube to which they belonged.

The mode which we have described for making the tubes of thermometers is employed only in making a few standard instruments, which are then used by manufacturers in making the initial points on all the thermometers which they make. The process discovered by Mr. Kendall has been recently revised by his son, John Kendall, of Lebanon, N. Y., whose thermometers have obtained the very highest reputation among our men-of-science, and whose business is in consequence, growing with astonishing rapidity. By this process several points are taken from the standard thermometer to the one to be graduated, and an ingenius arrangement of the graduating machine causes the divisions on the scale to increase and diminish in accordance with the swells and contractions in the size of the tube. This machine could not be explained without diagrams, but on examination we are satisfied that it is calculated to produce a thermometer absolutely correct throughout the whole of its length.

AMERICAN NAVAL ARCHITECTURE.

THE STEAMER "WEST POINT."

This steamer was constructed at Keyport, N. J., and has recently taken her appropriate position on the route of her intended service—New York to West Point. She is a well built and staunch vessel of her class; her dimensions are as follows:—Length on deck, from fore-part of stem to after-part of stern-post, above the spar-deck, 182 feet 6 inches; breadth of beam at midship section, above the main wales (molded), 27 feet; depth of hold, 8 feet 6 inches; draft of water at load line, 5 feet 3 inches; tunnage, 385 tuns. Her hull is of white oak, &c., and square-fastened with iron, treenails and large spikes. Distance of frames apart, at centers, 17 inches.

The *West Point* is fitted with one vertical, beam, condensing engine; diameter of cylinder, 40 inches; length of stroke of piston, 10 feet; diameter of water wheels, over boards, 27 feet; material of same, wood.

She is also supplied with one return flue boiler, located in hold; it possesses water bottom and was constructed with the design of attaining greater durability than is common in boilers of like size and pattern; in this the builders have been successful. She uses blowers to furnaces; has one smoke pipe, one bilge injection, and one independent steam fire and bilge pump. Ample protection has been made with tin, felt, zinc, &c., against communication of fire from boiler.

The cabins are on her spar deck and are very commodious. Bunkers for fuel, of wood; this vessel is well coppered.

Her value is about $45,000; owners, the Keyport Propeller Steamboat Company.

THE PROPELLER "F. W. BRUNE."

This steamer was constructed by Messrs. Harlan, Hollingsworth & Co., of Wilmington, Del., for the New York and Baltimore Steam Propeller Company, to ply regularly between those ports.

As she is claimed to be a very good vessel of her description, we herewith append the essential elements of her construction; they are as follows:—Length on deck, from fore-part of stem to after-part of stern-post, above the spar deck, 160 feet 3 inches; breadth of beam, at midship section, above the main wales (molded), 23 feet; depth of hold, 7 feet 6 inches; draft of water at load line, 7 feet, tunnage, 250 tuns. Her hull is of wrought iron plates, $\frac{1}{4}$ and $\frac{3}{8}$ths of an inch in thickness, and very securely fastened with rivets, $\frac{3}{4}$, $\frac{5}{8}$ths, $\frac{1}{2}$ and $\frac{3}{8}$ths of an inch in diameter, every $2\frac{1}{2}$, $2\frac{1}{4}$ and 2 inches.

The *F. W. Brune* is fitted with one vertical, direct-acting engine; diameter of cylinder, 28 inches; length of stroke of piston, 2 feet 2 inches; diameter of propeller, 8 feet; nnmber of blades, 4; material of same, cast iron.

She is also supplied with one return-flue boiler, loca-

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ted in hold, and possesses water bottom; does not use blowers to furnaces; has one smoke pipe, no independent steam fire and bilge pump, no bilge injection, but bottom valves or cocks to all openings in her bottom. Ample protection against fire has been made.

This vessel has three athwartship water-tight bulkheads, also freight house on deck, which is inclosed, thereby protecting all merchandise from damage by storms. A very pleasant cabin is on the promenade deck. The machinery of this vessel was constructed by Messrs. Harlan, Hollingsworth & Co., as above.

As we have previously explained, vessels of this class have, until recently, been fitted with the "Loper propeller," a description of which will be found on page 71, Vol. III (new series) of the SCIENTIFIC AMERICAN. We believe this steamer is of this kind, but it lacks many of the advantages of a new propeller recently invented and manufactured in Buffalo, N. Y., which has of late been extensively introduced. The novelty of this late essay is that the wheel is lighter than the "Loper," and the pitch of the blades, which are four in number, can be changed whilst the vessel is afloat, and without taking up the screw. It will be readily observed that this enables the engineer to regulate the set of the blades to accommodate their angle to whatever draft and whatever capacity of producing steam he may have to deal with. It is really an important advantage, and it is being generally appreciated, as it is being adapted in nearly all the new propellers now being erected, and also those being repaired by changing the screw.

WORKING STEAM EXPANSIVELY.

MESSRS. EDITORS:—Your correspondent G. H. Reynolds on page 118, of the present volume of the SCIENTIFIC AMERICAN, speaks of his belief in working steam expansively, and requiring more proof to the contrary than the recent experiments at the Metropolitan Mills, in this city. Now, there were no stronger believers in "cut-offs" than the proprietors of the Metropolitan Mills, but they have found their error at a very great cost; and when any one who is foolish enough to believe in the economy of working steam expansively can point to one single experiment in the history of the steam engine as fairly tried at one of the mills and can show any saving, he will have some grounds for his belief and not otherwise. Here is more proof to the contrary, from an English work on the economy of fuel by T. S. Prideaux, (page 100):—"At a recent trial of one of Her Majesty's screw steamers constructed with 4 cylinders for the *express* purpose of better obtaining the economy due to a considerable extent of expansion, it was found that a better effect was obtained by using only two cylinders, and cutting-off at half-stroke, than by using the same quantity of steam in four cylinders and cutting-off at quarter-stroke, although the result in the latter case ought to have been 50 per cent more; the cause of this anomaly was obviously the greater proportional condensation of the steam in the four cylinders than by the two, and the result might have been predicted. The proprietor of an extensive manufactory has told me this very day, the result of the trial of a "cut-off" which he had on his engine; he said it made no difference, in the cost of the coal used, whether he cut off at one-seventh of the stroke or one-half stroke."

The Metropolitan Mills, in this city, have six engines working in pairs, one pair driving 7 run of 4 feet burr stones; another pair driving 7 more run, and one pair doing the rest of the work of a flouring mill, such as driving the elevators, coolers, bolts, cleaners, &c. The engines driving the stones were constructed expressly for that purpose by Henry Waterman, 239 Cherry-street, in the most perfect form for using steam expansively. They are 14 inches diameter of cylinder, and 3 feet stroke. The engines doing the other work are a pair made at the Novelty Works, of their usual pattern, some 12 years since for the Bridge-street mill, Brooklyn, and were used there till the mill was burnt down. They are 15-inch cylinders and 4 feet stroke. The valves on all the engines are the ordinary slide, with the cut-off valve on the back, each worked by an eccentric. The point of cutting-off is varied by hand. The experiments were as follows: The engines were run for 36 hours, on an even quality of wheat, with their usual arrangements, steam at 90 lbs. pressure in the boiler, and cutting-off at 1-5th to 1-6th of the stroke. The amount of wheat ground and flour made, and coal used, were correctly noted. One engine was then taken off from each pair, and the cut-offs from the other engines, and a 36-hours experiment with the same kind of wheat made; the steam was at the same pressure in the boiler, following as near as possible the full length of the stroke, and running at the same speed. The wheat ground and flour made was the same, with 10 per cent less coal, which was quite contrary to the received "notions"—a positive gain by using the steam the full length of the stroke over using it expansively. The stones were sharpened as often in one case as the other. The condenser was not used at the time of the above experiment.

WARREN ROWELL.

New York, August 25, 1860.

TELEGRAPH BETWEEN THE ATLANTIC AND PACIFIC STATES.

The Secretary of the Treasury has advertised for proposals for building the line of telegraph to the Pacific, from the west line of the State of Missouri, by any route which the contractors may select (connecting at such point or points by telegraph with the cities of Washington, New Orleans, New York, Charleston, Boston, and other cities in the Atlantic, Southern and Western States) to the city of San Francisco, in the State of California. The bids are required to conform to the Act of Congress passed at the late session, which limits the compensation to $40,000 per annum, and prevents the public from imposition by limiting the charges for dispatches over said Pacific telegraph to 30 cents per word, with "the usual proportionate deductions upon larger dispatches." And it is further provided that this contract shall not prevent the building of other telegraph lines to the Pacific.

The bids or proposals were opened on the 2d of last month, at Washington, and no doubt considerable excitement is felt among those personally interested in telegraphic enterprises. The parties who control the American Telegraph Company are the owners of all the patents now in use to facilitate telegraphic communication, and must be reconciled before any contract can go into effect. There is another obstacle that will have to be overcome before messages can be sent through to the Pacific. On the California end of the route there are two separate companies now working their way with the wire in hand towards the east. One company has extended its stations far into Carson valley; the other, by this time, is working as far south as Los Angelos, 480 miles below San Francisco, on the line of the Overland Mail route. Whichever route is decided upon by the successful contractors, the line already built will be in the way, unless allowed a share in the enterprise. The same difficulty surrounds it on the east. Without perfect harmony between the bidders and the present telegraph companies no telegraph can ever be worked; but all these difficulties may, and no doubt will be removed, and mutual agreements made between all parties.

THE DISTRIBUTION OF CURRENCY.—A correspondent of the New York *World* says:—"It has been estimated that the currency required in the United States does not ordinarily exceed $9 per inhabitant, of which, at the utmost, only one-quarter is in coin. In England, it amounts to $28, of which one-third is in coin; whilst in France it is probably double the first-named sum, the largest portion being in coin." On the 4th ult., the liabilities of New York were:—Deposits, $83,846,988; circulation, $9,176,386; total, $93,023,374. The assets were:—Loans and discounts, $130,118,247; specie, $22,128,189; total, $152,246,436. The specie is a reserve to fall back upon in a case of emergency; but not a fund to meet the aggregate indebtedness of the banks.

PLATINIZING RIFLES.—A correspondent of the London *Mechanics' Magazine*, gives the following receipt for preventing rifles rusting in the interior of the barrels. "If nitro-muriate of platina be mixed with one-fourth of its bulk of ether, and the mixture then allowed to settle, the platina solution will fall to the bottom, when the lighter liquid may be poured off. The platina solution is then poured into a well-cleaned rifle barrel, when a galvanic action quickly takes place, and a thin coat of platina is deposited upon the surface of the barrel, and prevents it from rusting."

A COLUMN OF VARIETIES.

The bells of the Paris ornamental clocks are composed of 72 parts by weight—copper, 26.55 tin, and 1.44 iron.

The sulphate of barytes is the substance which is employed for giving that beautiful white glossy surface to card and other papers.

Hard iron when melted and cast in large masses, and then allowed to cool very slowly, becomes quite soft. Large castings of iron should be so constructed as to be cooled rapidly by a stream of water or a current of air passed through the center of them.

The annual gold product of Australia, since the first discovery of this metal in 1851, has been as follows:—1851, for five months, 145,145 ounces; 1852, 1,974,975; 1853, 2,497,723; 1854, 2,144,699; 1855, 2,576,745; 1856, 3,003,811; 1857, 2,729,655; 1859, 2,516,976. Total for the eight years, 17,589,729 ounces, valued at £4 per ounce. Total value, £70,358,916, or $340,535,153.

Some of the heavy engines for drawing on common roads in England are called "steam elephants." One of these lately built at Birkenhead for the Dutch government draws a load of 40 tuns on a level. It is provided with one of Gwynne's American centrifugal pumps to lift water, and it has also a common force pump, so that it may be used as a steam fire-engine when required.

In one of the libraries in Newark, N. J., there are a number of drawings formerly belonging to Robert Fulton. and executed by himself. These embrace diagrams of his submarine torpedoes. One of them represents the English channel sown with 190 marine torpedoes, so anchored as to destroy any French fleet that would attempt to invade England. The British government refused to entertain Fulton's propositions for protecting their coast.

Within the past three years, 10 barks, 5 brigs, 41 schooners, 1 propeller, and 8 tug-boats, which were built on the inland lake waters, are now employed in salt water service in our coasting trade. From their flat build they make excellent cotton traders, and large numbers of them are engaged in that branch of sea service.

An important improvement in some classes of plated goods, lately introduced, consists of solid rolled silver edges, beads, and moldings, instead of plated ores, which from their prominence have their silver surface speedily worn off. The silver employed in forming the ornamental edgings is laminated exceedingly thin.

One drop of the essence of bitter almonds will communicate an agreeable taste and smell to an ounce of the castor oil of commerce, and will not at all affect its medicinal action.

The American steamship *Vanderbilt* has proved herself to be the fastest sailer afloat. She sailed from New York July 28, at 2.30 P. M., and arrived at Southampton Aug. 6, at midnight. Allowing five hours for the difference of time in sailing eastward between the two ports, making 9 days and 4 hours, the fastest voyage on record.

Copper mines have been discovered in British Columbia, in which large blocks of the pure metal, similar to those obtained in the mines of Lake Superior, have been found. These blocks are said to be very numerous. Silver is also found in considerable quantities in these mines.

Dr. Wollaston obtained very fine platinum wire by inserting a platinum wire in a small cylinder of silver, then drawing them both through a draw plate, after which the silver was melted, leaving the platinum wire finer than the thread of a spider's web. Silver wire may be drawn to the three-hundredth part of an inch in diameter, and platina to the three-thousandth part of an inch.

On the Lexington and Danville Railroad, in Kentucky, Mr. J. Roebling is engaged in constructing a suspension bridge, which will form a span of 1,224 feet, from center to center of towers over a chasm 300 feet deep. When completed, it will be the most stupendous work of the kind in the world.

Two of Fawke's steam plows are now being constructed in Philadelphia for Cuba for the purpose of being used on tobacco plantations.

In Philadelphia, there are now in actual running order nineteen passenger railway companies, with 395 cars, 2,744 horses, and 1,623 men employed. There are 160 7-40 miles of single track.

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IMPROVEMENT IN GAS PUMPS.

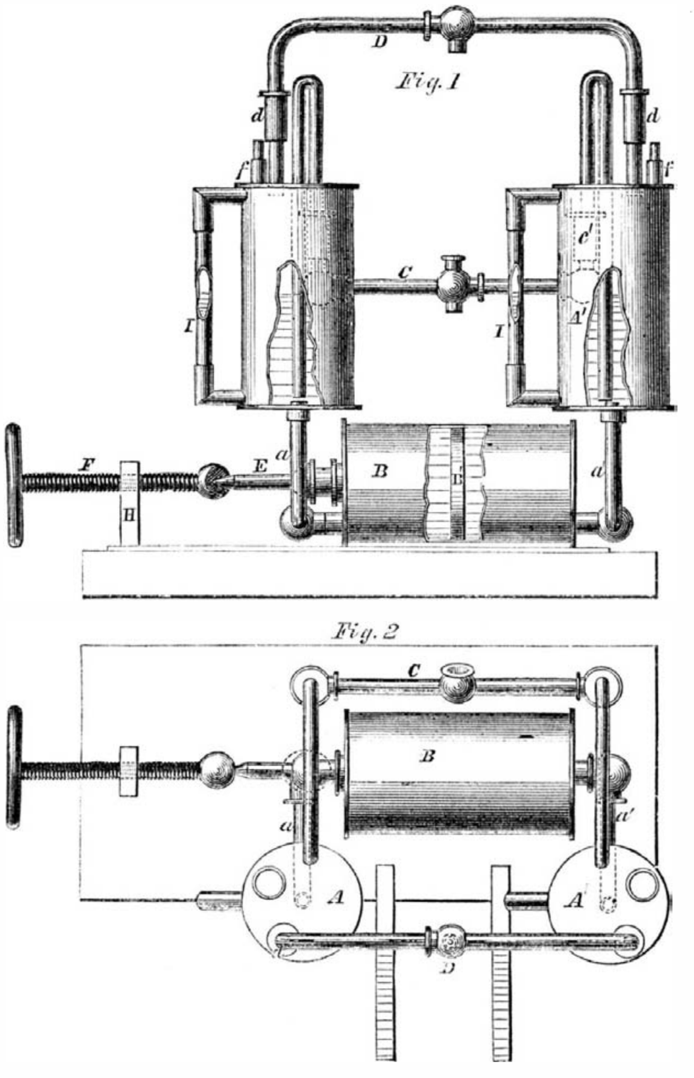
The apparatus here illustrated is designed to facilitate the compressing of illuminating gas in vessels, so that it may be transported from the gas-works to illuminate small villages or private houses in the country, or upon steamboats, railroad cars, &c.

A pump, B (Figs. 1 and 2), having the piston, B′, is filled with water, and the two pipes, *a* and *a′*, lead from the ends of the pump into two strong iron cylinders, A and A′, which are half-filled with water. As the piston is pushed back and forth, the water is forced alternately into each cylinder, compressing the gas in its upper end and driving the gas through the pipe, D, into the vessel in which it is to be transported. A pipe from the reservoir or gasometer connects with the middle of the pipe, C, which branches into both cylinders, each branch having a check valve, *c* and *c′*, to prevent the return of the gas as the water rises in the cylinder. As the piston is forced inward, forcing the water into cylinder, A′, the water in cylinder, A, runs down into the pump, drawing the gas into the upper part of cylinder, A, which is in its turn compressed and driven into the receiving vessel on the return stroke of the piston.

The piston, when worked by hand, is driven back and forth by means of a screw, F, working through a fixed standard, H, and connected with the end of the piston rod, E, in the manner shown in the cut, so that the screw may turn without turning the piston rod. The pipe, D, has check valves, *d d*, to prevent the gas reflowing through it into the cylinders. Openings, *f f*, are made in the upper ends of the cylinders for supplying them with water, and glass tubes, I I, are connected with the cylinders at the sides to indicate the level of the water in the cylinders, in order that the supply may be properly adjusted.

The manifest advantage of this apparatus over the ordinary air-pump consists in sealing the piston and the various connections with water, an advantage that will be readily appreciated by all who have undertaken the difficult task of packing working machinery, air or gas-tight.

The patent for this invention was granted (through the Scientific American Patent Agency) on August 7, 1860; and further information in relation to it may be obtained by addressing the inventor, W. H. Gwynne, at No. 142 Center-street, this city.

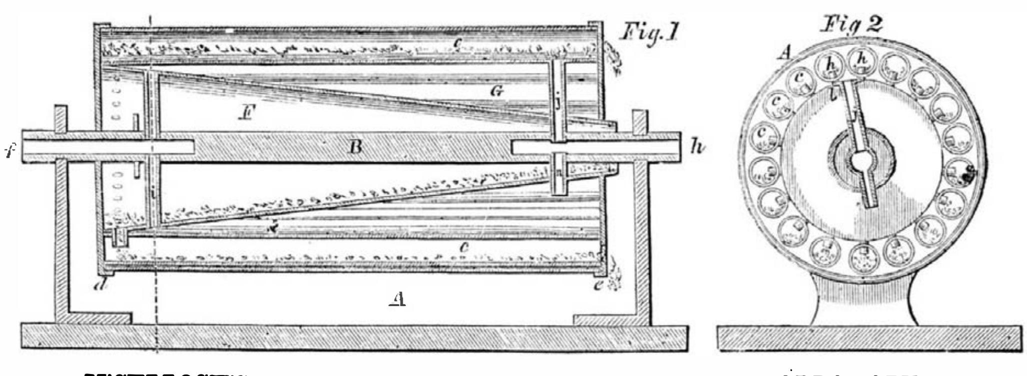


GWYNNE'S IMPROVED GAS PUMP.

AN ATTEMPT TO MAKE IT RAIN.—A letter from Lynchburg, in the Richmond *Dispatch*, says:—"A gentleman who resides near Boydton, Mechlenburg county, Va., has aspired to a new science—that of controlling the clouds in order to cause it to rain at will. With the view of attaining this end he has built a 'rain tower,' which novel structure is said to be thirty feet diameter at the base, which size it retains to the hight of forty feet. To this hight it contains 4 flues, each 7 feet in diameter. The number of flues is then reduced to two, which run up twenty feet higher, the top of the structure reaching an altitude of sixty feet. The whole concern was erected at a cost of about $1,000. The *modus operandi* of causing rain to fall is as follows:—The flues are filled with dry pine wood, which is set on fire, and which is kept up until the desired effect is produced on the elements. His theory is that the great heat produced in the air above the 'tower' will cause the clouds to concentrate over it, when plenty of rain will fall in that vicinity. The originator of this novel idea is said to be a firm believer in the practicability and utility of his invention, notwithstanding the fact that, after repeated trials, during which he consumed hundreds of cords of wood, his tower failed to produce the desired effect on the unpropitious heavens, he having been a great sufferer from drought during the entire Spring and summer." This is the famous plan proposed by Espy, several years ago, except that it is on a much smaller scale. Espy proposed to build a large number of great fires, extending in a long line north and south, when he thought that a rain would occur at the eastward.

McCULLOCH'S GRAIN-DRYING AND EVAPORATING APPARATUS.

Hundreds of thousands of dollars worth of grain are destroyed every year by moisture, and large quantities have been kiln dried to prevent this evil. In the process of kiln drying, some portion of the grain is almost invariably scorched, and to obviate this, as well as to secure a more rapid and perfect drying of the grain, the compact and convenient apparatus here illustrated has been devised.



M'CULLOCH'S GRAIN-DRYING AND EVAPORATING APPARATUS.

A hollow revolving cylinder, A, Figs. 1 and 2, is hung upon a shaft, B, each end of which is hollow, with the middle closed, one of the ends hung a trifle lower than the other. A series of tubes, *c c c*, extend the whole length of the cylinder, A, being closed at one end by the head, *d*, of the cylinder, and open at the other end, the head, *e*, being perforated for this purpose. Within the space surrounded by the tubes is the conical chamber, F, the larger end of which is closed by the cylinder head, *d*, while the smaller end passes through the opposite cylinder-head, *e*. A space is left between the smaller end of the chamber, F, and the axle, for the introduction of the grain to to be dried. Openings are made through the chamber F, near its larger end, and connected by several tubes, *c c c*, so that as the latter are successively brought to the bottom of cylinder, A, by its revolutions, the grain will fall through the short tubes into the tubes, *c c c*, through which, from the inclination of the cylinder, it will slowly be shaken, falling out at the end, *d*. Steam being admitted into the end, *f*, of the axle, B, passes through the tube, *i*, and fills the space, G, around the chamber, F, and tubes, *c c c*, whence it is lead by the tube, *n*, into the opposite end of the axle, and so passes off into the atmosphere. As some portion of this steam would naturally be condensed by the cooling action of the cylinder, provision has to be made for the removal of the water thence resulting. To this end two of the long tubes, *k k*, are joined throughout their length by the plate, *l*, this plate being perforated near its end for the tube, *j*, which leads into the hollow end, *h*, of the axle. As the cylinder revolves, the water of condensation is raised by the trough formed by the joining of the tubes, *k k*, and poured through the tube, *j*, into the axle.

Though the drying of grain is the primary purpose for which this apparatus is designed, it is claimed by the inventor to be the best evaporating apparatus yet invented, for which service it is manifestly well adapted, and is therefore worthy of the attention of the conductors of all arts in which evaporation forms one of the processes. For this purpose, the liquor to be evaporated would take the place of the grain in the apparatus.

The patent for this invention was granted (through the Scientific American Patent Agency) on the 17th of April, 1860; and further information in relation to it may be obtained by addressing the inventor, T. H. McCulloch, at Peoria, Ill.

CHEAP SUBSTITUTE FOR LAMPBLACK, IVORY BLACK, &C.—It is known that the refuse of the cannel coal which is used in the manufacture of kerosene oil is not a combustible coke like the refuse of common cannel coal, but is a perfectly waste, valueless substance. A writer in *L'Invention*—Mr. Lekieffre, of Namur—says that if this substance is simply pulverized it will answer perfectly for clarifying sugar, for printers' ink, for disenfecting—and, indeed, for all purposes for which bone-black, lampblack, &c., are used. He also says that it is an excellent fertilizer, and completely destroys all insects. We do not gather from his article, however, that he has learned these facts from actual experiment; and persons trying the substance would be wise to do it on a small scale.

THE *American Agriculturist* is probably the most widely circulated journal, now published, devoted to the interests of agriculture. It has removed to No. 41 Park-row, and has thus become an immediate neighbor of the SCIENTIFIC AMERICAN. We extend to it a hearty welcome, and wish it increased prosperity.

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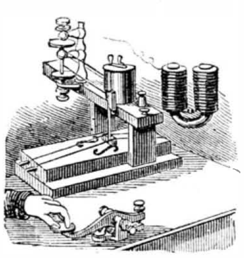
VOL. III., No. 12....[NEW SERIES.]....*Sixteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 15, 1860.

THE STIMULUS OF THE PATENT LAWS.



UNDER the naked rafters in the upper story of a house in Pine-street in this city, is the room of a man who is a very fair specimen of an American Inventor. His beard is long, his hair is uncut, his person is neglected; but his mind is as clear as crystal. He has that accurate and positive knowledge of the properties of matter, which is gained by those who come in actual contact with them, either in original investigations of physical science, or in personal practice of the mechanic arts. The man of whom we speak, has been engaged for some years in efforts to improve the process of telegraphing, and neither Faraday, nor Henry, nor any other man in the world has a more thorough knowledge of electricity and electro-magnetism than he has. He first devised a plan for the more rapid transmission and recording of the signals which constitute the Morse alphabet at present in use, by which he was enabled to transmit 15,000 words in one hour, instead of 2,000, the highest number previously reached. On removing the apparatus from his own room, however, and applying it to the line between New York and Washington, he found that the rapidity of the operation was limited by the action of the relay magnets. Accordingly laying aside all other matters, he has devoted several months to improvements in this simple little apparatus. We have never been more impressed with the importance of slight modifications in mechanism than in examining the relay magnet which is the result of these months of study, and contrivance. The one previously in use seemed to be as nearly perfect as possible and so very simple that there was no room for improvement in its construction, but there was a trifling amount of friction in the journals of the rocking bar, and even the almost instantaneous action of a spiral spring, was not sufficiently sudden to make the several letters of 15,000 words in an hour. By an accidental discovery of an important property of springs, which we shall fully describe at another time, by modifications of the helix and better arrangements of the several parts, the action of the relay magnet was so accelerated as to bring it up to the rapidity required, and our inventor had that intense satisfaction—which none but an inventor can appreciate—of witnessing the complete success of his long series of labors and experiments.

He is but one of a large number of persons in the country, whose minds and hands are busy under the stimulus of the patent laws, in eager efforts to effect improvements in the arts which will facilitate the operations of industry, and increase the annual production of wealth. These men neither expect nor ask any reward for their efforts, unless they really produce something of money-value to the community, and even then, all they ask is what they themselves can make out of the exclusive use, for a few years, of their own ideas. After these few years have expired, the community comes into free possession of the fruits of their studies and labors. Supposing the same number of men were employed by an arbitrary government on salaries, how feeble would be their labors compared with the efforts that are called forth by the splendid prizes occasionally realized by successful inventors! No kingly cunning could devise a scheme which would secure, at so cheap a rate, so large an amount of service to the state as this Republican Law, which was conceived in a spirit of simple justice, as affording a fair, but moderate compensation to those citizens who do the most to advance the prosperity, wealth and power of the country.

PIANOS—A GREAT PIANO MANUFACTORY.

Music—both vocal and instrumental—exerts a most elevating and refining influence. Its power over the human passions is beautifully illustrated in Holy Writ, in the life of Israel's warrior-minstrel—David, before whose strains on the harp the evil spirit fled from the heart of vengeful Saul. In all ages, music has thrilled the heart under almost every circumstance of life—on the field of battle, in the temple and at the fire-side. The ancient harp came down to us as the most suitable instrument for the domestic circle, and it seems to have been the parent of the pianoforte. If we look into a piano and examine the arrangement of its strings, the form of a harp placed in a horizontal position will at once be recognized. It is true the strings of the two instruments are made of different materials, and the mechanism for striking them is altogether different; still, in principle, there is a similarity. The improvements made in the modern piano—its great range in musical execution and its sweetness of tone, has rendered it the chief of instruments, for the domestic circle especially. Its paternity is claimed by several nations, but the testimony presented to us is in favor of Germany being its birth-place. In England it has been more generally introduced among the people than in any other European country, but it is in the United States where the manufacture of such instruments has reached its highest development. Once we imported such instruments from London; now, American pianos have won a superior reputation. The very best operative pianoforte makers of Europe have been attracted to our shores, and their experience and acquired skill have been multiplied and expanded with American spirit and enterprize. One of the most astonishing triumphs in the manufacture of such instruments, known to us, has been achieved by Messrs. Steinway & Sons, No. 82 Walker-street, in this city. The father, who was a manufacturer of pianofortes in Germany for 25 years, came to the New World about 11 years ago; and with his four sons, all practical instrument makers, engaged as journeymen, and thus worked for nearly four years in order to acquire a knowledge of our language, institutions and modes of doing business. Being possessed of some capital, they then commenced business on a small scale, making one piano per week. Now, mark the change. Last week we had the pleasure of going through their new manufactory in Fourth-avenue, in which no less than 30 square and 5 grand pianos are turned out weekly, and the means of supply can barely supply the demand. During the 25 years in which Mr. Steinway, Sr., was engaged in the business in Germany, he only made 473 pianos altogether; now they manufacture 1,620 per annum, or 1,154 more than they made in 25 years in Europe. And all this business has been made in the short space of seven years; a fact which makes it most surprising, considering the great number of other firms engaged in this manufacture. The new factory extends from Fifty-second to Fifty-third streets, occupying an entire block. The building is in the form of the letter L, running 201 feet in one direction and 165 feet in the other. In hight it is six stories, with the basement; it is 40 feet in depth. A large court yard occupies the inside space, in which are stored 2,000,000 square feet of lumber; and there is also a kiln where 240,000 feet are always undergoing the process of drying. About 350 operatives are employed on the premises, and all the departments are arranged in the most systematic manner to facilitate the operations.

The rise and progress of the Steinways in manufacturing pianofortes, it will be agreed, from these statements, is enough to excite astonishment; because it is not a speculative business, but a regular manufacturing institution. One cause may be assigned to the great number of pianos sold in the United States; namely, the general distribution of wealth among the people, by which so many families are enabled to purchase such instruments. And another is the very general cultivation of music in families, academies, and even in our common schools, at the present time. These are delightful considerations; because the piano is the best of instruments for accompanying the voice—in hall, in school or social circle. In the last issue of the SCIENTIFIC AMERICAN, we directed attention to the triumphs which had always been secured by good mechanism in all departments of manufacturing operations. Messrs. Steinways' success is a powerful confirmation of the statements we made in that article. But without original genius also, so as to devise improvements, little progress is made in any manufacture at the present day. The patents secured by any manufacturing company is a very good index of their enterprise and success. Messrs. Steinway have invented several excellent improvements in pianofortes; the patents for which were obtained through the Scientific American Patent Agency, and these have secured to them the just protection and enjoyment of rights and advantages which have proved eminently beneficial in their business.

NIAGARA RAILROAD SUSPENSION BRIDGE

We have received a pamphlet containing a report on the present condition of the above bridge, by John A. Roebling, of Trenton, N. J., its engineer. As this is an international structure, and the greatest railroad suspension bridge in the world, everything connected with its adaptability and durability for such purposes is of great interest to the engineering and railroad professions. This bridge was opened for traffic on the 8th of March, 1855; and the number of trains and trips of single engines which pass over it daily now average 45. This affords evidence of a very great traffic, thus subjecting the structure to the most severe tests. After an absence of two years, Mr. Roebling visited the bridge, and gave it a thorough examination on the 18th, 19th and 20th of July last, and he could detect no change in any of its parts. In order to judge whether the stiffness of the superstructure had been impaired by five years' traffic upon it, he placed a leveling instrument between the towers on the New York side, and observed the process of gradual deflection caused by five trains, as follows:—

A train, composed of the engine "Essex" and tender, of 35 tuns weight, drawing 10 empty cars, produced a deflection in the center of..............................	0.462 feet.
A small engine, drawing 2 loaded passenger cars, 1 baggage car, and 1 loaded cattle car..........................	0.540 feet.
Another light engine, with 5 loaded passenger cars and 1 baggage car..	0.520 feet.
The engine "Essex" and tender alone....................	0.315 feet.
The same engine, returning with 8 loaded cattle cars, each holding from 17 to 18 cattle of the largest size.....	0.789 feet.

He says:—"By comparing the above observations with those of 1855, we discover no essential difference. The question has been repeatedly asked why trains are not allowed to pass over this bridge at a higher rate of speed than five miles an hour? This limitation is looked upon as a sign of tacitly acknowledged weakness, and has been frequently referred to as a strong argument against suspension bridges for railroad purposes. The first great object of this limitation of speed is *safety.* Although it may look somewhat timid in this fast-going age to see freight trains move at the rate of five miles per hour, and passenger trains at even a less rate; yet, when it is considered that this slow speed insures *absolute safety,* no matter what accident may happen to a train, the traveling community ought to be satisfied with this cautious arrangement."

By an additional expenditure, however, of $20,000, the stiffness of this bridge may be so much increased as to allow trains to pass over it at the highest speed; but no increase of speed, we hope, will ever be permitted.

There are some very important scientific questions in the course of solution by this bridge. Wrought iron, such as that of which the cables are composed, has been held by many engineers to be an unsafe material for suspension bridges, from two causes. One is rusting of the metal by the oxygen of the atmosphere, and the other is the conversion of the fibrous into brittle cystalline iron by tension and vibrations. Mr. Roebling states that the iron of the Niagara bridge is protected mechanically from rusting by several coats of paint, and chemically, by calcareous cements, which absorb the oxygen in damp situations, and thus protect the anchor bars. He recently examined the anchor bars of the Monongahela suspension bridge, at Pittsburgh, Pa., which was built 16 years ago, and he found them perfectly preserved by this cement in which they were imbedded. Mr. Roebling is of opinion that the crystallization of fibrous iron by vibrations or by tension, or both combined, "has, in no instance, been satisfactorily proved or demonstrated by experiments;" and

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he insists that "the crystallization in iron or any other metal *can never take place in a cold state.* To form crystals at all, the metal must be highly heated, or nearly in a molten state."

The opinion is quite prevalent among engineers and men devoted to science, that tough metals in a cold condition do become crystalline and very brittle, when subjected a considerable period of time to tension and vibrations. The breaking of the axles of railroad cars, the piston rods of engines, and the iron stringers of bridges, is oftentimes attributed to the metal becoming crystalline. But, while Mr. Roebling is a disbeliever in the crystalline theory of vibrations, he admits that tension and vibrations impair the strength of iron while it retains its fibrous character. This, he considers, is due to a separation of the threads of the pure iron, and the *cinder* with which it is combined, by the vibrations, thus destroying the cohesion of the particles. This is a most interesting question, and the opinion of Mr. Roebling is of great weight in the matter. He asserts that the cables of the Niagara bridge are made of a superior quality of metal; that they possess an abundance of strength; are free from vibration; that they are well-preserved, and may be safely trusted for a long series of years. As iron, in large structures, has been applied only in very recent years, long experience on a large scale has not yet been obtained; but, so far as that experience goes, Mr. Roebling is of opinion that "good iron, not overtaxed by tension and vibration, and otherwise preserved, will prove one of the most durable building materials at our disposal."

CREOSOTING RAILROAD TIMBER

The facility with which timber can be worked into almost every variety of form, the fibrous and elastic character which it possesses, combined with great strength in proportion to its weight, renders it unrivaled as a material for many purposes. With its many good qualities, however, it has a number of inherent defects, such as combustibility when exposed to high temperatures, and proneness to early decay when exposed to moisture and the atmosphere. In bridges, ships, and other structures, it commences to decay from the very moment it is exposed. When placed in dry situations it endures for quite a long period, but when situated, like railroad timbers, partly above and partly under ground, exposed to air, heat and rain, its life is of very brief duration. The vast expenditures incurred for railroad timber—the sleepers of which have to be renewed every few years—have naturally drawn much attention towards the discovery of some process to render it more enduring. The Kyanizing, Payenizing and Burnettizing processes, for infusing the chlorides of zinc and mercury and the sulphate of copper into the pores of wood, so as to coagulate its sap and render it insoluble, have all been tried with more or less success, but recent experiments in England with creosote seem to give it the palm as a preservative agent over all other substances which have been heretofore used. On the Buckinghamshire Railway about ninety thousand sleepers that had been treated by the above-named three processes, and about thirty thousand prepared with creosote were laid down, and it was found that the latter were far more durable than the others. Timber which had absorbed about eight pounds of liquid creosote to the cubic foot was apparently as sound at the end of five years as when first treated. It has also been stated that this peculiar substance not only prevents the decay of timber that has been treated when in a sound condition, but it also arrests decay after it has commenced in timber. This is a most valuable condition, and its reliability has been tested on quite a large scale on the Great Northern and the Lancashire and Yorkshire Railroads (England), on which roads creosoted timbers, that have been down for ten years, appear to be as good as when first laid.

This is an important question for our railroad companies; they may have their timbers creosoted on the very spots where the trees are cut down in the forests. Creosote is a product of the distillation of wood in retorts, and it receives its name from its well-known power to preserve animal substances by coagulating the albumen. It is a liquid which may be made from the refuse or useless parts of the very trees that are chosen to make railroad timbers. It can be kept in wooden tanks into which the timbers may be placed and sunk by weights so as to steep them for several days under the liquor. Creosote has a pungent odor, but this is not very objectionable; it is the same as that which flavors smoked ham, and to many persons it is far from being disagreeable. All timbers for bridges, the sills of buildings, and the sleepers of railroad tracks should be treated with this substance or some other equally as good, if there is any. The refuse creosotic compounds of coal oil—those which are obtained from distilled coal as well as from the natural oil wells—may be as powerfully antiseptic in their nature as creosote distilled from wood. Experiments should be made to determine this, because such products are now thrown away as waste, whereas they may be usefully applied to render exposed timber ten times more enduring than it now is, and thus save millions of dollars to our country annually.

CONTRACT FOR A STEAM FIRE ENGINE.

We take the following common-sense, practical suggestions from the New York *Times*. There is one very great and unquestionable advantage of free institutions and a free press; they furnish the government with the whole combined knowledge and wisdom of the community:—

To the Editor of the New York Times:

I see by your paper of last Friday that there was no bid for the building of a steam fire engine for Hose Company No. 5. I believe the reasons are, that the advertisement was not conspicuous, being mixed up with street contracts; that the time was too short, and that, so far as one builder is concerned, the specification of a cylinder not less than $6\frac{3}{4}$ inches bore by $8\frac{1}{2}$ inches stroke, deterred him from bidding, his engine being rotary. I know one establishment that was disposed to bid for the contract, but had only five days notice, which was not sufficient to make an estimate, unless the design had been already made. A month would be but a moderate time for a shop not already in the business, to propose a plan and estimate upon it; and I respectfully suggest that the authorities should allow this time, and more, if they can spare more.

I further suggest that the printed forms should be sent to all the fire engine builders and to the principal machinists, and that the proposal should be advertised and also noticed in the SCIENTIFIC AMERICAN, and other papers that go to machine shops. I do not believe that two out of twelve or more shops that build steam fire engines knew that this matter was open to them, or could have been able to make their bids in time. The reference to a particular New York engine, as to size and style, would make it necessary to see that engine in order to estimate properly.

I would further suggest that the specification should be revised, the work to be done fully stated, and no reference should be made to the engines now in use, to render a journey to New York necessary as a condition of being able to make an intelligent estimate.

Yours, respectfully,

AN ENGINEER.

THE FAIRS OF 1860.

We take the following full list of the agricultural and mechanics' fairs of this Fall from *The Country Gentleman*, omitting those which have already been held:

NATIONAL.

American Institute	New York, opens Sept. 27.

STATE.

Alabama	Montgomery, Oct. 29, Nov. 2.
Canada, Upper	Hamilton, Sept. —
Connecticut	No exhibition on account of cattle disease.
Georgia	Atlanta, Oct. 23, 26
Georgia, Planter's	Macon, Dec. 3, 29
Georgia, Lower	Savannah, Nov. 22
Indiana	Indianapolis, Oct. 15, 20
Iowa	Iowa City, Oct. 2, 5
Kentucky	Bowling Green, Sept. 18, 22
Kentucky, North Eastern	Ashland, Sept. 18, 20
Maine	Portland, Sept. 25. 28
Maryland	Baltimore, Oct. 30, Nov. 3
Michigan	Detroit, Oct. 2, 5
Minnesota	Fort Snelling, Sept. 27, 29
Mississippi	Holly Springs, Oct. 16, 20
Nebraska	Omaha, Sept. 19, 21
New Hampshire	Manchester, Oct. 3, 6
New York	Elmira, Oct. 2, 5
North Carolina	Raleigh, Oct. 16, 19
Ohio	Dayton, Sept. 25, 28
Oregon	Oct. 2
Pennsylvania	Wilkesbarre, Sept. 24, 27
St. Louis Ag. and Mech. Association	St. Louis, Sept. 24, 30
South Carolina	Columbia, Nov. 13, 16
Tennessee, Mid. Div	Franklin, Sept. 24, 28
Virginia	Richmond, Oct. 22, 28
Wisconsin	Madison, Sept. 24, 29

HERMETICAL MASTIC OF GRAPHITE.—The preparation of this cement is very simple. A mixture is made of 6 pounds of plumbago, 3 pounds of fine chalk, 8 pounds of the sulphate of baryta, and 3 pounds of linseed oil, well boiled. The black lead, chalk and baryta must be reduced to a very fine powder, and well-mixed with the oil. A cement is thus obtained which, as shown by experiments, is much superior to that made with red lead, and which may be employed with great advantage in luting the joints of steam boilers, water pipes, gas pipes, &c.—*Journal de L'Eclairage au Gaz.*

APPLICATION FOR THE EXTENSION OF A PATENT.

Improvement in Drawing Frames.—Eliza Pray, administratrix of Joseph Pray, deceased, and Christopher Stafford, of Plainfield, Conn., has applied for the extension of a patent granted to the said Joseph Pray and C. Stafford on the 12th of November, 1846, for an improvement in the above-named class of inventions. The testimony will close on the 20th of October next; and the petition will be heard at the Patent Office on the 12th of November, 1860.

DR. BRADLEY'S IMPROVEMENTS IN TELEGRAPHING.—On page 274 of Vol. I. (new series), SCIENTIFIC AMERICAN, we noticed an improvement in telegraphing, invented by Dr. L. Bradley, now of this city, by which from 10,000 to 15,000 words per hour could be transmitted, in place of 1,500 or 2,000, which had been the previous limit. On applying this apparatus to long circuits, however, Dr. B. found a limit to the rapidity in the action of the relay magnet, and he has since been engaged in improving this part of telegraphic apparatus. He has now a relay which will enable him to transmit 10,000 words per hour. He has also connected this relay with an improved sounding apparatus which enables him to dispense with the local circuits for those who read by sounds. A full illustration of this great invention will appear in our next issue.

MACHINE SHOP ARCHITECTURE.—The illustrated article, published in another part of this paper, on Iron Works—their arrangement, location and construction, will be found worthy of the attention of such of our readers as take an interest in the subject. It is written with intelligence and ability, and will commend itself to a large class of our readers, as the subject is an important one, and has never before been presented in any journal so far as we know. The article, with accompanying plans. will be completed in our next number.

MCCORMICK AND THE PRESS.—In our issue of the 25th ult., we noticed the peculiar manner in which the famous inventor of the reaper, Mr. McCormick, became connected with the newspaper press of Chicago. It seems acording to the *Times* and *Herald* of that city, that Mr. McCormick did not get the control of the *Times* by the summary process of enforcing certain claims which he is alleged to have purchased against it. The transaction, as it is detailed, shows, that he acted all the while like a straight-forward man.

RECENT AMERICAN INVENTIONS

The following inventions are among the most useful improvements patented this week. For the claims to these inventions the reader is referred to the official list on another page:—

MAGNETO-ELECTRIC MACHINES.

These improvements are for the most part applicable to either of the two common forms of magneto-electric machines heretofore constructed, namely, that which consists of one or more series of helices composed of covered copper wire coiled round cores of soft iron, applied to rotate between or near the poles of a series of stationary permanent magnets, and that which is composed of one or more series of permanent magnets, applied to rotate near one or more series of stationary helices, but all the improvements are applicable to machines of the first-mentioned form. The first improvement consists in the employment of a number of helices in each wheel or circular series proportioned to the number of magnetic poles in each circular series of magnets as three to two, for the purpose of making the attractive force of the magnets always counterbalance the retarding or holding back force. A second improvement consists in the arrangement of the helices of two or more wheels or circular series in a spiral relation to each other, that is to say, so that in a machine having two wheels or circular series of helices each helix of either wheel or circular series is in a line midway between the lines of the two helices of the other wheel, and that in a machine, having more than two wheels or series of helices, the helices of the several wheels are arranged in regular succession at a distance in advance of each other equal to the distance between those of each wheel or series divided by the number of wheels or series in the machine, the object of such arrangement being to bring the helices of the several series alternat-

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ely or successively within the influence of the magnets, and to make the influence of the magnets more nearly continuous, or less interrupted. A third improvement consists in the construction of the helices with flat cores arranged radially to the center of the wheel or circular séries; and a fourth improvement consists in making the ends or poles of the magnets of such taper form, that their edges are radial to the center of motion, or so nearly so as to be always parallel with the edges of the cores of the helices at the time of their passing. The object of these third and fourth improvements is to make the change of polarity in the core of each helix more sudden and complete, and the electric impulse consequently stronger. A fifth improvement consists in an intensity regulator of novel character by which the quality of the current can be readily varied from high to low intensity, to adapt it to the particular duty required. The credit of these improvements is due to H. N. Baker, of Binghamton, N. Y.

BALANCING MILLSTONES.

The object of this invention is to obtain a ready means by which the revolving stone may be balanced while both in motion and at rest, and the parallelism of the faces of a pair of millstones always preserved. The "runner" or revolving millstone of a pair, when hung on its spindle, after completion, will be found in an unbalanced state, and the plan has usually been to balance the stone by inserting a piece of lead into its top at the light side of it. This plan of course, would balance the stone while at rest, but, when made to rotate the centrifugal force generated by its rotation and the position of the lead, which is above the point of suspension of the stone, causes the latter to be out of a state of equipoise, and hence the parellelism of the stones when at work is not preserved. Again, if the stone be balanced while in motion, but out of balance or state of equipoise when at rest, the unequal density or disposition of weight relatively with the point of suspension, will subject the spindle to considerable lateral strain, and it would be liable to heat and be injured by wear. In order to obviate these difficulties the inventor employs a band or strap, which encircles the "runner" circumferentially with a weight interposed between it and the side of the stone, the band and weight being in or about in a horizontal plane with the point of suspension of the stone, and the desired end is thereby obtained.* This device has been patented to D. Fellenbaum, of Lancaster, Pa.

COTTON GINS.

This invention relates to an improved mode of feeding or presenting the seed-cotton to the action of the saws, rollers or other means employed for separating the staple from the seed. The object of this invention is to produce a uniform motion of the roll of cotton within the hopper throughout the entire length and circumference of the roll, and to support or so sustain the roll, that the portion in immediate contact with the saws or other lint-separating device will not be deflected by gravity, or other causes, so as to press upon said device, a contingency which is injurious, especially where saws are employed, as a "cutting" and "napping" of the lint is the result. The invention consists in the employment of a cylinder constructed of light wood or other suitable material studded with radial spikes or teeth, and placed logitudinally within the hopper, whereby the desired end is obtained. The patentee of this invention is H. L. Emery, of Albany, N. Y.

SELF-ACTING WASTE GATE.

This invention has for its object the preventing of the washing away of mill dams by freshets, and by such a means that it will be automatic in its operations, that is to say, self-acting, requiring no special manipulation, and therefore performing at any moment when required its proper function. To this end there is inserted in the mill dam, a gate frame, provided with a gate or gates of suitable dimensions to allow when open the full volume of water to pass through unobstructed, or nearly so, the gates being arranged in such a way that the water within the dam when reaching a certain hight, will by its pressure open the gate or gates and pass through, thereby relieving the dam of any undue pressure. This improvement was patented by Sidney Hudson, of Milford, Mich.

THINNING BOARDS.

This invention is an improved machine for planing boards to render them thinner, it is intended more especially for carriage makers for reducing the thickness of boards to form panels for carriages. The invention consists in combining with a guide and gage box which may be made light and portable, a plane stock carrying a curved plane iron, a feed roller for carrying the stuff up to the cutter, and an adjustible board by which the stuff may be nicely gaged so as to be cut as thin as desirable. The credit of this invention is due to Sharon Case, of Lumpkin, Ga.

ATMOSPHERIC PILE DRIVER.

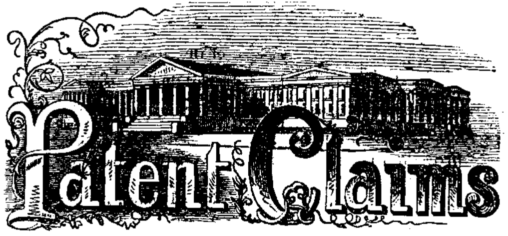
This invention consists in furnishing the air-lock which is employed to form the cap of the pile in driving, with a supplementary air-lock so applied as to permit the discharge through it of solid matters which may have been taken from within the pile, while the water is excluded by an artificial pressure of air within the main air-lock and pile, without the necessity of opening the main air-lock to the external atmosphere. The inventor of this improvement is W. S. Smith, of Trenton, N. J.

TUCK AND PLAIT FOLDER.

This invention consists in a certain construction and arrangement of the parts of a tuck and plait folder, which provides for its adjustment in a very simple manner to perform the folding of tucks and plaits of various widths and at various distances apart, and for the easy introduction of the fabric to be folded. This improvement was designed by Reuben Brady, of this city.

VEHICLES.

The object of this invention is to make a buggy easy of access from the rear, to avoid the wheels, in case of muddy weather, or an accident by falling under them, should the horse suddenly start. It consists in dividing the seat and box vertically through the middle, and hinging one or both to the floor of the buggy at the back end, said seat being furnished on its under side, with suitable steps which, when the seat is thrown back will serve for an entrance up into, or as a passage out of the buggy, when the seat may be returned to its former position. E. S. Wicklin and J. D. Weaver, of Carlinville, Ill., are the inventors.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING SEPTEMBER 4, 1860.

[Reported Officially for the SCIENTIFIC AMERICAN.]

, Pamphlets giving full particulars of the mode of applying for patents, 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.

29,850.—H. N. Baker, of Binghampton, N. Y., for an Improved Magneto-electric Apparatus:

I claim, first, The employment, in a magneto-electric machine, of a number of helices in each wheel or circular series, proportioned to the number of magnetic poles in each circular series of magnets, as described, for the purpose specified.

Second, The arrangement of the helices of two or more wheels in spiral relation to each other, as and for the purpose set forth.

Third, The construction of the helices with their flat cores, arranged radially to the center of motion, substantially as and for the purpose specified.

Fourth, The intensity regulator, consisting of the wheel, F, plates, G G, coupling straps, m m, and screws, j j, or their equivalents, combined substantially as described.

Fifth, Arranging the terminal wires of the helices to pass through the hollow rotary main shaft on their way to the intensity regulator and pole changer, substantially as described.

29,851.—Jonathan Ball, of Elmira, N. Y., for an Improvement in Mode of Preparing Wood for Umbrella Sticks:

I claim, first, The process of curing, consisting of the operations of curing, drying, digesting in hot water, drying again, soaking in hot oil, and drying in hot air, performed in the order specified.

Second, I claim, in combination with the described process of curing, the dying of the wood simultaneously with or by the same operation as the removal of the sap, substantially as described.

29,852.—I. S. Barber, of New York City, for an Improvement in Machines for Turning Ovals:

I claim, first, Supporting the cutter shafts in radial self-adjusting arms in combination with the pattern, arranged substantially as shown, and this I claim whether the driving pulley have the same axis with the said arms or not.

Second, I claim the movable and adjustable pattern guides, whereby various sizes, shapes and widths can be cut from one and the same pattern.

29,853.—W. H. Barber, of Wolcottville, Conn., for an Improvement in Seed Planters:

I claim the arrangement of the wheel, B, ratchets, F G, clicks, f g, shaft, C, rockshaft, c, spring, e, hopper, H, spring, h, slide, E, and shares, I J, as and for the purpose shown and described.

[This invention consists in arranging on the driving shaft two or more ratchet wheels with teeth of different fineness, so that the number and length of strokes of the seed slide can be regulated according to the nature of the seed to be sown and according to the ground in which the seed is to be deposit d. It consists also in combining the seed slide with a vertical flat spring passing through the center of the hopper in such a manner that by the action of said spring, the seed is stirred, and the filling of the seed cells facilitated.]

29,854.—Thos. Beach, of Freeport, Pa., for an Improvement in Steam Hammers:

I claim so constructing and arranging the piston rod and hammer shaft of steam and atmospheric hammers, as that the hammer shaft shall pass into or through the piston rod made hollow to receive it, in order that the length of the hammer shaft, below the cylinder, may thereby be capable of adjustment, without interfering with the length of stroke of the piston, substantially in the manner and for the purposes set forth.

29,855.—Benjamin Bogue, of Trenton, Iowa, for an Improvement in Horsepowers:

I claim the arrangement of the frame, A, and the wheel, B, the internal lead bars, a a, and the external lead and division bars, d, and e, substantially in the manner specified, for the purpose of applying horsepower internally and externally to the wheel, as is set forth.

29,856.—Reuben Brady, of New York City, for an Improvement in Tuck and Plait Folders:

I claim the construction of the confining plate, H, when hinged to the lower plate, A, for the purpose and in the manner shown and described.

I also claim the ledge, i, on the plate, P, when arranged to operate as and for the purpose set forth.

I also claim the arrangement of the plate, A, with the plates, F H, in the manner shown and described, whereby the said plate, A, serves to furnish an even bearing for the tuck being sewed, and also serves as a guide to the tuck last sewed, all as set forth.

29,857.—C. D. Brewer, of Lewisburg, Pa., for an Improvement in Machines for Dressing Millstones:

I claim the use of the plate, N, when the same is made adjustable on the pick carrier, D, by means of the slot, u, and screw bolt, V, or their equivalents, as described, and to operate in combination with the adjustable pawl, I, and lever arm, l, to enable the operator to vary the force of the pick, without varying the feed of the carriage, B, as set forth and described.

29,858.—T. E. C. Brinly, of Louisville, Ky., for an Improvement in Plows:

I claim the arrangement on the standard, D, and beam, A, of the ledges, a b, and shoulder h, to admit of the attaching of the standard to the landside moldboard and beam, as shown, in connection with the brace or rod, E, applied, substantially as and for the purpose set forth.

[This invention consists in a novel and improved way of attaching the standard of the plow to the moldboard and landside, whereby a very firm and durable attachment is obtained, and one that will admit of the standard being readily detached, if broken, and a new one adjusted in its place. The invention further consists in a novel arrangement of a cutter and the method of attaching the same to the plow, whereby a firm and stiff cutter is obtained and the durability of the plow increased.]

29,859.—Thos. Byrne, of Baton Rouge, La., for an Improvement in the Preparation of Flour:

I claim the bringing of flour of wheat and other grains in contact with carbonic acid gas, artificially manufactured.

29,860.—Thos. Byrne, of Baton Rouge, La., for an Improvement in Mode of Applying Sulphurous Acid to Cane Juice:

claim a method by which I treat cane juices with sulphurous acid gas and lime, or sulphurous acid gas and either of the earths, viz., baryta, magnesia, or strontia, so that no sulphite of lime, or sulphite of any of the above mentioned bases shall be formed in said cane juices, as set forth.

29,861.—Sharon Case, of Lumpkin, Ga., for an Improved Machine for Thinning Boards:

I claim the combination with a box, D, having an adjustable bottom operated by set screws, a a a a, of the feed roller, G′, arranged and made to operate as set forth, plane, A J, and pressure roller, G, the whole being combined and arranged substantially as and for the purposes set forth.

29,862.—C. T. Chester, of New York City, for an Improvement in Electro-Magnets:

I claim, first, In combination with cores confined, so as to prevent the action of the current through a surrounding helix from imparting motion to them. Helices wound on spools of hard rubber or other suitable material surrounding the cores, and so arranged that the cores may be removed from them when requisite, substantially for the purposes set forth.

Second, I claim holding, moving and adjusting the cores by means of the screw and spring, substantially as described.

Third, Coupling and supporting the helical spools by the double rings, substantially as described.

29,863.—L. S. Chichester, of New York City, for an Improved Sad Iron:

I claim a smoothing iron having a hollow spiral self-ventilating handle, and the edges of its rubbing surface provided with a groove, and otherwise constructed or shown and described.

[The object of this invention is to render the smoothing iron or goose much more efficient than those of usual construction, by facilitating the rubbing and pressing operation to which the fabric is subjected, and at the same time preserve all the facilities of the old iron in smoothing or ironing out the small folds in the fabric.]

29,864.—J. M. Cooper, of Pittsburg, Pa., for an Improvement in Revolving Fire-arms:

I claim the use of a locking bolt, such as described, operated by the trigger, spring, and trigger working on a collar on the trigger around the trigger pin, so as to prevent its action being interfered with by the pressure of the sides of the lock frame.

The use of a projection at the front end of the trigger, projecting through the lock frame, and pressing against the circumference of the rotating breech, in combination with suitable recesses in the circumference of the rotating cylinder, whereby when the trigger is not drawn back, and the parts are at rest, the cylinder will be secured from rotation in such a position that the end of the hammer will be situate between two of the nipples, and not upon or in front of any of them, thus avoiding in a great measure the danger of a premature or accidental discharge.

Also the arrangement of the trigger, hammer, and vibrating tooth constructed as described for the purposes described.

29,865.—A. B. Crawford, of Piqua, Ohio, for an Improvement in Threshing Machines:

I claim the cellular belt, H, as arranged, in combination with the vibrating belt, I, with the projections or fingers, f, teeth, g, and pins, h, and arms, I′, and stacker, S; all operating as set forth and for the purposes described.

29,866.—G. W. Efner and S. A. Sperry, of Ann Arbor, Mich., for an Improvement in Carriages:

We claim the hollow axle, B, in combination with the double spring catch, D, and the manner of operating the same by turning the spring within the elliptical opening at the outer end of the axle, as a mode of attaching and detaching the wheel.

We also claim the hollow axle, B, in combination with spiral spring, K, spring lever, I, and through brace, M, operating together in the manner described, as a carriage spring.

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29,867.—H. L. Emery, of Albany, N. Y., for an Improvement in Cotton Gins:

I claim the employment or use, within the saw chamber, A, of a cotton gin of a rotating cylinder or shaft, C, provided with spikes or teeth, c, for the purpose specified, substantially as set forth.

I also claim the arrangement, as shown, of the cylinder or shaft, C, within the saw chamber, A, to wit: providing the shaft with journals, a, which are fitted in openings, b, of sufficient diameter to admit of a necessary degree of lateral play or movement of the shaft, as and for the purpose specified.

I further claim, in connection with the journal opening, b, the disks or circular plates, D, attached to the shaft, for the purpose set forth.

29,868.—Daniel Fasig, of Rowsburg, Ohio, for an Improved Feeder for Straw Cutters:

I claim the combination with shaft, F, of the flanges, c c, tooth, e, rack handle, H, and rake, I, arranged and made to operate in the manner and for the purpose set forth.

[This invention is a self-feeder for moving the straw or stalks to be cut up, to the cutters as they are operated. It consists in operating a rake, by a novel arrangement, so as to give to it an advancing movement up to the cutters at each revolution of the crank-shaft that operates the knife; and said movement can be regulated at pleasure, to cut the straw longer or shorter.]

29,869.—D. Fellenbaum, of Lancaster, Pa., for an Improvement in Balancing Millstones:

I claim applying the weight, E, to the side of the revolving stone or runner, A, and in or about in a horizontal plane with its point of suspension, by means of a metal strap or band, D, or other suitable device, for the purpose specified.

29,870.—H. E. Fickett, of Glenn's Falls, N. Y., for an Improved Clothes-dryer:

I claim the dryer, constructed substantially as described, in combination with the standard, F, and ribbed socket, G; the whole arranged and operated as described and for the purpose specified.

26,871.—Luther Fogg, of Boston, Mass., for an Improvement in Skates:

I claim, first, The oscillating runner, being hinged to the stands projecting from the stock, substantially in the manner and for the purpose described.

Second, I claim the extension plate connected to the strap, substantially in the manner and for the purpose set forth.

29,872.—Albert Fuller, of Cincinnati, Ohio, for an Improvement in Hydrants:

I claim, first, The yielding valve, H, and waste valve, M, when combined, arranged and connected substantially as set forth, so as to permit the waste valve to operate alternating with the main valve, or remain inactive, at the option of the operator.

Second, The described combination of pipe or barrel, E, screw nozzle, F, guides, e, and casing, D; the said parts being constructed, arranged and operated as set forth, so that the hydrant may be removed bodily by unscrewing from above, and again replaced, without disturbance of the ground and without undue exposure of its base.

29,873.—M. A. Furbush and George Crompton, of Worcester, Mass., for an Improvement in Power Looms:

We claim connecting the two hand levers of the belt-shipper, one on each side of the frame, by combining therewith the sliding rod connected with one, so as to move therewith, and provided with shoulders on each side of the spring handle, and with a bevel or inclined plane, substantially as described, so as to enable the operator to stop or start the loom by one motion from either side of the frame.

We also claim the single lever under the breast beam, and passing through and working in a mortise in the side frame, substantially as described, in combination with the trip lever and spring lever of the shipper, substantially as described and for the purpose set forth.

And, finally, We claim giving support to the warp beam by means of one or more intermediate wheel or wheels, or equivalent thereof, in combination with a standard or standards fitted thereto, substantially as described.

29,874.—P. G. Gardiner, of New York City, for an Improvement in Cotton Presses:

I claim, first, The arrangement and combination of toggle joints and pawls, acting alternately on teeth or their equivalent, provided on a rod connected to the movable platen of a cotton press, and operating so as to move and supply alternately said rod and platen at stated intervals, whether the motion of the platen be upwards or downwards, in the manner and for the purpose, substantially as described.

Second, I claim the guide plate, M, provided with slots or guides, and operating the ends of the toggle joints and of the pawls, in the manner and for the purposes substantially as specified.

Third, I claim the lever, V, in combination with the forkpiece, X, operated by the lever, Z, acting on eccentric grooves, Y, attached to a wheel, W, in the manner and for the purpose specified.

Fourth, I claim the arrangement of the upper part, B', of the cotton box, with its movable sides and ends, for the purpose and in the manner substantially as described.

Fifth, I claim the combination of double toggle joints, working in reverse motion to each other, on teeth or notches attached to a rod fast to the movable platen, in combination with a guiding plate operated by a grooved cam wheel, and in combination with pawls; the whole being arranged and combined to work together in the manner and for the purpose, substantially as set forth and described.

29,875.—R. J. Gatling, of Indianapolis, Ind., for an Improvement in Hemp Brakes:

I claim, first, The oscillating heaters, B and C (as shown in Figs. 1 and 2), when constructed, arranged and operating in the manner and for the purpose substantially as specified.

Second, I claim the cam, D, cam yoke, F, curved lever, G, connecting rod, H, crank, S, rockshaft, K, lever, I, and connecting rods, L and R, treadle, P, and cord attached thereto, or their equivalents, when arranged and constructed substantially in the manner and for the purpose set forth.

29.876.—J. R. Gilbert, of Starkville, Ga., and S. R. Weston, of Dawson, Ga., for an Improvement in Cultivators:

We claim the arrangement of the handles, beams, hinged standards and hinged curved and notched braces, by which we are enabled to change the plow from a double beam adjustable cultivator plow to two single beam plows, substantially in the manner described.

29,877.—W. W. Golsan, of Autaugaville, Ala., for an Improvement in Cotton Cultivators:

I claim the arrangement of the cultivator point, L, and the central driving wheel, A, with the crank shafts, a a, the laterally-acting hoes, h h, and the uprights, F F', substantially in the manner and for the purpose set forth.

29,878.—W. W. Golsan, of Autaugaville, Ala., for an Improvement in Seed planters:

I claim the combination of cam wheel, c, agitating wheel, H, spring, e, and slide, d; the whole being constructed and arranged in the manner and for the purpose described.

29,879.—A. J. Graham, of Portland, Oregon, for an Improvement in Locomotive Engines:

I claim the arrangement of the yielding feet, F, and slides, E E, in combination with the double cranks, j j', rods, k k', and central shaft, G, as and for the purpose shown and described.

I also claim the employment of the double-beveled collar, m, in combination with the shaft, G, and sliding pulleys, H H', as and for the purpose shown and described.

[This invention consists in arranging on sliding cross-heads, which are connected by suitable rods and links to a common crank axle, a series of yielding toes or foot-pieces, in such a manner that, by rotating said axle, the foot-pieces are alternately drawn forward and pushed back on the ground, whereby a vehicle arranged in the proper relation to said foot-pieces is propelled on the ground.]

29,880.—John Greacen, Jr., of New York City, for an Improved Device for Discharging the Smoke, Cinders, &c., from Locomotive Engines:

I claim the combination with smoke pipes or tubes, arranged to convey the smoke from the front to the rear of the train, of reversible funnel connections, constructed and operating substantially as and for the purposes set forth.

29,881.—T. H. Green, of Fon du Lac, Wis., for an Improvement in Grain Elevators:

I claim the employment of the horizontally-revolving distributing spout, G, in combination with the bins, J, when the axis of rotation of said spout is arranged beneath the discharging mouth of the elevator, so that the grain may be conducted to any of the bins that are within the radius of the circle described by the outer end of the spout, G; all as shown and described.

I also claim the combination of the revolving spout, G, shaft, F, and index lever, H, with the elevating device, B, substantially as shown and described.

[This invention consists in attaching to a grain elevator-head an adjustable spout, so arranged and connected to an index arm or lever, that an attendant in the lower part of the storehouse or mill may adjust said spout, and cause the grain carried up by the elevators to be deposited in any of a series of bins, as circumstances may require or as may be desired for the purpose of storage of the grain.]

29,882.—Joseph Harris, Jr., of Roxbury, Mass., for an Improvement in City Railroad Cars:

I claim the arrangement and construction of a car, when made in the manner and for the purposes described.

29,883.—J. M. Hathaway, of New York City, for an Improvement in Augers:

I claim, first, The eccentrically-adjustable cutter, sliding on and held by the dovetail groove and tenon, as described.

Second, I claim, in combination therewith, giving a solid shaft or center to the auger, thus affording solid and sufficient metal upon which to form said tenon.

Third, I claim extending the spiral upon such solid shaft the entire length, and making the edge of said spirals sharp, for the reason given.

Fourth, I claim (in combination) making the center screw or worm removable, as described, for the reason given.

29,884.—Homer Hecox, of Rutland, N. Y., for an Improvement in Sap Conductors:

I claim, as an improved article of manufacture, a metallic sap-conducting tube, when made tapering in form and provided with a centrally-placed nose, b, and otherwise made as shown and described.

[This invention consists in constructing a sap-conductor or spile of a tapering metallic tube with a projection or nose on its upper side, so that the same may be driven firmly into the tree and that the bucket can be suspended from the conductor, thereby protecting the sap against the influence of the wind and keeping the bucket from tipping over.]

29,885.—M. W. House, of Cleveland, Ohio, for an Improvement in Harrows:

I claim constructing a harrow of the respective parts represented in the accompanying drawings, when the said parts are combined with each other substantially in the manner set forth.

29,886.—Michael Hauseman, of Huntington, Ind., for an Improvement in Corn-shellers:

I claim the jaws, 1 and 2, the hinge joint by which they are united, the handle, 3, the broad extremities of the jaws or blades, with the flange projections, 4 5 6 7, and the corresponding flanges on the opposite blade, the spring, 10, and the separating studs, 9; the whole being constructed and arranged in the manner before described, and operated and operating as set forth and for the purpose stated.

28,887.—Sidney Hudson, of Milford, Mich., for an Improvement in Self-acting Waste Gates for Mill-dams:

I claim the combination with the pivoted gates, B C, of the adjustable counterpiece, G, bent lever, F, rod, E, and connecting link, D, when all the parts are arranged and constructed to operate together as and for the purpose shown and described.

29,888.—J. J. Johnston, of Alleghany, Pa., for a Device for Teaching Children:

I claim the arrangement of the copy chamber, b, letter board, e, letter case, a, and hexagonal blocks, with the letters of the alphabet, punctuation points and figures impressed on them; the whole being arranged and constructed in the manner described, and for the purpose set forth.

29,889.—Wm. S. Kimball, of Rochester, N. Y., for an Improvement in Wine Presses:

I claim, first, The use of the perforated elastic apron, A, in combination with the rollers, R' R'' R''', in the manner and for the purpose substantially as described.

Second, I claim the use of the corded or enlarged edges of the apron, A, in combination with the grooved rollers (as shown in Fig. 4); the whole being arranged and operating in the manner and for the purpose substantially as set forth.

29,890.—J. W. Knapp, of Chester, N. Y., for an Improvement in Window-shutter Stands:

I claim the two posts with thin spikes, b b', one post being stationary and the other post jointed to a sliding piece, E, and prepared by an adjustable jointed piece, G; the whole constructed substantially as described and considered in combination, for the purposes set forth.

29,891.—Julius Koch, of South Adams, Mass., for an Apparatus for Trimming Paper:

I claim the combination of the box, E, provided with a flap, a, with the adjustable rotating cutting board, H, and with or without the gage, G, substantially as and for the purpose set forth.

[This invention consists in the use of a pressure box, operated by a screw or its equivalent, and provided with a flap or adjustable board, in combination with a pivoted cutting board and a gage board, all so arranged that the desired work may be very expeditiously and perfectly performed.]

29,892.—D. R. Lightner, of Bucyrus, Ohio, for an Improved Spring Bedstead:

I claim the arrangement of springs, C, batten, E, side rail, F, and elevating rack; the whole resting on the plank, A, across the middle of the bedstead.

29,893.—Daniel Lombard, of Boston, Mass., for an Improvement in Machines for Polishing Rice:

I claim the combination of the surfaces, a b and c, with stirrers, f, when all of these are covered with buckskin or other equivalent yielding material, and are of the form and relative arrangement described, operating together as specified to polish the grains of rice.

29,894.—Daniel Lombard, of Boston, Mass., for an Improvement in Machines for Scouring Rice:

I claim the described arrangement and combination of stirrers and stationary surfaces, of the form described, acting together in the specified manner.

29,895.—Henry Marcellus, of Amsterdam, N. Y., for an Improvement in Mowing Machines:

I claim, first, The combination of levers, F and H, or their equivalents, a caster, or its equivalent, and a double-hinged main frame, for the purpose of raising, lowering and holding up both ends of the finger beam, substantially as set forth.

Second, In a mowing machine whose main frame and finger beam are rigidly connected, and are free to vibrate up and down transversely to and parallel with the path of the machine, supporting the driver's seat on the axle of the driving wheel in such manner that it will be unaffected by the lateral vibratory movements of the main frame or the turning of the main axle, substantially as described.

29,896.—G. B. Markham, of Mead's Mills, Mich., for an Improvement in Self-acting Floodgates:

I claim the arrangement of the flanges, b, and adjustable bar, a, substantially as specified, so that the size of the discharge opening can be regulated at pleasure.

[The object of this invention is to arrange the gates especially in small streams, which are liable to swell considerably from a heavy shower, and to cause a break in the dam in such a manner that they are self-opening as soon as the water reaches a certain high water mark, and that they let the water out before it does any damage.]

29,897.—W. D. Mason, of Jarratt's Depot, Va., for an Improvement in Sowing Machines:

I claim the combination of the rotating screws, F, with the hoppers, D E, when the latter are divided at their lower part into compartments, c, and chambers, d, substantially as and for the purpose specified.

I further claim, in connection with the hoppers, D E, the rotating fan, L, and inclined board, M, as and for the purposes set forth.

[This invention consists in the employment or use of a rotating screw as a feeder or discharge device, to distribute the seed or manure from the hopper.]

29,898.—T. J. Mayall, of Roxbury, Mass., for an Improvement in the Manufacture of Flexible Gas Tubes:

In the manufacture of flexible tubes and other articles which are used for the purpose of conducting or retaining illuminating gas or other gaseous fluids, I claim the use of a vulcanizable soft india-rubber compound, containing gum shellac as an essential ingredient.

29,899.—Wm. McAllister, of Gerry, N. Y., for an Improvement in Pressing Cheese:

I claim, first, The application and use of the crevice hoop, Fig. 1, constructed and used as and for the purposes specified.

Second, I claim the application and use of the head clothes specified, the same being made and used as and for the purposes described.

29,900.—John McKinney, of Lansing, Mich., for an Improvement in Railroad Car Couplings:

I claim giving such a shape to the head of the spring-actuated shaft, P, and such a degree of strength to its spring that the flathead of the link, L, when placed within the buffer frame, will be so closely embraced between the said spring-actuated head and the draught pin as to retain said link in a horizontal position when unemployed, substantially as set forth.

When the head of the spring-actuated shaft, P, and the draught pin, I, bear the described relation to each other and the buffer frame, I also claim the vertical tube, G, which rises from the draught pin aperture in the upper plate of the buffer frame, and serves the purpose set forth.

29,901.—Albert Moffet, of Bristol, Ohio, for an Improved Machine for Marking Waving Patterns:

I claim the lever, M, sliding bar, O, and arm, S, arranged and operated in the manner and for the purpose specified.

I also claim the moving fulcrum, N, in combination with the connecting rod, P', and wheel, P, operated as and for the purpose specified.

29,902.—J. A. Naylor, of Rahway, N. J., for an Improvement in Extension Carriages:

I claim the arrangement of the draw front, B, folding seat, G, and seat, F, substantially as described and for the purposes set forth.

29,903.—Stewart Neill, of Chillicothe, Ill., for an Improvement in Harrows:

I claim the combination and arrangement of the teeth, E, toothed roller, C, and markers, D, substantially in the manner specified and shown.

29,904.—W. T. Opie, of Scarboro', Ga., for an Improvement in Cotton Presses:

I claim the combination of toggle levers applied to the follower, and having friction rollers at their joints, as set forth, when these levers are acted upon by the arm, I, pressing against their rollers, and extending them as described, and when said arm is itself operated by arm, J, connecting rods, K K, link and lever, M, as described and represented.

[This invention consists in applying power to the follower, which is moved by means of a peculiar arrangement of toggle-joints, with friction rollers applied at their knees and joints, which are acted upon by a number of compound levers, so as to extend the joints and force up the follower rod with great force, and at the same time as rapidly as possible, the motion being given to the parts by horse or manual power, as it may be found most convenient.]

29,905.—E. W. Ormsbee, of Montpelier, Vt., for an Improvement in Apparatuses for Collecting Sap from Trees:

I claim the cover, 1, the ledges, 2 2, the spring, 3, hooked or bent at the ends, as described, and the points, 4 4, when the whole are combined and arranged with each other in the manner described and for the purpose stated.

29,906.—John Osborn, of Mount Carmel, Conn., for an Improvement in Aqueducts:

I claim, first, The arrangement of the valve chest, E, with valves, e e', in combination with the reservoir, A B, pipes, C D, and pipe, F, constructed and operating substantially as and for the purpose set forth.

Second, The arrangement of the swinging box, G, in combination with the valve stem, f, valves, e e', and reservoirs, A B, constructed and operating substantially as and for the purpose specified.

Third, The arrangement of the float, l, lever, m, valve, k, aperture, n, and valve, o, in combination with the two chambers, j j', of the box, G, constructed and operating substantially as and for the purposes described.

Fourth, The combination with the box, G, reservoirs, A B, and pipe, F, of the faucets, M and O, operating substantially as and for the purposes set forth.

[The object of this invention is to arrange an aqueduct in such a manner that, by a simple and ingenious device, the head of the water passing through the aqueduct can be changed and the supply of water increased to suit circumstances.]

29,907.—A. R. Park, of Columbia, Texas, for an Improvement in Seeding Machines:

I claim a rotary seed-distributor, composed of drums, c c, and longitudinal spiral strips, e e, for distributing different kinds of seed, in combination with the reciprocating yielding apron, D, and a seed hopper, substantially as and for the purposes set forth.

[This invention relates to a machine for sowing seed broadcast in drills or in hills, and for sowing cotton, corn and all other kinds of

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seed. It consists in arranging in the bottom of a seed hopper, which is furnished with a reciprocating yielding slide or agitator for the seed in the hopper, a shaft having cylindrical heads on each end that are provided in the seed cells, which heads are connected together by strips of metal running spirally around the shaft that forms long channels, which conduct seed from the hopper and deposit it into the ground.]

29,908.—Homer Parmalee, of Philadelphia, Pa., for an Improvement in Molding Metal Pipes:

I claim forming molds and cores for the casting of cylindrical objects of metal by means of the pipe, D, with its flange, e, when the said pipe and flange are caused to revolve in a chamber around any desired object to rise as the mold or core is being formed, and to impart, by its weight, the desired solidity and uniformity to the mold or core, as set forth.

29,909.—E. G. Pomeroy, of New York City, for an Improved Method of Converting Iron into Steel:

I claim the conversion of iron into steel by its treatment in the molten state with the compound of potash or other alkali, carbonate of lime, oxyd of manganese and charcoal, substantially in the manner specified.

[This invention consists in a very simple and cheap mode of converting iron into steel.]

29,910.—Milo Peck and Charles Peck, of New Haven, Conn., for an Improvement in Drop Presses:

We claim the making and constructing of puppet heads to drop and other presses with cylindrical shanks, and fitting the same to anvils between raised ledges, or their equivalents, substantially as described and set forth.

29,911.—August Pernot, of Chilton, Wis., for an Improved Machine for Sawing Shingles:

I claim the arrangement of the reciprocating frames, B B, provided with rack bars, F F, and operated by means of the shaft, G, and bar, K, when used in connection with rocking tables, H H, the saw, J, plate, a, the clamp, c, and the bar, d; the whole being constructed, combined and operating in the manner and for the purpose specified.

29,912.—S. L. Pionnier, of New York City, for an Improvement in Shipbuilding:

I claim a ship or vessel constructed with the timbers in close contact, in combination with the wire or metallic supports running fore-and-aft and athwart ships, substantially as and for the purposes shown and described.

[The object of this invention is to increase the strength and the safety of seagoing vessels, and it consists in putting the ribs or frames of the vessel in close proximity, and in binding them together by suitable chains or wire ropes, thereby dispensing entirely with what is technically called "room and space," or the distance between the frames.]

29,913.—B. S. Pringle, of Barnesville, Ga., for an Improved Bedstead:

I claim attaching the four feet to their respective legs by a rack and pawl in the manner described, and pivoting these legs to the rails of the bedstead frame, as and for the purposes set forth.

[This invention consists in using four legs, each having two feet, one being placed at the head, one at the foot and one at each side of the bedstead frame, which legs are pivoted to the rails, and the heed and foot legs are so constructed that they may be lengthened or shortened, and fixed at any desired point of adjustment, to raise or low the head of the bedstead.]

29,914.—J. W. Ramsay and Daniel Wilson, of Grafton, Va., for an Improvement in Portable India-rubber Bathing Tubs:

We claim an india-rubber bathing tub, provided with double sides, in connection with the screw valve, a, or its equivalent, and arranged substantially as and for the purpose set forth.

29,915.—G. G. Ray, of Boston, Mass., for an Improved Steam Reed Instrument:

I claim the chamber, D, communicating with a steam boiler, and furnished with one or more orifices or slots, i, and corresponding reeds, m, substantially as described, for the purpose specified.

29,916.—John Revere, of Boston, Mass., for an Improvement in Sheathing Ships, &c.:

I claim the application to the inner surface of metallic sheathing of a ship, or other vessel, and with respect to the bottom of the vessel, as described and for the purpose set forth, of an ins lating material or composition of the character specified.

I also claim, in combination with such an application of such an insulating composition, extending it between the laps of the metallic sheets of sheathing, as and for the purpose explained.

29,917.—Louis Schneider and J. A. Montgomery, of Williamsport, Pa., for an Improvement in Self-acting Draw-bridges:

We claim the self-acting drawbridge described, capable of being turned in either direction by a passing vessel and closing itself with a constant force from any position, in the manner substantially as set forth.

29,918.—G. C. Selfridge, of North Greenfield, N. Y., for an Improvement in Pumps:

I claim a pump constituted of an upper and lower chamber, the upper chamber being of one-half the area of the lower one in diameter, placed one above the other, having a solid piston moving in the upper and a valved piston moving in the lower chamber, both attached to the same rod and operating in combination with a fixed valve seat and its valves below the discharge orifice lying between the pistons, the whole arranged and working together in the manner and for the purposes set forth in the above specification.

29,919.—Thos. Sheehan, of Dunkirk, N. Y., for an Improved Method of Converting Iron with Steel:

I claim, first, The liquid composition consisting of the ingredients used, compounded in or in about the proportions specified and described.

Second, The compound for steelifying wrought iron made of the liquid composition and flour, in the manner and for the purposes set forth.

29,920.—H. C. Smith, of Clarksville, Ohio, for an Improvement in Mortising Machines:

I claim the pitman, H e, link, I, and pin, d, operating in connection with a reciprocating rotary cutter head, F, in manner substantially as and for the purposes set forth.

29,921.—W. S. Smith, of Trenton, N. J., for an Improvement in Driving Piles by Atmospheric Pressure:

I claim the supplementary air-lock, D, applied substantially as described, in combination with the main air-lock, and serving the purpose specified.

29,922.—J. M. Spencer, of Enfield, Maine, for an Improved Hand-mowing Machine:

I claim the arrangement of the serrated cutter, F, two sets of gears, K L, two cranked shafts, I I, and the belts, G G (applied to such cutter and cranks), substantially in manner and to operate as described.

29,923.—H. D. Stover, of New York City, for an Improved Planing Machine:

I claim, first, Constructing that part of the dogging apparatus, E′, carrying the dogs, F′, with adjustable and variable inclined planes, J′, pressing against pine or surfaces, A4, attached to the platen, B, so that any desired pressure by the adjustable planes, J4, may be given, both to press the dogs forward into the lumber and hold them securely down to the platen by the turning of a single screw, H′, essentially in the manner described.

Second, The combination of the downward drawn guide bar, C7, with the dogs, F′, crossbar, L′, and revolving nut, G′, substantially in the manner and for the purpose set forth.

Third, The employment of flat cutters, beveled on their outer surface and parallel to the axis of the cutter head; the cutting edges being in the surface of a cylinder whose axis is co-incident with the axis of motion, so as to impart a drawing stroke, substantially as set forth.

Fourth, The combination of the cutting cylinder, U2, formed with recesses, r, and pressure edge, v, with the peculiarly-constructed cutters, V2, and the devices by which they are adjusted upon the cutter head and secured thereto, substantially as specified.

Fifth, So co structing, arranging and combining the parts constituting the roll feed, i e, the shaft, X′, the pinions, A2 B2 C2 and Z′, or their equivalents, and the platen feed, f e, shaft, X′, lever sleeve, P2, arms, R4 and S2, and pinions, P5 and Q2, that, by the act of lowering the rolls to be used, its feed is connected and the platen feed disconnected; and by the raising of the rolls, the feed is connected with the platen, substantially as set forth.

Sixth, Making the platen in two parts, B and C, with a ball, F, between, so that the top part may be tipped universally and secured by straps, n, or otherwise, in any position, so that a piece may be planed level and parallel in thickness, or tapering, as set forth.

Seventh, So constructing the feed roll boxes, R′, that they carry the pressure within them, so as to be invariable under any elevation of feed roll, substantially as described.

Eighth, I also claim the feed rolls, O′ and O2′, their frame, Q′, and the platen or rest, B6, firmly affixed thereto, and to come under the cutting cylinder when in use if desired, so as to always be level and on a line with top of the lower feed roll, O2, with or without matching cutters, J2, as set forth.

Ninth, I also claim rollers, B4, connected adjustably to the bed-piece, A, to wholly sustain and guide the movable platen, B and C, or in connection with tracks, N′, so as to receive the weight of the timber on the rollers, B4, and its guidance from the tracks for the easy movement of platen when carrying loads, as set forth.

Tenth, I also claim so combining friction feed apparatus, consisting of lever, L, having its fulcrum at Q, and its belt wheels, N A′ and B′, and its friction rolls, O and P, and wheel, G, on shaft, X′, with the platen, B and C, that a heavy piece of timber may be gradually and easily started into motion, stopped suddenly and reversed, and obviate the shock and destruction of parts consequent on starting suddenly, as described.

Eleventh, I also claim so constructing and combining matching cutters, X and W, with the movable platen, B and J2, with feed rolls, O′ and O2′, that a cutter will automatically find and correctly match the entire length of each edge of a board or piece regardless of its taper, with or the direction it passes through the machine, as described.

Twelfth, I also claim forming mouth pieces or openings, e, between the teeth, c, of the solid dogging racks, B10, to prevent shavings and chips lodging and clogging therein, all substantially as described and for the purposes fully set forth.

29,924.—J. C. Teague, of Center Hill, Miss., for an Improvement in Cotton Scrapers:

I claim the arrangement and combination of the cast iron box, G, with inclined bottom and balanced sides, bar, C, for attaching to the beam and movable weights, to i crease or diminish the weight of the scraper and keep it balanced, substantially as specified.

29,925.—W. D. Thomas, of Morristown, Vt., for an Improvement in Furnaces:

I claim the arrangement of the side flues and dampers relatively to the pan, as and for the purpose set forth.

29,926.—W. H. Towers, of New York City, for an Improved Broom:

I claim the broom constructed of broom-corn and strips of cane or reeds, substantially as described, as a new article of manufacture.

29,927.—N. K. Wade and Joseph Kaye, of Pittsburgh, Pa., for an Improvement in Car Wheels:

We claim the use of arms or spokes of wrought iron, or other flexible material, of single or double curvature, and so placed in the hub and rim as to afford a lateral brace, substantially as set forth and shown in the accompanying drawings.

29,928.—Maximilian Wappich, of Sacramento, Cal., for an Improvement in Cotton Presses:

I claim the ratchet frames, f f, and pawls, 6 6, acted on by the roller, e, and fluted wheel, c, as and for the purposes specified.

29,929.—E. P. Whitney, of Westfield, N. Y., for an Improvement in Locks:

I claim the construction of the latch, C, with double projections, d and f, so that the lock may be used as a right or left hand lock, as desired, by merely turning the latch, C; all as shown and described.

[The object of this invention is to render locks and latches capable of being reversed so that one and the same lock or latch may, without being inverted, be applied to a right or left hand door.]

29,930.—D. H. Whittemore, of Lynchburg, Va., for an Improvement in Hay and Straw Cutters:

I claim, first, So arranging the feed teeth, M M, &c., upon a revolving cylinder or flanges, that said cylinder or flanges will, while revolving with the half of said teeth, both draw the feed forward, and in passing by a stationary knife, cause it to be cut off substantially as described.

Second, I claim combining with said cylinder, the spring board, G, in the manner and for the purpose substantially as set forth.

Third, I claim combining with said cylinder and sp ing board, the stationary knife, O, substantially as described.

29,931.—E. S. Wicklin and J. D. Weaver, of Carlinville, Ill., for an Improvement in Carriages:

I claim a buggy seat, divided or not, hinged to the back end of the floor of the buggy and furnished with stepping boards on its under side, substantially as set forth, so as to serve the two-fold purpose of a seat and as steps by which to enter or leave the buggy from behind.

29,932.—C. A. Wilson, of Cincinnati, Ohio, for an Improvement in Steam-heating Apparatus:

I claim a tubular radiator communicating at bottom with a steam pipe, A, and its upper and free end discharging into the atmosphere through an aperture guarded by an automatic valve; the whole being constructed and operating substantially as and for the purposes set forth.

29,933.—David Wooster, of Seymour, Conn., for an Improvement in Lightning Rods:

I claim, first, Firmly securing together the ends of the rod, A, and the sleeve, B, by means of the grooves, c c, as described.

Second, I claim the treble jointed piece, F, when ma e out of sheet metal substantially as described.

29,934.—G. W. N. Yost, of Yellow Springs, Ohio, for an Improvement in Cultivators:

I claim the arrangement of sockets, b, with beam, A, and standards, a—the whole being constructed as and for the purpose described.

29,935.—J. F. Hall, of Bangor, Maine, assignor to himself and G. L. Kelty, of New York City, for an Improved Curtain Fixture:

I claim constructing the spool in two parts, one of which is affixed to the roll, and the stem of the other plays into the end of the roll, and is acted upon by a spring to push it out, thus keeping one of the flanges always in contact with the end of the roll, as set forth.

[This invention consists in forming the pulley spool around which the cord that regulates the movement of the curtain roller is wound, in two parts, the stem of one playing through a hole in the center of the other; this allows an end play to the spool.]

29,936.—Justus Ask (assignor to himself and J. H. Case), of Lyons, N. Y., for an Improvement in the Construction of Dental Chairs:

I claim the combination of the fixed screw, F, nut wheel, G, and its appurtenances, movable seat, D, and frame, A, arranged and operating substantially in the manner and for the purposes shown and described.

I also claim the arched supporting frame, A, with the seat frame, B, hinged thereto, in combination with the adjusting lever, J, and bail, k, arranged and operating substantially as and for the purposes set forth.

I also claim the supplementary seat arms, S, substantially as and for the purpose described.

I also claim the bellows-formed diaphragm, R, in combination with the movable seat and frame, B, substantially as set forth.

29,937.—A. F. Hines (assignor to himself and B. A. Kidder), of Washington, D. C., for an Improvement in Seed Planters:

I claim the arrangement of two reciprocating valve slides, D F, the s rfaces of which are smooth and without recesses or perforations, in combination with an arm, E, lever, L, and spout, B; one valve working through an aperture, C, in the side of the spout, while the other valve, F, works in contact with the under face of the spouts—constructed in the manner and for the purposes set forth.

29,938.—J. M. Long (assignor to himself, Peter Black and R. Alstatter), of Hamilton, Ohio, for an Improvement in Harvesters:

I claim lever, I, toothed slide, c, bar, f, band, e, and braces, g g, constructed, arranged and operating substantially as described in connection with draft pole, A.

29,939.—F. A. Pratt (assignor to himself and G. S. Lincoln & Co.), of Hartford, Conn., for an Improvement in Device for Stopping and Changing Motion:

I claim the combination of the levers or clamps, e, disk or collar, j, substantially as and for the purpose described.

Second, I claim the application of a wedge collar, l, or its mechanical equivalent for the purpose of operating the said levers or clamps, e, as described.

29,940.—J. H. Reed, of Penn Township, Pa., assignor to himself and L. J. Crans, of Clearfield Borough, Pa., for an Improvement in Machines for Cleaning Buckwheat, &c.:

I claim one cylinder revolving in another, the inner or revolving cylinder so grooved that while conducting the buckwheat or other grain from the place of feeding to the place of discharge the grain shall pass through a regularly diminishing space and thus be scoured or cleaned, as above set forth.

29,941.—August Schmidt (assignor to himself, Charles Schmidt, Edward Schmidt and Herman Schmidt), of New York City, for an Improvement in the Mode of Making Gas from Wood:

I claim the manufacture of illuminating gas from wood by the successive processes set forth.

29,942.—George Williamson (assignor to L. S. Goble and H. E. Richards), of Newark, N. J., for an Improved Machine for Chamfering Veneers:

I claim the combination of the adjustable ways, B B, the frame, C, spring clamp, D, and spring, m, substantially in the manner and for the purposes described.

RE-ISSUES.

M. A. Dietz, of Brooklyn, N. Y., for an Improvement in Lamps. Patented Sept. 8, 1858:

I claim an air chamber in combination with the chamber formed by the concavity of the deflector of a lamp top, substantially as described.

I also claim the combination of an air chamber for supplying air to the interior of the cone with openings for the admission of air on the outside of the cone, between the latter and the inside of the chimney, substantially as set forth.

I also claim forming a communication between the oil chamber and the cone chamber, o, by means of openings in the shell of the lamp top, substantially as described for the purpose set forth.

E. W. Goodale, of Clinton, Mass., for a Machine for Making Paper Bags: Patented May 29, 1855:

I claim, first, Cutting off the paper from a continuous roll, in a machine for making bags, by a cut of such form that when a bag is completed, one side of the mouth is caused, by the form of said cut, to project beyond the other side, substantially as represented in Fig. 12, to afford facility for opening the bag and to form a flap for closing the mouth.

Second, Giving the blades of the side shears, J J′ J J′, a curved angular or irregular form near the point, for the purpose of cutting out, each by a single cut, the whole piece necessary to leave the lap on one side of the bag, substantially as represented in Figs. 4 and 10.

Third, Hanging the movable blades, J′ J′ of the said shears on shafts or pivots, j j, perpendicular to their faces, for the purpose of allowing them to cut slightly across the fixed blades by a slight lateral movement which they receive simultaneously with the movement usually given to shears, substantially as described

Fourth, The intermittently rotating folder arranged and operating substantially as described, to receive the bag pieces from the feed apron, L, after the cutting and pasting operations, and to support or partly support them until the creasers come into their operative positions, and afterwards to fold them over the creasers.

Fifth, The combination of the side lappers, N N, and the folding stands, d d, substantially as described, that is to say, the stands being so placed as to support the bag piece and the creasers during the folding and lapping operations, and to allow the folder to pass between them, and the lapping pieces being attached to the said folding stands in such a manner as to be capable of falling over those creasers which are supported by the folding stands. This I claim irrespective of any manner of operating the lappers, and whether the folding stands have the lateral movement described or are stationary.

Sixth, The toothed roller, T, hung in a frame, T′, from the axle of one of the pressing and delivery rollers, and operating substantially as described, to commence the removal of the bags from the creasers.

Seventh, The general arrangement and combination of the several working parts of the machine substantially as described.

[This re-issue embraces an important claim in the man facture of paper bags.]

A. M. Mace, of Springfield, Mass., for an Improvement in Vapor Lamps. Patented June 22, 1858:

I claim, first, Combining the cap or heat retainer, H, with vaporizing tubes or retorts constructed substantially as described, when so arranged over the flame as to operate in the manner set forth.

Second, I also claim the combination of the heat retainer, H, and vaporizing tube, connected substantially as described, with the elevated reservoir; the whole arranged and operating with respect to the valve, C′, and burner, K, as set forth.

Third, The syphonic vapor or gas generating tube or retort, B A, or its equivalent, whereby the material from which the gas is generated is carried over or above the flame of the gas or vapor burner and subjected to the heat of the flame issuing therefrom, and converted into gas or vapor, substantially as set forth.

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ADDITIONAL IMPROVEMENTS.

W. C. Banks, of Como Depot, Miss., for an Improvement in Corn Planters. Patented May 1, 1860:

I claim, in connection with the seeding wheel, F, with its flanges, b, spring clearer, d, and adjusting device, C, as therein claimed, the spring holder, r, surrounding a portion of the seeding wheel, to prevent the seeds from dropping from the cells until said cells arrive at or over the exit opening, as fully set forth and represented.

T. J. Jolly, of Olean, Ind., for an Improvement in Machines for Loading Hay. Patented June 26, 1860:

I claim the sectional gathering teeth, F, constructed of stationary sections, f, and sliding sections, f′, combined and operating in a machine for loading hay in the manner and for the purpose set forth.

EXTENSIONS.

J. S. Gwynne, of New York City (formerly of Pittsburgh, Pa.), for an Improvement in Separating Oleic and Stearic Acids. Patent dated Sept. 3, 1846:

I claim the application of heat through a liquid or aeriform medium to the mass to be pressed, in such a manner that the said mass before it is subjected to pressure shall be heated gradually and uniformly throughout, to such a degree that while the stearic acid is at no time during the process melted, the oleic acid is rendered fluid enough to be afterwards expressed in the manner above described.

J. H. B. Latrobe, of Baltimore, Md., for an Improvement in Stoves. Patent dated Sept. 5, 1846:

I claim the employment of a stove such as described, so constructed and placed within the ordinary fireplace as to heat the room by its direct radiation as well as by heating air entering the room from outside, as described, serving the double purpose of a stove and hot air furnace.

DESIGNS.

Marie L. Livingston, of New York City, for a Design for a Medallion of Washington Irving.

N. S. Vedder, of Troy, N. Y., assignor to North, Chase & North, of Philadelphia, Pa., for a Design for Stoves:

Notes & Queries

CORRESPONDENTS sending communications for publication in our columns are requested to avoid writing on both sides of a sheet of paper. This fault, though common to persons unaccustomed to writing for the press, gives great trouble to the printer (especially in long articles), and, when combined with illegibility of handwriting, often causes interesting contributions to be regretfully consigned to our waste-paper basket.

C. C. D., of Ind.—Corn can be kiln dried in a very superior manner in a kiln similar to a malthouse. The floor should be made of tiles, with the flues of the furnaces conducting the hot air running underneath. Corn is often kiln-dried by steam conducted through the grain in pipes. Mr. Bulkley, of Kalamazoo. Mich., is engaged in the business of erecting steam drying kilns, and can give you any further information on the subject. The corn only requires to have its surplus moisture expelled, and is not "roasted like pop corn."

J. P. H., of Va.—You will find a series of articles on oilers, furnaces, and chimneys, in Vol. XIII. (old series) SCIENTIFIC AMERICAN, commencing on page 334. The common rule to be observed in constructing chimneys for stationary engines is to allow 1¼ square inches area inside for every pound of coal consumed per hour, and 3¼ inches in hight. A chimney 80 feet in hight by this rule is suitable for burning 300 lbs. of bituminous coal per hour. A chimney 100 feet in hight, and 450 square inches area inside, will afford a good draft for your 8 by 100 feet boiler, if you make a good thick wall, and have it plastered smoothly inside. Why do you get such a long boiler? We believe that one 30 feet in length would answer your purpose fully as well.

E. D. & Co., of Pa.—We do not believe that glue can be manufactured economically from old leather, because it requires a great amount of caustic alkali to remove the tannin before the gelatine will dissolve and become glue. The tannin can be removed from leather by strong caustic alkalies and frequent washings.

L. C. H., of Mass.—Bread raised by yeast is the best and most wholesome. If you can get a Frenchman to teach you to make bread, you will beat all Americans.

T. H. McC., of Ill.—The steam and water in a boiler are both of the same temperature at all pressures. If the pressure is 60 lbs. on the square inch, the temperature of steam and water is 305° Fah.

D. T., of Pa.—Your article on flying was crowded out.

H. B., of N. H.—You will find a new mode of silver-plating described in our last issue, page 176.

H. L. P., of N. Y.—The other natural curiosities of Florida would be more interesting; we have heard enough about the silver spring.

J. B. C., of Tenn.—Your article does not raise a doubt in our minds in regard to birds' flying by the power of their muscles.

H. R. A. B., of Mass.—Your article was prepared once for the printers, with an editorial in reply, but it got postponed, and you have doubtless seen the whole subject discussed since in our paper with a full illustration of Stevenson's wheel. Theoretically, the whole power, not half merely, can be imparted by percussion.

J. P. M., of Ill.—We do not believe that what you call hair snakes are formed from horse hairs. In order to convince people of that, it would be necessary to conduct your experiments in such a manner as to leave no possibility for the reptile to be produced in the ordinary way.

W. B. L., of Ill.—Your engine of 14 inch stroke may be run at the rate of 172 revolutions per minute—a 400 feet speed of piston. This is believed to be a good speed for such engines.

A. P., of Ga.—We have found no difficulty in dissolving india-rubber perfectly in refined turpentine. Cut the rubber into shreds, place it in the turpentine in a close vessel heated to about 90° or 100°, and stir occasionally, and if the rubber is pure it will not be long before it is perfectly dissolved.

C. K., of C. W.—We have never seen pans made of sheet iron employed for boiling down maple sap. We believe they would soon wear out, as the sap would exert a slight, acidulous action upon the metal. The best thing you can do, next Spring, is to make an experiment with one or two pans twelve feet long, four feet wide and one foot deep. This is the only safe way for you to proceed, and the expense will not be very great.

H. F. N., of Ohio.—Benzole will destroy the gloss of oil in painting, like turpentine, but is very dear in comparison with it. We do not know a good substitute, all things considered, for turpentine in oil painting.

L. P. L., of M. H.—An inferior kind of wood may be easily made to imitate mahogany by those who are skillful in the art of staining. Common white wood is now made to resemble maple, black walnut, rosewood and mahogany, in all our cabinet manufactories. The mahogany stain is made with a strong decoction of fustic, a little redwood and logwood, mixed with some varnish.

J. S. D., of N. J.—The teeth of saws are cut by the manufacturer with large punching machines. You will find an illustration and description of the operations on page 126, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN.

J. M. K., of Conn.—Warm turpentine will soften hard putty, but you will find it much easier to scrape the putty off your broken window, with a knife, than to soften it with any solvent known to us.

J. E., of N. C.—The most recently published work on dyeing in our country, you can obtain from J. Wiley, 56 Walker-street, this city; its price is $5.

G. H., of Summit.—Your phonometer appears to be new, and we should think a patent could be obtained for it. When you write to us again, please advise us in what State you reside.

J. D., of Mass.—To enable us to judge of the probable novelty of your inventions we shall require sketches and descriptions of each. These you can prepare and send us by mail.

W. B., of Pa.—Your suggestion will be complied with so far as is in our power.

M. J., of Mass.—We have never been at Sevastopol, but have been informed that the American company employed for raising the sunken vessels in that harbor, first inclose them with tarpaulins, then pump out the water; after which they are raised without much difficulty with water camels.

F. B., of N. Y.—Take plaster-of paris and make it into the consistency of putty, with a strong solution of alum, and then bake it in a fire for half an hour. When cool, reduce it to powder, then mix it to the consistency of paste with water and burr grit, to fill up the holes in your millstones. This is the best cement for the purpose known to us.

H. C., of N. Y.—If the patentee to whom you refer proposes to apply for an extension of his patent, he should do so within the next two months. We are prepared to undertake the case, and will attend to it at once. Let him send us a complete statement of his receipts and expenditures, also what efforts he has put forth to introduce his invention into use. Of the value of the invention there cannot be much doubt.

O. G., of Pa.—Our pamphlet of advice to inventors contains all the information you desire about caveats. We send you one by mail, free of charge.

MONEY RECEIVED

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Sept. 8, 1860:—

A. C., of Mass., $30; I. M., of Ohio, $30; J. H. B., of N. Y., $30; M. A. R., of N. Y., $25; B. F. C., of Conn., $25; B. F. K., of R. I., $35; H. B., of Ill., $30; G. W. H., of Pa., $30; S. L. B., of S. C., $25; W. H., of Ill., $35; D. & W. W. B., of Iowa, $25; W. L., of Conn., $30; L. S. G., of Ky., $40; G. N. C., of Conn., $30; J. E. S., of Maine, $32; L. W. E., of Mich., $20; J. Y., of Ohio, $30; C. W. S., of Ala., $30; J. H. B., of Ohio, $30; D. D., of Pa., $30; J. H. B. S., of Ga. $30; J. F. E., of N. Y., $30; W. H. S., of N. Y., $25; O. B. L., of N. Y., $30; D. E. T., of N. Y., $30; G. P. R., of Mass., $25; G. J. C., of Vt., $25; C. C. S., of Fla., $30; J. S. N., of Cal., $45; W. S. K., of Conn., $30; A. H., of N. Y., $15; J. C. C., of Conn., $280; C. W. F., of Ill., $30; J. R., of Mass., $30; J. M., of Maine, $55; T. J. W., of Conn., $30; J. T. M., of Ill., $20; H. W., of N. J., $30; G. C. A., of Ky., $25; H. C., of Conn., $30; E. S., of N. Y., $25; D. A. P., of Ind., $25; C. A. W., of N. J., $30; D. M. of N. Y., $20; J. E. A., of Ill., $55; E. R. P., of N. Y., $30; J. H., of Ind., $30; D. F. E., of Mass., $20; J. & D., of Pa., $50; J. C., of Iowa, $25; J. L. G., of Ga., $5; P. D. V., of N. Y., $10; W. H. T. of Ohio, $30; S. C. St. J., of N. Y. $30; W. A. C., of Ill., $250; W. W. G., of Mass., $50; G. W. R., of N. Y., $30; S. C. S., of N. Y., $30; U. B., of Mass., $30; T. M. T., of Ohio, $25; M. & S., of Ga., $40; I. N. Y., of Ind., $15; E. T., of Maine, $25; J. & E., of Ill. $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Sept. 8, 1860:—

M. & S., of Ga.; S. J. H., of N. Y.; T. M. T., of Ohio; U. B., of Mass.; E. T., of Maine; J. H. D., of N. Y.; G. G., of N. Y.; C. C., of N. Y.; J. M. B., of Maine; G. J. C., of Vt.; A. K., of Wis.; G. P. R., of Mass.; G. O. G., of N. Y.; H. L. N., of N. Y.; J. & D., of Pa. (2 cases); J. L. G., of Ga.; D. F. E., of Mass.; G. D. W., of Mich.; J. C., of S. C.; P. D. V., of N. Y.; D. A. B., of Ind.; M. A. R., of N. Y.; D. P., of Ill.; B. F. K., of R. I.; D. A. P., of Ind.; B. F. C., of Conn.; E. S., of N. Y.; C. S. S., of N. Y.; J. C. C., of Conn.; H. C., of N. C.; G. C. A., of Ky.; J. A. B., of N. Y. (2 cases); J. N. Y., of Ind.; E. R. P., of N. Y.; W. H. S., of N. Y.; J. & E., of Ill.; D. H., of N. Y.; S. H. & M. C. W., of Mass.; J. E. A. of Ill.

NEW BOOKS AND PERIODICALS RECEIVED

THE LONDON QUARTERLY REVIEW, for July; re-published by L. Scott & Co., No. 54 Gold-street, New York.

Messrs. L. Scott & Co. are rapidly putting forth their reprints of the English reviews for the coming quarter. These publications have been long issued with such regularity that the announcement of their issue has become almost unnecessary, as readers know confidently when to expect them. The following is an abstract of the present number of the "London Quarterly:"—I. The Missing Link and the London Poor; II. Joseph Scaliger; III. Workmen's Earnings and Savings; IV. The Cape and South Africa; V. Ary Scheffer; VI. Stonehenge; VII. Darwin's Origin of Species; VIII. The Conservative Reaction. This number commences a volume. They are also the publishers of the "Edinburgh," "North British" and "Westminster Reviews" and "Blackwood's Magazine," all of which are obtained for $10 per annum—one "Review," $3.

ATLANTIC MONTHLY; published by Ticknor & Fields, Boston, Mass.

By missing the July and August numbers of the "Atlantic," we lost our interest in the "Professor's Story," and consequently find the September number rather dull.

REVUE UNIVERSELLE des Mines, de la Métallurgie, des Travaux Publics, des Sciences et des Arts appliqués á L'Industrie; sous la direction de M. Ch. De Cuyper, Professeur ordinaire á la Faculté des Sciences de L'Université de Liege, Inspecteur des études á L'Ecole des Arts et Manufactures et des Mines. Published by E. Noblet, editor and proprietor, Paris and Liege.

Our correspondent who was so anxious to find an article in this valuable periodical, from an extract which he saw in the SCIENTIFIC AMERICAN, will doubtless be able to procure the desired number of H. Bassange & Son, of this city.

WHAT MAY BE LEARNED FROM A TREE; by Harland Coultas. Published by D. Appleton & Co., New York.

The traveler, in his journey, experiences an exquisite sensation of pleasure, when, unexpectedly, some scene of surpassing beauty meets his gaze; perhaps at the top of a mountain, perhaps at the end of a narrow defile. It is all one where the scene is found; the sensation is the same. As it is with the explorers of natural scenery, so it is with those who journey among books. In the above modest title, Mr. Coultas has given to science a useful production, and to literature an elegant entertainment. He is the author of several works on botany, but this one he esteems the most highly. A tree is his subject, and he gives us its "life-history." He traces it from the first manifestations of vitality in the germinating seed until the period of puberty, when it puts forth flowers and fruit. "A tree," he says, "is indisputably the most highly-developed form which vegetable life assumes. In the appearance of one which has stood for centuries, there is something noble and majestic. It is God's own architecture. This mass of vegatable matter is only earth and air which has undergone transformation; the material alike of wandering zephyrs and rushing storms—of gently-descending night dews and angry thunder showers—has been here, on this spot, metamorphosed." This author traces (scientifically and historically) the life of a tree, from the planting of a beech-nut in the soil until it has grown to be a lofty temple of Nature, with the birds singing and the squirrels playing among its waving branches.

USEFUL HINTS TO OUR READERS.

BOUND VOLUMES.—Persons desiring the first volume of the New Series of the SCIENTIFIC AMERICAN can be supplied at the office of publication, and by all the periodical dealers; price, $1.50; by mail, $2, which includes postage. The volume, in sheets, complete, can be furnished by mail; price $1. Vol. II. is now bound and ready for delivery. The price for this volume is the same as that charged for Vol. I.

SUBSCRIBERS TO THE SCIENTIFIC AMERICAN who fail to get their papers regularly will oblige the publishers by stating their complaints in writing. Those who may have missed certain numbers can have them supplied by addressing a note to the office of publication.

IMPORTANT TO INVENTORS.

THE GREAT AMERICAN AND FOREIGN PATENT AGENCY.—Messrs. MUNN & CO., Proprietors of the SCIENTIFIC AMERICAN, are happy to announce the engagement of HON. CHARLES MASON, formerly Commissioner of Patents, as associate counsel with them in the prosecution of their extensive patent business. This connection renders their facilities still more ample than they have ever previously been for procuring Letters Patent, and attending to the various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Court, Interferences, Opinions relative to Infringements, &c., &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of fifteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, on sending a model or drawing and description to this office.

Consultation may be had with the firm, between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH-STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Office, are cordially invited to call at their office.

They are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business they have Offices at Nos. 66 Chancery Lane, London; 29 Boulevard St. Martin, Paris, and 26 Rue des Eperonniers, Brussels. We think we may safely say that three-fourths of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of patents to inventors. Any one can take out a patent there.

A pamphlet of information concerning the proper course to be pursued in obtaining patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office or either of the Branches. They also furnish a Circular of Information about Foreign Patents.

The annexed letters, from the last three Commissioners of Patents, we commend to the perusal of all persons interested in obtaining 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.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of 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.

Messrs. MUNN & Co.:—Gentlemen: 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.

Communications and remittances should be addressed to

MUNN & CO.,

Publishers, No. 37 Park-row, New York.

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A VALUABLE LIBRARY FOR YOUNG MECHANICS.—Young artizans and mechanics who desire text books for their leisure hours and books of reference for their libraries, will find the following works valuable aids in their investigation of truth and science:—

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12 2* SPENCE & CO., No. 86 Court-street, Boston, Mass.

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11 4* ASHCROFT & CO., No. 50 John-street, New York.

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BACK NUMBERS AND BOUND VOLUMES OF the NEW SERIES of the SCIENTIFIC AMERICAN can always be had of A. WINCH, No. 320 Chestnut-street, Philadelphia, Pa. 11 12*

STEAM GAGES.—ASHCROFT & CO., NO. 50 John-street, New York. 11 4*

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FOR SALE—TWO LARGE TRIP HAMMERS; one new and one second-hand (as good as new). For full description see advertisement in SCIENTIFIC AMERICAN.
3 12* J. C. HOADLEY, Lawrence, Mass.

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STEPHENS' DYES FOR WOOD—IMITATING black walnut, mahogany, satinwood, rosewood or oak. Specimens sent on receipt of 15 cents. C. J. REILLY, No. 70 William-street, New York. 3 10*

BARREL HEAD-CUTTERS, PLANERS AND wheel-jointers for sale at the Greenwood Patent Barrel Machine Works, Rochester, N. Y. [7 8*] JNO. GREENWOOD.

SCRUBBING BRUSHES, FLESH BRUSHES, Hand Brushes, Nail Brushes, &c.—For a good valuable article, see illustration on page 400, last volume of the SCIENTIFIC AMERICAN.
3 3

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WOODWORTH PLANING MACHINES FROM $80 to $150.—Sash-molding, tenoning and mortising machines at low prices. For sale at the Philadelphia Machinery Depot, No. 135 North Third-street. [1 13*] CHAS. H. SMITH.

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A MESSIEURS LES INVENTEURS—AVIS IMportant.—Les inventeurs non familiers avec la langue Anglaise et qui prefereraient nous communiquer leurs inventions en Francais, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence.

MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

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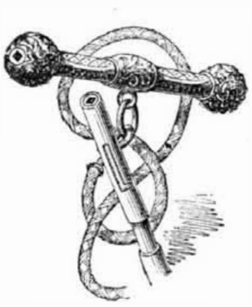
ELMER'S COMBINED WATCH KEY AND GUARD BAR.



THE beautiful little picture annexed represents an ornamental watch key and guard bar, not less beautiful, which has just been secured to the inventor by Letters Patent. The inner tube, *a*, one end of which is fashioned for a winding key for a watch, is made of brass or other inferior metal, and is covered and concealed by gold or other precious metal, which may have balls at the end or be otherwise ornamented,

at the taste of the manufacturer. The outer sheath is divided (in the middle) into two parts, one of which is soldered firmly to the interior cylinder, while the other, *b*, is fitted to slide loosely upon it, so that when the part, *b*, of the sheath is slipped inward upon the interior cylinder, the end, *a*, of the latter will protrude beyond the sheath with the ball upon its end sufficiently for use as a winding key. A slot is made in the sheath, *b*, and a pin firmly secured in the cylinder, *a*, enters this slot and controls the movements of the sheath. Two forms of slot have been devised by the inventor, and secured by separate Letters Patent. Both forms are clearly shown in the cut. One of them is L-shaped, consisting of a longitudinal slit, with a small recess at right angles to hold the sheath in place when it is drawn outward, so as to bring the ball to the end of the guard. The form preferred by the inventor, however, is the spiral shown in the detached spindle, requiring the sheath to be turned around spirally in carrying it inward to expose the end of the winding key, and the reverse direction in carrying the sheath outward to complete the symmetry of the ornamental bar. A band of precious metal around the middle of the bar conceals the joint where the two parts of the sheath come together.

The first of the patents by which this neat little invention is secured was granted (through the Scientific American Patent Agency) on June 6, 1860; and further information in relation to it may be obtained by addressing the inventor, D. F. Elmer, at Haydenville, Mass.

A GREAT BALLOON.—Old Rome had her Horatios, Ciceros, and Cæsars, but she never had a great balloon builder. Modern Rome in New York completely eclipses her ancient mother in a grand attempt at aerial navigation. The Rome *Sentinel* states that Professor Coe of that place has commenced a balloon which is to be 208 feet high (20 feet higher than the steeple of the Presbyterian Church of that village) its horizontal diameter will be 118 feet, and is to contain 1,731,000 cubic feet of gas. About 20 miles of sewing has been executed on this balloon already, and 8,700 yards of cloth are required for it. Professor Lowe's great aeriel ship, which contains only 700,000 cubic feet, is but a baby to this giant of Professor Coe's. Talk of the *Great Eastern* after this. Why, it cannot fly.

THE USE OF COMETS.—C. L. Carter sends us an article, suggesting that the use of comets may be to keep up an exchange of electricity between our solar system and other similar systems in the universe.

IMPROVED HORSE RAKE.

When the horse rake was invented, it was thought that the *labor* of raking hay was at an end; the farmer had merely to follow his rake about the field, while the horse did all the work. But the progress of improvement is rapidly pushing the community forward in luxury and ease, and our inventors will not be satisfied until they have taken the farmer from his feet, and the ground, and placed him in an easy seat, to *ride* over his fields in the operation of raking hay.

The invention illustrated in the accompanying engravings consists essentially in the atttachment of a revolving horse rake to a carriage on wheels. The rake-head, A (Figs. 1 and 2), is connected with the uprights, B B, by iron straps, in such a manner that it may revolve. While it is sliding along the ground, gathering the hay, it is prevented from revolving by the bar, C, which is held just above the ends of the back teeth. When the rake has gathered its load of hay which is to be deposited in the windrow by turning the rake over, the bar, C, is drawn back from over the end of the teeth by pressing forward the lever, D. The joint, E, is so constructed that it can only turn a short distance, and when it is brought to its stop, a continued forward motion of the lever, D, causes the whole back part of

Fig. 1

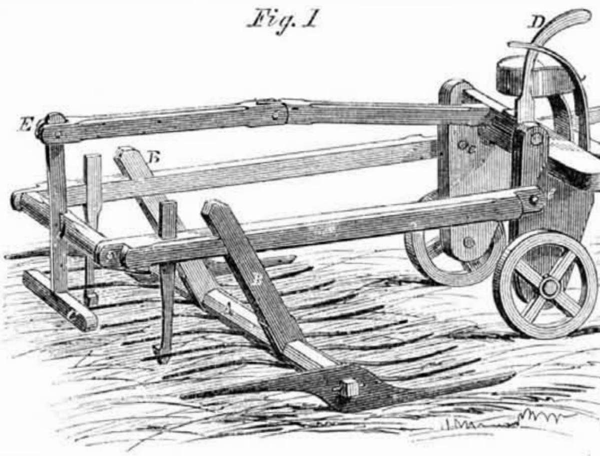
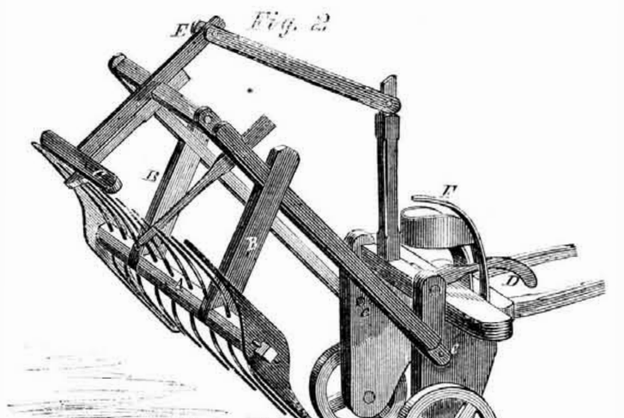


Fig. 2



SCHNEBLYS' PATENT HORSE RAKE.

the rake frame to rise, turning around the joints, *e e*, as fulcra. This rising of the rake frame causes the forward end of the rake teeth to catch against the ground, thus insuring the turning over of the rake. The lever, D, is held in place by a square notch in the brace, F, until it is released by the workman; thus holding the bar, C, over the ends of the teeth, and preventing any casual obstacle from causing a revolution of the rake before the windrow is reached.

The lever, F, has also a second notch, with the square face upward, for holding the lever, D, *down* (as shown in Fig. 2), by which means the rake is lifted entirely from the ground when it is desired to interrupt its operations.

The patent for this invention was obtained (through the Scientific American Patent Agency), on July 10, 1860; and further information in relation to it may be obtained by addressing the inventors, William and Thomas Schnebly, at Hackensack, N. J.

THE PHILOSOPHY OF CART HUBS.

MESSRS. EDITORS:—I have two carts, one has cast iron hubs weighing 200 pounds, the other has wooden hubs weighing 100 pounds. My carmen tell me that this 100 pounds extra on the iron hubs, is like carrying 100 pounds extra on the cart body. I reply no, for the weight on the bottom of the cart body is dead weight, whereas this rolling along on the hub is live weight in a measure, and does not consequently bear so heavily as the dead weight. They ask what is the difference? I answer I cannot tell, and refer the question to you.

Another thing, I contend that the greater weight of an iron hub wheel gives it a greater momentum, and that this on the rough pavement is an advantage in its favor. They ask how much advantage? I answer I cannot tell, I also refer that question to you.

If the surface over which the wheels moved were hard and smooth, I suppose this increased momentum would be of no benefit, but when the wheels drop into holes and roll over obstructions, it is a different matter. Please answer, and oblige— A.

[In regard to the first point, we agree with the men, and ask you what is the difference? In regard to the second point, the greater the load the greater the momentum; but is it not just as well to put the load in the cart, as to add weight to the hubs? Let the driver ride.—EDS.

FIRST FRUITS OF A CROP.

MESSRS. EDITORS:—There is an extraordinary crop of wheat in the northwest. My wheat will average about 33 bushels per acre—superior quality. Corn is good, and ripening off well on account of the dry weather. Wheat is only bringing 70 cents here on the Mississippi, instead of 90, as it would were there sufficient shipping to get from Chicago.

That you may know how I appreciate the SCIENTIFIC AMERICAN, I would just say that this is my *first* expenditure, of the first receipts, from my first farming in Illinois. When my subscription expired, I felt as poor as all my neighbors, and deferred renewal of it until I was out of debt. J. I. COX.

Fulton City, Ill., Sept. 8, 1860.

CEMENT.—J. B. Mahoney, of Columbus, Ohio, writes us, for the benefit of our correspondent of the 25th ult., that he makes a cement for coating buildings, which will not crack.

MECHANICS

INVENTORS, MACHINISTS, MILLWRIGHTS, AND MANUFACTURERS.

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