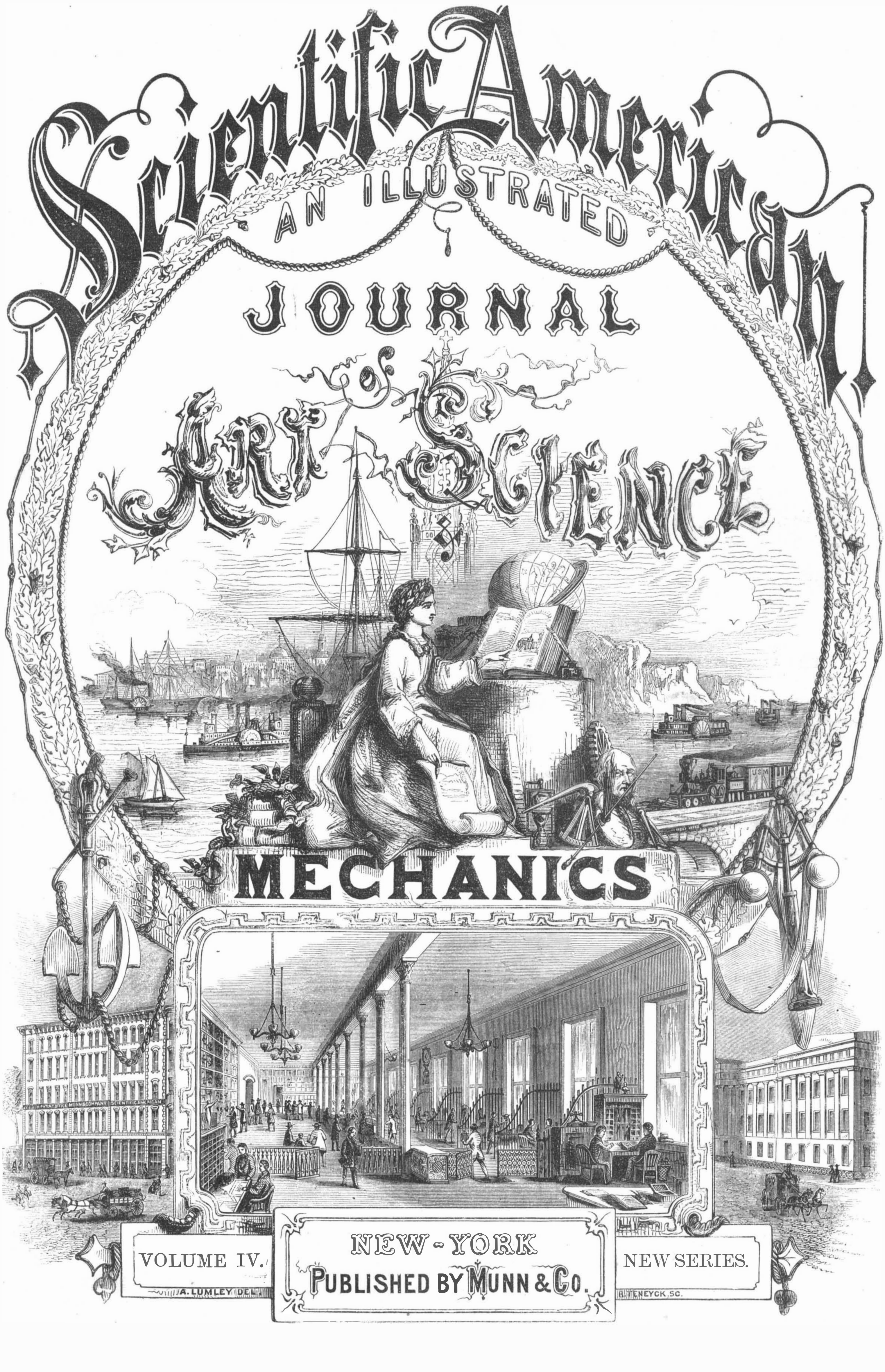
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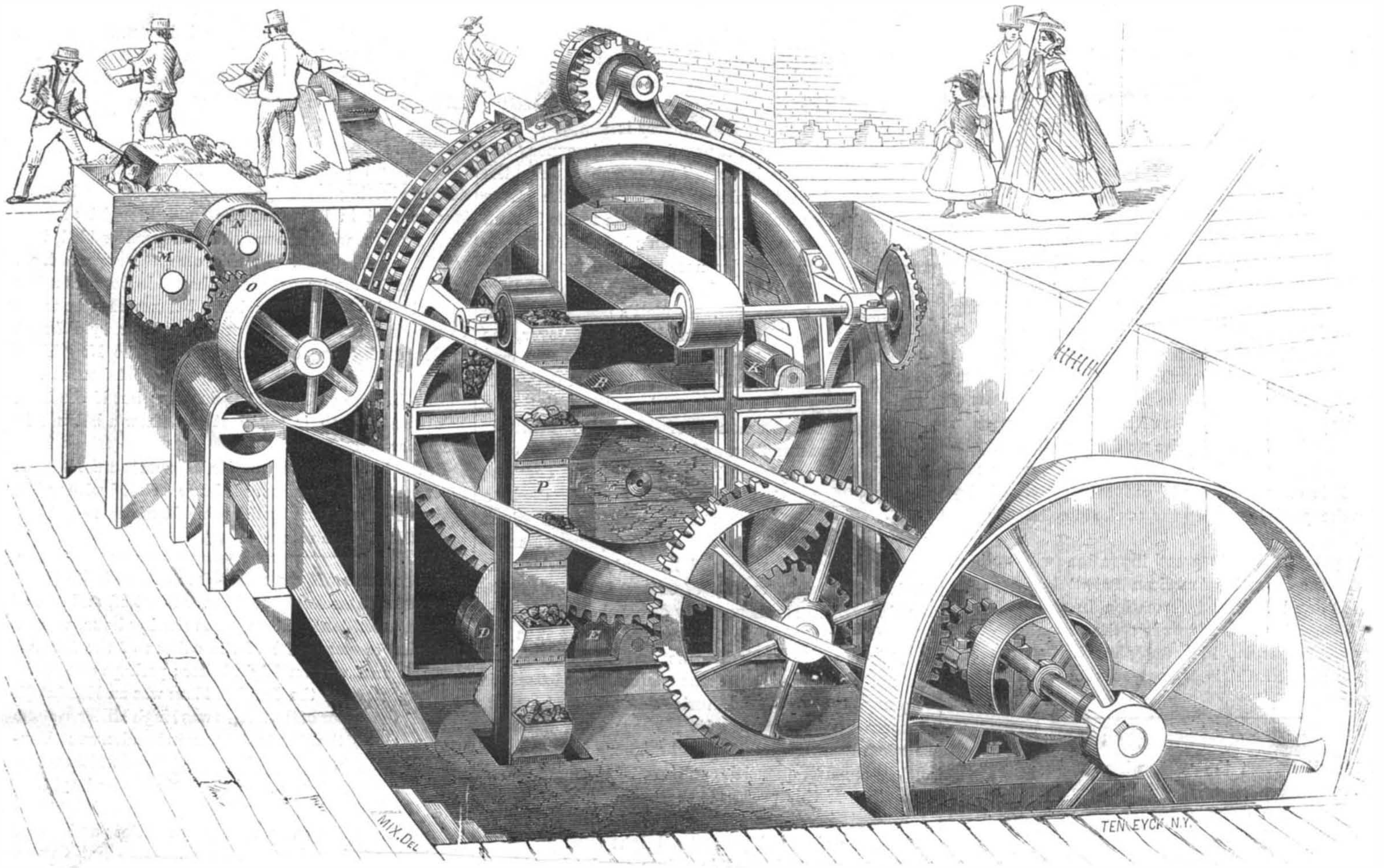
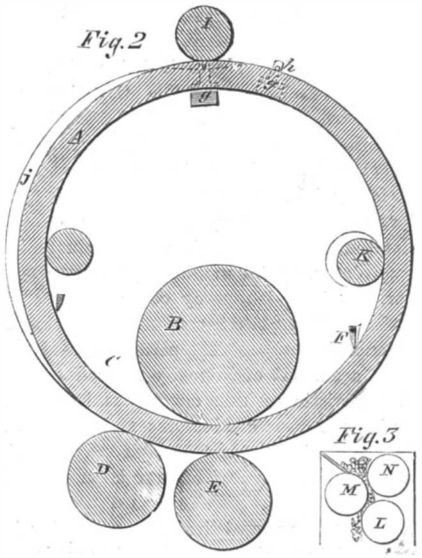


CRARY'S IMPROVED BRICK-MAKING MACHINE.

Unless we are mistaken in our opinion, the invention which we here illustrate is one of the most valuable that has been made in many years. In view of the immense number of bricks that are annually manufactured and used, inventors have long since recognized the importance of a brick-making machine, and a great many patents have been issued for inventions in this department. It was early seen that the real *desideratum* was a machine which should mold the clay in a comparatively dry state, so as to make what are technically called "pressed brick;" but the very rigid nature of the material has proved a formidable obstacle to the production of such a machine. We have known a very ingenious mechanic, after spending a great deal of time and money in trying to construct a machine that would mold brick from dry clay, to abandon the attempt in despair from the rigid nature of clay, which, he said, was as difficult to press into a mold as cold lead. But, in Crary's machine, while the pressure is one of the most powerful capable of being produced by mechanism, it is brought to bear on only a portion of the brick at a time, and the clay is crowded into the mold with a peculiar kneading motion, which fills the edges and corners of the molds in the most perfect manner conceivable; thus producing a brick which, in smoothness, hardness and strength, is greatly superior to those made by the ordinary wet molding processes. Besides this, the rotary motion of the machine enables it to be run with such velocity as to give it a capacity of production which would be deemed incredible without a description of its construction, which we will proceed to give.

Of the annexed cuts, Fig. 1 is a perspective view of the whole machine, and Fig. 2 a vertical section of the principal parts. The molds are formed in the inner or concave side of the revolving ring, A, and the clay is pressed into them by the revolving roller, B. The quantity of clay fed into each mold depends upon the angle, C, between the mold ring, A, and the press roll, B, and this angle must accordingly be adjusted to

Fig. 2



the thickness of the brick, by making the roller, B, of a proper size in proportion to the ring, A. As the clay falls down into the angle, C, it fills the molds as they pass along under it, and as they come under the roller, B, the clay is pressed into them; the forward edge of the brick first receiving the full force of the pressure, and afterward each portion in turn as it passes under the roller, while, at the same time, sufficient pressure is exerted on the other portions of the brick to prevent the clay from yielding upward, and the peculiar rolling motion of the press kneads the material into the edges and corners of the mold in the most admirable manner. The rollers, D and E, support the molds and sustain the pressure.

As the molds are carried up by the revolution of the ring, A, the steel blade, F, scrapes off the surplus material. The bottom of the mold consists of a stiff iron plate, *g*, which has a motion like a piston or plunger to discharge the brick; a shank, *h*, being attached to it to serve as a piston rod. When the mold reaches the upper portion of the wheel, the brick is pushed out of it by the shank, *g*, coming under the roller, I. The bricks fall upon an endless belt, which carries them out to the kiln. The bottoms of the molds are drawn back into place by the pins which pass through the shanks, *h*, and rest upon the eccentric plates, J. It will be perceived that the bricks are flat upon one side and slightly concave on the other—just the form that is requisite for a perfect brick. The roller, K, is only brought into operation when it is desired to give a very smooth polish to the concave surface of the brick.

The pulverizing apparatus is an entirely separate invention, and is shown in Figs. 1 and 3. It consists of three rollers in a hopper, running with unequal motions; the roller, L, revolving about twice as fast as M, and M about twice as fast as N. This produces exactly the crumbling kind of pressure required for pulverizing clay. Beneath the hopper is a horizontal shaft carrying arms placed spirally, which, by its revolutions, sweeps the ground clay along out of the hopper into the screen, O, through which it falls into a chute which carries it to the bottom of the elevator, P. From the elevator, P, the material is discharged by a chute into the angle, C, Fig. 2. The spiral arms of the shaft at the bottom of the hopper not only perform the office of moving the clay along to the screen, but they also mingle it thoroughly with the sand which it is necessary to mix with pure clay in order to make good brick. In case the clay contains pebbles to be taken out, the screen may be placed above the pulverizing hopper.

This machine is the invention of a man who has been engaged for many years in the manufacture of brick on an extensive scale. Having a large contract for furnishing brick to be used in the construction of Fort Jefferson—the largest fortification in the United States, situated on the island of Tortugas, off the coast of Florida—he had one of these machines constructed, and has subjected it to a thorough test. He says that it will, when running quite slow enough, turn out 40,000 bricks per day, requiring about a ten-horse power engine to drive it; that in New York it takes seventy hands to set and burn 40,000 bricks per day; but that, with his machine, twenty hands will do the work. The brick, too, made by his machine are smoother, better finished and more solid than those made in the ordinary way; they have been thoroughly tested in regard to strength and power of resisting pressure, by the engineers who have charge of Fort Jefferson, and found to be far superior in these respects to ordinary brick. But perhaps the most important feature in this machine is the facility which it gives of carrying on the manufacture of bricks in all weather. As the molded forms require no drying, but may be placed at once in the kiln as they come from the machine, it is only necessary to provide a supply of clay under cheap sheds to keep the works in constant operation.

The patent for this great invention was granted through the Scientific American Patent Agency, Aug. 17, 1858; and further information in relation to it may be obtained by addressing the inventor, J. W. Crary, at Pensacola, Fla., or John H. Keyser, No. 2 Bible House, Ninth-street, corner of Fourth-avenue, New York.

Bisulphide of Carbon in Coal Gas.

It is well known that gas, when made from most kinds of bituminous coal, contains a minute quantity of sulphur, even after its most careful purification. In order to ascertain how much is contained in the London gas, Professor A. M. Hoffman was appointed to make experiments by a committee of the House of Lords on Education. The object of the inquiry being to ascertain the quantity of sulphurous acid capable of being formed by the combustion of the gas, an exceedingly small jet of gas, carefully washed with acetate of lead and measured by an accurate experimental meter, was burned in a large two-necked glass globe. Through one of the necks the gas tube was conveyed into the globe, while the other, fitting into a condenser, carried off the products of combustion into a two-necked receiver. To establish a current of air, the receiver was connected with a water current aspirator; a couple of Woolfe's bottles, containing water or dilute ammonia, being inserted for the purpose of fixing any trace of sulphurous acid which might escape condensation with the water in the condenser. The experiment being terminated, the liquids in the receiver and in the wash bottles were united, oxydized with chlorine, and precipitated with chloride of barium. Four experiments were made, and two cubic feet of gas burned on each occasion, when it was found that 9.04 grains of the bisulphide of carbon were in every 100 cubic feet.

Sizing French Paper.—At the celebrated paper mill at Essone, in France, the writing and photographic papers are sized with resin soap, as follows:—Good white American resin is placed in a moderately sized boiler and melted; then some caustic alkali in solution is added, which combines with the resin and dissolves it. This resin soap is now conducted to another vessel containing boiling water, where it is allowed to settle to permit the impurities to fall to the bottom. The clear is used to mix with the paper pulp, after which some thin starch, containing a portion of alum in solution, is also added. This is also similar to the American mode of sizing paper.

ELECTRICITY AND SOME OF ITS PRACTICAL APPLICATIONS.

Article I.

We propose to give a series of articles on such applications of electricity as are known only to a very limited number of persons. Much of the information which these articles will comprise cannot be obtained without the perusal of a great number of works; and some of it cannot be obtained in any other publication whatever. To all young men who desire to gain a full knowledge of electricity, this series of articles will be indispensable.

BATTERIES.

The source of voltaic electricity is the galvanic battery. Of this instrument, there are several forms in use, each of which has its merits and defects. One that is easily managed and well adapted to the wants of the general experimenter is Daniell's. This battery furnishes electricity, either of quantity or intensity, with great facility. Smee's battery is simple in construction and theory, but practically it is expensive; for, after it has been in operation for a short time, the mercury used on the zinc plates attacks the silver plate, and the resulting amalgam falls to the bottom of the cells. Grove's and Bunsen's batteries are both powerful, but they render necessary the use of nitric acid, which stains the hands of the operator, and they are expensive in working. Daniell's battery is liable to none of these objections, and it has, moreover, the advantage of furnishing a constant and uniform current for hours. It should be borne in mind that in all batteries there is, for each equivalent of zinc consumed, a certain amount of electricity evolved; but this consumption of zinc includes only that which is employed in developing the current; and the fact that one battery has used a larger amount of zinc than another in a given time does not always show that it has given off more electricity. In Grove's and Bunsen's batteries, the nitric acid, from a variety of causes, finds its way to the zinc, which is consumed by direct chemical action, without any useful effect being produced; thus involving a waste of both zinc and acid. The best method of preparing the zinc plate of any battery is to plunge it in dilute sulphuric acid until a brisk effervescence takes place upon its surface; it should then be taken from the solution, and mercury poured on its surface in small quantities and evenly spread by a rag of cloth. If this process is thoroughly gone through—not omitting the edges of the plate—the whole surface of the zinc will present a bright silvery appearance, and, when plunged in dilute sulphuric acid, no effervescence will take place. After the zinc has been well amalgamated, it may be placed in the proper position and the exciting liquid poured upon it. In all practical batteries, the zinc is called the "positive plate" or element, and the other plate the "negative." If these two plates are connected by means of a wire or other conductor, the current will pass from the positive through the liquid to the negative plate; and thence through the conductor to the positive plate again.

When a number of cells have all their positive plates connected with each other, and also all their negative plates, it will be seen that the whole battery is equivalent to one large cell. The current produced by such an arrangement is called one of quantity, and is characterized, firstly, by its inability to traverse a very long conductor; secondly, by its power to produce powerful heating and magnetic effects when the conductor is not too long; thirdly, by its inability to traverse a poor conductor. It has also many other characteristics. When each positive plate is connected with the next negative, and the first and last plates attached to the polar wires, a current of intensity is produced. The chief characteristic of this current is its power to pass very long or poor conductors; and, for this reason, it is very useful for the telegraph and other pieces of apparatus where a considerable resistance must be overcome.

When a current is passed through a conductor, it experiences a certain resistance. This resistance increases directly with the length of the conductor, and also varies directly according to its area. If, for instance, a wire has a certain conducting power, and we double its length, its conducting power is reduced to one-half its former capacity; and so on, indefinitely. The conducting power of a wire, which forms a part of any machine or piece of apparatus, should always be proportioned to the amount of electricity which is to pass through it, or the battery should be adapted to the instrument. If all the current cannot pass the conductor, the size of the battery should be reduced until that point is reached.

The Balance of Trade.

The following statement of the exports and imports of the United States, for the last five years, is taken from the report of the Secretary of the Treasury:—

Year.	*Exports.*	*Imports.*	*Ex. over Im.*
1856.........	$326,964,918	$314,639,942	$12,324,976
1857.........	362,949,144	360,890,141	2,059,003
1858.........	324,644,421	282,613,150	42,031,271
1859.........	356,789,462	388,768,130	18,021,332
1860.........	400,122,296	362,163,941	37,958,355
For 5 years..	$1,771,470,241	$1,659,075,304	$112,394,937

Several of the papers are parading these statistics as proof that the balance of trade is in our favor. The "Balance of Trade" is a delusion that has to be exploded about as often as perpetual motion. The whole thing depends upon the way the books are kept at the Custom Houses. A cargo of wheat is brought into New York for $100,000 and sent to England, where, the freights and profits added, it is sold for $140,000. After deducting the freight—say $20,000—the balance is expended in hardware, &c., and brought to New York, where, with the weight and profit added, it is worth, say $150,000. In this case, the exports have just paid for the imports, and the trade has paid a fair profit besides the freight; but a balance may be made to appear either against us or in our favor by different modes of keeping our accounts. If the New York prices of both imports and exports are taken, it will show a balance of $50,000 against us; but if the English price of both is taken, it will show a balance in our favor of $20,000.

In the long run, every nation's imports must balance its exports. A temporary balance, settled with coin, is shown at any time by the rate of exchange—but not by Custom House returns.

Distinguished Mechanics.—One of the best editors the Westminster *Review* could ever boast of, and one of the most brilliant writers of the passing hour, was an Aberdeen cooper. One of the editors of the London *Daily Journal* was an Elgin baker; perhaps one of the best reporters of the London *Times* was an Edinburgh weaver; the editor of the *Witness* was Hugh Miller, a stone mason. One of the ablest ministers in London was a Dundee blacksmith, and another was a Banff watchmaker. The late Dr. Milne, of China, was a Rhyne herd boy. The principal of the London Missionary Society's College at Hong Kong was a Huntley saddler; and one of the best missionaries that ever went to India was a Keith tailor. The leading machinist on the London and Birmingham Railway was a Glasgow mechanic, and perhaps the very richest iron founder in England was a Moray workingman. Sir James Clark, her majesty's physician, was a Banff druggist. Joseph Hume was a sailor first, and then a laborer at a mortar and pestle in Montrose. These men, however, spent their leisure hours in acquirinug useful knowledge.

Experiments with Wire Rope.—Some experiments, important to all persons engaged in the manufacture of wire ropes or who may be accustomed to use them, have just been made by Mr. J. Daglish, who has communicated the results to the North of England Institute of Mining Engineers. The conclusions arrived at were, that half the strength of the rope was lost by heating the wire; that the ordinary joint is much weaker than any other portion of the rope; that if a flat rope was well spliced it was not weakened thereby, but if the workmanship was bad, it lost from 25 to 33 per cent of its strength. In either event, a round wire rope spliced became 13 per cent weaker than before. Round steel wire rope will bear more than double the weight required to break iron wire rope of similar diameter.

Aluminum and its Alloys.—The metal aluminum is coming more and more into use. A firm at Newcastle-on-Tyne, England, have begun the manufacture of it on a large scale, in the pure state and as bronze. Unexpected results have been obtained in experimenting with it as an alloy; 20 parts of aluminum with 80 of copper produce a metal which, to the eye, has all the appearance of gold. Alter the proportions, and mix 10 of aluminum with 90 of copper, and the result is a metal singularly hard, and of excellent application for pivots and bearings in machinery.

AMERICAN ENGINEERS' ASSOCIATION.

[Reported for the Scientific American.]

On Wednesday evening, Dec. 12th, the regular weekly meeting of this association was held at its room, No. 24 Cooper Institute, this city—Thos. B. Stillman, Esq., presiding; Benj. Garvey, Secretary.

MISCELLANEOUS BUSINESS.

Roosevelt's Anti-Frictional Journal.—This anti-frictional journal, or box, was submitted to the society for its opinion thereon. The peculiarity of its arrangement is, that around a central shaft a cluster of small wheels revolve, each independent of the other, and the inventor claims that by this method there exists no sliding or rubbing point of friction.

West's Improved Pump.—Mr. Garvey introduced this pump to the notice of the association. The inventor claims it is one of the most simple and powerful in use. It is extensively used on railroads, and as a house and cistern pump; also for deep wells and decks of vessels. The inventor claims that in this pump are combined the double-acting, anti-freezing, lifting and forcing principles. The above articles were referred to the Committee on Science and New Inventions.

The late report of this committee upon the practicability of Shrimpton's High Pressure Condenser, and as published by this journal, was accepted as the sense of the society, without discussion.

The same committee presented the subjoined report upon "Runkel's Oscillating Piston Engine":—

Your committee have carefully examined a neat working model of this engine, and have heard and considered the explanations of the inventor; and after taking up his claims, one by one, they have come to the following conclusions:

1. That the engine is very simple in construction, consequently, not liable to be expensive in first cost, or for repairs. An engine from 8 to 10-horse power can be constructed, by estimate, for $340, patterns included.

2. That this engine is compact and therefore requires but little space, and is peculiarly well adapted for screw propellers, locomotives, &c., where economy of room is important.

3. That the weight of the moving parts is much less than is required in ordinary steam engines; so that this engine is well suited for high velocities, the momenta of the moving parts being comparatively so small.

4. That the claim in relation to the "reciprocal motion of the rockshaft," &c., &c., in our opinion, does not embody any peculiarity, the same being predicable of any engine.

5. That the claim, relative to the application of "modern improvements, such as cut-offs," &c., though correct, is not peculiar to this engine.

6. That there is a peculiar adaptability of this engine to steam pumps, fan blowers, and in general to all kinds of machinery where a great velocity is required. Its principal advantage, however, seems to consist in its fitness for locomotives, steamships, screw propellers, &c.

In addition to the points above enumerated, the committee have examined the "balance of forces on the oscillating shaft," and find it correctly described by the inventor, and that there is no extra friction upon the shaft, the resistance being transferred by the steam to the abutments, and thence to the floor or support upon which the engine rests.

With regard to comparative friction, or comparative cost of fuel, your committee cannot, as engineers, give any opinion, as they have not had an opportunity of experimenting with a full-sized engine; they, however, do not think that this engine will compare unfavorably in these particulars with well constructed engines of the ordinary kind.

By request, Mr. Louis Koch, with the aid of a drawing upon the blackboard, described this engine and the manner of its operation to the several members present. He had seen a large one driven at the rate of 250 revolutions per minute, and a small working model that could be driven with one's breath.

The above report, being acceptable in every particular to the association, it elicited no discussion, but was unanimously adopted by them.

Messrs. Warren & Banks' "Low Water Detector" wrs here introduced.

DISCUSSION.

Mr. Koch—The inventors and proprietors of this instrument being present, I should like to hear any reasons why the society should not accept the report of the committee upon their detector, to the effect that it is not reliable.

Mr. Warren—It seems the committee have tested an instrument of our manufacture, now in operation in this city, and they report that no reliance can be placed upon it. I have a fact or two in relation to the detector seen by them, which I trust will not remain unnoticed. It had been tampered with by the engineer in charge on several occasions, and at times when expressly forbidden to do so. I contend that the principle upon which it is made is a good one, and it remains untouched by this case. We have for two years been fully satisfied that the peculiarity of its construction, and the principle involved, are such that it can be depended upon. If the instrument seen by the committee had been left alone and not been meddled with, as was the case on several occasions, it would not have failed. I do not think that the reliability and usefulness of the detector should be thus condemned when the only evidence in the case is the isolated one just referred to. All I have ever put on boilers have worked with perfect success, and instances are known where the water fell but the 1-16th of an inch below the water line when the alarm was given. I hope the society will be pleased to receive further evidence in the case; we think that we can offer such proof as will materially change the present aspect of it.

Mr. Banks—I have very recently seen the gentleman who is proprietor of the manufactory where the detector in question was seen, and he states as his opinion, that it was placed too high, and that by dropping it a little it would work well.

Mr. Garvey—The fault, as understood by me, is the rare construction of the gage, that the principle upon which it operates is too nice, and that upon trial it would not work as stated. The existence of an error in its construction was very apparent, as when the water was let down below the alarm point the whistle did not blow until the valve was touched by the point of a knife blade; and, as the committee found upon inspection and experiment that the instrument would not work, they were justified in condemning it.

Mr. Koch—The committee tested the instrument fully. We tried it two different times, and it failed to work in both cases; the fault, as judged by them, was in its construction. A short brass tube, by expansion, operates upon a steel spring, which, in turn, works a valve, when the alarm is given. It is true the brass tube expanded, as claimed for it, but the steel spring failed to perform its duty, and the valve did not work. This is not the only instance the members of the committee are cognizant of. The one at the Cooper Institute did not work at all satisfactorily; with plenty of water in the boiler, the steam issued with great force, but the whistle did not blow.

Mr. Warren—The instrument is so constructed that it will blow at any point desirable, and it will also give an alarm when there is too much water in the boiler; this we claim as a very essential point. In relation to the non-working of the steel spring upon the gage, at the Cooper Institute, I would remark, that at the commencement of our manufacture we were so unfortunate as to have a large lot of springs burned when being made, which took the life from them. One of this lot was put upon the instrument in question, before the fact was discovered by us. Since then, every detector before it leaves our shop is fully tested by us, and two years' experience has proved to me the principle upon which they work is a correct one.

Mr. Koch—With all justice I can call these low water detectors life preservers, for such they are in one respect. The are intended, by warning us of danger, to save life and property. I repeat what I have said before, that if one fails to do its duty, because of its construction or principle, we cannot depend upon any of them. I am prepared to admit we might visit ten different places where they are in operation in this city, and find that they work perfectly well, yet if we should extend our visit still further and inspect the eleventh, and find it wholly unfit for the purpose intended could we recommend the instrument? Might not this very one be the cause of the sacrifice of valuable lives and property?

Mr. Simpson—The question should be looked upon by the society in this manner, viz:—Were the committee examining an instrument in good order, or were they testing one which had been tampered with by the engineer in charge, as intimated by Messrs. Warren & Banks. An engineer may, at times, wish to shirk his duty, and then will alter or regulate an instrument as he pleases. If this was tampered with, and its valve screwed up upon sundry occasions, in direct violation of orders, can the blame be attached to the construction of the gage, or to its principle, when it fails to act? Was this failure attributable to a mechanical fault, or that of the engineer in charge of it? I consider this question an important one.

Mr. Banks—Many parties have spoken to me in relation to the report of our detector, as published in the Scientific American, and they were, one and all, perfectly astounded at its purport. We have some 500 in operation, and this is the first that has been known to fail. Many persons, both in this city and in Boston, known to us, place implicit confidence in it; among them are the Manhattan Gas Works, New York city, and the Boston Manufacturing Company of that city. We will cheerfully give the committee a list, that they may further inspect and examine our gage, as we sincerely think they have not seen it as it is.

Mr. Garvey—The remarks of Mr. Simpson are of the highest importance; the committee are not reporting upon an instrument that is imperfect. Any tool will give way under severe usage; one may take a hammer and so batter an instrument that it will be perfectly useless, or they may in other ways disarrange it to such an extent that it will be comparatively useless. It is no more than simple justice to the inventors of this gage, to examine and test those they consider in good order; then if their principle is correct let it be so understood.

At this period the committee, through its chairman, asked to be discharged from the further consideration of this particular case, which was granted. It was then resolved to appoint a select committee whose duty it will be to experiment still further in relation to the reliability of this detector. That committee, as appointed by the chair, is composed of Messrs. Garvey, Holden, and others; the committee to consider the low water detector of Messrs. Ashcroft & Co., as named at the last meeting is Messrs. Merriam, Cameron, and Garvey.

A letter was received from Mr. Ashcroft, who is now in Boston, in relation to his instrument, which was referred to the committee, as named above.

The society then adjourned.

Spontaneous Decomposition of Chloride of Lime.

The following account of a curious chemical explosion is given by Dr. Hoffman in the Quarterly Journal of the Chemical Society:—One morning, I think it was in the summer of 1858, when entering my laboratory, which I had left in perfect order on the previous evening, I was surprised to find the room in the greatest confusion. Broken bottles and fragments of apparatus lay about, several window-panes were smashed, and all the tables and shelves were covered with a dense layer of white dust. The latter was soon found to be chloride of lime, and furnished without difficulty the explanation of this strange appearance.

At the conclusion of the Great Exhibition of 1851, M. Kuhlmann, of Lille, had made me a present of a splendid collection of chemical preparations which he had contributed. The beautiful large bottles were for a long time kept as a collection; gradually, however, their contents proved too great a temptation, and in the course of time all the substances had been consumed. Only one large bottle, of about 10 litres capacity, and filled with chloride of lime, had resisted all attacks; the stopper had struck so fast that nobody could get it out; and after many unsuccessful efforts—no one venturing to indulge in strong measures with the handsome vessel—the bottle had at last found a place on one of the highest shelves of the laboratory, where for years it had remained lost in dust and oblivion, until it had forced itself back on our recollection by so energetic an appeal. The explosion had been so violent that the neck of the bottle was projected into the area, where it was found with the stopper still firmly cemented into it.

I have not been able to learn whether similar cases of the spontaneous decomposition of chloride of lime have been already observed.

Semi-Steel Locomotive Tires.—We have lately examined a piece of semi-steel employed for locomotive tires, manufactured at the Albany Iron Works, of Corning, Winslow & Co., Troy, N. Y., and its grain indicates great tenacity. We understand that this material has been submitted to a great number of tests to ascertain its tensile strength, and the result has been conclusive as to its being from one-third to one-half stronger than high qualities of Low Moor iron. Some semi-steel tires of engine wheels have been in use for six months and have given entire satisfaction. This metal must come into very general use as a substitute for wrought iron as applied to a great number of purposes. We would direct the attention of railroad companies and engine builders to the advertisement of Messrs. Corning, Winslow & Co., on another page.

ROMANCE OF THE STEAM ENGINE.

Article IV.

HEATING BUILDINGS BY STEAM.

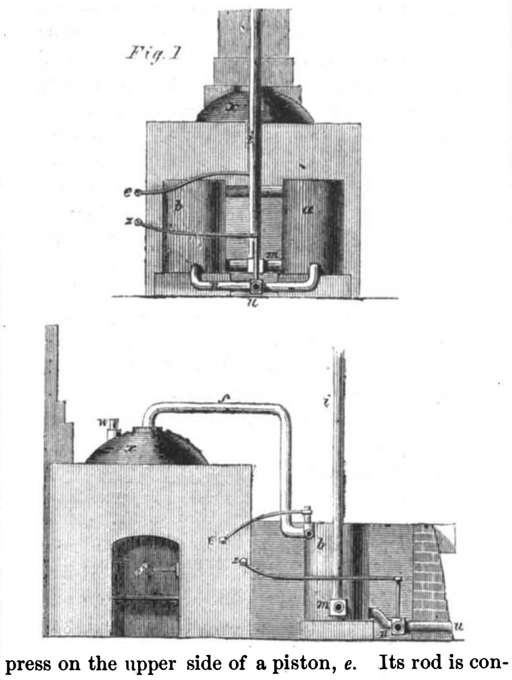
In a work of Sir Hugh Platte, published in 1660, steam is suggested for heating a conservatory, by placing a funnel over a kitchen cauldron employed for boiling the beef for the sturdy yeomen. A pipe from thence was to conduct the steam to the conservatory, during the winter, so as to provide a temperate heat for the flowers. By this mode of artificial heating, he said: "If I be not deceived, you may have both oranges, lemons, pomegranates, pepper trees, and such like."

THE MARQUIS OF WORCESTER.

The life of this English nobleman has all the air of a romance. He was the Lord of Ragland Castle, and among the most wealthy and ancient of the feudal families. He was a determined cavalier and commanded a large body of troops under King Charles I, in the civil wars with the Parliament. In that long struggle the Puritans were the victors, and Ragland Castle was taken, its valuable furnishings carried away, its chief driven into exile, and his estates confiscated. Having come from France to London, in 1656, on some secret mission for the king, he was taken prisoner and committed to the Tower, where he was kept closely confined. It is believed that some birds sing more sweetly when confined in small cages, and this may be the reason why we have had some very able works written in dungeons. While confined a prisoner, Grotius composed his famous work, "De Veritas," and Bunyan his incomparable "Pilgrim's Progress," and so it was similar with the subject of this memoir. His thoughts were first directed to the "amazing force of steam," by observing the rising of the lid of a vessel employed for boiling food in the prison, and from this circumstance he projected that machine which has thrown a radiance round his name. Being originally of a mechanical turn of mind, he beguiled the long hours of his weary confinement with mechanical amusements, and after Charles II, was restored to the throne and the Marquis restored to liberty, he still continued to find pleasure in making new inventions. He wrote a description of his contrivances, which was published in 1663 and called "A Century of the Names and Scantlings of such Inventions as, at present, I call to Mind to have Tried and Perfected." No drawings accompanied the book, but the annexed figures have been drawn from the following descriptions which he has given, namely, "An admirable and forcible way to drive up water by fire, not drawing or sucking it upwards. * * * This method has no bounds, if the vessel be strong enough. One vessel of water rarified by fire driveth up forty of cold water, and a man that attends the work has but to turn two cranks, that one vessel of water being consumed, another begins to force and refill with cold water, and so successively."

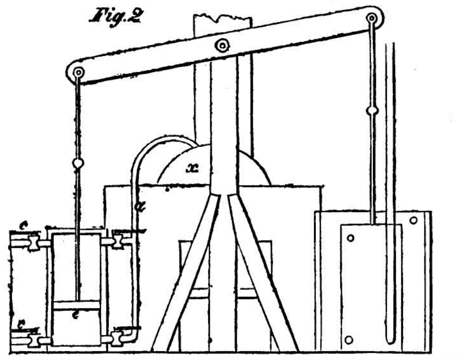
Figures 1 and 2 represent an apparatus for raising water by steam, which appears to fulfill the conditions of the description; *x* is a boiler connected to two receivers, *a b*, by a pipe, *s*; the steam is admitted or shut off by a cock, *e*, from each vessel alternately, and by a pipe, *m*, containing two valves opening outwards, from each receiver, they are connected with the eduction pipe, *i*. Another pipe, *n u*, connects the cistern with the receivers, and the cock at *n* interrupts the the communication between the cistern and each receiver at pleasure. By a hole in each receiver, capable of being closed tight, the air may be expelled as it accumulates in either. When steam is generated in the boiler, *x*, it flows through the pipe, *s*, and passing into the receiver, *a*, which has previously been filled with water, it presses upon its surface and forces it through the pipe, *m*, and up the eduction pipe, *i*, by which it is conveyed to the required hight and distance. When all the water has been expelled, the attendant turns the cock, *e*, and the steam flows into the opposite receiver, *b*, and at the same time he also turns the cock, *z*, and water flows from the cistern to the receiver, *a*. The steam from the boiler now pressing upon the surface of the water in *b*, forces it up the pipe, *i*, and when it has expelled all that it contains, the cock, *e*, again shuts off communication with the boiler and the receiver, *b*, and the vapor rushes again into *a*, and forces the water that has flowed into it up the pipes, as before related, and so on alternately, while steam rises from the water in the boiler.

In Fig. 2, we have another view of the steam engine, equally answerable, it is believed, to the descriptions in the "Century of Inventions." *x* is the the steam boiler; a is the pipe for conducting the steam to



press on the upper side of a piston, *e*. Its rod is connected to a beam which raises the plunger of a pump in another cylinder, as the piston, *c*, descends. A cock, *c*, permits of communication with the atmosphere, and another cock opens a passage for the steam under the piston, in the very same manner as a high pressure common steam engine would be worked by hand without valve rod connections. Of this engine, the devout marquis said: "I call this a semi-omnipotent engine, and do intend that a model thereof shall be buried

Fig. 2



with me;" and his reverend and grateful mind for great inventions led him to thank the Deity with the following prayer which was afterwards found among his manuscripts:—

"Oh! infinitely omnipotent God, whose mercies are fathomless and whose knowledge is immense and inexhaustible, next to my creation and redemption, I render thee most humble thanks from the very bottom of my heart and bowels for thy vouchsafing me (the meanest in understanding) an insight into so great a secret of human nature, beneficial to all mankind, as this, my water-commanding engine. Suffer me not to be puffed up, O Lord, by knowing of it and many more rare and unheard of, yea, unparalleled inventions, trials and experiments; but humble my haughty heart by the true knowledge of mine own ignorant, weak and unworthy nature, prone to all evil. O most merciful Father, my Creator, most compassionating Son, my Redeemer, and holiest of Spirits, the Sanctifier—three divine persons and one God—grant me a further concurring grace, with fortitude to take hold of thy goodness, to the end, that whatever I do unanimously and courageously to serve my king and country, to disabuse, rectify and convert my undeserved, yet wilfully incredulous enemies, to reimburse thankfully my creditors, to remunerate my benefactors, to reinhearten my distressed family, and with complacence to gratify my suffering and confiding friends, may, void of vanity and self-ends, be only directed to thy honor and glory everlasting."

In this prayer of the noble inventor his secret thoughts are laid before us, and they impress us with deep respect for the memory of the man. He felt the importance, and had a deep insight into the great value of the invention. The steam engine has done more for the elevation of society than all the edicts of princes. The Marquis of Worcester was not well treated by the profligate King Charles II., although he had lost an immense fortune in his cause. He met with ingratitude where he should have found friends, but he was cheered to the last by a most devoted wife. He died in London on the 4th of April, 1667, and his remains were carried to Ragland Castle and interred in the family cemetery, and it is said that the model of his engine was placed beside his coffin. It was stated in late news from England that his grave was requested to be opened for examination, to obtain this model.

After his death, the Marchioness his wife, who seems to have been a congenial spirit and actuated by a share of her husband's enthusiasm, continued her exertions to introduce "the water-commanding engine." She was so zealous in her efforts for this object that it was considered unbecoming to her sex and bordering on insanity, and a priest, who had some influence with her, expostulated strongly against her interfering in any manner to dispose of the "great machine."

We have a very good record left us that the Marquis of Worcester's steam engine had been in actual operation in London about the year 1656. Cosmo de Medicis, Grand Duke of Tuscany, who was in England in that year, and had with him a number of letter-writers, who noted down everything which they saw. This diary of the Duke was carefully deposited in the ducal library at Florence. In 1818, this manuscript was first printed, and a very clear and brief account is given in it of a hydraulic machine, invented by the Marquis of Worcester, which the Duke saw lifting water, 40 feet high, by the attendance of one man, and which he stated was superior to another hydraulic machine which he also saw, operated by two horses, for raising water from the river to a high wooden tower, to be conveyed thence to the greatest part of the city. It is not stated that it was a steam engine which the Duke saw, but nothing else but a steam engine could have effected such results. It was nothing else than "the most stupendous water-commanding engine," the "semi-omnipotent engine," which the Marquis invented and for which, in the joy and devout thankfulness of his heart, he beseeched Almighty God to make him humble, and for which, when he was laid in the grave, his widow incurred the blame of being considered insane by her priest for persisting in carrying it forward and introduce it to the public. When we consider what the steam engine now does, we may well say it was produced by "heavenly inspiration."

Principle of Giffard's Injector.

There has been very much analytical discussion, invested with an air of mystery, of the principle of the injector. The principle, however, is perfectly obvious: the light weight, or mass, and high speed of the steam are merged into the greater mass and lower speed of the water; the momentum of the steam thus employed is transformed into and is equivalent to the momentum of the body of water set in motion. True, the steam is condensed in the process; and it is said thus to produce a vacuum, which the water rushes in to occupy, and hence the power of the water to penetrate into the boiler against the pressure within. But it is to be remarked that the vacuum is only incidental to the operation—or, more properly, it is not essential to the general principle of action. We do not, of course, mean to imply that the injector, as it is made, may operate independently of the vacuum; but, properly speaking, there is no vacuum at all, for, if there be a vacuum, in virtue of which, it is supposed, the water rushes in, it is obvious that atmospheric air, with free access to the injector would rush in to supply the void, in preference to the water. Whereas, it is a matter of fact that the injector works, or may be made to work, with the same degree of readiness, whether open to, or enclosed from, the external atmosphere.—*London Engineer.*

As this is substantially the same explanation as that which we have already given, we have nothing to say but simply to indorse it. Only, it is to be remarked, that the production of a vacuum, or rather of a partial vacuum, by the condensation of the steam as it comes in contact with the cold water, is the *first step* in the operation, making room for the steam to rush into, and thus giving it the motion by which it acquires the momentum to carry itself back into the boiler, and the feed-water along with it.

Gold Coming Back.—For seventeen years past the exchange between England and America was against the latter, but now the tide has turned. Instead of sending gold to Europe, it is now flowing rapidly from thence to New York. The *Persia* brought no less than $3,100,000 on the 20th ult., to pay for the grain with which America is now feeding the population of the Old World.

THE POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

[Reported for the Scientific American.]

The Association, having adjourned over, week before last, on account of Thanksgiving, and last week on account of the meeting of the American Institute, met Dec. 13, at the usual hour, and was called to order by the President, Professor Mason.

NEW SUBJECTS.

The President proposed for consideration at some future meeting, "The best Economy in Motive Power for Farm Buildings and Small Manufactories."

Mr. Johnson proposed the subject of "Pottery," upon which Mr. Rouse, a practical manufacturer, of Jersey City, would read a paper.

Mr. Haskell proposed the subject of "Drawing from Objects." A practical gentleman in that line would give illustrations upon the blackboard with regard to perspective, elevation, and all other styles of drawing.

THE CUT-OFF.

Mr. Rowell exhibited a card from the steamer *Michigan*, received from Mr. Isherwood. There was a full-stroke experiment with a single engine, and an experiment with the engine cutting off at one-third stroke. This experiment showed an advantage of 2 per cent in favor of the full stroke.

SEWING MACHINES.

The President, upon calling up the special order for the evening, said that the subject of sewing machines was rather out of the usual range of subjects, for two reasons: first, it was dealing with something not recently invented or brought to light; and, secondly, there seemed to be little strictly scientific inquiry to be made respecting it.

The sewing machine has brought up the class of sewing women to a well-defined and proper place in the class of educated laborers. For thirty years the wages of household servants, upon the average, have been above the wages of sewing women. Life was shortened by the labor of sewing women more than in the manufactories in this country or in England. He could remember the time when his mother and his aunts carded and spun and wove their cloth. But the cotton machinery made that useless, and it was discontinued. Not long ago there was a sewing room in every house, but that is now shut up in the houses of people of prosperous condition. Women having sewing machines have ceased to use them, handing over their work to the class which can do it cheaper. Manufacturers have put into the hands of the public more than 200,000 sewing machines, and the call for them is still increasing. They are passing down into lower stations in life. A very small proportion, and that of the coarsest kind of work, can be done by machines driven by steam power. Even in our best conducted manufactories, such as at Manchester, N. H., there is a manifest shortening of the life of the female operatives. On the other hand, it is conceded that the use of the sewing machine is decidedly a healthful occupation. Assuming that three-fifths of full work is done upon all the sewing machines sent into the community, it will give us 300,000 hands employed upon the sewing machine; and if the work produced is five-fold, as all agree, it will be equal to the hard labor of a million and a half of women working with the needle.

Mr. Stetson considered the Wilcox & Gibbs machine as the highest point yet reached. He was in favor of simplicity when it could be attained; and it was usually found that progress in an art simplified it. The single-thread sewing machine is generally considered impracticable, because the seam can be ripped out. For family work he regarded facility in ripping out a great desideratum. If we can unite facility of ripping out when we desire to do so with security against ripping out in actual use, it will be the perfection of the sewing machine stitch. In the Wilson & Gibbs machine this stitch is peculiar.

The President—Does this machine require Howe's invention?

Mr. Stetson—No, sir; but it requires many of the improvements upon it. Mr. S. proceeded to explain, by means of drawings, the stitch and its formation. The thread is caught by a hook and carried within the preceding stitch, each loop being twisted before it is thrown off the hook; the result being a twisted loop stitch. The twisting tightens the friction, and increases the compactness of the job; and the certainty of not looping in two loops, due to a peculiar guard, renders the single-thread sewing machine practically successful. In order that the sewing may progress downward to the lower classes of society, it is important that they should be simple that they may be cheap. He hoped to see the day when the sewing machine would be as common and as cheap as the clocks upon our mantelpieces. Mr. Stetson here exhibited the machine and explained its use. As they ordinarily run, every stitch is tied; but if the operator, upon stopping the machine, will then turn it one turn backward, the work can then be unravelled. This machine could be run at a higher rate of speed than any other. The form of the stitch insures elasticity, and the machine can be worked with perfect success, whether the thread is very tight or very loose. It requires, therefore, no particular skill to regulate the tension. Nor is any skill required to fit the needle; there being a little projecting spur upon one side, so placed that the needle cannot be put in wrong. There is a brake upon the wheel to prevent its being turned backward. These simplifications in the use of the machine will also tend to secure its introduction among the lower classes of sewing women.

Mr. Lancey stated that he had been acquainted with sewing machines for fourteen years. His business was the manufacture of shirts and gentlemen's furnishing goods. The first sewing machine practically adapted to that class of work was the Wheeler & Wilson machine. But the stitch was weak, and as the work required a great many bias seams, they were all done by hand. Mr. Lancey then exhibited a drawing of various kinds of stitches—the hand back stitch, the hand running stitch, and sewing machine stitches; and also specimens of work done with the different stitches, to illustrate his remarks upon their relative strength. The twisted loop stitch, in respect to its elasticity, he considered exactly the same as if the loops were not twisted. But, in this respect, no machine ever made would come up to handwork. Upon sewing equal pieces of cloth from the same piece, six inches in length, with thread from the same spool, in the different ways, he found that the hand back stitch would stretch 1¼ inches, the Grover & Baker stitch the same, and the shuttle stitch only five-eighths of an inch, before the thread would break. In the use of thread, the shuttle stitch is the most economical; but this is no advantage.

The President—Is this a general rule that the best sewing, whether by hand or machine, uses the most thread?

Mr. Lancey—It must necessarily be so. An establishment in Boston is saving $2,500 a year by using cotton yarn, and the stitch is strong. He would cut every fifth stitch of work done with the Grover & Baker machine, and then guarantee that the seam should hold until the linen should be worn out. It uses about one-fifth more thread than the shuttle stitch; but time is money, and the time saved from the ends being self-fastened more than compensates the cost of the additional thread. In family sewing, the Grover & Baker stitch actually uses no more thread than the shuttle stitch—what is put into the cloth by the former being wastage in the latter. The Wheeler & Wilson machine, however, is generally used in the Albany district, which is the great collar district, having been introduced there before the Grover & Baker machine was perfected.

Mr. Dibben stated that the needle was seriously imperfect in the best machines, being so imperfectly made that when work is dressed they cut the material. Some manufacturers who use the sewing machine consider this such an important evil that they refinish the needles themselves. At the price which is charged for them, the needles ought to be better finished than they are.

Mr Babcock stated that the exercise of running a sewing machine is undoubtedly wholesome; much more than doing the same amount of sewing by hand labor. If each family possesses a sewing machine, and does its own work only, its influence would be good. But, in the majority of cases, sewing machines are used as a means of procuring a livelihood; and when a person is obliged to run one for a considerable portion of the time, the labor is excessive, and not beneficial. The power required to run a Wheeler & Wilson machine—which runs as easily as any of them—at the rate of 600 stitches per minute, is about 1-60th of a horse power. This seems small, but it is equivalent to 500 lbs. falling one foot per minute, or a tun and a half ten feet per hour. Place before any woman of ordinary strength the task of raising one tun and a half ten feet per hour, all day long, and it would be considered excessive labor. I do not know a single instance where the constant running of the sewing machine is not detrimental to their health; and I have looked into it pretty closely. There is a demand for some kind of power about sufficient to drive a sewing machine—cheap, simple and easily managed. At present, we have no power that will answer the purpose. A steam engine would be dangerous; the air engine would cost too much; electricity is expensive and unreliable. Springs have been repeatedly suggested, but a spring of sufficient tension to drive a sewing machine five hours would require 1,500 lbs. of steel, and it would take a man an hour to wind it up. So with weights: it would take a weight of a tun and a half, pulling ten feet per hour; and one man could not probably wind up more than five of them before the first would have run down. If it were not for the friction in applying this power, he could probably drive ten or twelve machines; but the power could not be applied without loss.

Mr. Hitchcock stated that Mr. Ericsson has invented a machine for such purposes, using compressed air.

Mr. Lancey said that, having used the sewing machine extensively for seven years in manufacturing, he did not know of an instance where ill effects have followed from its use within proper hours. In manufactories, a great many sewing machines are run by water power, steam power and the Ericsson engine. He would suggest that private families adopt the Doesticks' method—attaching a cat blindfolded, with a mouse before her, and when the machine was to be run, slip of the hood, and let the cat chase the mouse. (Laughter.)

Mr. Bartlett stated that the sewing machine was an American invention, and the world was indebted to us for it. Probably the highest price ever paid for a sewing machine was that paid by the Emperor Napoleon for the first sewing machine he ever saw. He saw in that machine the means of clothing the Imperial Guard, which was then a question of great importance to the French government; and he paid 120,000 francs for the machine, and the right to construct others for the use of the government.

A Gentleman said that he was a fellow-townsman of Walter Hunt, and, to his certain knowledge, Mr. Hunt invented the sewing machine 30 years ago, but Mr. Howe bought it up.

Mr. Dibben said that Mr. Hunt made the claim, and presented a model which embodied a similar invention, but that he could not prove his model. He admitted that what he presented was not an original machine, but a machine made after the fashion of something he had done some time ago. The courts gave the invention to Mr. Howe as his right. Mr. Hunt may have had a model made and showed it to others, but he could not prove what it was.

The President—Has any sewing machine yet ever done work which you deem equal to the best handwork?

Mr. Lancey—No, sir. I have had in my employ over 400 females at one time, and I do not think that there were 20 of them who made perfect sewing. Furthermore: of the 400, at least 90 per cent were farmers' wives and daughters—abundantly able to live without the work, but doing it for "pin money." When they lost this work it was no great loss to them, and was an advantage to the poorer class, because there was so much work in basting, bands, &c., which the machines could not do, and which the better class did not care to do.

Mr. Wood desired to have half an hour to reply to objections made to the shuttle stitch; but, as the hour was late, it was voted that the opportunity should be afforded him at the commencement of the next meeting.

At the suggestion of the President, it was voted that opportunity should also be offered to Dr. Gardner to speak upon the question of the healthfulness of the occupation.

SUBJECT FOR THE NEXT MEETING.

The association adopted the subject proposed by the President, modified by him so as to read—"The best Economy in Motive Power for Farm Buildings, Small Manufactories and Sewing Machines."

The meeting then adjourned.

THE SCIENCE OF COMMON THINGS.

NUMBER 1.

THE CHEMISTRY OF KNIVES AND FORKS.

"Good morning, Charles and John."

"Good morning, father. I wish you would tell us what everything on the table is composed of."

"Do you think that would be interesting?"

"Certainly, sir. I like to know what things are made of."

"Very well. Where shall we begin?"

"Why not begin with the table itself?"

"That would seem to be the proper place; but I think it better to begin with the knives and forks; you will understand why by and by. Do you know what substance knives are made of?"

"Iron, sir."

"What do you say, Charles?"

"Steel, sir; or iron and steel, I suppose."

"Yes, iron and steel. Do you see this little wrinkled place on the side of the blade near the handle? That is where the steel blade is welded to the iron shank. Steel can be made a great deal harder than iron, and, consequently, when it is ground down to a very thin edge, it does not break away as iron would, so that the blade is made of steel and the shank of iron."

"Why do they not make the whole of steel?"

"Steel is worth 16 or 17 cents per pound, and iron only 5 or 6 cents, and the manufacturers find it profitable to weld iron shanks to the blades in order to save the trifling difference in the cost of the material. This is a striking instance of the extreme economy introduced into industrial operations of the present day."

"What is the difference between iron and steel?"

"Iron is a pure metal, and, like all the metals, it is a simple substance. All the matter of the earth is composed of a few simple elements. When I first attended lectures on chemistry, there were 44 of these elements known, but others are being constantly discovered, and they are now reckoned at 62, of which 47 are metals. How many of these metals do you know?"

"Iron, lead, copper, silver and gold. That is five."

"What is that sheet before the stove?"

"Oh, zinc."

"And what is that in the thermometer?"

"Mercury, that makes seven; and brass."

"No. Brass is not a simple metal. It is a mixture of copper and zinc. Mixtures of metals are called alloys. There are three more metals besides those which you have named that are of importance—tin, platinum and aluminum. The others occur in such small quantities that it is of very little consequence whether you know anything about them or not."

"You have forgotten steel."

"No; steel is iron with a very little carbon in it."

"What is carbon?"

"Carbon is one of the 62 simple elements, and we see it in various forms. The diamond is pure carbon, crystallized; and charcoal is almost pure carbon."

"How does a little carbon make iron so hard?"

"Nobody knows. That is one of the many mysteries that we meet with in nature. Indeed, the composition of steel has been a very difficult thing to ascertain. There is now a discussion going on whether it does not contain nitrogen in addition to the carbon and iron. The quantity of carbon, however, has been learned, and it ranges in different varieties from 6-10 of one per cent to $1\frac{3}{4}$ per cent. Cast iron, which is still more brittle than steel, contains more carbon, the proportion ranging in the different varieties, from 1 9-10 to 4 3-10 per cent."

"How is iron welded to steel?"

"The ends of both are heated to a white heat, much hotter than red heat, when the end of one is laid upon the end of the other, with a little borax sprinkled on them, and they are hammered or swedged together. After the knife is made it has to be tempered. In this process it is first hardened as hard as it can be, by heating it red hot and plunging it into cold water. But this makes it so brittle that the edge would crumble right off, and to make it right for cutlery, a little of this brittleness has to be taken out. This is done by moderately heating it again, 'drawing the temper,' as it is called."

"What are forks composed of?"

"These forks are composed of German silver, covered on the outside with a very thin coating of pure silver."

"What is German silver?"

"German silver is an alloy of copper, zinc and nickel, which are mixed in different proportions. The ordinary rule is 60lbs. of copper to 25 of zinc, and 15 of nickel."

"What is nickel?"

"It is one of the simple metals. The new cent is an alloy of 88lbs. of copper to 12 of nickel."

"How is the silver-plating on the forks fastened on?"

"Silver-plating is an art which it would take too long to describe now. The reason why I took knives and forks for the first subject in describing to you the several things on the table, is that the metals are all simple substances. We will begin with the simplest substances and go up to those which are more complex; this rule will require us to examine water next week."

Our Correspondence.

The Steam Experiments at Erie, Pa.

MESSRS. EDITORS:—The naval experiments upon the use of steam on board of the United States steamer *Michigan* are progressing finely. Although the weather has been at times sufficiently cold to freeze a large portion of the harbor, yet where the eddies from the paddle wheels circulate there is no ice, owing to the hot water from the condenser. After running for a few hours, the first experiment of 72 hours was commenced Dec. 1st, at 8 P. M. There being quite a leak in the safety valve, this experiment was entirely repeated, it proving useful only to get everything into working order, and the men drilled to their respective duties. In this experiment, the engine was run as nearly full stroke as possible 13-14ths—this being the nearest the valves would allow. The results of this first experiment were not materially different from the fourth, so that I have not thought it necessary to give it in the following table:—

	One engine cutting off at .354 with both boilers.	One engine cutting off at .354 with one boiler.	One engine following 13-14ths of the stroke with both boilers.
Date of commencing	9 P. M. Dec. 5	10 P. M. Dec. 8	3 P. M. Dec. 10
Duration of experiment	72 hours.	36 hours.	72 hours.
Revolutions per minute	11.035	11.114	14.00
Boiler press above atmosphere	20.1 lbs.	20.7 lbs.	20.0 lbs.
Press above zero at cut-off	32.8 "	32.4 "	31.7 "
Do. at end of stroke	12.7 "	11.8 "	28.6 "
Vacuum in condenser	25.5 in.	25.7 in.	25.8 in.
Hight of barometer	29.71 "	29.92 "	29.95 "
Mean indicator, press on piston	20.5 lbs.	19.5 lbs.	30.0 lbs.
Coal per square foot of grate	7.223	14.740	12.322
Proportion of steam room in boiler to weight used per stroke	25 to 1	12½ to 1	25 to 1
Coal per effective indicated horse power	5.855	6.235	5.666
Total pounds feed water per tank	346.155	178.969	626.466
Temperature of injection water	33°	38°	33°
Do. feed do	44°	55°	64°
Do. hot well	101°	101°	101°
Do. engine room	75°	78°	77°
Do. external atmosphere	32°	35°	34°
Pounds of water consumed per hour per effective indicated horse power	43.301	46.736	42.233

It will be seen that the second experiment—the first in the table—was tried with both boilers; it was thought by one member of the Board that, the fires being lighted, there was probably some cold air allowed to enter the combustion chamber; and the third experiment, with one boiler only, was tried as a verification thereof. It only tended to prove, however, that a limited steam room caused a greater consumption of both water and coal, as a much greater quantity of saturated steam was carried over into the cylinder. Although this is no news to the engineer, yet the experiment is of value, inasmuch as it shows the exact loss. By comparing experiment No. 2 with experiment No. 4, you will see that the large per centum of gain by cut-offs is all moonshine, and that engineers and scientific men have, for the last eighty years, subscribed to one of the greatest of fallacies. Why this idea has obtained so long will be quite plain in the discussion sure to follow these experiments. I shall not attempt to commence the argument here, but confine my remarks to the experiments only, and show the reader that it is impossible that there can be any error in the above results.

The Board consists, as your readers are already aware, of four Chief Engineers and one First Assistant. Mr. Isherwood, as chairman of the Board, stands no watch, but has accepted the much more laborious duty of laying out all the diagrams and preparing the averaged tables. Each of the other members of the Board stands his regular watch of six hours, and keeps a log of hourly observations, taken with the nicest possible exactitude. These observations include many other items than those I have thought necessary to place in the above table. The officer in charge takes a diagram alternately each half hour from both ends of the cylinder, marks thereupon the exact time, and files them regularly. These diagrams, with the exception of the variations in the vacuum line by the changes in the barometer, present a singular uniformity, due, doubtless, to the extreme care in firing, the pressure not varying a pound during any of the experiments. The variation in the temperature of the feed water is due to the fact that the tank is filled partly by the engine and partly by hand; but it will be seen that the variation is not great. The temperature of the tank is logged when half emptied; the temperature of the hot well is taken from the average during the hour, as is also the vacuum per the condenser. The boiler pressure is as taken from an Allen gage and a siphon, both of which exactly agree. The coal used in these experiments is bituminous, and does not show so good results per pound as the coal used upon the Atlantic coast. It is perhaps as well to remark that the diagrams, both of full stroke and cut-off, are exceedingly good, the lead on the valve being no more than is ordinarily given, although, in my opinion, a trifle too much.

In conclusion, allow me say that every attention is shown to visitors by members of the Board, and I hope that many of our engineers and engine builders will accept the invitation of the Secretary of the Navy and witness the experiments that are destined to effect an entire revolution in marine and stationary engines. Captain Lanman has done everything in his power to place visitors at their ease, and every facility is afforded them to take notes or examine the logs. The Commission are all stopping at Brown's Hotel, which is quite near the steamer. Yours, truly,

JOHN C. MERRIAM.

New York, Dec. 18, 1860.

Oregon—Its Climate and Productions—Inviting to Mechanics—Wages, &c.

MESSRS. EDITORS:—Presuming that your correspondents are not very numerous in this remote corner of the republic, I will attempt to note down a few things for the information of your readers.

Although this State occupies such an isolated position, there is, nevertheless, a great number of people here who take an interest in the mechanical and social progress of the age. The daily line of stages which has lately been started from Sacramento to Portland, is an enterprize which the people of Oregon hail with great satisfaction. The mail is carried with greater speed and safety than it was by the steamship company; the people being supplied all along the route as the mail comes from California, instead of being carried by sea to the extreme northern end of the route, and then south again at a snail's pace, nearly half way back to Sacramento.

This is a fine healthy country, and there are good opportunities for the prudent and industrious. All the productions of a temperate climate do well here. Horses, cattle, &c., can graze all the year round, there seldom being sufficient snow to interfere with pasturing.

There is a good opening here for mechanics—such as house builders, blacksmiths, saddlers, tanners, shoemakers, and all those branches necessary in a new country. A pair of common coarse shoes for a man costs $4, a set of harness from $35 to $50, common saddles (Spanish) from $25 to $40. The Chinese sugar cane grows well in this valley. There is a great lack of labor on this coast. The great majority of people here are farmers, having usually from a half section to a whole section or more of land, a portion of which they cultivate, besides stock-raising; and where there are so few hands to do so much work, under the disadvantages of a new country, a man must labor very hard or make but little show.

The summers here are delightful, and the winters (rainy season) long and gloomy. There is a constant north wind all summer, which is a gentle, invigorating breeze, "bringing healing upon its wings." And, taking a more practical view, it is well adapted to the running of machinery by a windmill, there being, perhaps, a hundred days that the north wind is as constant as a stream of water. In the winter it is from the south, bringing rain, and always dense with humidity. As I write, the mists are brooding on the hills, which are in their autumnal bloom of the "sere and yellow leaf."

I have often thought that if it were generally known in the Atlantic States that good industrious laborers could get from $25 to $30 per month here the year round, that it would induce a large number of energetic young men to come out to this coast, and operate to the advantage of both borders of the country. Such wages can be obtained here without difficulty. I am aware that hiring out is not the highest ambition of even a poor man; yet, as thousands have to make a beginning from their own unaided labor, the wages here mentioned are a very encouraging indication of what an economical man may do in a few years.

C. W. SMITH.

Deer Creek, Oregon, Oct. 21, 1860.

Patentees' Estimate of Inventions and the "Scientific American."

MESSRS. MUNN & Co.—*Sirs:* Yours of Nov. 5, 1860, informing me of the success of the second patent which has been granted me through your agency this Fall, was duly received, and its contents found very gratifying. Accept my sincere thanks for the prompt and efficient manner in which you have conducted all my business to a successful issue; and, as an evidence of my gratitude, I promise you my business in future, although I have had several applications from other solicitors for it.

I would further state that it is owing to the information I have derived from your valuable paper that I have been induced to make these applications, and very much regret that I did not subscribe for it years ago, as, by so doing, I might have secured many things that are now lost to me. There are many thousands of persons who, could they have the reading of your paper—and who ought to subscribe for it at once, or, like me, will regret it—would be led to direct their attention to something useful for themselves and their country—for all useful patented improvements benefit both—while those unpatented are little known, and are therefore of little benefit to the inventor or the community. Yours, G. W. HATHAWAY.

Tioga, Pa., Dec. 3, 1860.

MESSRS. MUNN & Co.—*Gentlemen:* My patent papers came to hand on the 29th of November; and I am very much pleased with their execution as well as with the accuracy of the drawings. I have to thank you for your trouble in my behalf and to express my gratification for the favorable opinion of my invention, shown by the editorial notice of it, designating it as one of the best improvements lately patented. From the moment I put my business in your hands, I have had every confidence that my interests would be guarded, and that the result would be favorable if my improvement deserved it. This feeling of entire confidence that your interest will be much better attended to than you could possibly do it yourself, or have it done by less responsible agents, is worth much more than the moderate fee it costs. Yours, respectfully,

JAS. H. ANDERSON.

Easton, Md., Nov. 10, 1860.

Ashcroft's Low Water Detector—A Case in Point.

MESSRS. EDITORS:—A practical demonstration of the utility of this instrument occurred at my forge and foundry this morning, and I deem it a simple act of justice to the detector and the public to briefly state the facts of the case.

The severe cold of last night caused the water to freeze in the pipe connected with the street main which supplies the tank of my boiler. The pump is operated by a self-acting feed apparatus, which, for want of supply, soon exhausted the water; and the moment it fell in the boiler below the bottom of the detector, the plug fused, and the alarm was given to some seventy of my hands, in no mistakable manner, that danger was close at hand. I have reason to believe that, but for this timely warning, many valuable lives might have been sacrificed.

I had this instrument attached to my boiler in October last, and this is the second time the plug has melted and the whistle alarmed; the first time, having purposely blown off, the engineer forgot to shut the cock which is placed in the pipe for convenience of shutting off steam. LYMAN KINSLEY.

Cambridgeport, Mass., Dec. 14, 1860.

It would seem, from the above letter and the long list of testimonials in our advertising columns, from some of the largest manufacturing concerns in the country, that the "Ashcroft Low Water Detector" is not the unreliable instrument that the Engineers' Association pronounced it to be in their discussions of Nov. 21, 1860. The public must decide who is most likely to be correct—the hundreds who are daily using the instrument, and are willing to indorse it over their signatures, or the committee of engineers appointed by the Engineers' Association to make an experiment.—EDS.

Preserving Meat Under Ground.

MESSRS. EDITORS:—In your paper of Nov. 24, you notice a patent for packing and curing meat in warm climates. I take this occasion to give publicity to a mode—which I suppose is identical with the one above referred to—for curing meats in the hottest climate, and which has been practised in most of the Southern States, not less than fifteen or twenty years at any rate. The plan is to dig a hole in the earth, from four to six feet deep, and large enough for the amount of meat you have to cure; lay boards on the bottom, and on this pack your meat in salt—the usual quantity—and then cover the hole with boards and earth, keeping it in this condition till the meat is sufficiently salted. By this mode of preserving, no person need lose a pound of meat in the warmest climate

H. CLARK.

Mount Holly, S. C., Dec. 11, 1860.

Artificial Fish Breeding.

MESSRS. EDITORS:—I notice, in your paper of Dec. 8, 1860, an article headed "Artificial Fish Breeding." Mr. Kellogg, of Hartford, Conn., is not the first who has succeeded in this. Mr. Aaron S. Vail, of Smithtown, L. I., one of your subscribers, has been some three years engaged in the propagation of trout, and met with great success. Last year some 25,000 or 30,000 were produced, and the first transported in this country were taken from Mr. Vail's waters, and several ponds were stocked from this successful experiment. This season there is every appearance of an immense increase. A SUBSCRIBER.

Soap and Civilization.

According to Liebig, the quantity of soap consumed by a nation would be no inaccurate measure whereby to estimate its wealth and civilisation. Political economists, indeed, will not give it this rank; but whether we regard it as joke or earnest, it is not the less true, that, of two countries, with an equal amount of population, we may declare with positive certainly, that the wealthiest and most highly civilised is that which consumes the greatest weight of soap. This consumption does not subserve sensual gratification, nor depend upon fashion, but upon the feeling of the beauty, comfort, and welfare, attendant upon cleanliness; and a regard to this feeling is coincident with wealth and civilisation. The rich in the middle ages who concealed a want of cleanliness in their clothes and persons under a profusion of costly scents and essences, were more luxurious than we are in eating and drinking, in apparel and horses. But how great is the difference between their great days and our own, when a want of cleanliness is equivalent to insupportable misery and misfortune!

A NEW ARISTOCRATIC ORDER.—In China they have a button aristocracy. The Emperor alone has for his button a large pearl. Among the madarins the ornaments are graduated according to rank. The dragon, which the Emperor wears as his arms, is furnished with five claws or nails, but a citizen can only have four embroidered on his coat, under severe penalties. The yellow color is another imperial sign, and is sometimes worn by mandarins as a reward for important services. The yellow orange waist belt is worn by the descendants in a collateral line from the founder of the present dynasty; and these men are often so poor and so numerous that they may frequently be found conducting a plow.

Column of Varieties.

At Stowe, Vt., there are five factories in which starch is made from potatoes. Each consumes about 20,000 bushels per annum, and eight pound of starch is the yield of each bushel.

A piece of meteoric iron weighing 2,000 pounds, found in Tucson, Arizona, is about to be sent to the Smithsonion Institute. A smaller piece, found in the same place, has been used for several years for an anvil in a blacksmiths' shop.

There are no less than twenty-three steam fire engines in use in the city of Philadelphia, where there are five firms engaged in manufacturing such fire extinguishers, one of which (Neaffie & Levy) has built twenty-seven for companies in other cities.

Large quantities of pyroligneous acid are manufactured in Philadelphia and sent to Cincinnati for the purpose of curing hams. It gives them the same flavor as those which are smoked and it may answer just as well.

M. Auguste Mariette, an eminent French archæologist, writes from Egypt that he has discovered the remains of a large palace, in granite, in the immdiate vicinity of the Sphinx. He takes this palace to be that of Chephrem, who built the great pyramid. No less than seven statues of this prince have been found in the palace.

The Philadelphia *Enquirer* states that the number of oil wells bored on Oil Creek, Pa., is 345, that the average product daily of 29 wells is 15 barrels, and that the oil has been sold as low as 10 cents per gallon on the spot. No less than 145 wells have been bored to a considerable depth without obtaining oil. Persons are cautioned against being too enthusiastic about the profitable character of such wells.

A simple microscope may be made out of a common pill box for a few cents. Take out the bottom and put in a piece of window glass; then paint the inside black, and make a small eye-hole in the lid. In this hole place a single drop of warm Canadian balsam, and allow it to cool. This drop of the transparent resin assumes, when cooling, the proper form of a glass lens, with considerable magnifying power.

The wood of white thorn is the best known substitute for boxwood in wood engraving. In England, when white thorn of considerable size can be obtained, it brings nearly as high a price as Turkey box. Perhaps the white thorn can be cultivated successfully in America, so as to be used in engraving, as box is becoming very scarce and dear.

Lobsters are so stupid that when they are left on dry land by a receding tide they have not sufficient instinct to crawl back into the water, but always wait for the return of the tide. Several lobsters were thrown a few feet above the sea by a landslide in England, and although the water came within five feet of their noses, they remained waiting for the water to come to them until they died.

A correspondent of the Germantown (Pa.) *Telegraph* states that he has made successful experiments in feeding turkeys with charcoal. He took eight of these fowls and put four in each of two separate pens, and fed them alike, with meal, boiled potatoes, and oats, with the exception that one set had a pint of pulverized charcoal daily, while the others had none. They were all killed on the same day, when it was found that those which received the charcoal averaged each one and a half pounds more than the others, and their flesh was more tender and pleasant.

The imperial minister of commerce has addressed a circular to the French prefects, requesting them to exercise the utmost vigilance in their inspection of manufacturing establishments suspected of employing the arsenite of copper. Certain stuffs, such as green gauze and the leaves of artificial flowers, are often colored with this poisonous substance. Complaints of serious accidents, caused by the use of stuffs so colored, were made to the French government.

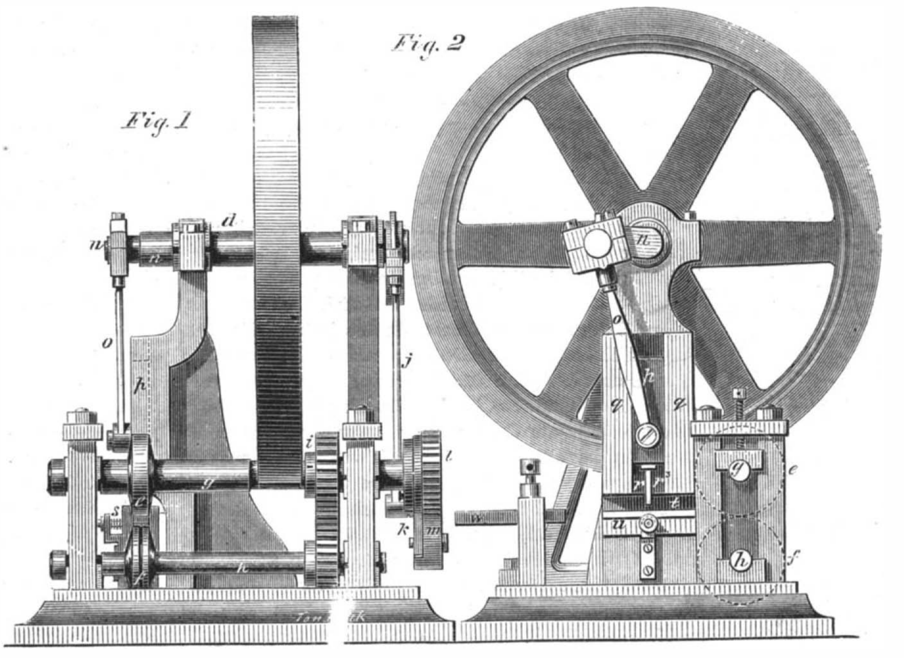
When gutta percha is exposed to the air for some time it gradually becomes brittle and loses all cohesion. This change in its character is owing to its combination with oxygen by absorbing it from the atmosphere. When laid under water, in telegraph cables, it does not undergo such changes, because it is excluded from the air. In constructing the East India telegraph lines, vast quantities of gutta percha were used to coat the iron wires, which, becoming useless, an immense loss was sustained.

Machinery for the Manufacture of Wire Netting.

Mr. John Reynold, Jr., of Soho, London, has patented a set of improvements in the manufacture of wire or metal netting and in machinery employed therein, of which he gives the following description in the *Mechanics' Magazine*:—

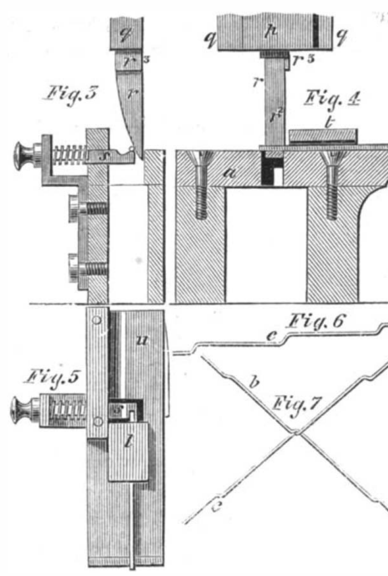
Heretofore in the manufacture of twisted wire netting it has been usual to twist together by hand the wires employed at the points where they cross and pass round one another. Now, according to this invention, I prepare wire for the manufacture of netting of this description by first bending the wires at intervals, viz., at the points where the crossings will fall when the wire is made up into netting; and I make these bends of such a form that the wires, when crossed, have the same appearance and are as firmly held together as when the wires are bent in the act of passing them one round the other, as heretofore. This method of manufacturing twisted wire netting enables me to use hard wire in the manufacture, and so I produce a stiffer net than that which is made in the manner heretofore practised, as when twisted wire netting is so made annealed wire is necessarily employed. The machinery I employ for preparing the wire consists of a pair of rollers or instruments, which feed the wire forward at intervals over a bed in which a hole is formed, and the wire is bent by a wedge, which descends at intervals, and, forcing the wire against suitable stops, gives to it two nearly right-angled bends. A slight curve downwards is afterwards given to the short length between the two angle bends by a projection on the side of the descending wedge, forcing the wire down into a hollow in the bed. The arrangement of the mechanical parts of this machine may be varied so long as the principle of its action is maintained, which consists in giving to the wire each time it is fed forward at intervals two nearly right-angle bends by an instrument forcing it against suitable stops, and subsequently giving a curve to the portion between the two bends by an instrument caused to press on the wire at this point. In place of wire, metal rods may be employed in the manufacture of netting of large size.

Fig. 1 is a front elevation of a machine arranged in a suitable manner for bending wire when carrying out my invention; Fig. 2 is an end elevation thereof; and Figs. 3, 4 and 5 show different views of the dies or bending apparatus separately; Fig. 6 shows a piece of wire bent into a pecular form requisite for carrying out my invention. In Fig. 6 it will be seen that the wire is bent at intervals into steps, the distance from bend to bend representing one side of the mesh of the wire netting, into which several of such bended wires are to be made. In addition to bending the wire into steps, as shown, the short bends at *c* (where the intersections or crossings of the wires take place when they are combined into a net), are each bent concave on one side and convex on the other, so that, in fact, a length of wire, when bent out of the straight line into the steplike form shown at Fig. 6, represents, as near as may be, one of two pieces of wire which have been twisted together; hence, when a number of these wires are brought together and combined, they will, at each of the crossings or intersections, bend round each other, as is shown at Fig. 7, where two of such bent wires, *b* and *c*, are combined or placed around each other, forming an intersection or crossing as if the two had been brought together when straight, and then twisted or bent round each other as heretofore. The peculiarity of this part of my invention consists in bending each wire into the peculiar form and at the precise distances apart (according to the size of meshes) before bringing the wires together, and this is very important, as such preparatory bending is done by machinery. This process of bending is performed very quickly, and at comparatively small cost, resulting in far greater exactness than when wires are brought together when straight, and twisted together into meshes by hand. The arrangement of machinery for bending and shaping the lengths of wire into the form shown at Figs. 8 and 9 may be varied. And I would state that, although I prefer to use both sets of wires, *b* and *c*, bent into the forms shown, yet I find that the process of making twisted wire netting is greatly facilitated by having one set (say *b*) bent, as shown, and then to employ therewith straight wires for the other set, and to bend such other set around the wires, *b*, at the points of their bends: by so doing the accurate bending of the one set of wires greatly facilitates the workman in getting



WIRE NETTING MACHINERY.

truth or evenness of manufacture; but in this, as in the old manufacture, the use of annealed or soft wire is required. I prefer, in all cases, that both sets of wires should be bent into the forms shown in Figs. 6 and 7; *d* is the main or driving shaft of the machine, which may be put in motion by hand or by power. The shaft or axis, *d*, gives motion at intervals to the feed rollers, *e* and *f*, fixed on the shafts, *g h*, which are geared together by the toothed wheel, *i i*. The feed rollers are put into motion, and at each motion they



are caused to move forward a length equal to that required for one side of a mesh of the netting, together with the requisite bend, *c*. The length of wire which moved in at each motion of the feed rollers is regulated in the following manner:—On the shaft or axis, *d*, is an eccentric, which, by a rod, *j*, gives motion to a slotted arm, *k*, which moves freely on the axis of one of the feed rollers, on which axis a ratchet wheel, *l*, is fixed, into the teeth of which wheel a driver, *m*, takes each time the slotted arm, *k*, is depressed, and according to the position at which the lower end of the rod, *j*, is attached to the slotted arm, *k*, so will be the quantity of wire fed in. The shaft or axis, *d*, has a crank, *n*, at its outer end, which, by a connecting rod, *o*, gives motion to a slide, *p*, which is guided in dovetail guides. At the lower end of the slide, *p*, is fixed the die or tool, *r*, the form of which is clearly shown in the engraving, Fig. 4. This die or tool, in descending, pushes back the spring bolt, *s*, which has at all times a tendency to remain across the opening into which the tool, *r*, descends. The face, r^1, of this is plain and at right angles to the wire; the other face, r^2, is inclined to the wire. The wire, in its passage into the machine, passes under the plate, *t*, then over the spring bolt, *s*, near its end, then over the platform, *u*, and then through the tube, *w*, which is flat at the top side, and is capable of being set a little inclined in its bearing. The descent of the tool, *r*, presses the spring bolt back and bends the wire, which, resting on the end of the bolt, is prevented descending with the tool, *r*; then, when the tool, *r*, has nearly completed its downward motion, the projection, r_3, which is convex on its under side or edge, presses on the bended part of the wire and depresses it into the groove, and produces the concave form required at that part. The tool, *r*, then ascends, a further quantity of wire is fed in, and the groove in the bolt, *s*, and in the platform, is for receiving and guiding the bent part, *c*, of the wire as a fresh quantity of wire is fed in, which fresh quantity, till it is acted on by the tool, *r*, rests on the edge of the groove in the spring bolt and in the platform.

The above figures represent a modification of the wire crimping machine illustrated on page 202, Vol. XIV. (old series), of the Scientific American. Until now, it would seem that the art of manufacturing wire netting has been much further advanced in America than in England; as in that country they have been twisting the wire by hand for years, while, according to H. Jenkins' method, patented in 1847, we have been doing it by machinery.

Improvement in the Money Market.

The influx of gold from California and England during the past week has had the tendency to greatly improve the money market, and the result is that government, railroad and bank stocks have advanced from three to six per cent. The appended extract from a daily paper, shows the amount of gold which had arrived in this city up to Thursday evening, Dec. 20, 1860:—

The following are the receipts by the steamers since Saturday last:

Per *North Star*, from California	$1,083,213
Per *Europa*, from Liverpool	540,000
Per *Etna*, from Liverpool	330,000
Per *Atlantic*, from Liverpool	861,000
Per *Borussia*, from Southampton	17,500
Per *Persia*, from Liverpool	3,100,000
Total	$5,931,713

Averaging but a little short of a million per day! And as long as the exchanges remain as much in our favor as they are at present, there is nothing to prevent a continuance of the flow of gold to this point, to pay for the Western breadstuffs and the Southern cotton shipped on English account long before our politico-financial crisis set in. With the foreign importations down to an extremely moderate point, the balance of trade is largely in our favor; but, for the lack of confidence and credit, growing out of the threatened dissolution of the Union, the country at this moment would be enjoying an unparalleled prosperity.

The State Convention assembled at Charleston, South Carolina, on the 20th ult., and passed an ordinance declaring that State out of the Union. Business in all parts of the country is inactive, and if we except the department of inventions, the mechanical and manufacturing industry of the country is mostly at a stand still. The long list of cases sent from this office to the Patent Office during the past week shows that the inventors from all sections are not so paralyzed by the crisis as to be deterred from securing their inventions.

The largest tree in Massachusetts is said to be an elm, situated upon the Hubbard farm, in North Andover. It is one hundred and ten feet in hight, and its branches spread one hundred feet in width. Its girth, at six feet from the ground, measures twenty two and a half feet.

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VOL. IV. NO. 1..... [NEW SERIES.]....*Seventeenth Year.*

NEW YORK, SATURDAY, JANUARY 5, 1860.

NOW IS THE TIME!—SEND IN YOUR NAMES, ACCOMPANIED WITH $2, IMMEDIATELY.

This number commences a new volume, and thus a better opportunity is presented for subscribing to this paper than at any other period during the year. We hope mechanics, inventors, manufacturers, planters and farmers throughout the country, who are not already subscribers, will avail themselves of the present most favorable time to enroll themselves with the band of nearly thirty thousand who are already its patrons. We believe no employer can make his workmen or apprentices a better New Year's gift than by presenting them with a year's subscription to the SCIENTIFIC AMERICAN. The subscriber not only receives sixteen pages of valuable reading matter, illustrated by a number of beautifully executed engravings, every week, but at the end of the year, if he preserves his numbers (which we counsel every subscriber to do), he will have two beautiful volumes of four hundred and sixteen pages each, with an index, which will be worth to him, as a work of reference, many times the cost of subscription.

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THE FUTURE.

We have entered upon a new year; and are looking forward, each with his own hopes and anticipations, into the future, all eager to know the events which are to come forth from its infinite depths. But an impenetrable vail is drawn over them all, with the single exception of the motions of the heavenly bodies. While all other sciences are limited to the study of the past and the present, astronomy alone assumes the high prerogative of foretelling the events of futurity; and the most impressive of all proofs of the power of knowledge is furnished by the precision with which her predictions are fulfilled. The possession of the God-like power of foreknowledge is moving astronomers with the sublime ambition of enlarging the sphere of its action, and they are now engaged with two great problems, the solution of which will reveal the fate of the universe to times more remote than those which have yet been explored by the daring intellect of man.

If it shall be ascertained that there is a resisting medium in which the planets revolve, the prophecy will be as safe as the foretelling of an eclipse; because it follows, by strict necessity, that all the planets will wind spirally inward till they severally crash into the mass of the sun. And, besides the final catastrophe, there is no doubt that many other events in the future history of the solar system may be foreseen.

The other great problem is the motion of the solar system, itself, among the stars. If this motion is in a vast orbit about the common center of gravity of our stellar system, then the questions will arise whether this orbit is very eccentric, and whether, in one of the foci, there is a collection of suns, as the Pleiades may be. For in this case, as our solar system approached the perihelion, the temperature might be so increased as to destroy all animal life upon the planets, so that the long work of creation would begin anew.

Again occurs the possibility of the motion of our *stellar* system among its kindred collections of stars. It may be that this is sweeping around some great reservoir of heat, in an eccentric orbit like that of a comet, and that the matter which composes the solar system will be dissipated into the fiery particles from which it was originally formed as this central heat is approached, and again condensed into a sun and planets as it moves towards its aphelion, away from the heat which scattered it.

Geology teaches us that, compared with the lower forms of animals that earliest inhabited the earth, the human race has been in existence but a very brief period; and when we compare the physical, mental and moral state of the Asiatics, the Africans, and of large numbers of Europeans and Americans, with that of Carlisle, Faraday or Agassiz—the actual condition with the proved possibilities of human nature—we are, on this ground, impelled to believe that our race is in its infancy. Have we not, in the history of the past, good grounds to hope that the ignorance, intemperance, licentiousness, superstition, oppression, vice, crime, war and degradation which prevail in the world, will be gradually removed, and that the time will come when every individual will grow up to the full measure of nobleness and worth of which our nature is capable?

It may be that, when the human species has received its full development, it will be swept away like the extinct species that have preceded it; and as this is the last step in bringing the animal life of the globe to perfection, it may be that all will perish together; perhaps in that final catastrophe "when the elments shall melt with fervent heat," the matter of the solar system shall be scattered into a fiery cloud like that from which it was originally formed. This matter may then again be drawn together into suns and planets, a new earth like our own may be formed, again to be inhabited by animals rising from the monad, through long gradations, up to man; the human race may again be developed from the savage state to the highest form of civilization, again to overcome the evils of ignorance, superstition and intemperance, again to invent the steam engine, the microscope, the telescope and the electric telegraph, again to unroll the records of the past, and again to speculate on the possibilities of the future. And thus the universe may move through successive cycles of perpetual change forever.

FOOD AND GAS REFORMS.

England has advanced with rapid strides in education, rational freedom and wise legislation since the Reform Bill was passed twenty-eight years ago. This is very gratifying to all who labor for social and educational progress. During the last session of Parliament, two bills were enacted which, in an especial manner, affect the welfare of the people, and we look upon them with decided approbation. The one relates to the adulteration of food and drink, and the other to the sale of gas by companies. It has been enacted that any person selling any article of food or drink which, to the knowledge of the seller, contains any mixture injurious to the health of the consumer—also, any person who sells for pure an article of food or drink that is adulterated, shall, on conviction before two justices, forfeit a sum not exceeding five pounds, together with the costs of the prosecution, and on a second conviction, the justices may order the particulars of the offense to be published. Power is given to local boards to appoint competent chemists, subject to the approval of the Secretary of State, to examine articles of food offered for sale, alledged to be adulterated, and report thereon, but opportunity must be given to the seller of such articles to accompany the purchaser to the analyst to secure the article from being tampered with. The purchaser of any article of food or drink can also, upon the payment of a small fee, have the article analyzed by the appointed chemist. Ample provisions are thus made to secure justice to both purchaser and seller. This law is certainly susceptible of wider application and might be copied for New York and others of our own cities with immense advantage to the community. It is calculated to deter unscrupulous dealers in alimentary substances from adulterating their articles for the purposes of unlawful gain. Provision is also made for cases of appeal, if objections are taken to the analysis of the chemist. This is positively necessary, as it requires not only great chemical knowledge but a very clear judgment to be an exact and sound analyst.

The law relating to gas refers only to London, but it is applicable as a guide to other cities. The act determines the quality of the common gas to be supplied, limits its cost, and provides for a sufficient supply. Its illuminating power must be equal to six sperm candles at six to the pound. The gas made from cannel coal is to be equal in illuminating power to twenty sperm candles. It is to be so pure that it will not discolor turmeric test paper or darken paper imbued with acetate or carbonate of lead during one minute's exposure to a current issuing at a pressure of five-tenths of an inch of water. The gas company which fails to comply with these conditions is liable to a fine of fifty pounds. The local boards have the power to appoint competent examiners, who, for a small fee, will inspect and report to any consumer on the power and intensity of the gas supplied to him. The cost of gas made from bituminous coal is fixed at 4s.6d. per 1,000 cubic feet—that of cannel coal gas at 7s.6d.

This bill is judicious and scientific in its features. There is a very great difference between the quality of gases made from different kinds of coal, whereas most persons suppose that all coal gas is alike. The gas made from common Liverpool coal possesses but little more than half the illuminating power of that obtained from cannel coal. In London its price is about sixty per cent less than the gas sold in New York.

No corporation or company has any right to establish an injurious custom or practice. It is the duty of the legislative authorities to protect the public from such practices, no matter whether it be in the sale of food, drinks, gas, or any other thing. Newton's *London Journal* contains a most able article commending the two reform acts we have described. It justly asserts that while laws had been made previously for the punishment of frauds committed by trustees, bankers, and other persons entrusted with property, it was remarkable that until now no adequate provision had been made to prevent adulteration in the important articles of food and drink, on the quality of which our very lives depend. Well, it is wonderful, but when we know that the telescope was invented before the microscope, we may justly attribute the course of legislation to the same causes.

Our New Year's Dress.

Some persons make great pretensions to having arrived at a delectable state of mind in which they remain as unmoved in an old as a new coat. We confess to a complete scepticism in the sincerity of all such individuals. We never yet knew a sensible fellow who did not feel a sort of *all-overish*, good-natured opinion of himself, his tailor, and the rest of mankind, when he donned a well-fitting new coat. "It's human nature" to feel so, as old David Crocket would have said. We look upon the old Diogenesians and stoics, about whom philosophers have boasted so much, as a set of fossilated curmudgeons, only fit to be stowed away in Dr. Hitchcock's geological cabinet with the teeth of the great *Equus Americanus* and the footprints of the *Ornithichnites*. The SCIENTIFIC AMERICAN, in its own personality, feels an inward warmth of conscious regard, sufficient to defy the most chilling blue-nosed nor'wester, at being enabled to make his New Year's bow to old patrons and new friends in "a sprit new dress from top to toe." He considers it the handsomest suit that ever graced his redoubted person; and this anybody can appreciate by a mere side glance, even when running to catch the last train at fifteen seconds and a half behind time. Having discovered the "elixir of life" we intend never to grow old, and our friends, with a full knowledge of this fact, have dressed us up accordingly in the most sprightly and engaging manner, and yet with none of the "gewgaw" and gimp trimmings of the flash style. Our suit is of the best quality, and it is cut in the most harmonious proportions to correspond with our character. With such notions about ourselves, we feel greatly energized in commencing our new volume, and with the best desires for the welfare of our friends, we wish them all "A Happy New Year."

THE STEAM EXPERIMENTS AT ERIE.

It is not a little remarkable that some old questions of science, which it had been supposed were "fixed facts," have been brought up for discussion by men of science, and others during the past year. This has been the case with the working of steam expansively. It had been recognized as a general truth in science and practical mechanics, that in almost every case a great saving was effected by using steam expansively in engines; but it is now contended that, practically, there is no economy in so employing steam. We stated, in a previous number, that experiments were to be made for the determination of this question by a board of naval engineers at Erie, Pa.; and some of these experiments are now given in a communication from Mr. Merriam, on another page. As there presented, the experiments appear to be conclusive against the use of steam expansively, and our correspondent, who was previously, like ourselves, a believer in expansion, confesses to a complete conversion in opinion. We have always been cautious in receiving and adopting opinions, and just as tenacious in holding on to them. "Prove all things, hold fast that which is good," is a favorite text of ours. We objected to Chief Engineer Isherwood's views respecting the uselessness of cut-offs when his second volume of "Engineering Precedents" was published, and until we have more full details of the experiments at Erie, and have given them further investigation, the information we have acquired will not lead us to renounce hastily our former opinions on this subject.

In the Erie experiments, the amount of coal used, per indicated horse power, was greater when cutting off at a little over one-third of the stroke than when running full pressure for thirteen-fourteenths of the stroke, thus showing a positive loss instead of a gain by expansion. If a saving of fuel is effected by working steam at full stroke, what an economy in working expenses, and what a benefit to manufacturers using steam engines, will be the result, permitting, as it will, most steam engines to be simplified, as well as greatly reducing the expenses. But is it possible that the whole engineering world, for the past fifty years, has been laboring under the delusive idea that instead of effecting a saving, a great loss has been incurred in the use of expansive steam? It is quite possible that this may have been the case; but as every pound of steam exhausted from an engine, above atmospheric pressure, involves the loss of just so much work, we certainly cannot divine how a saving of fuel can be effected thereby in comparison with working steam expansively in the best manner, and exhausting it at a lower pressure for the purpose of utilizing all "the work" in it.

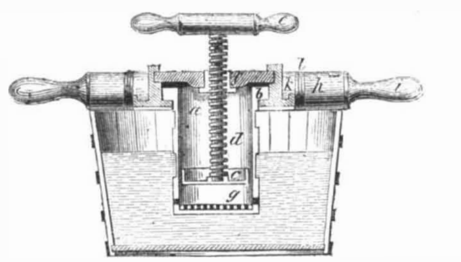
We have been given to understand that the theory adopted to account for the loss entailed by expansion is the condensation of such a portion of the steam as nullifies all the gain that has hitherto been awarded to the use of cut-offs. This theory is scarcely new. In using saturated steam expansively, it has long been held that considerable condensation resulted therefrom; but the way to prevent this and obtain a great saving has been well known. In the experiments made by M. Hirn, of Mülhause, France, in 1855, with expansive steam, and surrounding the cylinder with a heated jacket, a saving of 23.5 per cent was obtained. Mr. Gordon McKay, of Patterson, N. J., also made experiments with a steam jacket surrounding the cylinder, as described on page 309, Vol. XIV (old series), of the SCIENTIFIC AMERICAN, by which he obtained a saving of 27 per cent of fuel. The refrigerating effect by expansion must be as great with as without a steam jacket, and yet the experiments were conclusive as to the saving effected by the heated steam jacket. How, then, does the question now stand with our old motive agent, steam? Why it is supposed that while much is positively known about it, there is a great deal that is still obscure, and demanding further investigation to clear up the entire subject.

Working and Molding Butter.

Mr. James Lamb Hancock, of Pentonville-road, London, has patented an improved apparatus for working and shaping butter, and for separating it from the butter-milk, of which he gives the following description:—

My apparatus consists of a jar or vessel, open at top and perforated at bottom with circular or other shaped apertures, and with the rim formed with a flange or recess in the inside, with portions of the rim removed. Butter is placed in the vessel, and a piston is inserted in the top thereof; a nut is introduced in the flanged rim, the portions removed admitting of its introduction; a screw is then inserted and turned down through the nut, whereupon the butter is expressed in a divided state through the apertures in the bottom of the vessel. Instead of the nut of the screw being placed inside the flanged rim it may be fitted on the outside of the vessel. Movable perforated plates may be used for the bottom of the vessel.

The accompanying engraving is a sectional elevation of an apparatus for working and shaping butter, and



for separating it from the buttermilk, fitted in a suitable frame; *a* is a jar or vessel, open at bottom, the the upper part of which is formed with a flange, *b*; *c* is a piston of or about the size of the interior of the jar, *a*; *d* is a screw-threaded rod connected to the piston, and carrying at its upper part a handle, *e*; this rod works through a nut, *f*; *g* is a perforated metal plate placed in the bottom of the jar or vessel, *a*. To use the vessel or jar, for the sake of convenience I place it in a frame, *h*, provided with handles, *i i*, the flange, *b*, rests on a metal plate, *k*, supporting a flanged rim, *i*, with part removed as shown in the figure; and the frame, *h*, with the jar, is then placed on an ordinary tub, as for example, one similar to that shown, and the butter to be operated on is put in the vessel, *a*, and the piston inserted, a cloth having been previously wrapped round it; the handle is then turned, which drives the piston down, and forces the butter out in thin flakes or filaments through the perforated bottom of the vessel, *d*, into the cold water in the tub, *k*, where it becomes instantly chilled and freed from all traces of milk and whey.

In some cases I perforate the jar or vessel near the bottom, as shown.

In the specification of his patent, Mr. Hancock shows a drawing of a frame, in which the jar or vessel is supported at a slight angle from the horizontal line. This apparatus is used for shaping or making up butter into certain quantities, such as pounds or half pounds. A plate is placed in the bottom of the vessel, having a hole formed in it according to the size the butter is required to be made; and the butter which is forced through this hole is received on a slab, where it is cut into the required lengths. The piston and apparatus connected therewith, before described, are used for forcing the butter down the jar through the hole. Butter can be formed into an endless variety of shapes for the table and garnishing purposes, by altering the shape of the holes in the plates at the bottom of the jar.—*Mechanics' Magazine.*

Recent American Inventions.

The following inventions are among the most useful improvements lately patented:

MACHINE FOR WINDING WOOLEN ROVINGS ON SPOOLS.

The object of this invention is to facilitate the labor of removing the roving from the carder to the machinery which subjects them to the succeeding operation in the manufacture of yarn. The invention consists in the employment or use of a series of spools connected together or placed on the same shaft, the latter being placed in a sliding frame which is fitted in a swinging one, and arranged with certain parts whereby the rovings, as they are discharged from the carder, are wound upon the spools, the latter being filled consecutively by a continuous operation and adjusted automatically. J. A. Chapman, of Poquetanuck, Conn., is the patentee of this invention.

SPRING BALANCE FOR SAFETY VALVES.

The want of some convenient and expeditious means of reducing the load upon the safety valves of locomotives has long been felt. With the spring balance in common use, the nut, constituting the only means by which the load can be varied, requires to be turned so far before any considerable reduction of load is obtained, and the adjustment to effect such reduction is so tedious that engineers, when compelled to stop for a time, will often neglect to reduce the load, as it is their duty to do on such occasions, or will fail to reduce it as much as they ought to do. The object of this invention is to enable the load on the valve to be conveniently and instantaneously reduced by the engineer as much as may be desirable, and to this end it consists in a certain mode of employing an eccentric and lever in combination with a spring, whereby the desired result is produced. The credit of this contrivance is due to Charles Graham, of Scranton, Pa.

GAS BURNER REGULATORS.

This invention consists in a longitudinally adjustable tube having a number of apertures, and so fitted to the interior of a gas burner, or to the pipe or passage leading to the burner, that all the gas admitted to the burner must pass through said tube, and having its apertures so arranged that, by its longitudinal adjustment, the gas is allowed to pass through in greater or less quantity, according as may be required by the various pressures in different localities. It also consists in the employment in combination with the said adjustable tube, of one or more chambers or diaphragms, either with or without valves, for the purpose of regulating the supply of gas at the varying pressures to which any burner is subject. The patentee of this invention is William Mallerd, of Fairfield, Conn.

Wooden-soled Boots and Shoes — A New Article of Manufacture.

Nothing conduces more to the health and comfort of a human being than to keep the feet dry and warm during the winter months. How many poor human beings are wasting away with pulmonary diseases, who can unerringly date the commencement of their declining health to damp feet. The disease of consumption prevails to some extent in most quarters of the globe, but so fearful are its ravages in this country that it is denominated the great American scourge. We believe that the protection of the feet from cold and damp is a most important thing to be done to preserve the health, and one of the best means known to us to secure dry, warm feet, are the use of the new and most useful article of wooden-soled boots and shoes patented by W. C. McClelland, of Chicopee, Mass., on the 6th of March, 1860.

The boots and shoes made on McClelland's plan are unlike the French *sabot*, which is entirely of wood, or the ugly Lancashire clog. The sole is made of hard wood and so treated as to prevent its absorbing moisture or being likely to crack. The uppers are made of leather and are secured between the thin wooden inside and thick wooden outer soles, by pegs, nails, screws, cement, or any other means most suitable for the kind of article manufactured, and, in appearance, are as neat as heavy boots and shoes made entirely of leather. They are chiefly intended for farmers, miners, foundrymen, bleachers, dyers, and classes of persons working in damp situations. As wood is a good non-conductor, such boots and shoes are superior to those made entirely of leather for keeping the feet warm, and the soles will endure, of course, much longer, while the cost is not so great, we are informed, as the same quality composed entirely of leather. During the Crimean war, numbers of the French soldiers wore *sabots* in winter, and it was remarked that they suffered less from sickness than their leather-soled comrades. We understand that great quantities of boots and shoes are now manufactured by McClelland & Co., at Chicopee, Mass.

The large shoe firm of Howes, Hyatt & Co., Nos. 12 and 14 College-place, this city, are agents for the sale of this new production, and we learn that they have already sold many thousands of pairs, although they have been but recently introduced.

Patents for this valuable and humane invention have been secured in most of the European countries through the Scientific American Patent Agency. We would recommend persons who are troubled with cold feet to try the wooden-soled boots. They may seem a little stiff at first, but the wearer will soon become used to that feeling.

MOORE'S RURAL NEW-YORKER.—We receive regularly the above popular periodical, published at Rochester, N. Y. All agriculturists, horticulturists, mechanics and architects should read it.

An Interesting Engineering Feat.

A well proportioned column of gray marble of the Doric order overhangs the railway at the entrance of the tube on the Anglesey side of the Menai Straits, in England. It was erected in 1815 to commemorate the military achievements of the Marquis of Anglesey, who was second in command at Waterloo, and perched as it is on an elevated plateau of rock, and visible for many miles in every direction, it has been considered one of the sights of the far famed Menai Straits. To crown this column, the inhabitants of Anglesey have just had a bronze statue (by Noble) of the marquis of that name, erected upon it, and the manner in which this statue, 12 feet 4 inches in hight, has been raised to the top of the column is considered a bold and novel, if not an extraordinary feat in engineering.

The rock on which the column stands presented but an insufficient space for scaffolding, and great difficulties arose in consequence; these were, however, overcome by the device of a youthful engineer named Haslam, a native of Anglesey, only 23 years of age, and whose untimely death, brought about by the anxiety attendant upon the critical operation he undertook, has given additional interest to the bold project in question. By this design the expense and inconvenience of the use of scaffolding had been avoided. The following is a description of it, taken from the London *Times* of November 28:—

Two balks of timber, about 70 feet long, were placed vertically at the foot of the column, and formed a sort of double mast, on which was placed what sailors term "cap and cross-trees," to admit of a topmast which was hoisted up and secured between the two lower masts, the whole attaining a hight of 120 feet, giving a clear of 20 feet above the column itself. On the capital of the column a shorter mast was erected, and between these two masts a large pair of traverse beams was laid across; the whole were firmly bolted together and secured with several pairs of shrouds. The structure looked of so slender a nature that when the great mass, weighing 2½ tuns, which was about to be lifted in mid-air, to an elevation of 120 feet, was seen, every one felt considerable misgivings. The hoisting apparatus consisted of a large hawse carefully attached to the statue, and leading through rollers on the traveling truck, along the traverse beams, and down on the opposite side of the column, and attached to a heavy three-fold tackle, forming the principal purchase. Besides this, two other tackles, likewise attached to the traveler on the summit, and thence to the statue, were used as supports to the main hoisting apparatus.

The statue commenced to move at exactly 11 o'clock, and rose majestically in the course of half an hour to the hight of 70 feet, when the main tackle suddenly twisted itself up so completely as to appear like a single rope. This was an awkward moment and appeared to threaten a failure, but the sailors speedily climbed up to the tackle and applied a lever to the upper block, and so untwisted the tackle and the hoisting was resumed. The half-hour consumed in this matter was one of no ordinary anxiety, for the statue began to vibrate rather unpleasantly. At 1 o'clock it reached the summit and there remained only the operation of sliding it along the beams until it stood over its final resting place. For this purpose it was necessary to rack the tackles in order to liberate the statue from them during its natural movement. The operation of racking caused a delay of about half an hour, when the ponderous weight was slid by the main purchase, checked by two tackles at the opposite end of the truck, until it was poised over the column; the preventer tackles were then unracked, and it was lowered into its place at half-past 1, amid the cheers of the bystanders.

Young's Coal Oil Patent Case.

One of the most important patent cases ever tried before any court commenced at Edinburgh, Scotland, on the 1st of last month and lasted until the 7th, before A. McNeil, Lord President of the Court of Sessions. The parties in the case were E. W. Binney & Co., of the Bathgate chemical works, plaintiffs, and the Clydesdale Chemical Company, defendants. The application was for an injunction to restrain the defendants from manufacturing paraffine oil or oil containing paraffine from any bituminous coal, by distilling it, this being claimed as an infringement of Young's patent belonging to the former company. The Court was numerously attended by scientific men, and others interested in the manufacture of coal oil.

It was admitted that James Young obtained Letters Patent on the 7th of October, 1850, for making paraffine oil from coal; the following were the three issues sent to the jury:—

1st. Whether the defendants had used at their works the invention described in the Letters Patent specified.

2d. Whether the invention described in the Letters Patent was the original invention of James Young.

3d. Whether the invention described in the Letters Patent was known and publicly used in Great Britain prior to the date of the patent.

On all these counts the jury, after a charge by the President of the Court, returned in half an hour with a verdict in favor of the plaintiffs. This case is of great interest to American manufacturers of coal oil, because Mr. Young obtained an American patent on the 23d of March, 1852, which has been a subject of considerable controversy. We published the specification of the patent on page 186, Vol. XIV. (old series) of the Scientific American, and upon solicitation we gave our opinion on that occasion that the patent was a good one, and that Mr. Young, in a legal sense, was the inventor of the improved process which he claimed. Several correspondents disputed the correctness of our opinion, most of them asserting that the invention claimed by Young was known before the date of his patent. Dr. Antisell, of the Patent Office, edited a work on oils obtained from coals, which was published by D. Appleton & Co., of this city, in 1859, in which he took the very same views of this patent which we had done. A long review of this book appeared in Silliman's *Journal of Arts and Sciences* for July last (1860), by Frank H. Storer, chemist, the object of which was the annihilation of Dr. Antisell for his ignorance regarding the invention of Young. It was principally directed to prove that the patent was invalid for the want of originality—that the process or invention claimed in the patent was old and well known. Under the appearance of much candor, smartness and chemical erudition, the article in Silliman's *Journal* was very shallow, so far as it related to the true nature of the patent. The present trial has proved conclusively that the views which we first expressed, and with which Dr. Antisell coincided, have been confirmed in a very distinguished British Court.

At this trial, the whole chemical science was ransacked for testimony by the defendants, and Drs. Penny and Playfair, Sir Robert Kane, Dr. Taylor, Mr. D. Campbell, and Mr. Brande, all eminent chemists, were examined as witnesses.

The charge of the President of the Court on the principles of the patent laws was very able, and we commend the following extract from it to all who are disposed to cavil at the issue of too many patents because they do not (according to their notions) contain a sufficient amount of novelty:—

I think a patent may be taken for a new method or an improved method of obtaining a product formerly produced, if the new or improved method has the effect of producing the old article more economically or in greater quantity. A new or improved method of treating a raw material, so as to give more economically or in greater quantity a product formerly obtained from the same material, falls under this rule. The rule applies emphatically if the result is to obtain in merchantable or useful quantity that which, by the former modes of treatment, had been produced only in small inappreciable quantities—quantities so small as not to be profitably or usefully employed.

These views on the principles of patents for chemical improvements are sound, and they come from a judge who is distinguished for great legal attainments. The smallest improvement—no matter how small—is worthy of a patent and is capable of being defended at law.

Producing Manure from the Atmosphere.

The London *Chemical News* contains an article on this very important subject by two French chemists. The value of guano and most other concentrated manures consists to a considerable extent of the ammonia which they contain. As three-quarters of the atmospheric air consists of nitrogen, and as hydrogen forms one-ninth of all pure water, if some cheap means could be found for inducing the hydrogen of water to enter into combination with the nitrogen of air in the form of ammonia, this valuable manure could be produced in unlimited quantities, and the agricultural products of the world enormously increased. The production of ammonia at a low price has been a problem of the highest interest to agriculturists. It is composed of nitrogen and hydrogen.

Atmospheric air is an inexhaustible and gratuitous source of nitrogen. However, this element presents so great an indifference in its chemical reactions, that, notwithstanding the numerous attempts which have been made, chemists have not heretofore succeeded in combining it with hydrogen so as to produce ammonia artificially. M. M. Marguerite and De Sourdeval, the chemists alluded to, have succeeded in making it artificially from the atmosphere, by the use of baryta. The following is the operation:—In an earthen retort is calcined, at an elevated and sustained temperature; a mixture of carbonate of baryta, iron filings in the proportion of about 30 per cent, the refuse of coal, tar, and sawdust. This produces a reduction to the state of anhydrous baryta, of the greater part of the carbonate employed. Afterwards is slowly passed a current of air across the porous mass, the oxygen of which is converted into carbonic oxyd by its passage over a column of incandescent charcoal, while its nitrogen, in presence of the charcoal and barium, transforms itself into cyanogen and produces considerable quantities of cyanide. In effect, the matter sheltered from the air and cooled, and washed with boiling water, gives with the salts of iron an abundant precipitate of Prussian blue. The mixture thus calcined and cyanuretted is received into a cylinder of either cast or wrought iron, which serves both as an extinguisher and as an apparatus for the transformation of the cyanuret. Through this cylinder, at a temperature less than 300° (Centigrade) is passed a current of steam, which disengages, under the form of ammonia, all the nitrogen contained in the cyanide of barium. It is impossible to foresee all the results of this great discovery. Among other things, it suggests the production of nitric acid from the air by oxydising ammonia.

Silver's New Steamship.

A new steamship possessing several novel features has been projected by Mr. Thomas Silver, of Philadelphia, the inventor of the well-known marine governor, illustrated on page 356, Vol. II. (old series), Scientific American. She is to be 600 feet long, 75 feet broad, and to draw only 16 feet water. She is to have two paddle engines that are to be located on the sides and not in the center as is the case in all steamers, and each engine is to work its own independent shaft and wheel. She will also have two screw engines, each separate and working a propeller under each quarter. The hull of this vessel is to be braced in the most thorough manner for strength; she is to be divided into fifty water-tight compartments, and be 15,000 tuns burden. Mr. Silver is now in Europe, and it is stated that several American gentlemen in Paris have examined his plans, and are confident that such a steamer could make a voyage across the Atlantic in six days. We are of opinion that the propellers would rather be an injury than a benefit on such a shallow steamer. The model of a propeller and a paddle wheel steamer should be quite different; the former does best when it draws considerable water, the later when it is of light draft: therefore it is scarcely possible to combine the two principles of propulsion successfully in one vessel.

Death of Chevalier Bunsen.

By recent news from Europe, we learn that this distinguished Prussian diplomat, man of science and literature, died in the early part of last month, at Bonn, at the age of 70 years. For 12 years he filled the high office of Ambassador of Prussia to the court of St. James, from which position he was removed in 1853 for liberal opinions. As a writer on theological and literary subjects, he had few superiors in Germany. His scientific attainments were well known, and the "Bunsen battery" bears his name as a monument of his inventions in electrical science. In public and private life he was both admired and respected, and at the present moment we do not think that Prussia has a man that can fill his place.

Great Mine Explosion.—An explosion of fire damp took place in the Risca coal mine, at Newport, Wales, on the 6th ult., by which no less than 170 persons lost their lives. This is perhaps the most destructive mine explosion on record, and it was all caused by a stupid miner who removed the cap of his safety lamp to light his pipe. In Glasgow, Scotland, there is a Mining School where the whole practical art and the science of mining are taught in the most perfect manner. Hundreds of working coal miners have availed themselves of its advantages, and have succeeded as superintendents and overseers of mines in almost every part of the globe.

Bronze Castings for Washington.—The bronze foundry in Munich, in which the "Bavaria" was cast, has just completed the cast of Roger's two doors for the capital at Washington. These doors are devoted to the history of Columbus, which is told in compartments not unlike those of the gates of the Baptistry of Florence. Between each compartment are niched busts of historians who have written on Columbus. Among these is a fine head of Washington Irving. Around are statues of men connected with Columbus, and at the top of each door is the head of an Indian.

Practical Directions to Engineers.

We continue our extracts from King's work on the Steam Engine, published by F. A. Brady, No. 24 Ann-street, New York:—

REGARDING THE FIRES WHILE UNDER WAY.

Small as this may appear in the eyes of one not practically conversant with the management of the steam engine, it is one of the most important things that the engineer is called upon to regulate; on the one hand, that a proper and uniform supply of steam is maintained, and on the other, that more fuel is not consumed than is actually necessary to produce the result. Different fuels and differently constructed boilers require the fires to be regulated in a different manner, and notwithstanding the repeated efforts, the adoption of specific rules, which shall apply alike to all, is positively absurd. A few general hints, however, touching the leading features, may be useful to those who have not had much experience in this matter, but they must bear in mind nevertheless, that actual service and observation for themselves, will alone make them proficient, no matter how well they may understand the chemistry of coal, or the natural laws governing the combustion of matter.

The proper supply of atmospheric air, and the proper time for the combustion, are the important elements in the consumption of coal. A slow rate of combustion, and a moderate draft, always produces a better evaporative result, than when the fires are urged, occasioning them to be more rapid; and hence, on no occasion, should "blowers" be resorted to, if the proper supply of steam can be maintained without them.

The fire should be spread uniformly all over the grate bars, and in the use of bituminous coal, should be from 6 to 8 inches in thickness, but with anthracite coal, 4 or 5 inches will be thick enough. So long as the ashpit remains bright, there is no necessity for slicing or stirring up the fire, but whenever the spaces between the bars become choked with clinker, or ashes, it will be indicated by the darkness in the ashpit, and, if burning bituminous coal, a slice bar should be run in through the stoke holes or furnace doors to break up the fire and clear out the air spaces. A pick applied from below is also very useful in this respect. In the use of anthracite coal the pick alone should be used; the breaking up of the surface of such fire,—as it does not amalgamate or run together, forming a crust like the bituminous—prevents the regular uniform combustion by allowing too much air to enter among the disturbed parts of the coal, it requiring considerable time for them again to unite in regular ignition after being once disturbed. It is very important that no part of the grate bars be left bare, as the admission of cold air, through such space, deadens the fire, and cools the flues. It has been ascertained of late, that better results are obtained by admitting air through a number of small holes in the furnace doors, on the plan of W. Wye Williams, Esq., of England.

No two furnaces should be fired at the same time; the fresh coal of the one should be fairly ignited before a new supply is added to another, in order to keep a regular supply of steam. Anthracite coal requires less frequent firing than bituminous, but with either, the coal should not be thrown upon any particular part of the furnace, but uniformly all over it. Before firing with bituminous coal, it is well to break up the upper crust of the fire, which sometimes amalgamates so closely as to exclude the proper supply of air. The trouble with most firemen is, that they are disposed to heap their fires too much, particularly in front, sometimes half way to the crowns; this they do for three reasons: first, because they suppose the larger the fire the greater the supply of steam; second, the more coal there is piled in at one time, the less frequent they will have to fire; and third, it requires much less labor to shovel the coal into the mouth of the furnace, than to supply it uniformly, all over the grates. No coal larger than one's fist should be allowed to enter the furnace, nor in cleaning the fires, should more than one be cleaned at the same time, which should be done at stated intervals, unless it so happens, that they all or many of them, have got so dirty that a further supply of coal is useless, when the engine can be throttled off a little while the cleaning is going on. In cleaning anthracite fires, care should be taken not to reduce them too low, otherwise they will take a long time to recover.

In cleaning fires, as well as when supplying them, the furnace doors should not be kept open longer than necessary, admitting an undue supply of cold air; and the party, therefore, who, performing his duty as well, does it the quickest, is the best fireman.

The slower a steamer runs the greater distance she will perform with the same amount of fuel, provided she has not an adverse tide or head winds to contend with; with men-of-war, therefore, it often occurs that the saving of fuel is a more important consideration than high speed, and for this reason the consumption of coal is reduced far below what would be required to keep the vessel up to her maximum speed. This can be done in two ways: either by shutting off a portion of the furnaces entirely, by shutting the ash pit doors and closing up the cracks around them with wet ashes, or else reducing the quantity of coal consumed in each, by covering the back part of the grates with a thick layer of ashes. When the diminution in the quantity of coal is not very large, this latter plan is the better, by retaining the original heating surface at the same time that the combustion of coal is allowed to go on very slowly, an end very desirable to secure. When, however, the reduction in coal is very considerable, some of the furnaces can be shut off, while the back ends of the grates of the remainder can be kept covered with ashes. Men-of-war sometimes proceed at half or less speed, and as a large extent of boiler surface occasions considerable loss from radiation, in such cases it will be more economical to shut off some of the boilers and continue with a moderate supply of fuel in the remainder. The furnaces and ash pits of the boilers shut off should be closed tightly, to prevent cold air from passing in to cool the surfaces of the other boilers, or, to injure the draft.

After a boiler is shut off, the steam should not be allowed to escape, but to remain in it and condense, to freshen the water.

PATCHING BOILERS.

Inasmuch as all things constructed by human hands are liable to decay, steam boilers are not exempt from this infallible law; they therefore frequently require to be patched, new stay bolts and braces to be put in, old rivets cut out and replaced with new ones, &c. In patching boilers, wherever the defective part can be reached so as to work at it well, it is best to cut it out and rivet a patch on, calking the seams; but as this cannot always be done, the most common practice is to put a patch over the defective part, securing it with bolts and nuts, or tap bolts, and making the joint with stiff putty, composed of white and red lead, and a small quantity of fine iron borings. A piece of sheet lead fitted over the place to be patched, will answer for the pattern to make the patch by, which, however, before the joint is made, should be fitted snugly to its place while hot.

Owing to imperfection in the iron, small cracks are sometimes discovered in the flues or other parts of the boiler subject to a high temperature. Should these not be more than two or three inches in length, they can be stopped by drilling holes and putting in three or four small rivets, hammering the heads well down so as to cover the crack.

A leaky stay-bolt, or rivet, has, like the toothache, but one sure remedy, and that one is to cut it out and put in a new one.

In cutting out a stay-bolt fitted with a socket, the latter can usually be saved and retained in its place, ready to receive another bolt; but sometimes a screw bolt is cut out which has to be replaced with a socket bolt, and as this may be in such part of the boiler which cannot be reached by the arm, or tongs, a very good plan to get the socket in its place is to pass a string through both holes and secure the ends, dropping the centre down and hauling it out through a hand hole; cut the string in two, pass the ends through the socket, join them together again, and haul the socket to its place. In the fitting of sockets, it is very important that they should be the exact distance between the sheets, with the ends filed square, otherwise the sheets will be drawn out of shape.

Application for the Extension of a Patent.

Manufacture of Wire Grating.—Henry Jenkins, of Brooklyn, N. Y., has applied for the extension of a patent granted to him on the 6th of March, 1847, for an improvement in the above-named class of inventions. The testimony will close on the 4th of February next; and the petition will be heard at the Patent Office on the 18th of same month.

American Architecture—A Noble Idea.

The American Institute of Architects is an association which belongs to the city of New York and which holds its meetings from time to time, without making much ado about them. At a special meeting of the Institute, held on the evening of the 18th ult., one of the members, Mr. Idletz, read an essay on the "Æsthetics of Architecture," in which he maintained that "in everything of practical utility there is a certain adaptedness to its purpose which causes the object to possess something of symmetry and beauty." Here we have a principle in architecture enunciated, and it may be applied not only to architecture but also to engineering, the construction of machinery of all kinds, and every article adapted for the use of man. Let the idea of Mr. Idletz be accepted as a governing truth in the construction of all things. Every article of utility should combine harmony of form and proportion—beauty with usefulness. Some persons seem to be imbued with the idea that ugliness and utility are twin brothers, and that gracefulness in a machine is a token of its flimsiness. A more mistaken idea never entered the human brain. Let the mechanic, the artizan, and the architect all strive to improve their works in beauty as well as in utility and convenience.

Burning of a New Steamer.

On the morning of the 18th ult. the fine new steamship *James P. King*, belonging to Spofford & Tilleston, of Charleston, S. C., took fire while lying at pier No. 4, North river, this city, and was consumed to the water line. This steamer was 1,800 tuns burden, cost $180,000, and was just finished; she was about to take her place in the line to Charleston. Her model was beautiful, and her engines first class. The fire broke out in the engine room, but no person has been able to ascertain accurately how it originated. Although it took place in broad daylight—9, A.M.—and two steam fire-engines, together with several hand engines and a number of steam pumps belonging to several of the ferry and tug boats, were early brought to bear on the flames, they were unable to prevent the entire decks and the whole interior wood work and hull from being burned to the water's edge. The engines of the *J. P. King*, it is believed, may be again fitted up, as they are but slightly injured. The burning of this beautiful new steamer affords evidence of the dangerous and combustible material used in the construction of a wooden steamer.

STEEL FROM CAST AND WROUGHT IRON.—An important invention has been patented by Messrs. Noel & Co., of Paris. It relates to the production or manufacture of a new metallic alloy, which is easily melted, and when cast forms a species of cast steel capable of being substituted for ordinary steel; and consequently, when used in the construction of machinery, obviating, to a great extent, the use of forgings. The principal bases of this alloy are wrought iron and cast iron, the proportions of which are varied according to the degree of hardness required. To the bases here mentioned are added oxydized iron ore free from sulphur, manganese, nitrate of potash and chlorhydrate of ammonia. These several ingredients may be used in various combinations and proportions, according to the required degree of hardness of the alloy to be produced.

PAPER NECK-TIES AND COLLARS. — Messrs. Smith & Brouwer, of No. 36 Warren-street, this city, have recently applied, through the Scientific American Patent Agency, for a patent for paper neck-ties. They are printed in imitation of gingham, silk, &c., and counterfeit the cloth with wonderful exactness. The wholesale price is from 25 to 50 cents per dozen! This firm sold, last season, of one single style of cloth neck-ties 17,000 dozen. The introduction of paper neck-ties as a new article of manufacture goes considerably ahead of paper collars, which have been so extensively sold for the past two or three years, and are sold for about the same price. Who will go, in future, without a clean collar and handsome neck-tie of the latest style, when he can purchase both for six cents.

ICE BOATS.—Great sport is anticipated this winter with ice boats such as we described on page 249 of our last volume. Of all winter amusements this is the most exciting and exhilarating, and it can be enjoyed at once by ladies without the necessity of learning a new art, as is required in skating.

SSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 18, 1860.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for atents, size of model required, and much other information useful to aventors, may be had gratis by addressing MUNN & CO., Publishers f the SCIENTIFIC AMERICAN, New York.

0,905.—John Allen, of Union, N. Y., for an Improvement in Harrows:

I claim the combination and arrangement of the vertical oblong links, g, and horizontal oblong hook links, h h, substantially as described, whereby the double advantage of allowing a free vertical and horizontal lay to the sections of the harrow, and a very efficient and convenient neans of connecting and disconnecting them readily is secured at the ame time.

0,906.—E. C. Atkins, of Indianapolis, Ind., for an Improved Method of Attaching the Handle to Saws:

I claim the attachment of the ear or tang to cross-cut saws by means f a screw and open slot passing in at the end, or on the edge of the saw ear the end.

0,907.—E. G. Atwood, of Derby, Conn., for an Improvement in Skeleton Skirts:

I claim the combination of a series of hoops to form the skirt, with a eries of flattened spiral springs extending from the waist band or upper oop to the bottom of the skirt, crossing the intermediate hoop and atached by any well-known means for the purpose set forth.

0,908:—L. P. Brady, of Mount Joy, Pa., for an Improvement in Rakes for Harvesting Machines:

I claim the overlapping plate, F, on the rake handle, E, and the guide od, G, on its side, in combination with the slotted swivel, C, and perendicular crank pin, H, when combined and arranged in the manner escribed for the purpose specified.

0,909.—Lysander Button and Robert Blake, of Waterford, N. Y., for an Improved Coupling for Hose Pipe:

I claim the folding handle lever or levers attached to a part or parts of ich coupling for hose and pipes as require a rotary movement of said art or parts in the act of setting up, as set forth.

0,910.—Cyrus Chambers, Jr., of Philadelphia, Pa., for an Improvement in Paper Folding Machines:

I claim, first, Sliding or moving the paper on or between bars or their quivalents, by means of revolving wheels or rollers, whose surfaces ome in contact with the paper as and for the purpose specified.

Second, The combination of revolving surfaces with bars and stops, their equivalents, arranged substantially as and for the purpose deribed.

,911.—J. W. Church, of Cold Water, Mich., for an Improved Fastening for Hame Tugs:

I claim the combination of the self-locking perforated slide with the erforated bed piece, in the manner and for the purposes substantially shown and described.

,912.—John Ende, of Buffalo, N. Y., for an Improvement in Horse Collars:

I claim the manner in which the clips, G G, Fig. 4, and hold-back ngs, D D, Fig. 1, are attached, as described and for the purpose set rth.

I also claim the peculiar construction of the lock, H I, Fig. 1, and Fig. in the manner and for the purpose specified.

I also claim the arrangement of the welt seamed in with the pad, and e seam covered by the hames, as described and for the purpose set rth.

,913.—John Durham, of Cherry Grove, Ohio, for an Improved Boot Jack:

I claim the combination of the frame, A, with the folding indented otch, B b b′, and the lid, C c, adapted to hold the crotch to its open sition, and to cover it in closed position, substantially as set forth.

,914.—G. N. Fairchild and Thomas Joyce, of New York City, for an Improvement in Collimators:

We claim the combination of the two wires, c d, with each other and ith the mirror, D, as shown and described.

[The object of this invention is to produce a simple, cheap and reliole instrument with which straight lines, running from one point to nother, at a great or a small distance, and running in a horizontal, a ertical or an inclined direction, can be determined in an easy and ady manner.]

,915.—J. P. Fisher, of Rochester, N. Y., for an Improvement in Carriage Wheels:

I claim The combination of the binding rods, c, with the hollow spokes hub, H, and felloes, f, in the manner shown and described.

[This invention consists in the construction of an entirely metallic heel and axle for common carriages, and which will afford the greatest ssible strength with no more weight than that of wooden ones.]

,916.—E. F. M. Fletcher, of Georgia Plains, Vt., for an Improvement in Water Wheels:

I claim the combination of the two hemispherical hubs, D D, shaft B, ncave and tapering buckets, d d, and springs, E, the whole being conucted and arranged and operating in the manner and for the purses set forth.

[This invention consists in the employment or use of wheels formed having spiral buckets attached to central hubs, and also used in conction with the buckets springs so applied to the wheels as to regulate e capacity of the issues, according to the force or supply of water, so at the wheel will always work economically, or, in other words, give t the maximum power of the head under varying hights of the same.]

,917.—Cornelius Godfrey, of Brooklyn, N. Y., for an Improvement in Boilers:

I claim the arrangement of boiler and furnace or furnaces with the eam chamber, as described and for the purpose set forth.

,918.—Joseph Grice, of New York City, and R. H. Long, of Philadelphia, Pa., for an Improvement in City Railroad Cars:

We claim, first, The employment in combination with the rear end the frame or car body, A, of a truck pivoted in advance of the axle or les, and so constructed and arranged with an arc, d, and suitable aring plate and friction rolls as to have the entire weight supported by e truck brought on the said arc, d, substantially as described, for the rpose set forth.

Second, We claim the employment of two trucks in combination with e frame, A, when the two trucks are each constructed with a single c, d, which sustains the entire weight of the car, and both pivoted at ints lying between the axle, substantially as described, for the purse set forth.

Third, We claim the combination of the spring shaft device, e f s, with e double inverted incline, one frame, A, the whole arranged and opeting as specified for the purpose set forth.

Fourth, We claim extending the frame of the truck from the platform, d forming thereon a pole holder, m, as and for the purpose described.

30,919.—J. F. Hammond, of Lynn, Masss., for an Improved Cement for Roofing:

I claim the combination of the within-mentioned ingredients, or their equivalents, in substantially the proportions specified.

30,920.—Jacob Hiney, of Hartford, Conn., for an Improvement in Faucets for Bottles:

I claim the conical and pointed valve, h, its stem, i, and the hollow tube, g, with the screw portion, c, in combination with the screw stem, a, substantially as and for the purpose set forth.

[This invention consists in applying to a faucet constructed in a peculiar manner, a pointed valve which will allow the stem of the faucet to be passed through a bottle cork while it is in the bottle, and which will also serve as a valve for opening and closing the orifice in the stem of the faucet.]

30,921.—R. W. Hix, of New York City, for an Improvement in Railroad Car Brakes:

I claim the combination with the brake shaft, B, of the geared cap, J, geared wheels, G, and pinion, H, in the manner and for the purposes shown and described.

[This invention consists in applying to the ordinary brake shafts, instead of the hand wheel at present used, a circular box with a movable cap, which box contains three or more spur wheels having stationary bearings and which engage with the teeth of a pinion that is keyed to the brake shaft, and also with inside gearing on the movable cap, so that by turning the cap the motion will be transmitted to the brake shaft and multiplied according to the size of the central pinion.]

30,922.—Jedediah Holcomb, of Brandon, Vt., for an Improvement in Platform Scales:

I claim, first, The combination of the jointed rods, c2, connected by the link, D, and six links, B, for supporting the same, with the frame, A, and weighing levers, E, of a platform scale, for the purposes set forth.

Second, I also claim the use of the extenson case, R, in combination with the stationary case, P, weighing levers, E, and scale beam, T, for the purposes set forth.

30,923.—J. R. Jacob, of Elizabethtown, Ky., for an Improved Valve Gear for Steam Engines:

I claim the combination of the forked independent rocker, K, working on the valve rockshaft, the two arms, I J, with their studs, c d, rigidly attached to the said rockshaft, and the spring, f; the whole applied in relation to each other and operating substantially as set forth.

[This invention is more especially designed for a direct-acting engines, such as are used for pumping and other purposes for which a rotary motion is unnecessary. It may, however, be applied to an engine with a rotary shaft. It consists of a forked rocker worked upon, but independently of, an ordinary valve rockshaft by a connection with the piston rod or other reciprocating portion of the engines, and operating upon an ordinary valve rockshaft, in combination with a spring acting upon another arm thereof, to cause the valve to be first moved gradually to a position to close the steam port at either end of the cylinder, as the piston approaches the other end, and then to be moved suddenly sufficiently further to give a full opening to the steam port at the last-mentioned end, to admit steam to move the piston in the opposite direction.]

30,924.—John Jameson, of Gateshead, England, for an Improved Apparatus for Expanding and Compressing Elastic Fluids. Patented in England June 11th, 1860:

I claim the combination of the apparatus to produce those actions which I have called "borrowing and lending," with the apparatus for performing the functions of what I have called the "compressing apparatus, substantially as described.

30,925.—F. C. Leypoldt, of Philadelphia, Pa., for an Improvement in Apparatuses for Cutting Button Holes:

I claim an instrument for cutting button holes, combining the levers, A and C, when arranged and jointed in the manner described, and actuating the cutter, B, substantially as and for the purpose set forth.

30,926.—Isaac Miers, of Clay Lick, Ohio, for an Improvement in Cultivators:

I claim the arrangement of the longitudinally adjustable side beams, C D, straps, a a′ b b′, and adjusting plate, d, with the center beam, B, plows, E F G, adjustable handles, h h, and standards, y y, all as shown and described, for the purposes set forth.

[This invention consists in the arrangement of the center shovel or plow, in three-toothed cultivators, in the rear of the side plows. It also consists in making the side beams adjustable longitudinally. By means of the said arrangement of the center plow it divides the ridge of mold formed by the combined inner furrows of the side plows and throws it up each way, from the center towards the roots of the corn, in addition to the ridge thrown up to the rows by each of the side plows.]

30,927.—P. P. Mills, of Washington, Ohio, for an Improvement in Sugar Cane Leaf Stripper:

I claim the described leaf stripper for sorghum or sugar cane, consisting of two or more elastic blades, D E, and the semi-circular plates, E, the whole being arranged and combined on a block or frame, A, for the purpose and in the manner set forth and explained.

30,928.—D. K. Nixon, of Sandyville, Ohio, for an Improved Device for Preventing Hogs from Rooting:

I claim the combination of the metallic part, A, having the opening, B, with two or more pins or wires, substantially as and for the purposes set forth.

I also claim the curved or projecting points, C C, with the lower part of A, as set forth.

I further claim bending the lower ends of the pins in, as shown at c, for the purposes set forth.

30,929.—W. H. Pease, of Dayton, Ohio, for an Improvement in Tobacco Cutters:

I claim, in connection with the endless belts, C C′, arranged as described, and the throat, d, the revolving knives, E F, and screw thread, G, the same being arranged and made to operate substantially as and for the purpose specified.

30,930.—John Pike, of Syracuse, N. Y., for an Improved Churn:

I claim the combination and arrangement of the adjustable convex dish, D, concavo-convex dish, E, with the radial beaters on each, as described, together with the wings, d d, shaft, C, and dashers, x x, &c., when used for the purposes specified.

30,931.—Robert Plews, of Smithfield, R. I., for Improved Cylinders for Spinning Frames:

I claim the improvement in the process of manufacturing tin plate cylinders described, consisting in perforating the edge of each plate of which the several sections of the cylinder are composed with a series of holes, whereby, on the application of heat, the air is expelled and the soldering metal is permitted to flow over the entire surfaces in contact.

30,932.—F. W. Robinson, of Richmond, Ind., for an Improvement in Grain Separators:

I claim, first, Obtaining a separate and independent discharge of grain from the grain carrier, D, and straw carrier, E, by means of a division board, a, and the inclined bottom board, G, the upper line of the straw carrier, E, being arranged below the plane of the cellular grain carrier, D, so as to obtain a fall between the carriers, substantially as specified.

Second, I claim the deflecting plate or board, m, arranged in relation to the shoe, F, and fans, L, as set forth, to effect the object stated.

[This invention consists in arranging endless carriers on an inclined plane, one of which conducts the grain and straw from the threshing cylinder and delivers the straw on the other endless carrier, separating the grain and chaff from the straw and depositing it on the shoe; while the second carrier (which is open) conveys off the straw and conducts the grain, &c., left by the first carrier down into the shoe, where it is submitted to the operations of blast and screening. The invention further consists in arranging a stationary or adjustable inclined deflecting plate or board, in such relation to the shoe and jaws that the blast of air is turned downwards into the shoe and drives the partially threshed heads back, and they are elevated and again submitted to the threshing operation, while the chaff and other impurities pass out over the back end of the shoe.]

30,933.—J. S. Royce, of Cuylerville, N. Y., for an Improvement in Harvesting Machines:

I claim, first, The downward curved, arched, metallic frame, A, constructed as described, in combination with the driving wheel, D, the pinion or pitman shaft, S, and its rod, the cutting apparatus and the wheel, W, for the purpose set forth and substantially as set forth.

Second, The arched projection of the frame, F′, in combination with the adjustable cross piece, C′, and its friction wheel, W′, and the rod, r, for the purpose set forth, and substantially as described.

30,934.—G. M. Selden, of Troy, N. Y., for an Improvement in Eave Troughs:

I claim the combination and arrangement, substantially as described, of the air passages or flue spaces with an eave's trough and its conductor, located upon a building, as usual, and with a warm air apartment or hot air furnace, for the purpose of preventing the damage which ordinarily results to the building from the freezing within, and consequent overflowing of the conductor and eave's trough by the water which sometimes runs from melting snow or ice on the roof in freezing weather.

30,935.—S. A. Skinner, of West Berkshire, Vt., for an Improvement in Fountain Pens:

I claim the combination and arrangement of a valve, f, separate from the agitator, H, with a spring pen-carrier, B, arranged with respect to the agitator, h, and the branch, e, provided with a valve opening and extending from the ink fountain, as described.

I also claim the improved mode of making the spring tongue, k, viz., with corrugations, the same being for the purpose described.

30,936.—J. J. Slocum, of New York City, for an Improved Rotary Engine:

I claim, first, The arrangement of the rotary winged abutment, F, in combination with the rotary piston, A, constructed and operating as and for the purpose specified.

Second, The combination and arrangement of the notched disk, I, with the spring catch, J, plate, H, with the rollers, b and e, and rotary abutment, F, constructed and operating substantially as and for the purpose set forth.

[This invention consists in the employment of a rotary winged abutment, in combination with a rotary piston, in such a manner that, by imparting to said abutment a rotary motion at certain intervals, the piston is allowed to pass by unobstructed. It also consists in arranging on the shaft of the piston a notched disk with a spring catch, in combination with two sets of roliers, attached at different distances from the center of a plate that is screwed to the axle of the rotary abutment in such a manner that, by the action of the notched disk on the outer set of rollers, the abutment is kept perfectly stationary, until, by the combined action of the spring catch and the two sets of rollers, the abutment is partially rotated.]

30,937.—E. N. Steere, of Providence, R. I., for an Improvement n Oiling Spindles:

I claim the tube, B, or its equivalent, constructed and arranged, with the step and bolster of a spindle, substantially as described, for the purpose specified.

30,938.—S. M. Stone, of New Haven, Conn., for an Improved Means for Ventilating Buildings:

I claim the use of the pure air passage as A, in combination with the passage, E E, and smoke pipe, G, when the whole is constructed, arranged and fitted to produce the result as described.

30,939.—Claude Sturel, of New York City, for an Improvement in Fire Escapes:

I claim the arrangement of the platforms, D, alternately on opposite sides of the framework, and holding them rigidly parallel to the deck of the wagon in all conditions of the frame, by means of the bars, d, or their equivalents, substantially as and for the purpose set forth.

30,940.—Horace Tupper, of Buffalo, N. Y., for an Improvement in Turnouts for Street Railroads:

I claim the inclined wave or swell, D, in combination with the rails, A B and F, operating in the manner and for the purposes set forth.

30,941.—D. T. Ward, of Mansfield, Ohio, for an Improved Churn:

I claim the disk or wheel, C, constructed as described, and, in connection therewith, the rim or collar, D, arranged in the manner and for the purpose specified.

30,942.—Seth Wheeler, of Albany, N. Y., for an Improvement in Ash Sifters:

I claim the use of lever, G, treadle, F, and spring, E, when used in combination with the sieve, B, substantially and for the purpose specified.

30,943.—C. K. Hostetter, of East Donegal Township, Pa., assignor to J. R. Koffer, of Mount Joy, Pa., for an Improved Bag Holder and Conveyer:

I claim the sliding frame, E, held and operated by the cord, H, friction and ratchet pulley, I, spring pall, J, and cord-tightner, L, together with the bag rest, B, the whole mounted on wheels, D, substantially as described.

30,944.—Hirsch Heinemann and John Buser, of New York City, assignors to Hirsch Heinemann aforesaid, for an Improvement in Machines for Covering Cord:

We claim, first, The arrangement of the revolving creel, f, to twist the strand, with a revolving carrier plate, e, for laying the silk or other fibers upon the outside of said strand, when each has a separate revolving motion, so as to make different sizes and characters of strands, as set forth.

Second, We claim the construction of the cap, l, and jaws, o o, in combination, to guide the strand so that the covering material may be laid evenly thereon, as set forth.

Third, We claim the revolving bobbin, t, and fly frame, acting as specified, in combination with the covering apparatus, to twist in a cord or cut the strand as it passes from the covering apparatus, as set forth.

30,945.—Xavier Karcheski (assignor to L. T. Valentine), of New York City, for an Improvement in the Manufacture of Vegetable Parchment:

I claim the application, to certain parts of the paper, of starch or some other gelatinous substance, either plain or colored, substantially as set forth, for the purpose of producing in the parchment an indelible water-mark.

[The object of this invention is to produce vegetable parchment equal, or nearly so, in strength to the animal parchment, and of a uniform transparency, with indelible water-marks, in such a manner that the same can be used with particular advantage for bankbills and other papers of the same character.]

30,946.—Peter Keffer, of Read ng, Pa., assignor to himself and D. A. Ulrich, of Berks county, Pa., for an Improvement in Car Brakes:

I claim, first, The spring sliding rod and its projection, q, in combination with the slotted arms, T and T′, and the frame, X, with its roller, e, the said arms being operated and motion being communicated from the said frame to the brake bars by the devices described, or their equivalents.

Second, The levers, K and K′, hung to the pin, I, on which the truck turns, in combination with the rods, L and L′, and rods, M and M′—the whole being arranged and operated as and for the purpose specified.

30,947.—J. L. Mahan (assignor to D. Stuart and R. Peterson), of Philadelphia, Pa., for an Improvement in Gas Stoves:

I claim the inner chamber, D, diminishing in size toward its mouth, d, the outer chamber, c, the plain plate, F, the plate, m, of wire gauze, or its equivalent, and the hot air passage, i, when the said plain plate, forms a continuation of the wire gauze and when the whole of the above named parts are arranged, in respect to each other, as and for the purpose set forth.

30,948.—Andrew Parkinson, of Norwich, Conn., assignor to James Parkinson, of Newark, N. J., for an Improvement in Looms:

I claim the employment of a comb, substantially such as described, in combination with the lay of a loom, substantially as and for the purpose specified.

30,949.—C. P. S. Wardwell, of Lake Village, N. H., assignor to S. H. Dotem, of Plymouth, Mass., for an Improved Comb Cleaner:

I claim, as a new article of manufacture, a comb cleaner, constructed substantially as described and set forth.

30,950.—Parker Wells, of Middleton, Mass., assignor to E. Townsend and William Wells, of Boston, Mass., for an Improvement in Pegging Machines:

I claim changing the supply of pegs of one length for others of a different length, by substantially the means described for changing the position of the peg wood channels, v v'.

Also the described arrangement of the awl and driver bars, h and g, which consists in permitting them to oscillate in the top of the head, a, when they are connected with a slide, l, which is made to reciprocate substantially as and by the means described.

Also the arrangement shown and described of the shaft, e, both with regard to its direction of rotation and position by which the usual gage on the pegging head, a, is kept pressed against the edge of the sole.

And I claim also the arrangement described by which the whole of the peg-driving mechanism is changed in its position relative to the pinion, b, which actuates the boot or shoe carrier, for the purpose of altering the angle at which the pegs are set in the work.

30,951.—C. E. Bertrand, of New York City, for an Improvement in Tanks for Crystallizing Sugar:

In the manufacture and refining of sugar, I claim the method described of extracting the crystallizable sugar from the secondary products or drainings of ordinary sugar molds, by the employment of a capacious tank, having combined with it a perforated discharge tube and plug or stopper, both or either capable of rotation, the whole being constructed and arranged substantially as set forth and operated in the manner and fo· the purposes specified.

30,952.—Levi Bissell, of North Bergen, N. Y., for an Improvement in Stove Pipes:

I claim the heads of the safe as constructed in combination with registers and inside pipes, g g, when said pipes are provided with ventilating holes, and all arranged as and for the purpose set forth.

30, 953.—John Blue, of Covert, N. Y., for an Improvement in Harvesters:

I claim the combination of the knee joint, i, with the reel standard, f f', shaft, B, and bearings, k k', when these several parts are arranged for operation in the manner described, for the purpose specified.

30,954.—Gabriel Boos, of New York City, for an Improvement in Machines for Enameling Moldings:

I claim the arrangement and construction of the front piece, A, and side frames, C C, in combination with the guide pieces, J J, for the purpose of changing the machine easily to any width of molding as well as to make thereby the surface of the molding to act as guide for the machine, substantially as described.

30,955.—E. D. Bootman, of Janesville, Wis., for an Impromement in Automatic Attachment to Keyed Musical Instruments:

I claim, first, The use and application of the spherical balls, i, or their equivalents, when used substantially as described and for the purpose described.

Second, I claim the construction and use of a cylinder made of any suitable material, with a continuous spiral groove cut around the cylinder similar to a screw, which groove is crossed at proper distances by like grooves running parallel with the shaft or axis of the cylinder, thereby forming at the crossings of the grooves proper receptacles for the balls, i, substantantially as described and for the purpose set forth.

Third, The employing a belt or cloth, v, in combination with rollers to keep the balls, i, in their places on the cylinder, and to propel the cylinder in performing music, substantially as described, or any arrangement accomplishing substantially the same object.

Fourth, The side or lateral movement of the sliding carriage, C, in combination with the ways, X X, substantially as and for the purpose set forth.

Fifth, The combination of the keys or levers, k k, grooves, l l, pins, t t, cups, J, and conductors, k, or their equivalents, when used substantially as shown and described, or any arrangement accomplishing substantially the same thing.

Sixth, I claim the arrangement of the componnd levers, M, in connection with the oscillating lever, K, or their equivalents, substantially as shown and for the purpose described.

Seventh, The use and application of the screw, x, and slide, t, or their equivalents, when used in connection with a cylinder to give a longitudinal motion to the same as it revolves, substantially as and for the purpose described.

Eighth, The arrangement and combination of the lever, P, with the connecting lever, m, spring catch, n, weight, o, and pulley, X, substantially as described and for the purpose set forth.

Ninth, I claim the manner of raising the hammer, U, to strike the strings or keys of a piano, substantially as described, or any arrangement, substantially the same.

Tenth, I claim the method described of pressing down the keys upon the organ or melodeon by means of the levers, v and w, pins, t t, wheel, m m, or any arrangement accomplishing the same thing.

Eleventh, I claim the application and use of the devices composing my attachment, substantially as described, in combination with an organ, piano, melodeon or other instruments to which it may be applied to produce or perform music.

The remainder of this week's Claims will be given in our next.

Notes & Queries

J. H. A., of Md.—Conical rifle balls are both molded and stamped from the solid metal. Some of the machinery we have for accomplishing this latter purpose is quite complicated.

D. P. F., of Mass.—The edition of the patent laws which we announced, last week, as being in press, is now out, and you can be supplied with a copy on receipt of seven three-cent stamps.

C. C., of N. Y.—We cannot tell you the amount of sulphur that is in the iron ore which you have sent us, without an analysis of it; but from inspection, we consider it worth working if you find it in abundance as good as the specimen (No. 2) in the package.

J. T., of N. Y.—Multiply the quantity of water in pounds which passes in one minute into the vertical hight of your fall and divide the product by 33,000. This will give you the power of the fall, from which deduct one-third, and you will have the actual power of your overshot wheel.

J. R., of Pa.—The beautiful, glossy, black varnish for iron work may be made by fusing one pound of amber in an iron vessel and adding, while hot, one quart of boiled linseed oil and three ounces each of dark rosin and asphaltum, in powder. When the whole is thoroughly incorporated take it off, and, when cool, add about one pint of turpentine. Several coats of this varnish are put on, and the articles are dried, after each application, in a warm oven.

E. R., of Ill.—The cheapest gas that you can use as an explosive agent, when mixed with air, is carbureted hydrogen.—that used for illumination. Water, when decomposed into its elementary gases, is highly explosive, but no vapor known to us will explode unless mixed with air or oxygen. An explosive gas engine, *per se*, is not patentable, but some of your arrangements may possess novel and patentable features. You will find sulphuric acid cheaper than hydrochloric for obtaining hydrogen gas, by decomposing water with zinc.

L. C. G., of Cal.—"Hitchcock's Geology" is a little old, but you will find it instructive. Hugh Miller's "Old Red Sandstone" interesting. By the time you have read these, perhaps Dr. Stevens' work on the geology of the United States will be out, and this will give you the information you need.

J· R., of Ga.—We do not know of any stimulant offered for sale here as a substitute for tobacco. If the use of the weed is injuring your health, regard it as an enemy and treat it accordingly. A substitute might prove to be a remedy worse than the disease.

J. B. C., of Ill.—We do not know of any other State but Virginia that has a special law against the free introduction and sale of patents. The design of it was to subser e the purposes of domestic peace. Its constitutionality has never been tested.

C. P. P., of Ala.—So long as you can take oath that you are a citizen of the United States, so long will you be entitled to apply for a patent on the payment of a fee of $30. We cannot say what is to be the ultimate result of the present state of things; we hope all will come out right in the end.

To Southern Inventors.—We are in receipt by every mail of letters from our Southern clients, asking "in what relation they stand to the Patent Office in case their respective States should secede from the Union? We answered this inquiry fully in our issue of the 15th ult. We will now state, however, in brief, that so long as an applicant can swear that he is a citizen of the United States, he will be required to pay only $30. The matter is therefore one that must be settled by the conviction which the applicant himself entertains on this point.

C. W. S., of Oregon.—We suppose that when a bird, at a great hight, appears to float without motion upon the air, he is really slowly falling through it.

J. S. B., of N. Y.—We have published but one article with the caption "Does a Red Hot Stove Burn the Air." You will find it on page 21, Vol. II. (new series). There are other articles relating to the same subject; one entitled "A South-east Rain," on page 226, and one, headed "A Hint in Regard to Steam Pipes and Furnaces," on page 415, Vol. I. (new series).

A. D. W., of Miss.—Smee says that in electro-plating, gold is best reduced from the auro-cyanide of potassium, and silver from the argento-cyanide of potassium. But the proper solution to be used depends upon the material on which it is to be deposited. Your only safe course is to get practical instructions from some one experienced in the art; otherwise you are not only liable to destroy your materials but to blow yourself up with some fulminating metal.

J. W. G., of Mass.—You can neither make, use, nor sell any patented article without becoming liable to the patentee for infringement of his patent. There are patent blowers which you may use as a substitute for a blacksmith's bellows. Dimpfel's patent blower is manufactured at the Novelty Works, this city. Perhaps your blower is an improvement, but we cannot tell without being furnished with a more minute description.

T. H., of Pa.—We do not understand what you mean by a machine for "pointing iron." If you mean a spike cutting machine, there are several of these machines which have been patented, and some have been described in former volumes of this journal. The rule for calculating the pressure which a boiler made of good American iron will sustain, is to take the tensile strain which one square inch of the iron will bear, divide it by 3 (for the weakening effect of riveting), and by the diameter of the boiler in inches. The tensile strength of boiler plate is 60,000 pounds. A long boiler is weaker than a short one.

J. D., of N. Y.—You are perfectly right in stating that a great amount of gas escapes in an unconsumed state from common burners, thus entailing a great loss, and, at the same time, poluting the atmosphere of rooms. Your remedy for this is of great importance.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Dec. 22, 1860:—

G. N. B., of Conn., $25; J. R. A., of Ind., $30; G. W. C., of Ga., $30; A. J., of Iowa, $25; O. S., of Conn., $25; K. & T. C., of N. Y., $250; S. W., of Ga., $25; A. & L., of Conn., $63; A. B. & E. D. J., of Texas, $30; J. & D. B., of N. J., $30; R. R. C., of N. Y., $55; W. B., of N. J., $30; J. H., of Ill., $15; J. C. A., of Md., $25; N. E. D., of Mo., $25; S. & R., of N. Y., $30; D. C., of N. Y., $30; S. S. M., of S. C., $35; L. C., of Cuba, $25; C. G., of N. Y., $10; W. & S. B. H., of Mass., 30; Z. F., of Mo., $30; W. S. W., of Conn., $25; O. C. T., of Pa., $50; M. B., of N. Y., $30; C. H. D., of Ill., $30; J. L., of Mass., $25; S. R. B., of Pa., $35; J. P. A., of Ga., $25; E. C., of Conn., $30; H. & M., of Ga., $25; F. W. S., of N. Y., $30; C. O. L., of Vt., $25; J. H., of Conn., $25; P. T., of Va., $25; A. & D., of N. H., $10; A. R., of N. Y., $25; M. A. McL., of La., $35; J. T., of Cal., $30; W. F. G., of N. Y., $25; L. F., of Mass., $25; A. R. T., of La., $25; W. H. D., of Ill., $25; H. P. De G., of N. Y., $30; W. G. R., of Mo., $10; D. W. S. R., of Ill., $45; G. P. R., of Mass., $15; S. & A., of Iowa, $18; L. C., of N. Y., $25; A. M. B., of N. J., $30; J. B. B., of Iowa, $25; J. J. C. S., of Pa., $10; T. S., of N. J., $55; B. & B., of N. Y., $30; A. L. F., of N. Y., $50; E. L. G., of Conn., $25.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Dec. 22, 1860:—

G. N. B., of Conn.; A. J., of Iowa; O. S., of Conn.; W. H. D., of Ill.; J. P. A., of Ga.; S. W., of Ga.; E. G., of N. Y.; J. K. S., of N. J.; D. W. S., of N. Y.; J. H., of Ill.; E. L. G., of Conn.; J. H., of Conn.; J. B. B., of Iowa; W. S. W., of Conn.; J. T., of Cal.; O. C. T., of Pa. (2 cases); T. S., of N. J.; A. R. T., of La.; R. R. L., of N. Y.; C. W. S. H., of Ill.; A. F., of Ill.; G. P. R., of Mass.; E. & H., of N. Y.; B. & N. E. D., of Mo.; R. R. C., of N. Y.; W. F. G., of N. Y.; C. L. B., of Mass.; L. F., of Mass.; S. S. M., of S. C.; J. L., of Mass.; E. M., of N. Y.; R. E., of N. Y.; D. S. W. R., of Ill.; P. H. T., of Va.; C. O. L., of Vt.; J. C. A., of Md.; A. R., of N. Y.

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nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für Erfinder, um sich Patente zu sichern, in den Ver. St. sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche, welche patentiren wollen.
Preis 20 Cts., per Post 25 Cts.

ASHCROFT'S LOW WATER DETECTOR, FOR PREventing the explosion or burning out of steam boilers.—Below are a few of the many hundreds of certificates received, setting forth the usefulness and efficiency of my Low Water Detector:—

We have had in use several years at our works nine of your Low Water Detectors. They have in many instances notified us of low water, and on one occasion unquestionably saved us from a serious accident. We value them highly, and would not be without them.
CHAS. M. BURNEY, Boston Belting Co.,
Roxbury, Mass.

Our experience tells us that a plug is good for more than two years certainly. I am so well satisfied with it that I should not look for any thing else were I putting in more boilers.
ISAAC HINCKLEY.
Supt. Merrimac Manufacturing Corporation, Lowell, Mass.

We have twenty-one Low Water Detectors (Ashcroft's Patent), that is, one on each boiler. We think they are perfectly reliable.
WM. BARBOUR, Pacific Mills, Lawrence, Mass.

I have had them in use on on my boilers for nearly two years, and am well pleased with them, and have never found them to fail to give the alarm. EDWARD HARRIS, Woonsocket Mass.

We have seven of your Low Water Detectors in use on our boilers, and have every confidence in their being the best "Detector" that has been offered us. We have had others, but after a trial, have given yours the preference.
O. H. PERRY, Middlesex Manu'g Co., Lowell, Mass.

We know of three different places in our city where there would have been severe explosions had it not been for your Detectors.
DEXTER & BROTHERS, Pawtucket, Mass.

I have used Ashcroft's Low Water Detector, at Francis & Loutrell's, No. 45 Maiden-lane, and find it perfectly reliable, durable and efficacious, an infallible safeguard from loss of life and property consequent upon explosions. The steam melts the plug in fifteen seconds, promptly blowing the whistle. No oxydation can take place upon the plug, as the water supplying the machine is from the condensed steam that remains in the chamber. I would urge all interested to give this valuable improvement an early impartial trial. GILBERT. W. SCOPEY,
Engineer for Francis & Loutrell.
New York, May, 1860.

MANHATTAN GAS WORKS, 14th-st. Station,
New York, August 8, 1860.
Messrs. ASHCROFT & Co.—Gentlemen: After thoroughly testing your Low Water Detector, I am fully convinced that it will invariably perform just what you claim for it. Any person of ordinary capacity will at once comprehend its principles as well as the certainty of its action. A "fusible plug," dissolving by the action of steam, in all cases, is everything that can be desired. Had you constructed a device depending upon mechanical, instead of philosophical principles for its action, your invention could have been open to the grave charge of "inconsistency in operation." Allow me to add in conclusion, that your invention possesses the power to force itself into notice, and should be placed on steam boilers universally. Yours truly,
I. D. J. SWEET.

NOS. 64, 66, 68, 70, 72 AND 74 WASHINGTON-STREET,
New York, Feb. 1, 1860.
MR. E. H. ASHCROFT.—Dear Sir: It affords me much pleasure to state that having had your Low Water Detectors in use at my factory nearly one year. I find them perfectly reliable. In three or four instances they have given us timely warning of low water. If everybody owning boilers used Ashcroft's Low Water Detector, the "Union would be safe." Yours, respectfully, B. T. BABBITT.

OFFICE OF THE MANHATTAN GAS WORK, 18TH-ST. STATION,
New York, August 1, 1860.
Messrs. ASHCROFT & CO.—Gents.: It is with pleasure I bear testimony to the value of your Patent Low Water Detector, as a simple and entirely reliable indicator of a deficiency of water in steam boilers. Decidedly, it is superior to any apparatus I have yet seen, which has been introduced for a similar purpose. Respectfully,
JOS. A. SABBATON, Chief Engineer M. G. Lt. Co.

We have in use Ashcroft's Low Water Detector, and find it equal to all you claim for it. Its operation is certain, insuring a supply of water at all times in the boiler.
C. G. HAMMOND,
Gen'l Supt. Chicago, Burlington and Quincy R. R.

I have attached quite a number of the the Low Water Detectors myself, and have seen a great many more in use. I have also known them in a number of instances to save boilers, and in no instance have I known them to fail in case of low water.
G. B. KING,
Inspector of Steam Boilers, Lowell, Mass., and twenty years Master Mechanic, Boston and Lowell R. R.

It has operated to our satisfaction, and has never failed to advise us when the water in the boiler has reached a point low enough to call the Detector into action. WM. B. SMITH, Sec'y.
Russell & Irwing Manufacturing Co., Conn.

PROVIDENCE, Nov. 6, 1859.
MR. E. H. ASHCROFT.—Dear Sir: It gives me great pleasure to testify to the usefulness of your Low Water Detector, and to say that I have the greatest confidence in its operation. We now have about two hundred applied to boilers in this city; some have been in use three years, and in no instance have failed to give notice of low water. In this city it has detected low water at least twenty-five times within the last three years. Therefore it is useful not only in saving the boilers from destruction, but in all probability it has been the means of saving many lives. N. P. BARTLETT,
Inspector of Steam Boilers for the City of Providence, R. I.

Messrs. ASHCROFT & Co.:—The Low Water Detector attached by you to our boiler has proved itself all that was represented, as we have melted several plugs in less than half a minute from the time the water got down to the point at which the indicator was set. We admire its simplicity, there being no points about it requiring attention—no stuffing boxes or other contrivances requiring the attention of the engineer, as there is no fear from heat, cold, rust or sediment. We consider the more it is let alone the better it is, and we also consider the Detector a perfect safeguard against loss of life and property by explosion, and wish such a safeguard was on every boiler in the land.
FRANCIS & LOUTRELL.
New York, June 8, 1860.

LOWELL, MASS., March 25, 1860.
Messrs. ASHCROFT & Co.:—In reply to yours of the 22d ult., I would say that we have ten of your Low Water Detectors on our boilers at the Boott Cotton Mills, and that the plugs have been in place four years and then been melted by the action of the steam. I do not see how any length of time can change their fusible qualities. Yours, &c.,
GEO. F. SAUTELL,
Engineer at the Boott Cotton Mills.

FOR SALE—AN AGRICUTURAL IMPLEMENT MANUfactory, situated in the village of Baldwinsville, Onondaga county, N. Y. Foundry built of stone, 25x52 feet; machine shop, wood shop, show rooms and office are in a three and a half story building 39x52 feet. This establishment is now in perfect running order. It has a reliable water, railroad and canal communication, and is now doing a good local business, which is without competition. It is offered at a low price and on liberal terms. Address J. M. & S. W. BALDWIN, Baldwinsville, Onondaga county, N. Y. 1 2*

STEPHENS' DYES FOR STAINING INFERIOR WOOD to imitate black walnut, mahogany, satin wood, rosewood, or oak. Specimens and prospectuses sent to all parts of the States on receipt of 15 cents. C. J. REILLY, No. 70 William-street, New York. 1 8*

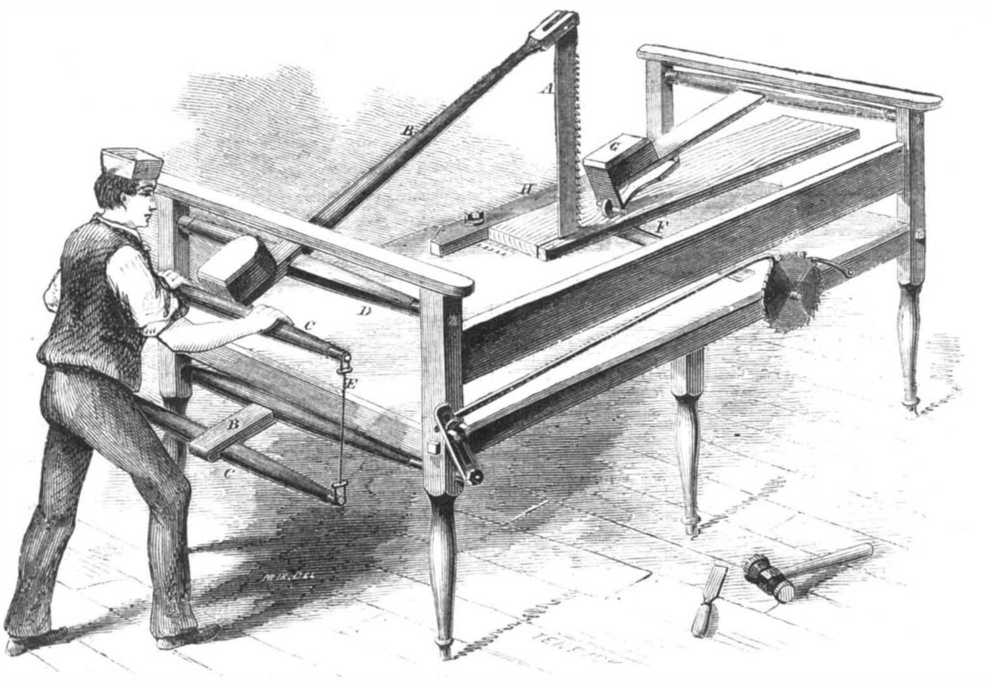
THE NEW BRICK MACHINE IS GRADUALLY EXtending over the United States and Canada; is worked by one man, by horse and by steam; makes from 4,000 to 25,000 bricks a day; costs from $75 to $400. For further particulars in a pamphlet giving full instructions on brick-setting and burning, address, enclosing three stamps, FRANCIS H. SMITH, Baltimore. 1 6*

A MESSIEURS LES INVENTEURS—AVIS IMPORTANT. Les Inventeurs non familiers avec la langue Anglaise et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous adresser 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.

Improved Sawing Machine.

The unlimited field which is open to inventors, and the boundless fertility of ideas which is constantly busy in filling this field, are both strikingly illustrated in the invention here represented. In working wood by carpenters and others, a great deal of labor is expended in sawing boards lengthwise—"ripping" them, as it is called—and this work requires not only a true eye and hand, but a certain measure of skill which is the result of long training. By this machine, the operation is performed by any boy, however inexperienced, or any workman, however unskillful.

The saw, A, is strained between the ends of the two levers, B B, the opposite ends of these levers being



BARTHOLOMEW'S IMPROVED SAWING MACHINE.

connected by the cross bands, C C, and the straining rods, E. Each lever has its fulcrum on the rocking bar, D D, and the upper cross bar, C, serves as a handle for the workman, by moving which up and down he operates the machine, giving motion to the saw. The stuff rests upon the roller, F, by the rotation of which it is fed along to the saw; the roller receiving motion from the lower rocking bar, D, through the intervention of the rod and ratchet wheel, as shown. The weight, G, rests upon the stuff to hold it down, while the guide, H, keeps it in place as it slides along.

The advantages of this machine are thus stated by the inventor:—"It can be manipulated to good advantage in shops where woodwork is carried on to any extent, where steam or water power has not been introduced, for ripping up plank and boards into different widths. One man will do as much work on one of these machines as three will with the ordinary hand saw in the same time, and the work is not nearly so laborious. It is self-feeding, and gages the width as it saws, and always leaves a square edge on the stuff which needs very little dressing afterward with the plane. It occupies but a very small space in a shop—3x6 feet. In ripping long stuff, there should be two trussels—one before and one behind the machine—with rollers to carry along the stuff. It cannot easily get out of order, can be worked by any person who is not a mechanic; even a boy fifteen years old will operate it. Lastly, the price brings it within reach of every mechanic who has a shop."

The patent for this invention was granted, through the Scientific American Patent Agency, on Dec. 11, 1860; and further information in relation to it may be obtained by addressing the inventor, D. B. Bartholomew, at Lancaster, Pa.

Since the above description of Mr. Bartholomew's Sawing Machine was in type, we received the annexed letter from the inventor, which we take the liberty of appending:—

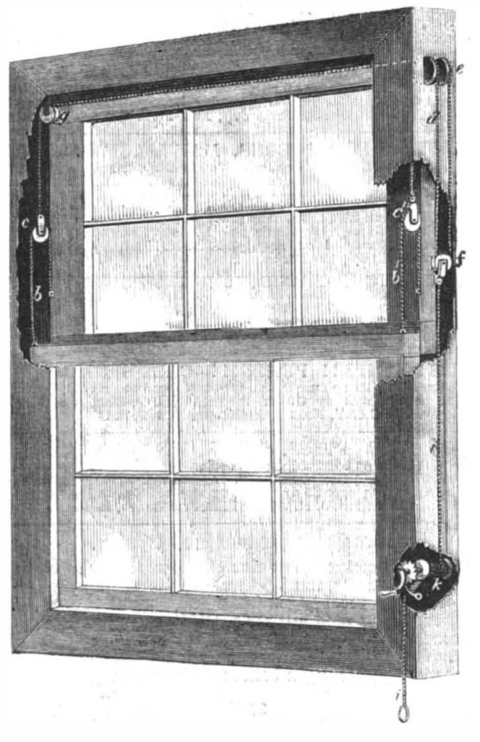
MESSRS. MUNN & Co.—This morning I came into possession of my Letters Patent for the Hand-sawing Machine, for which you will please accept my thanks. You have been very successful in prosecuting my case before the Patent Office, and bringing it to a satisfactory termination by giving me ingenious claims that are not likely to be invaded. Your ingenuity and skill in executing drawings and drawing up specifications is a model piece of work, in my judgment, not to be equalled by any other attorneys in the country. I feel proud in saying that we have such an institution as "Munn & Co.'s Patent Agency," through whom inventors can always receive justice at the Patent Office. This is the second patent I have received through your agency. Should I be so fortunate in the future as to invent anything worthy of a patent, I shall procure your services in preference to any other. I remain, yours truly D. B. BARTHOLOMEW.

Lancaster, Pa., Dec. 13, 1860.

Stanard's Window Sash Pulleys.

The annexed engraving represents a novel device for raising and lowering window sashes, and holding them in any desired position.

A cord, *b*, is fastened with one end to the top of the lower sash, and the other end to the middle of the upper sash at one time, this cord passing over a hanging pulley, *c*. The pulley, *c*, is supported by a cord, *d*, which passes over the fixed pulleys, *g* and *e*, and is joined to the cord, *d*, which supports the hanging pulley, *c'*, similar to the pulley, *c*, but on the opposite side of the window. The cord, *b'*, which passes over the pulley, *c'*, is similar to the cord, *b*, and is fastened



to the sashes in the same manner, but on the opposite side. The cord, *d*, supports in its bight the pulley, *f*, so that, by drawing down this pulley, both ends of the cord, *d*, are raised, carrying up the two hanging pulleys, *c* and *c'*, to which they are fastened. To the pulley, *f*, is attached the cord, *i*, which passes down and around the spool, *k*.

Now, to raise the lower sash the spool, *k*, is turned to draw down the pulley, *f*; while turning the spool in the opposite direction lowers the upper sash. A ratchet and pawl hold the spool from turning back to drop the upper sash, which, of course, tends to fall by its own weight. A cord, *i*, is fastened to the pawl to draw it away from the ratchet when the upper sash is to be lowered. By leaving the pawl in the ratchet, so as to hold the hanging pulleys stationary, and taking hold of the lower sash, the window may be opened at the top and bottom at the same time; the upper sash falling just as much as the lower one rises.

It will be seen that the middle stop between the sashes must extend upward only about half the hight of the upper sash, in order not to interfere with the movements of the pulleys.

Application for a patent for this ingenious invention has been made through the Scientific American Patent Agency, and further information in relation to it may be obtained by addressing the inventor, H. T. Stanard, Wayne, Mich.

SOME samples of very fine Persian cotton have lately been received in Belgium from Trebisonde, which have been found well adapted for making lace.