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Improved Shears for Plate Iron.

This engraving represents a very powerful pair of shears for cutting plate iron. The vast quantities of iron plates worked up into one form or another in this country, should render such a machine of the utmost value.

This machine is provided with its own motive power, and can be used on ship board, or out of the shop, as well as in it; at any point where steam can be had the machine can be used.

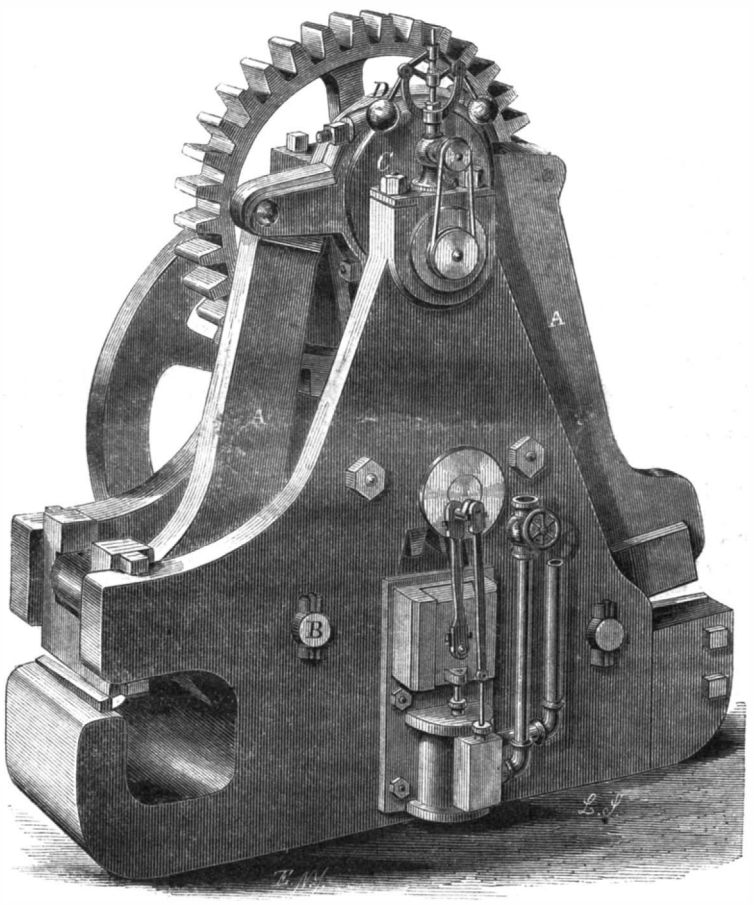
Aside from its massive strength and the convenience of having the power applied in the manner spoken of, it is well designed as regards durability and ease of access.

The mechanism consists of a pair of right-angled levers, A, vibrating on rock shafts, B, set and keyed fast in the frame. These levers are driven by an eccentric, C, against which they bear at the upper ends. The straps, D, on the eccentric take no portion of the strain, but are provided to draw the levers back to their positions; or, in other words, keep the ends up to the face of the eccentric.

The end thrust of the hub of the lever the shears are fastened to, is received by a brass washer which is recessed out on one side and brought up against the frame so that it is held and prevented from turning when the rock shaft moves. The washer renders the motion much more regular, and the tool may be easier kept in order than without it; it also keeps the shears up to their work, so that they are less liable to run off the line of cut. One end of the shears can be used for splitting long plates if necessary, while the other pair are set in a contrary direction so as to bring the shears within range of all kinds of work. It is equally well adapted for punching large holes, and from the nature of the combination of the several parts should be capable of doing very heavy work.

The engine shaft has a pinion on it inside the frame which meshes in the large spur wheel. It will be seen that these shears require no foundation to rest upon, that they weigh less than two single pairs of shears, that they are very compact, and, in all respects, desirable for those who use such tools.

The machine was patented through the Scientific American Patent Agency on Feb. 7, 1865, by Julius Hornig, superintendent of the Ontario Iron Works, Oswego, N. Y. Address him at that place for further information.



HORNIG'S SHEARS FOR PLATE IRON.

American Breech-loaders in Switzerland.

The Swiss correspondent of the New York *Staats Zeitung* writes as follows:—

"Your countryman, Mr. H. A. Chapin, Secretary of the New Haven Arms Co., induced by a circular from the Federal Council on the introduction of a breech-loading fire-arm, has exhibited in Berne a number of superior repeating rifles, particularly repeating carbines of Henry's pattern, and thereby he has produced quite an excitement among experts. Since you are acquainted with the effect of this, the best of all fire-arms, particularly from Sherman's great march through Georgia, I will only remark, that Mr. Chapin has a good prospect of introducing his fire-arm among the sharp-shooters of Switzerland."

Coal, Its Use and Abuse.

A series of interesting experiments, "On the use and abuse of coal in our manufactories," has been made by Mr. Lewis Thompson, M.R.C.S., and from the communication to *Newton's London Journal*, he seems to have discovered that practically at this moment in our manufactories, with a kind of coal capable of converting 15 times its weight of water into steam, only 6 lbs. of steam are raised per pound of coal consumed; in other words, more than one-half of the coal burnt under our steam boilers is thrown into the air and lost. This assertion is based upon the daily working of several different steam boilers in London, Manchester, Newcastle-on-Tyne, and Glasgow. Mr. Thompson has come to the general conclusion, that, except immediately after a charge of coal, the air from a well-fed furnace contains no appreciable amount of hydrogen, or hydrocarbon, or sulphurous acid; that the quantity of carbonic acid gas is about 6 per cent, the quantity of oxygen gas about 9 per cent, and the quantity of carbonic oxide gas about 8 per cent—thus leaving us to infer that about 9 per cent of the oxygen in atmospheric air is consumed by the hydrogen of the coal. Hence it appears that, in respect to the production of heat in furnaces, 9 parts of the oxygen of the air escape unacted on; and of the remaining 12 parts, 6 are converted into carbonic acid, 2 combine with the hydrogen to form water, and 4 are carried off in the shape of carbonic oxide gas. Upon these data he states that the heat given out by coal is thus distributed—usefully employed in raising steam, 46⅔ per cent; loss from carbonic oxide gas, 41⅔ per cent, and loss from radiation and imperfect conduction, 11⅔ per cent. We have employed percentages as more generally intelligible than the fractions of a semicircle expressed in degrees, according to which Mr. Thompson calculates. An improved steam-boiler furnace has been invented by Mr. Thompson for preventing the loss.

IRON PLATING OF GRANITE FORTS.

It will be remembered that in 1851, Gen. Joseph G. Totten—then Chief Engineer of the United States Army—made a report to the Secretary of War, giving an account of an elaborate series of experiments undertaken by him to ascertain the suitableness of wrought iron as a lining or facing for the embrasures of granite fortifications. In this report Gen. Totten says:—"Our experiments show that wrought iron is the best material for insertion, as above mentioned, and that a thickness of eight inches of wrought iron, solidly backed with masonry, will resist an 8-inch solid ball, fired with 10¼ pounds of powder, from a distance of 200 yards." General Totten further stated that the plate would offer far greater resistance if rolled in one solid mass, than if made up of eight one-inch plates.

By the report on another page, it will be seen that experiments have been made in England, with heavier shot and charges than those tried by Gen. Totten, and on a facing of iron more than 8 inches in thickness, and the granite casemate was quickly battered to pieces. It is true that the iron facing was not rolled in one solid mass, nor was it backed directly by solid masonry, as recommended by Gen. Totten.

It had altogether 15 inches in thickness of iron, with 6½ inches of teak; the details of its construction will be found in the report. These experiments seem to show that much more than 8 inches of wrought iron will be required to protect granite walls from the force of steel bolts fired from the 10-inch rifled guns at present in use; though what the effect of more solid backing would be can be learned only by further experiments.

Dr. Angus Smith, when traveling in a railway carriage, collected some of the particles of dust which floated in the air and which seemed to shine with a metallic luster. On examination Dr. Smith found that the larger class were in reality rolled plates of iron which seemed to have been heavily pressed and torn up from the surface. Another and smaller class were less brilliant, and when looked at with considerable power showed many inequalities of surface. Probably these were the particles which were not torn up but rubbed off.

Humboldt stated that guano is deposited in layers of 50 to 60 feet thick on the granite of many of the South Sea islands of the coast of Peru. During three hundred years the layer of guano deposited is only a few lines in thickness. This shows that many centuries must have elapsed to form the present guano beds.

It was not until the sixteenth century that the present mode of coating the backs of mirrors with quicksilver and tinfoil was introduced.

SOME FACTS IN RELATION TO IRON.

From a lecture recently delivered before the Society of Arts, England, by Dr. F. Grace Calvert, F. R. S., T. C. S., we give the following extracts:—

IRON AND MANGANESE.

As far as our present day's knowledge extends, no metal is more influenced than iron, either for good or for bad, by the presence in it of a minute quantity of another element; thus a few thousandths of carbon transforms it into steel, and a few per cent of the same element converts it into cast iron; a few thousandths of sulphur, or a few per cent of silicium, renders iron "red-short," that is to say, brittle at a red heat, while the same quantity (thousandths) of phosphorus makes it "cold-short," or brittle at natural temperature. These facts explain why iron smelters and manufacturers do all in their power to use ores as free as possible from these impurities, or apply all their skill to remove them from the ores or metal when present. I am, therefore, satisfied that all iron smelters will appreciate the value of the following facts, published by M. Caron, in the *Comptes Rendus* of the Academy of Science of 1863, on the influence of manganese when used on the blast furnace to remove silicium from cast iron. The following table shows the relative quantity of manganese and silicium existing in the cast iron thus produced:—

	Manganese.	Silicium.	
No. 1	7·93	0·05	
No. 2	6·32	0·08	
No. 3	4·70	0·30	
No. 4	3·81	0·55	
No. 5	2·25	0·76	
No. 6	3·90	0.50	cold blast.
No. 7	2·10	0·75	hot blast.

This table shows that as the quantity of manganese decreases in the pig iron, the quantity of silicium increases; further, that the higher the temperature (all the rest of the operation being conducted in the same manner), the quantity of silicium increases and the maganese decreases.

M. Caron has further made the important remark, that it is the interest of the iron-smelter to use as much lime in the blast furnace as practicable when manganiferous ores are employed, for not only does lime facilitate the introduction of manganese into the iron, but also helps in a degree to remove the excess of silicium.

Eight or nine years ago, I made the observation that if manganese had not the property of removing phosphorus from iron, it had the one of hiding or of counteracting the bad influence of that element on iron; in fact, I found that cast iron, containing as much as one or two per cent of phosphorus, would yield good mercantile iron if the pig iron contained at the same time five or six per cent of manganese, and I have lately heard that manganiferous ores have been used with great advantage by the Cleveland iron smelters to overcome the "cold shortness" of their cast iron, which is due, as is well known, to the presence of phosphorus compounds in the Cleveland iron ore.

It is highly probable that the advantages which have been derived from the employment of spiegeleisen iron, in improving the quality of steel produced by Bessemer's process, is owing, not only to the fact that this peculiar iron contains a large quantity of carbon, which it yields to the molten iron contained in the large crucible used in Bessemer's process, but that the manganese it contains contributes also to hide the influence of the phosphorus or to overcome the detrimental properties which a trace of phosphorus would impart to the steel produced by this process. I say hide, because the phosphorus is still present, since that substance cannot be removed by the above process from any pig iron in which it may be present.

LIME IN IRON.

M. Caron has published in the *Technologiste* for 1864, a paper in which he shows that no amount of lime on the blast will remove phosphorus from any ore which may contain it; and that tin-plate manufacturers and others who employ charcoal iron should pay the greatest attention to the quantity of phosphorus contained in the charcoal they employ for refining ordinary iron; thus some charcoals are susceptible of yielding as much as one per cent of phosphorus to iron, while others only 0·12 per cent, and, lastly, some only a trace.

TUNGSTEN IN IRON

If phosphorus, sulphur, and silicium are injurious to the quality of iron, the metal called tungsten, on the contrary, appears to improve in a marked degree its quality, especially when in the state of steel. This fact has not only been demonstrated beyond all doubt by Mr. Mushet, but also recently by some scientific researches due to M. Caron, who has proved that steel containing tungsten presents greater tenacity, and can be used with great advantage for many purposes; in fact, he thinks that tungsten can be used instead of carbon as a converter of iron into steel. There can be no doubt that the employment of tungsten in connection with the hardening of steel, and other various applications which that metal is susceptible of, will be greatly enhanced if the fact stated in the *Chemical News*, of August 25th, is brought to bear, viz., that a Swedish chemist has found a simple and practical method of extracting tungsten from its ore so as to reduce its cost of production to a few shillings per pound.

PRESERVING IRON FROM RUST.

It is easy to preserve small articles made of iron from rust, either by plunging them into a weak solution of caustic alkali (whether the iron is preserved by a peculiar action of the alkali, or because it prevents the action of the carbonic acid of the atmosphere in conjunction with oxygen and moisture, are points to be determined), or covering them with a varnish made of india-rubber, gutta-percha, and a small amount of fatty matter. As to the preservation of ships' bottoms from corrosion, without entering here into the various methods that have been proposed of late to effect this important object, still I deem it my duty to call your attention to one or two methods that have been tried with apparent success; thus, Mr. Leach has applied on the iron surface of ships' bottoms, a coating of gutta-percha or other cement, and fastening by it sheets of glass of about one-fourth of an inch in thickness. The glass is previously bent to the shape of the ship, and pierced for the reception of the screws or bolts, which are preserved from immediate contact with the metal bolts by coating them with a little of the fastening mixture.

IRON IN BRASS.

Without occupying your time with further instances, let me call your attention to an important fact that Dr. Matthiessen, Mr. Johnson, and myself have observed, viz., that the addition of a small quantity of a metal which may be considered as an impurity, completely modifies, in many instances, its properties; and the most important example that I am acquainted with is, the influence which the addition of 1 or 2 per cent of iron exercises on the properties of brass. If a brass be composed of 60 per cent copper and 40 per cent zinc, it will be susceptible of being drawn or bent when cold, but cannot be forged or worked when heated; while if 1·75 or 2·0 per cent of iron be substituted for the same quantity of zinc, then a most valuable brass is obtained, for not only is this brass capable of being forged at a red heat, like iron, but its tenacity is increased in an enormous proportion, for each square inch of surface is able to support a "breaking weight" of from twenty-seven to twenty-eight tuns, a tenacity nearly equal to that of iron.

Messrs. Beyer and Peacock, of Manchester, who experimented with bolts made of this alloy, in the hope of substituting them for iron ones in the fire-boxes of locomotives, found that these bolts would support a strain equal to those of iron, and that the threads of the screw were not stripped with more facility than those of iron when exposed to the same strain.

There is no doubt that when this alloy becomes more generally known, many valuable applications of it will be made in the arts and manufactures.

We understand that by order of the Emperor the use of gun cotton by the Austrian artillery and corps of engineers is prohibited. A few years ago forty batteries of eight guns were made, all of which were to be charged with gun cotton instead of powder, and now they must be recast. There is a large quantity of gun cotton on hand which if not soon sold will be destroyed.

NOTES ON NEW DISCOVERIES AND NEW APPLICATIONS OF SCIENCE.

EXTRACTION OF VEGETABLE OILS BY MEANS OF VOLATILE HYDROCARBONS.

It is found that all the more common vegetable oils, including palm oil, olive oil, colza oil, linseed oil, rape-seed oil, and cotton-seed oil, may be extracted with great economy by means of some of the volatile hydrocarbons obtainable from petroleum, or by the distillation of coal, chist, or bitumen. The hydrocarbons which answer best for this purpose are those which are volatile at a little above the boiling point of water. The seeds or fruits from which the oil is to be extracted, having first been crushed or ground in the usual way, are digested with the hydrocarbon in tightly-closed vessels. The hydrocarbon gradually dissolves out all the oil contained in the crushed seeds or fruits, and from the resulting solution of vegetable oil in mineral spirit the volatile solvent is driven off by evaporation. The solvent is of course condensed for use over again, and with careful management, the loss of hydrocarbon per operation is found to be exceedingly slight, while the yield of oil obtained in this way is from 40 to 50 per cent greater than is obtainable by the ordinary method—that of mechanical pressure. By this process of digestion with a volatile mineral solvent there could be obtained from the olives which are pressed every year in the neighborhood of Marseilles alone not less than six millions of pounds more oil than is at present obtained from them.

ABSORBENT POWER OF COCOA-NUT SHELL CHARCOAL.

The property of absorbing lagre quantities of gases which is possessed by wood charcoal and other porous forms of carbon—a property which has received several valuable practical applications, and is probably susceptible of others—has hitherto been supposed to be presented in largest measure by the charcoal made from boxwood. Mr. John Hunter, however, has found that the absorbent power, for gases and vapors, of charcoal made from the shell of the cocoa nut, is between two and three times greater than that of boxwood charcoal. Cocoa-nut shell charcoal, after having all the air expelled from its pores by strong ignition in a nearly closed vessel, will absorb, at about the temperature of boiling water, one hundred and fifty-five times its own bulk of the vapor of methylic alcohol.

PASSAGE OF THE EARTH THROUGH THE TAIL OF A COMET.

Early in the month of June, 1861, M. Liais, the celebrated astronomer, wrote from Rio Janeiro to the Academy of Sciences of Paris, to the effect that the observations which he had made of the great comet of that year, which had not as yet become visible in Europe, had convinced him that there was a great likelihood that the earth would come in contact with one of the tails of that body. M. Liais, who is now in Paris, attended the sitting of the Academy and submitted elaborate calculations proving beyond question that on the 19th of June, 1861, the earth really did pass through one of the comet's tails. The moment of contact was twelve minutes past six a.m., Rio Janerio time, and, according to the calculation of its dimensions made by M. Liais, the earth must have been wholly immersed in the tail for about four hours! This immersion in the tail of a comet had no perceptible influence upon the weather, a very remarkable fact, adding one more to the many reasons there were already for supposing that cometary matter is some million of times rarer than our atmosphere. Not the least curious consideration suggested by the phenomenon is, that it was one which had perhaps never occurred before—for, according to Arago, the chances against the contact of the earth with a comet are more than two hundred and fifty millions to one.—*Mechanics' Magazine.*

Model from Freeport, Ill., Destroyed.

Charles Fargo, superintendent of the American Express Company, at Detroit, informs us that a box to our address, from Freeport, Ill., is supposed to have been destroyed in a collision on the Michigan Central Railroad on Nov. 14th, and that upon receipt at his office of proper evidence of contents and value of the box, the contents will be forwarded or paid for at once. Having no information in our possession upon this matter we publish the above for the benefit of whom it may concern.

PROFESSOR CHANDLER ON BOILER INCRUSTATIONS.

[Continued from page 7.]

THE FORMATION OF INCRUSTATIONS.

The analyses presented in the tables already published show that the incrustations consist chiefly of the carbonates of lime and magnesia and the sulphate of lime. The two carbonates are insoluble in pure water, and owe their presence in the waters of springs and rivers to free carbonic acid, which forms with them soluble bicarbonates.

When such waters are boiled this carbonic acid is expelled, and the carbonates of lime and magnesia separate in the form of insoluble powders, portions of which adhere to the sides of the vessel containing the water.

The carbonic acid acting as a solvent is so loosely combined with the carbonates, that exposure to the air is sufficient to cause the separation of a portion of it, an equivalent quantity of the insoluble carbonates separating as a deposit, as already mentioned in connection with the Weedsport waters.

The more slowly the carbonates are precipitated from their solution in carbonic acid, the more compact are the deposits, and the more firmly do they adhere to the surface with which they come in contact. In caverns, by slow evaporation, hard stony stalactites and stalagmites are formed, while in boilers, unless sulphate of lime be present in considerable quantity, the deposits consist usually of a fine loose powder or mud.

Various alkaline substances, by appropriating this carbonic acid, cause the precipitation of the insoluble carbonates. Potash, soda, and ammonia, as well as their carbonates, produce this effect, as does also lime water. In the latter case, the lime added, unless an excess be used, is also deposited as carbonate; consequently no alkaline salts are substituted for the carbonate removed, as in the case when the other substances are employed.

It is seen from the above that the carbonates may be removed without decomposition, by simply depriving them of their solvent, the carbonic acid.

The sulphate of lime is soluble in water, one part of the sulphate requiring about 400 parts of water for its solution. One gallon of water is capable of holding about 150 grains of sulphate of lime. The solubility of sulphate of lime in water is modified by the presence of other substances. The chlorides of calcium and magnesium, alcohol, etc., and even a high temperature diminish, while the chlorides of sodium and ammonium, sugar and various other organic substances, somewhat increase in solubility. Hyposulphite of soda is said to increase its solubility ten fold. Above 212° F. the solubility rapidly diminishes as the temperature increases. At 255° F., equivalent to a pressure of 30 pounds, its solubility is diminished nearly three-fourths; at 272° F., equivalent to a pressure of 45 lbs., nineteen-twentieths, and at a temperature of 280° to 300°, it may be said to be totally insoluble.

The following analyses of waters taken from boilers are interesting in this connection:—

	1. No. 101.	2. No. 106.	3. No. 113.	4. Stationary Machine Shop, Syracuse.
Distance run	700 miles.	416 miles.	416 miles.	
Road	direct.	Auburn.	Auburn.	
Preventive used	bran.	bran, two buckets.	nothing.	Potatoes, one peck.
Reaction	neutral.	neutral.	neutral.	alkaline.
Sulphate of lime	17·88 grs.*	9·53 grs.*	39·89 grs.*	49·82 grs.*
Carbonates of lime and magnesia	trace.	trace.	trace.	trace.
Chlorides, etc.	56·76 "	19 38 "	52·95 "	37·42 "
Organic matter	9·33 "	8·86 "	13·99 "	12·59 "
Nitrates	trace.		trace.	faint trace.
Total per gallon	83·97 grs.	37·77 grs.	106·83 grs.	99·83 grs.

* These figures are probably too high, as they are calculated from the sulphuric acid, a portion of which probably exists in the form of alkaline sulphates.

No. 106 had run for eight months, and was very clean. The water from the stationary was turbid, depositing on standing, a sediment containing sulphate of lime, carbonates of lime and magnesia, oxide of iron, clay, etc. The small quantities of sulphate of lime and of the carbonates of lime and magnesia contained in these waters, confirm the statements already made with regard to the effect of heat on the solubility of these substances.

Sulphate of lime does not therefore require the presence of carbonic acid for its solution. It is deposited in boilers on account of the high temperature and its limited solubility, and forms, in the absence of the carbonates, as in marine boilers, a hard crystalline scale, sometimes an inch or more in thickness. When the carbonates of lime and magnesia are present the deposits vary from a loose powder to a hard crystalline incrustation, according to the relative proportions of the three substances.

In practice sulphate of lime can only be removed from water by undergoing decomposition; for example, by carbonate of soda, which forms carbonate of lime, which is deposited as a powder, and sulphate of of soda, which remains in solution. It has been stated, that as much as thirteen hundred pounds of incrustation has been taken from a single boiler at one time. It may seem impossible for so large a quantity of earthy matter to be deposited from waters which average only seventeen grains of incrusting constituents per gallon. When it is recollected, however, what vast quantities of water pass into a locomotive boiler, the possibility will be fully conceded. It was stated by a master mechanic on the road, that a locomotive in running 40 miles will take in 1800 gallons of water, equivalent to 45 gallons per mile, a quantity which seems incredible.

Accepting this statement as a basis for calculation, we have 765 grains, or more than an ounce and a half of earthy matter as a possible average of the quantity which enters the boiler per mile. Multiplying this by 1988, the average number of miles run on this section of the road by each of 56 locomotives, in one month (Dec.), we have 217 pounds of incrusting matter entering a boiler per month, or 2604 lbs. per year. Nor is this necessarily a maximum, as some boilers receive the larger part of their water form stations furnishing water much below the average in purity.

THE EFFECT OF INCRUSTATIONS.

The injurious action of the incrustations is threefold:—

1. Being very poor conductors of heat, and occupying a position between the boiler plates and the water, they cause a great loss of heat and consequent waste of fuel. This waste is estimated at 20 per cent., and in some cases as high as even 47 per cent. of the fuel used. Nor does this waste require a very thick incrustation, a very small fraction of an inch of scale being sufficient to exert a decided influence on the quantity of fuel necessary to produce the required power. This loss of heat involves, of course, a corresponding loss of power.

2. For the same reason they cause an over-heating of the boiler plates, which often become red hot, though only separated from the water by a thin scale. Such over-heating is sure to cause a rapid burning out of the metal, and may result it an explosion of the boiler, should the expansion of the boiler plates loosen and detach the scale so as to expose the over-heated surface of the water.

3. The corrosion of the metal occurs most rapidly in those parts of the boiler upon which the deposits are most liable to accumulate.

[To be continued.]

RECENT AMERICAN PATENTS.

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

Hoisting Tackle.—This invention consists, first, in casting a block with suitable recesses to receive a wrought-iron or steel hook and eye connection or swivel, in such a manner that a cheap and durable block is obtained, the hook or eye of which is not liable to give way before any of the other parts; second, in providing said wrought-iron or steel eye with a suitable recess or recesses, or with a head whereby the same, when cast into the block, is perfectly engrafted therein, and a spontaneous detaching of the same from the block is rendered impossible; also, in casting in the single block a seat composed of two holes and arranged to receive a rope or other suitable becket in such a manner that the hoisting rope can be secured as close as possible to the shears, and the largest possible amount of hoisting room is obtained; finally, in the arrangement of ribs acting in combination with the bosses on the shanks of the eye so as to relieve the center pin partially or wholly of the strain to which the eye is exposed. J. W. Norcross, of Middletown, Conn., is the inventor.

Fire-arm.—The object of this invention is to produce a repeating rifle which will not need to be recocked by the hand for every shot. An arm of this sort will be of great advantage in deer hunting, as it will allow the hunter to keep sight on the running deer, while the gun discharges the contents of its cylinders in a successive series, automatically. It will also be of great service in hunting other game, and for military uses. Ordinary revolvers or repeating fire-arms cannot accomplish like results with this arm in hunting swift-running animals, as they take too much time to be got ready for each succeeding discharge, and the hunter has to lose sight in the act of cocking the piece. In shooting water fowl at a great distance, a rifle barrel for "0" sized shot, arranged after this invention, would do great execution, as a many-chambered breech for that size of shot might be made to hold ten to fifteen charges without being too bulky, and two shot might be loaded in each chamber, and the whole discharged in about two seconds, having greater range than a shot-gun, and being made to scatter by the hunter in moving his aim along the line of the object, whether the same be stationary or running game, or a flock of birds in flight. This plan may also be used for smooth-bored guns, giving the hunter six shots through one barrel (where a cylinder with six chambers is used), which he might discharge singly or in rapid succession. George C. Bunsen, of Belleville, Ill., is the inventor.

Turbine Water Wheel.—Water wheels which are fitted within scrolls, helixes, or cylindrical water guides or boxes, all leak, in a greater or less degree, at the joint or junction of the wheel with the scroll, helix, or box, in consequence of a tight joint not being formed in order to avoid friction. This leakage, of course, serves to diminish the efficiency of the wheel, and the object of this invention is to obtain a tight joint without causing friction, and to this end a flange is attached to the inner edges of the scroll, helix, or box, either at the top or bottom, or both; said flange being of such a shape as to form annular boxes in which water, when the wheel is at work or in motion, is retained directly over the joints by centrifugal force generated by the rotation of the wheel, and loose joints admitted which will not cause any friction and at the same time prevent the escape or leakage of water therefrom. George Talcott, of New York City, is the inventor.

Process for Cleaning Cotton Seed.—Many attempts have been made to plant cotton seed by a machine, but none have hitherto succeeded, the fine lint which adheres to the seed causing the latter to adhere together, and preventing them from being properly distributed or discharged from a seed box or hopper. The object of this invention is to obtain a simple and inexpensive means for depriving the seed of its lint, so that the former will have a perfectly smooth exterior, and be capable of being planted with a machine in equally as perfect a manner as corn or other seed. To this end a perforated revolving cylinder is used in which the cotton seed is placed with small pebbles, stones, or other hard material, a trifle larger than the seed, the attrition produced by the action of the seed and hard substances against each other, as the cylinder rotates, effectually depriving the seed of its lint. John G. Page, of Rockford, Ill., is the inventor.

Blind Fastener.—This invention consists in the use of a short lever latch attached to the bottom of the blind, with an arm at the outer end, bearing catches for keeping the blind open or shut, and a knob at the other end to operate the lever. The fastenings at present in use are placed either so near the hinge as to cause the blind to surge and get loose, or so far from it as to necessitate the reaching of the arm, and sometimes the head, far out of the window to loose the fastenings from the staple. This invention obviates these difficulties. The catch is far enough out to be always secure and in good working order, and at the same time may be loosened from the staple by simply pressing on the knob a few inches from the hinge. Rev. B. S. Huntington, No. 255 East Thirtieth street, New York, is the inventor. Patented November 28, 1865.

A ROD of iron 846 inches in length, has its length increased one inch by being heated from the freezing to the boiling point of water.

THE FOOT LATHE.

Number 4.

It is not always an easy task to chase a true thread on a piece of work, and even "the boldest holds his breath for a time," if he has a nice piece of work all done but the thread, and that in a critical part. It is so easy to make a drunken thread, or one in which the spirals are not true, but diverge or waver in their path around the shaft, that many are made. That they are more common than true threads, is well known to mechanics. To start a thread true is quite easy with an inside chaser; for, strange as it may seem, it is seldom that drunken thread is made on inside work; only have the bore itself true and the chaser will run in properly. The case is different when a bolt or shaft is to be cut. With fine threads, the slightest obstruction on the rest will cause the chaser to catch and stop slightly. No matter how slight the stoppage, it is certain to damage the thread. The injury is more perceptible on fine threads than on coarse, for in the former, if the threads do not fit (as they will not if they are drunken, one crossing the other, when both parts are put together), the drunken thread will not come fair with the other. In coarse threads, however, it will not be so apparent, for, by making the drunken thread smaller, it will have play and accommodate itself to its place. This is not workmanship, it is "make-shift."

To chase a true thread the rest must be smooth and free from burrs or depressions. Nice workmen keep a special rest with a hard, polished steel edge expressly for this purpose.

If the chasers themselves are smoothly finished at the bottom, on an emery wheel, they are all the better. With these precautions, and others noted below, success is certain. When a thread is to be started, take a fine diamond-pointed tool and hold it on the end of the shaft to be chased. Set the lathe going, and give the tool a quick twist with the wrist, so that a spiral will be traced on the work, like this figure.

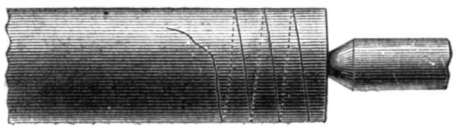


Fig. 16.

Some part of this will correspond with the pitch of the thread to be cut, and there is less liability of making it drunken. By a little practice one is able to hit the pitch of the chaser exactly in making a start.

"There is no trouble, after you once know how." We have chased quantities of small screws with 48 threads to the inch, and not a sixteenth of one inch in diameter. If the chaser once hesitates on such screws, they are spoiled. For heavy threads—seven and eight to the inch, which is about as hard work as any man wants to do, it is the custom of some turners to use a tool with only two teeth, and some use only a sharp-edged cutter, like this—

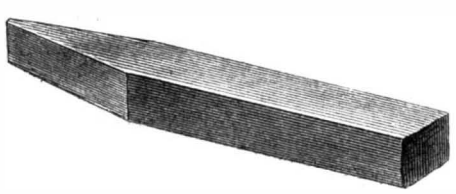


Fig. 17.

to deepen the thread, the chaser being used afterward to rectify the job. There is danger with this tool, unless it is used by an expert, of digging out the thread, so that the last end of it will be worse than the first.

Another tool used in chasing heavy threads is a doctor. This consists in having a fac-simile of the thread to be cut on the back of the chaser and in applying a short set screw behind, so that as the iron is cut away the chaser may be followed up behind. This is the doctor, but the follower opposite the chaser is too narrow, and should be made nearly half a circle to avoid slipping; with this exception it is all right.

These tools, and the screws made by them, are all inferior to those made by lathes with traversing mandrels; that is, a mandrel which slides in and out of the head rest, as in a Holtzapfel lathe.

This lathe has a series of hubs, unlike the one shown previously, slipped over the back end of the

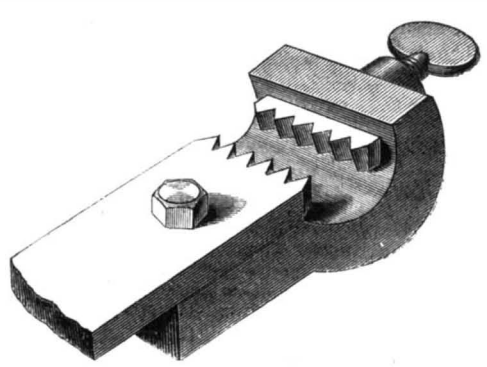


Fig. 18.

lathe spindle (furthest from the workman) and a fixed nut on the head-stock, which being put in communication with the hub on the mandrel, drives the same in and out according to the direction the cone pulleys are turned. Of course, with such an attachment as this, there is no danger of making drunken threads, for the hubs which start the threads are cut with a train of gears in an engine lathe, so that it is impossible for them to be incorrect. Moreover, a square thread, or a V-shaped thread can be made with them, which is not the case with common chasers.

In lathes that have traversing mandrels to cut screws, the tool itself remains stationary, but as this is obviously a disadvantage in many kinds of work, it is far better to have the tool advance and the mandrel revolve as usual. By this plan much time is saved, a greater range of work is possible with the same gear, and a piece that is chucked, or one that is between the centers can be cut with equal facility.

Any common lathe can be rigged to do this by putting a shell on the back end of the mandrel between the pulley and the set screw, and slipping the hub over the shell, with a feather, to keep it from turning. To take a thread from this hub, a round bar must be set parallel with the shears in easy working guides. The bar must have an arm at one end to reach over to the hub, said arm to be fitted with a piece of hard wood to match the thread on the hub. The other end of the bar has the cutting tool in it; of course at right angles, so as to run in to the work and bear on the tool rest. The tool is held in the bar by a set screw, so that it can be lengthened or shortened.

By this arrangement a true thread can be rapidly generated on any rod, hollow cylinder, or other kind of work—the pitch depending on the pitch of the hub.

It is necessary to have as many different hubs, varying in pitch as there are different kinds of work to be done, and although the thread on the hub is only an inch or half an inch long, perhaps, a screw of any length may be cut on a rod by simply shifting the cutter on the rest. This same bar is also useful for turning, as with a slide rest, for, by sliding it along gradually it acts in a measure like a fixed tool in a slide rest.

From these hints the amateur who takes a lathe in hand for the first time, or is at best a neophyte, may learn much to his advantage. Persons of a mechanical turn only need a hint, when the mind springs to the conclusion with surprising rapidity.

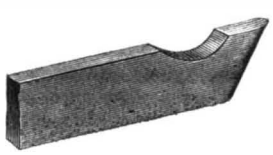


Fig. 19.

This little tool is very handy in many instances, particularly for running under the necks of screws when the thread is cut up to the head. By so making them the head comes fair down upon its bed and holds much better.

THE POTTERS' WHEEL.—In the archæological investigations in France, remains have been found of pottery so uneven and rude as to show clearly that it was made by hand without the aid of the potter's wheel; but in Egyptian tombs, which were built more than 2,000 years before the Christian era, there are paintings representing men at work with this ancient implement.

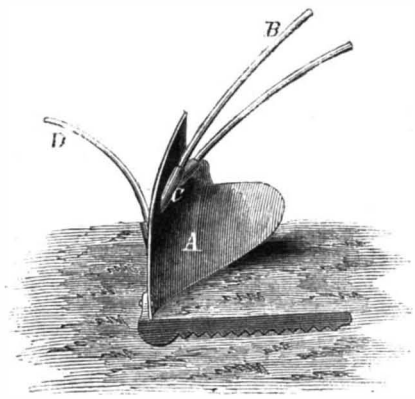
MARKET FOR THE MONTH.

The expected collapse in the great Chicago grain speculation has occurred, with the failure of many heavy operators. The price of cotton is, however, maintained, notwithstanding there is said to be a larger stock in this city and other markets, in bales and pounds, than ever before. Gold remains steady in spite of the continued inflation of our paper currency by the issue of notes to new National banks. The following table gives the prices of leading staples at the close of November and of December:—

	Price Dec. 27.	Price Nov. 29.
Coal (Anth.) ₩ 2,000 lb.	$13 00 @13 50	$13 00 @13 50
Coffee (Java) ₩ lb.	27 @ 28½	28 @ 29
Copper (Am. Ingot) ₩ lb.	41½@ 43	42 @ 45
Cotton (middling) ₩ lb.	51 @ 53	52 @ 54
Flour (State) ₩ bbl.	$7 20 @ 8 75	7 90 @ 9 00
Wheat ₩ bush.	2 25 @ 2 80	2 25 @ 2 85
Hay ₩ 100 lb.	75 @ 80	60 @ 65
Hemp (Am.drs'd) ₩ tun.	325 00@345 00	320 00@350 00
Hides (city slaughter) ₩ lb.	13	13
India-rubber ₩ lb.	43 @ 95	37½@ 90
Iron (American pig)	51 00 @52 00	50 00 @51 00
Iron (English and American refined bar)	110 00@115 00	125 00@130 00
Lead (Am.) ₩ 100 lb.	10 00	10 50
Nails ₩ 100 lb.	8 00 @ 8 25	8 00 @ 8 50
Petroleum (crude) ₩ gal.	40½ @ 41	40 @ 41
Beef (mess) ₩ bbl.	11 00 @24 00	11 00 @17 00
Saltpeter ₩ lb.	22	22
Spelter (plates)	10⅜@ 10¾	10⅜
Steel (Am. cast) ₩ lb.	13 @ 22	13 @ 22
Sugar (brown) ₩ lb	11½@ 17½	12 @ 17¼
Wool (American Saxony fleece) ₩ lb.	75 @ 77	75 @ 77
Zinc ₩ lb.	15 @ 15½	16
Gold	1 45¼	1 48½
Interest (loans on call)	6 @ 7	7

FRAILEY'S MOWING MACHINE ATTACHMENT.

This improvement in mowing machines consists mainly in the combination of adjustable rods and a curved dividing board. The dividing board, A, has the shape of the mold board of a plow, which aids



greatly in turning the grass inwards as it is cut, and assists the ordinary rods, B, in their office. These rods are made adjustable, however, in fixed sockets, C, in the manner shown, and held by a set screw.

In addition to these details, there is an outside rod, D, made adjustable in like manner; this performs the important office of turning back the overhanging grass from the swath cut by the machine and throwing it upon the standing grass, thereby bringing the stems open at the bottom, so that in going the next round the machine can again cut to its full capacity, instead of losing six or more inches or cutting the overhanging tops only, as is the case when the grass is heavy or tangled.

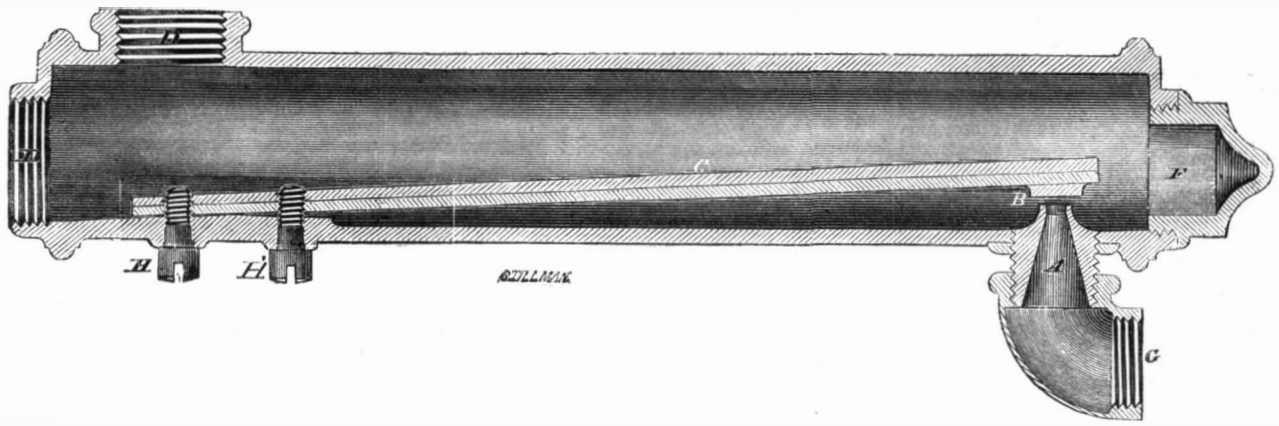
By the use of this track-clearer more work can be done, and done much better, in mowing grass, than without it. Experience and a fair trial, says the inventor, will secure its favorable reception every where as a desirable and useful improvement.

For particulars as to rights to sell or manufacture, apply to Frailey & Rohrer, Lancaster, P. O., Pa. Patented by H. L. Frailey, Dec. 5, 1865.

A PNEUMATIC DISPATCH IN BERLIN.—A pneumatic communication has just been set up between the Bourse and the central telegraph office at Berlin. Between the two there have been placed two parallel iron pipes 2,835 feet in length and 3½ inches in diameter. By one of them telegraphic dispatches deposited at the Bourse are carried to the central office, and by the other the reverse takes place in the space of from one minute to a minute and a half.

Improved Steam Trap.

The object of this invention is to remove air and condensed water from all kinds of steam apparatus, for which purpose it is claimed to be invaluable. This trap is self-acting, the valve remaining open for the escape of air and water as long as any remains, and closing, by a simple and beautiful device, on the approach of steam. The details are as follows:—D D are inlets, tapped to receive one-inch gas pipe; either may be used at pleasure; the one not used to be closed with a plug. A is a brass nipple or cone screwed into the body of the trap; the inner end is faced and forms the valve seat; the outside is screwed to receive the elbow, G, to which a pipe is connected to conduct the condensed water wherever desired. C is the spring, the upper leaf brass, and the lower steel; the two are closely riveted together. B, the valve, is a plate of common solder, raised on the under side of the steel leaf of the spring. H and H′ are screws for securing the spring and adjusting the valve to a proper hight above its seat.



WILSON'S STEAM TRAP.

The operation is as follows:—The air or condensed water enters through the inlet, D, from the steam pipe or apparatus, and readily escapes through the outlet, A. The steam follows, and its high temperature closes the valve, B, by means of the differential expansion of the two metals of which the spring is constructed. Thus: brass expands at a lower temperature and to a greater degree than steel; the upper leaf of the spring is brass—when the steam comes in contact with it, it raises its temperature and causes it to expand. Being secured at H and H′ by the screws, it can only expand in the direction of B; the steel leaf not being so sensitive, holds back against the expansion of the brass. The result of the opposite direction of these forces is to cause the valve end of the spring to describe a curve, until the the valve, B, is forced and firmly held on its seat, preventing the escape of any steam. Any condensed water afterwards collecting in the trap, cools and contracts the brass leaf, and opens the valve until the water has escaped, when the steam following at a higher temperature again closes it.

The seat of the spring from H to H′ is slightly rounded, enabling the valve end of the spring to be elevated or depressed, which is accomplished as follows:—By unscrewing H and screwing up H′ the valve, B, will be depressed, and by unscrewing H′ and screwing up H the valve will be raised. Where there is a large quantity of condensed water, or a very high pressure of steam used, the valve should be adjusted higher than when there is less condensation or less pressure of steam. The traps are all tested and adjusted, for any ordinary use, at the factory. They will very seldom require any re-adjusting. The cap, F, may be unscrewed for the purpose of removing any obstruction that may lodge in the chamber of the trap, or for taking the valve out for repairs, which may be made by any one who can use a soldering iron.

These traps have been in operation for six years, and have required no attention since they were put up. For further information address Greenwood Pipe Company, sole manufacturers for the United States, corner of Walnut and Canal streets, Cincinnati, Ohio, proprietors of the patent.

An object in motion will appear to be at rest when its motion in a second is to its distance as 1 is to 1,400.

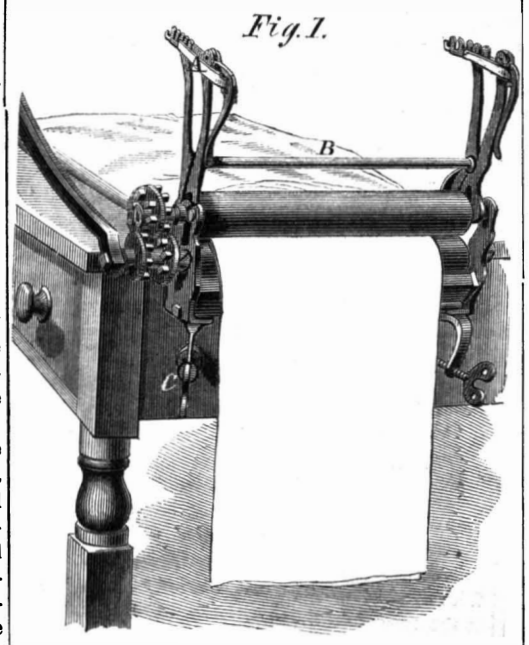
Tank Engines.

Tank engines will, no doubt, some day claim a page in history. The earliest steam carriages, however, carried their own water and fuel, and the first tramway and railway engines would have been equally independent of a "tender" but for the weakness of the trams and rails originally laid down, and over which it was therefore necessary to distribute the weight as much as possible. The *Novelty*, of 1829, was a tank engine; and so was Dr. Church's engine, the *Eclipse*, of 1837. An impression exists, however, that tank engines are of modern origin, and they have been widely attributed to Mr. W. Bridges Adams. He employed them, to some extent, where the whole weight did not exceed 10 tuns, but he publicly recorded his objections against their use for heavy trains. Tank engines came into extended use between 1847 and 1850 for branch traffic, and for service about stations, and there is reason for believing that they will be much more generally employed in future practice than they have yet been.—*Colborn's History of the Locomotive Engine.*

PALMER'S COMBINED WRINGER AND MANGLE.

During the last few years much progress has been made in lessening the labor and vexation of washing. Many good washing machines have been introduced, and the wringer is one of the most popular household utensils. But in the matter of ironing little advance has been made.

Fig. 1.



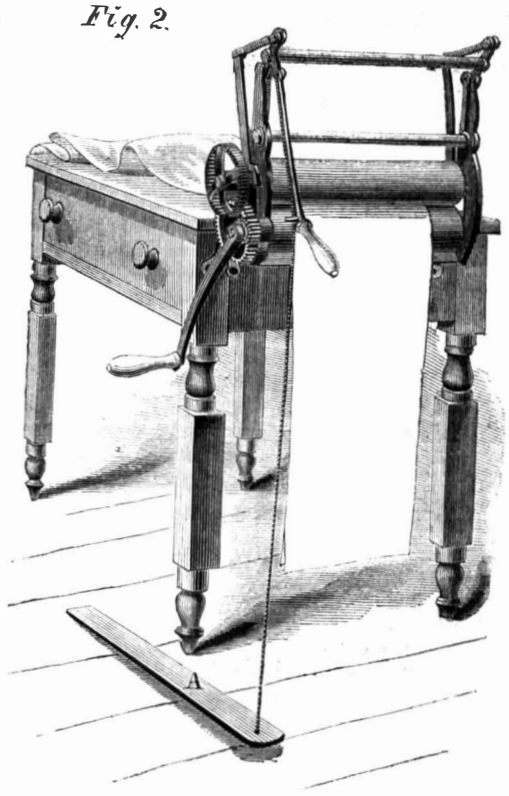
The machines shown in the engraving are very simple, and seem well designed for family use. Mangles, or machines for ironing without heat, or by pressure solely, are not new, but owing to their great cost, size and weight, their use has been confined to large hotels, laundries, etc., where they are considered indispensable. The economy of this method of ironing, both in time and fuel, is very considerable, as no heat is required, and the articles are ironed as quickly as they would be run through a wringing machine. The object of the inventors of these mangles is to place this method within the reach of all by furnishing effective machines occupying but little space at a low price.

Fig. 1 shows a machine which can be used either for wringing or ironing clothes. To this end it is provided with two sets of rolls—one of hard non-elastic rubber,, or wood for ironing, and one of soft rubber for wringing. The change is made in a moment by simply removing the bands, A, when the levers, B, are removed, and the rods can be taken out to put in. For ironing the machine is fastened to the ironing table by means of the removable clamps, C, Fig. 1. For wringing it is fastened to the tub or any similarly shaped vessel, by the swivel clamp.

Fig. 2 is a larger machine made to attach to any table for families, hotels, laundries, etc. The pressure is given through powerful compound levers, by placing the foot on the treadle.

These machines do the work in the most perfect manner, giving a brilliancy of luster and prominence of figure to table and towel linens not obtainable by the ordinary method. The hard rubber is perfectly

Fig. 2.



adapted to this purpose, and does away with the only serious obstacle to the general use of small sized mangles; wood dents and gets rough, while metal rolls cut the fabric or get rusty. These have the required hardness combined with the necessary elasticity. Application for a patent on this roll is now pending. Patented Nov. 14, 1864. For further information address the sole proprietors, S. W. Palmer & Co., Auburn, N. Y.

Varnishes for oil Paintings and Lithographs.—1. Dextrine 2 parts, alcohol 1 part, water 6 parts. 2. Varnish for drawings and lithographs—dextrine 2 parts, alcohol ½ part, water 2 parts. These should be prepared previously with two or three coats of thin starch or rice boiled and strained through a cloth.

Siphons were used in Egypt at least as early as 1450 B. C.

Correspondence

Fusible Alloys and Their Discovery.

MESSRS. EDITORS:—Having in my former communication given an account of the new "Fusible Metal," it may not be out of place, in the same connection, to say something about the discovery of this and other fusible alloys. But not to be considered as having written to meet a particular case, I will quote from an article published in January, 1863, in the *Dental Register of the West*—being one of a series of articles on "Metals and Alloys," communicated to that journal. As the *Register* is limited in circulation to the profession (chiefly in the Western States), the remarks quoted may be, to most of your readers, the same as though now first published. Speaking of bismuth, reference is made to its fusible combination, as follows:—

"As an ingredient in alloys, bismuth has long been pre-eminent among metals for its property of promoting fusibility. The most remarkable instance of this is afforded in certain combinations with lead and tin, distinguished as fusible metal; also called Newton's alloy, from the original discoverer; also Rose's, or Darcet's metal—the former having made a supposed improvement in the formula, and the latter having re-produced it in France for dental purposes. Newton's alloy consists of 3 parts of tin, 5 of lead, and 8 of bismuth; another formula is given of 2 parts of tin, 3 of lead, and 5 of bismuth; Rose's formula is, 1 part of tin, 1 of lead, and 2 of bismuth. It is remarkable that in nearly all of our scientific books, the melting point of Newton's allow is given as 212°, while Rose's is 202° or 200·75°, whereas there is scarcely any difference, either in fusibility or other qualities, both melting at about 200°. To close tests the order of fusibility stands as follows:—*First*, the mixture of 2 parts of tin, 3 of lead, 5 of bismuth; *second*, 1 of tin, 1 of lead, 2 of bismuth; *third*, 3 parts of tin, 5 of lead, 8 of bismuth—there not being more than one or two degrees difference between the first and last. To the thermometer inserted in the melted mass they were all perfectly fluid at 200°, and perfectly congealed at 198°.

"Newton's alloy is adduced in all the chemical text books to illustrate the effect of combination in promoting fluidity, and the property of bismuth as a fluidifying agent. Although different formulas are given of this alloy (3 parts of tin, 5 of lead, 8 of bismuth; 2 of tin, 3 of lead, 5 of bismuth; 1 of tin, 1 of lead, 2 of bismuth, etc.), they are all substantially the same in properties, melting at a similar temperature, being fluid at about 200° Fahrenheit, when the bulb of the thermometer is immersed in the melted metal, and if tested in water, varying from 205° to 208°. Heating in water does not, according to my experience, indicate as low a melting point, nor as uniform results, in the case of these or of other fusible alloys, as when the other mode is adopted. [For remarks on "Determining the Melting Point of Metals," see *Journal of the Franklin Institute*, vol. XLIII., page 61; also copied in the *Dental Cosmos* for February, 1862.]

"This combination afforded the most fusible alloy known until quite recently. Of course the addition of mercury, itself fluid at 39° below zero, lowers its melting point in proportion to the quantity added, by simply communicating its own fluidity to the mixture, but without imparting any new property, forming not an alloy proper, but an *amalgam*.

"But within the past four or five years, three distinct alloys have been added to the list, one being but slightly less fusible than that, and two much exceeding it in this property; the discovery of all of which happened to fall to the writer of this paper.

"The first discovered (June, 1858,) consists of the three metals—bismuth, tin, and cadmium. The most fusible proportions of this alloy appears to be three parts of bismuth, one of tin, and one of cadmium, although a little increase of either of the two last named metals does not alter the result. It is fluid around the bulb of the thermometer at about 210°, and congeals between 200° and 204°. Tested in hot water a higher melting point is indicated.

"The next (discovered same date) consists of the four metals—bismuth, tin, lead, and cadmium—forming the most fusible alloy we have, which is well enough known, having been repeatedly referred to in the scientific journals. [This is the alloy spoken of in our former communication, which see for proportions, etc.] It is fluid at 150°, and congeals at the same degree. Melted in water, it fuses between 150° and 160°, and is hard at 150°. Professor Silliman gives its melting point at about 158°; but Lipowitz puts it as low as 140°. Perhaps my own measurement expresses it as nearly as any, being about the mean between the two, and the result of carefully-repeated tests.

"The last consists of the three metals—bismuth, lead, and cadmium. In October, 1858, I noted that two parts of bismuth, one of lead, and one of cadmium, melt at a heat so low as to soften (without becoming fluid) in boiling water; and again (April, 1859), that four parts of bismuth, two of lead, and one of cadmium become fluid at the same heat; but, although noting the fact for further inquiry, neglected to follow it up at the time, and it finally slipped my memory until November, 1861, when, on contrasting the two notes, I resolved to trace up the ultimate results, which proved the most fusible combination of these metals to consist of seven parts of bismuth, six of lead, and one of cadmium, forming an alloy fusible at 180°, or, in water, a few degrees higher, being the most fusible alloy known that consists of but three metals—a most remarkable result, considering the small proportion of cadmium employed, and the high melting point indicated by the mean of the constituents."

B. WOOD.

The Power Required to Drive Machinery.

MESSRS EDITORS:—To answer this question depends upon so many conditions that it seems doubtful if a satisfactory reply can be given; not because a certain amount of labor does not require a definite amount of power to perform it; but in which it is to be performed, the quality of the work produced, and the particular kind of tool used, all have a bearing on the result.

The speed with which machines are capable of performing labor sometimes, is limited by the machine itself—as is the case with sash and muley saws, common millstones, and others. Circular saws and some other machines are almost without limit, except in the amount of power employed.

In operating circular saws and grist mills, I have made it a special point to ascertain accurately, by means of a dynamometer, the power consumed by each machine performing in its daily labor

I will give my experience with circular saws. These were three in number, one 54, one 39, and one 16 inches diameter. They were tried under similar conditions, as regards kind of timber sawed, etc. The power required to drive the points of the teeth through the timber, alone, was considered—that accumulated in the motion of machinery or momemtum, was carefully excluded, as was also all friction except that in the bearings of the saw shafts. The 54 and 39-inch saws were each run 300 revolutions per minute; each had 20 teeth, as had also the 16-inch saw; all three had the same feed or forward cut—$\frac{1}{16}$ of an inch, and, of course, advanced $1\frac{1}{4}$ inches each revolution.

With the 39-inch saw, to cut a board 6 inches wide at the rate of 32 feet in length per minute, required 12 horse-power. To cut a board one foot wide at the same rate, 32 horse-power was required. With the 54-inch saw, to cut a board one foot wide at the rate of 32 feet per minute, required but 25 horse-power. This saw being larger had an advantage of allowing each tooth to cut nearer its proper distance forward than the other; and it also should be observed that while it had scarcely two teeth cutting at once, the other had three.

This illustrates a very important point in the operation of saws generally, viz., it requires little, if any, more power to drive a saw tooth, cutting forward $\frac{1}{16}$ of an inch, than it does to cut forward less, or even one-half that distance; especially is this true in sawing pine, or other straight-grained and soft wood. In sawing hard wood a less forward cut is necessary; not that it is any saving in power while the saw is running in straight-grained wood, but in order to make a clear cut in cross-grain knots, etc., because here the sides of the teeth are to cut as well as the points.

Saws with a great many teeth are sometimes used, running at a high speed, being more like a filing or rasping operation than sawing—an advantage to file makers, perhaps, but a great loss in producing lumber. The only advantage ever assigned for this worse than foolish method, is, that thus a saw is not apt to run out of line; but a properly dressed saw does not run out of line, will last a great deal longer, do more work, and save files and filing.

The other, a 16-inch lath saw, making 3,000 revolutions per minute, required twelve horse-power when sawing pine lath as fast as two men could handle them.

To deduce a rule from which the number of feet of lumber—board measure—may be sawed per minute, we must, according to these results, consider the thickness of the saw kerf, and, also, whether each tooth is at all times cutting its proper distance forward.

The 54-inch saw, making a kerf $\frac{1}{4}$ of inch wide and sawing boards one foot in width, required one horse-power to saw 1·30 feet per minute.

The 39-inch saw, kerf $\frac{7}{32}$ sawing the same width of boards, required one horse-power to saw one foot per minute. The same sawing a board six inches wide, required one horse-power to saw 1·33 feet per minute.

In these results there is no great variation, except in the advantage of the smaller saw cutting the wider board, but when we come to consider the lath saw making $\frac{1}{8}$ of an inch kerf, the difference is great. This saw required but one horse-power to saw 2·66 feet per minute.

A correspondent asks the power required to drive the different sizes of circular saws; but the size of saws has nothing to do with the power required; that is determined alone by the width of boards to be sawed. I can only say, that in sawing pine logs, generally, one-horse power will be sufficient to make one foot of inch boards per minute. This leaves the momentum of the fly wheel, etc., out of the question. The advantage to be gained by the use of fly and other heavy wheels, in driving circular saws, is great. A 24 horse-power, with this aid, will, generally speaking, saw as much lumber in twelve hours, as a 48 horse-power would do in the same time, without it. Of course, not that there is any power in a fly wheel, except that accumulated while the saw is not cutting, as in backing the carriage, etc. This generally amounts to more than the cutting time, and, hence, double the work can be done.

The speed at which the teeth of a circular saw is to saw, generally determines the power to be applied, and practice seems to require that this shall not be less than about 50 feet per second. The angle formed by the points of the teeth, their pitch, manner in which they are upset, set, and filed, all are important—and should be carefully considered by any one who would excel in using these most efficient lumber-producing machines.

J. B. REYMAN.

Stockton, Minn., Dec. 5, 1865.

An Apprentice Seeks Information about His Trade.

MESSRS. EDITORS:—Having been a constant reader of your very valuable paper for upward of twelve years, I find that it contains valuable information for all classes; rich and poor, high and low, can find something new every week, yet I think there is one class that get the least, and that is the painters. Can not some of your correspondents post us up a little now? I would like to know how lead and zinc are made, etc. My boss is a gruff kind of a man and don't like to answer questions. What is the best way to mix oil graining? APPRENTICE.

Cranston, R. I., Dec. 5, 1865.

[An apprentice who has "a gruff boss who dislikes to answer questions," is certainly in a bad way to learn anything. Will some of our readers answer this inquiring mind.—EDS.

To Makers of Lathes.

MESSRS. EDITORS:—Can you inform me where such "American Foot Lathes" are to be obtained? Nothing of the kind worth having is to be obtained in this neighborhood for any reasonable price. Our

machinists and tool shops do not keep them, and will not get one up without the purchaser will pay for the patterns. At least such was the case two years ago, when I tried in vain to obtain one.

C. H. T.

Boston, Dec. 17, 1865.

Filthy Water Supplied to Cities.

MESSRS. EDITORS:—The Schuylkill river supplies the city of Philadelphia with nearly all the water for all domestic purposes. It takes its rise in the coal regions, in Schuylkill County, about one hundred miles from Philadelphia. All the water from the coal and other mines in that region, are either directly or indirectly emptied into the waters of this small river, which, at some seasons, has not much more capacity than to supply the city with water. The waters from these mines are all more or less acid, some so much so as to destroy the iron machinery used in working them. There are several cities and towns of considerable size and many manufactories of various kinds, some close to the city, the filth and refuse of chemicals of which are washed into this river. I ask, do these acids from the mines, the filth from the cities, towns, manufactories and chemical laboratories, that are washed into this river, impregnate the water, and will not the increase of those washings by and by make the water unhealthy? Do these acids, chemicals, and washings mix with the water, or do they leave and the water become pure before it reaches the basin for domestic use? I think this is a very important matter for the city of Philadelphia, as it depends mainly upon this source for its water. Whether it has ever been thoroughly investigated or not, I do not know. Without making any claim to a scientific knowledge, I do believe that these substances do impregnate and remain in the water, but to what extent I have no idea. That a vast amount of unhealthy matter is washed into this river there is no question; it may be so small, at present, compared with the body of water, as to be imperceptible, the same as it would be if a small portion of poison was put into a hogshead of water—the poison would be there, notwithstanding it would be so diffused that it would be comparatively harmless. What becomes of the deleterious matters? Does the water neutralize them so as to remove their unhealthy properties?

I think our public would like to see the views of some of your scientific correspondents published in your paper upon this important subject. FANNY.

Philadelphia, Dec. 15, 1865.

[Whether the filth and poison in the Schuylkill water is injurious to health, depends entirely on the quantity. If our fair correspondent is so fastidious that she is willing to take the trouble, she may obtain pure water by distilling, filtering and aerating. Get a simple still to set on a cooking stove, and distill all the water intended for drinking, then filter it through freshly-burned charcoal to remove the volatile odors that come over, and finally agitate it in the atmosphere so that it may reabsorb its supply of air to make it sparkling and palatable. A simpler process for obtaining pure water is to melt ice. This process is employed by some of the most eminent physicians in this city for their own families, to avoid the danger of lead poison from their water pipes.—EDS.

Heating Feed for Low-pressure Boilers.

MESSRS. EDITORS:—I want to heat to the boiling point, if possible, the boiler feed of a large low-pressure boiler. The usual method, *i. e.*, taking it from the hot well, is not sufficient; nor can the exhaust, before entering the condenser, be conveniently used. I have thought of passing the feed pipe through one of the main flues or close to the crown sheet, and only the length of the fire-box. Of course the check valve would be changed, so that the pipe should remain full. This plan has been tried on Lake Erie, I think, with what results I do not know. The arrangement would, I think, be safe enough while a current of water was moving through the pipe, but with the pump at rest and the pipe exposed to heat, would it be safe? SUBSCRIBER.

Dec. 12, 1865.

[A pipe carried in the manner suggested by our correspondent is obviously in danger from being burnt so soon as water ceases passing through. Pumps often stop working, when the pipe would get red hot in a short time. A better way would be to put a coil of pipe across the flues in the smoke box, so that the heat would act upon it without danger of burning it.—EDS.

Gun Cotton.

MESSRS. EDITORS:—Among the earliest objections urged against the use of gun cotton was its liability to decomposition. M. Blondeau, in a recent communication to the French Academy of Sciences, recommends a compound of gun cotton and ammonia as "being more stable and less liable to spontaneous decomposition than gun cotton." He proposes the new name of "pyroxilic acid" for "pyroxiline," the present name of gun cotton. I have, at various times, prepared large quantities of gun cotton, and have never witnessed this liability to decomposition, and am inclined to think that, if properly prepared, using pure and concentrated acids, and very careful and thorough washing, it is a stable compound below 200° Fah. It is possible that, when prepared in very large masses, its formation is not so perfect or uniform throughout the mass, and the washing process may not extend to every fiber.

I send inclosed a small sample of gun cotton prepared by myself nearly twenty years since, soon after the announcement of Schonbein's discovery. You will find it on trial to be as good as new, although it has been exposed to all the vicissitudes of this climate during this long period, and for several years of this time in a very damp situation. It is a part of several pounds which I prepared for Capt. Mordecai, with which to test its comparative merits with gunpowder at the U. S. Arsenal. It will be remembered that he reported against its use in the Government service on account of its greater explosiveness, three or four superposed charges bursting muskets of the best quality. As this condition of charges cannot occur in breech-loaders this objection cannot apply, and with all the advantages possessed by this substance over gunpowder, it is to be hoped that it may receive further attention from the Government, and also from manufacturers for sporting purposes, since breech-loaders are now so much in vogue.

CHAS. G. PAGE.

Washington, D. C., Dec. 21, 1865.

A Question in Relation to Water Wheels.

MESSRS. EDITORS:—I wish your opinion respecting a proposed change in the construction of a horizontal water wheel. I find, according to the "Mechanic's Text Book," pp. 84, 85, that "water is subjected to the same laws of gravity as those of solid bodies, and thereby accumulates velocity or effect in an equal ratio when falling through an equal space, or descending from an equal hight—that its greatest effect is obtained when acting by gravity throughout its whole hight."

If the above be admitted, it seems that there is a loss in the affective power due the falling column of water, from its describing an arc, from 3 o'clock of the circle to 6 o'clock, instead of falling in a perpendicular right line from 3 o'clock until it reached or intersected a parallel line from 6 o'clock. For it seems that the effective power due to a bucket at 3 o'clock is proportionately less at 4, and still less at 5, and nothing at 6, if any remained in at this point of the circle.

Now, if I am correct in the above, it seems to me that I can construct or arrange buckets in or on a wheel, so as to fall vertically from a point level with the axis instead sweeping round the arc.

But do you think it worth the doing, so that it would pay well, and be patentable? A. W. L.

North Adams, Berkshire Co., Mass., Dec. 4, 1865.

[Nothing whatever would be gained by this change. The water exerts precisely the same effect in falling around the arc that it would in descending vertically.—EDS.

A Suggestion to Astronomers.

MESSRS. EDITORS:—A recent article in your valuable paper, in relation to tables for cutting screw threads on geared lathes, suggested the possibility of an astronomical calculation, by means of a series of cogged gearing, properly constructed, which should automatically indicate eclipses, transits, conjunctions, appositions and all regular motions of the planetary system with mathematical exactness, thus saving the trouble of "brain-work" in such matters, other than reading the register and taking notes. I think such an apparatus might be found quite useful in practice, and would be better, every way, for such purposes, than even the best known planetarium, besides costing far less. W. L. D.

Louisville, Ky., Dec. 4, 1865.

Solvent for Shellac.

MESSRS. EDITORS:—One of your correspondents asks if you can inform him of a solvent for shellac, and you replied, that "alcohol was the only menstruum that completely dissolves it," or some such answer. I have not the paper before me, and cannot give the exact words. It may be of some benefit to him to know that a saturated solution of borax will completely dissolve it. J. T. R.

Advantages of Advertising.

Mr. Seymour, P. M., at Hudson, St. Croix County, Wis., in sending a club of subscribers for the coming year, writes as follows:—

"Below please find list of subscribers for SCIENTIFIC AMERICAN, which I have succeeded in getting up for you. I had hard work in raising them, but thought it a shame that but one copy was taken among sixty old mechanics, and that copy my own, who am not a mechanic. I cannot do without it. Many say they cannot afford to take it.

"I saw in it the advertisement of Waits' jonval turbine. Never had heard of it before, but wrote to Mr. Wait once or twice, and got a wheel. It is the best I ever saw, and does more work than he warranted it to. I save 54 inches of water by it over my old wheel—worth to me say $200 per year, or more than the price of the wheel. So much for advertising in the right paper."

NEW AND VALUABLE SCIENTIFIC WORKS.

We have received from Mr. John Wiley, No. 535 Broadway, New York, two most valuable scientific works which he is now issuing. These works are, "Rankine's Ship-building," theoretical and practical, and "A Treatise on the Screw Propeller, Screw Vessels, and Screw Engines, as Adapted for Peace and War," by John Bourne.

Both of these works are issued in monthly parts, the first at $1 25 per number, the second at 2s. 6d. English money. They are profusely illustrated with plates which are, in fact, working drawings, so clearly are all the parts and details given. In the work on screw propellers, the author begins at the earliest attempts, and leads the student on to the latest achievements and best practice of modern builders.

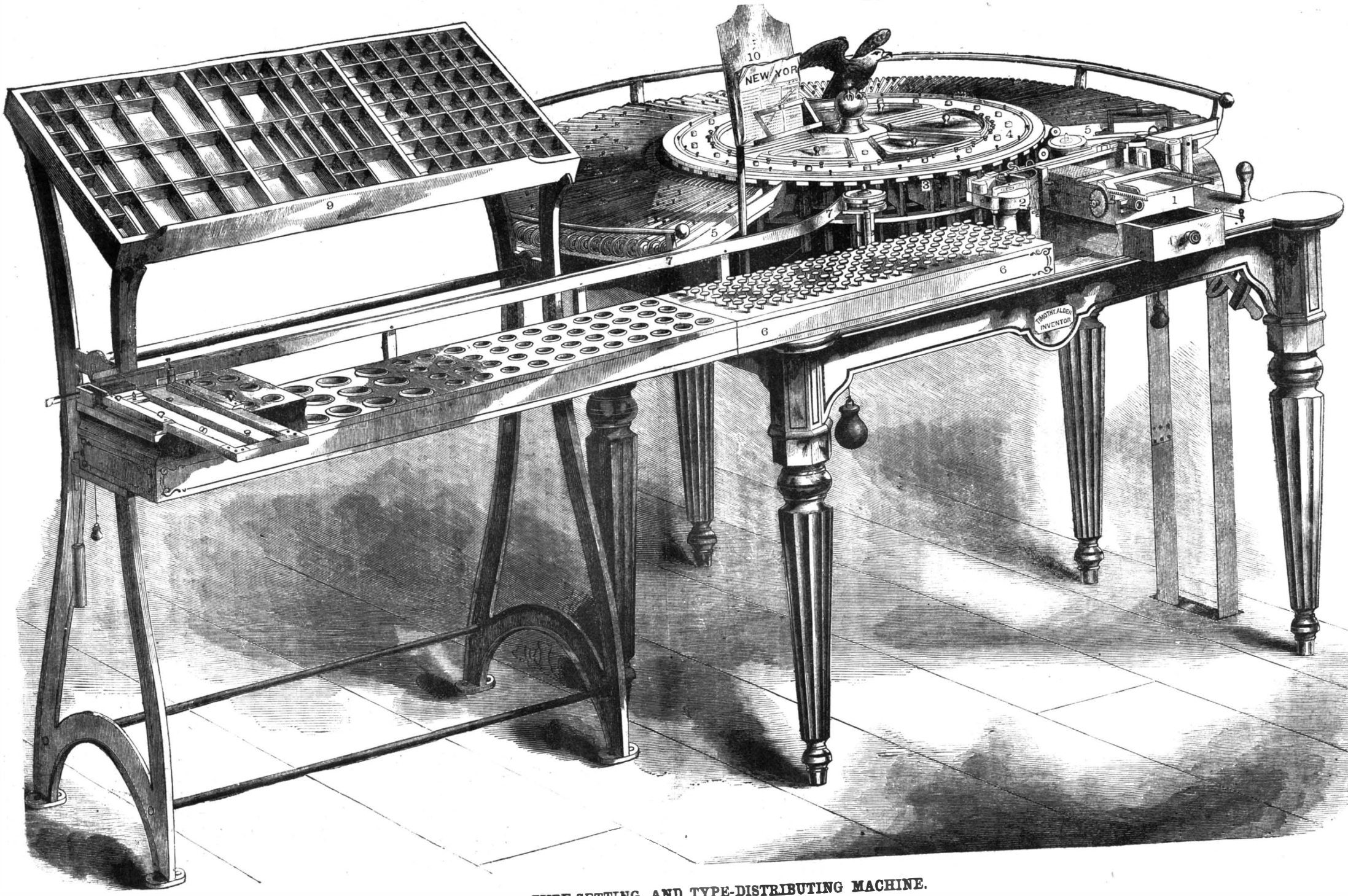
Part I. contains, in addition to the text, a large double-plate page of the engines and hull of the *Great Eastern*, exhibiting the builder's lines, coal stowage, and general arrangement of the interior.

The work will be completed in twenty-four numbers. Every reader of the SCIENTIFIC AMERICAN interested in steam machinery should subscribe.

The work on ship-building is contributed to by the most celebrated English ship-builders, Prof. Rankine of the Glasgow University being the corresponding editor. The hydraulics of ship-building, strength of materials, masts, sails and rigging, the geometry of ship-building; practical ship-building, and marine steam engineering—are all to be treated on in the progress of the work. The mere citation of the contents and the name of the presiding editor, Prof. Rankine, are sufficient guarantees of the invaluable character of the work.

LEADEN pipes were used by Archimedes to distribute water by engines in the large ship built for Hiero. The first improvement on the ancient mode of making leaden pipes was matured in England in 1539. It consisted in casting them complete in short lengths, in molds placed in a perpendicular position. After a number were cast, they were united in a separate mold by poring hot metal over the ends until they ran together.

IN 1678 engines were constructed by Hautefeuille and Huyghens, which derived their motion from the explosion of small charges of gunpowder within their cylinders. In the same year Hautefeuille proposed the alternate evolution and condensation of the vapor of alcohol in such a manner that none should be wasted.



ALDEN'S TYPE-SETTING AND TYPE-DISTRIBUTING MACHINE.

THE

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MUNN & COMPANY, Editors & Proprietors.

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Contents:

(Illustrations are indicated by an asterisk.)

THE ALDEN MACHINE.

On the opposite page we publish an illustration which very faithfully represents the Alden type-setting and type-distributing machine—an invention from which our facilities for the diffusion of intelligence and education must take a new point of departure—its completion forming, in the estimation of its proprietor, an era in literature only second to the original discovery of printing by type. This machine enables a single hand to do—and the hand may be that either of man or woman—all the type-setting work for which, at present, eight ordinary compositors would be required; while, in the matter of distributing type, the machine is all but an automaton, requiring only the very slightest supervision of human agency, and so perfect in mechanism as to prevent physical impossibilities against the occurrence of any mistake. It has now triumphantly stood the severest test of practical experiment in the *Tribune* office, in this city—the judges certainly not being prejudiced in its favor, if not absolutely hostile; and the result is so complete a triumph, that so soon as the requisite number of machines can be supplied, it is supposed, all the "great dailies" of this city will be set up by the Alden machine, and, of course, the minor and country press will follow suit as rapidly as possible. It has been carefully examined by the leading mechanical and other progressive minds of the age, and is pronounced a most marvelous triumph of human ingenuity. Mr. Theodore Tilton, in the *Independent*, pronouncing it "the eighth wonder of the world;" and Col. Halpine, in the *Citizen*, declaring, in regard to its automatical power of distributing type, that "the fingers of steel and brass would seem to have not only eyes in their busy tips with which to read the letters, but brains to comprehend their spelling and meaning, and to direct their re-distribution, when used, into their proper places."

The original discoverer or inventor of this machine was Timothy Alden, a young printer of Massachusetts, who gave his life in devotion to the discovery, and died before accomplishing its completion for practical use. The machine was bequeathed by him to his cousin, Henry W. Alden, who expended a large amount of money upon it without attaining any satisfactory or practical result. It was, in fact, a "slough of despond, in which all capital embarked was swallowed up without return, until, finally, it fell under the eyes of Mr. Charles C. Yeaton, of Brooklyn, who, commanding the confidence of such gentlemen of intelligence, public spirit, and capital as Josiah O. Low, Augustus C. Richards, Charles F. Livermore, and various others, organized a company for its further development and completion. By the faith and resources of these men, acting through the industry and talent of Mr. Yeaton, and an able corps of assistants and mechanics, the imperfect and inoperative discovery of Timothy Alden—valuable as a curiosity, but in no other light—has now been carried forward to a splendid success as a great triumph of the labor-saving machinery of the age; and already the present company is about being merged into another—combining the American and foreign patents—with a capital of three million dollars, to start a factory that will be commensurate to supply five perfect machines *per diem*.

The discovery is already protected by patents in all European countries, obtained through the Scientific American Patent Agency, and the Alden machine will, perhaps, soon be accepted abroad as one of the last and highest triumphs of that "Yankee ingenuity," whose benefits the world has already to acknowledge in connection with the names of Morse and Fulton.

To give any detailed account of the *modus operandi* of a machine so intricate and yet so simple in its action, would be not merely an impossible, but an absurd attempt, in such limits as are at our disposal. It must be not only seen, but thoroughly studied, to enable a[illegible]e to appreciate its rare mechanical excellence, [illegible] talent displayed by its creators in conquering [illegible]ccessive difficulties. Fortunately this opportun[illegible]s now furnished to any to whom the *Tribune* office is accessible, and will soon be furnished to all who have access to any newspaper or other printing office; for, unless we are mistaken, the day is not far distant when the only limit to the general adoption of these great engines of labor-saving and economy, will be the capacity of the factory to meet the demands of the public. They have had to fight their way up against embattled lines of [illegible] who declared "the thing impossible;" but they have finally conquered and overborne all opposition by the practical test of their working, and we congratulate not merely the Company, but the whole reading public, on the assurance of their success, now established beyond any question.

THE PARIS EXHIBITION.

By an advertisement on another page it will be seen that the time for making application for space at the great Paris international exhibition of 1867, has been extended to the 20th of the present month, January, 1866. Applications must be made to the agent, J. C. Derby, Esq., whose office is at No. 40 Park Row, in this city. Mr. Derby will furnish blank forms for the applications, with full instructions, to any person who will write to him for them and will inclose a postage stamp for his reply.

Professor Joy stated at the last meeting of the Polytechnic Association that, on his recent visit to Paris, it seemed to him as if the whole city was being pulled down in making preparations for the great exhibition. One company has purchased a tract of two miles in length right in the heart of the city, and is pulling down all the buildings to make room for others better adapted for one of the collateral speculations connected with the exhibition. One feature is to be a representation of the indsutry of all nations in practical operation by the natives of the several countries. If this scheme is carried out as proposed, there will be seen in the middle of Paris, Laplanders making fishing tackle; Ural Tartars employed in the preparation of skins and carpets; the Kabyles of Algeria making the glazed pottery of Bjerdjera, carvings in the wood of the fig tree, ornaments in silver and coral, and carpets of Oran and other districts; natives of Morocco weaving silk, cotton and woolen fabrics, making fez caps, saddles, and arms, and preparing shagreen; negroes of Soudan producing cotton cloth, morocco work and pottery; the half *petit blancs*, of the Isle of Bourbon, making sacks for sugar and coffee; Anatolians weaving Smyrna carpets, silks and cloth of gold; Syrians fabricating tissues and arms of Damascus and Aleppo, mother of pearl work of Bethlehem, and gold work of Beyrout; Persians at work on Kurdistan carpets, silk embroidery, Kirman shawls, silks and cottons of Yerd, enameled tiles, and damascened arms; Indians weaving muslins, embroidering cashmeres, engraving ivory and wood, and twisting threads of gold into bracelets and other ornaments; Cambogians fabricating boxes and toys from sandalwood; Siamese carving rhinoceros horn; and, perhaps, Chinamen carving a nest of ivory balls; Japanese painting their incomparable lacquer wares; Mexicans turning their perfumed pottery; and redskins composing head-dresses of feathers and bead-embroidered moccasins.

FILE-CUTTING MACHINERY.

Although many attempts to cut files by machinery have been made, few have been successful. Those that have, however, are, in the hands of competent business men, making immense fortunes for their owners and stockholders. The consumption of files in this country is very great. Besides those imported, millions of dollars' worth are made both by hand and by machine, so that there is a fair field for inventors and capitalists to divide the profits. The Whipple File Company, of Providence, R. I., is said to divide from fifty to eighty per cent among its stockholders; and another concern, the Russell File Company, by a secret process, recuts old files at a rapid rate, and has, we learn, been successful in a financial point of view. We have never seen a recut file that, in our opinion, was worth the price paid for doing it. Ordinarily recut files are thinner, inferior in temper, and generally much poorer in quality than new files. It is possible, however, that the files recut by the company alluded to are entirely free from these objections.

It is clear, at all events, that files can be manufactured by machinery, and that a great market for them exists which can be profitably supplied by more than one company.

Any workman that knows how to use a file will make it last a week, but many destroy them in far less time, so that, with the immense iron works of this country, the marine steam engine and locomotive shops, the tool works and hundreds of minor industries, it is easy to see that tuns upon tuns of them must be needed.

We know of several file-cutting machines, models of which are now in this office and at Washington. One of them, we are certain, is destined to work a great change in the cost and time of producing files.

CONCENTRATED BEEF.

After many years of persevering effort, and the expenditure of many thousand dollars, Mr. Gail Borden has at last succeeded in producing an extract of beef that is not only nourishing but palatable. We have before us a specimen of this extract; it closely resembles a piece of erasing india-rubber. This specimen is about 2½ inches in length, 1½ inches in width, and ¾ths of an inch in thickness, and it weighs 4 oz.; the price of it at retail is 75 cents—equal to $3 per pound. At the present cost of production the article is expected to come into use only for making beef tea for invalids; but after a market is opened, establishments for its preparation will be erected in Texas and other cattle-grazing localities, where beef is cheap, and it will probably be brought into general use for making soups, etc.

At the present time there is only one establish ment in operation, that is at Elgin, Illinois, 42 miles N. W. from Chicago. Beeves, fresh from the pastures and stalls, are killed, the meat is macerated in boiling water, care being taken to avoid ebullition which would carry off some of the most savory and nutritient elements; the extract is then concentrated in a vacuum pan to a very thick jelley; and the drying is completed by a process that, for the present, is kept secret.

The perfect extract is rolled and cut into the form described, and wrapped in paper that has been saturated with paraffine. Paraffine being tasteless and inodorous, exerting no chemical action, and being impervious to air and moisture, is an admirable substance for this purpose, and may be profitably em-

ployed for a great variety of manufactures, where it is desirable to keep the product from the atmosphere.

The establishment at Elgin is capable of reducing the carcasses of eight beeves per day; from 100 lbs. of meat 4½ lbs. of extract are obtained. Mr. Borden claims to get all the albumen, and everything but the fiber. He says that farmers who have given the substance remaining to their hogs, affirm that the swine refuse to eat it, and that it is worthless for purposes of food for any animal. The gelatin is not included in the extract; it is well known that that substance is all eliminated by the kidneys without imparting nutriment to the system.

We have tried Mr. Borden's extract, and find that it makes a palatable and nutritious beef tea. It is recommended by the Boston *Medical and Surgical Journal*, and other medical authorities of the highest respectability, for the use of invalids.

MAKING CRUCIBLES IN MOLDS.

In a visit to the plumbago crucible manufactory of J. H. Gautier & Co., of Jersey City, N. J., we learned that an entire revolution has recently been made in the process of fashioning the crucible. They were formerly all made by hand, on that ancient implement, the potter's wheel, but the substitution of steam for hand power, in its irresistible progress, has invaded even this most conservative portion of the arts. The wheel is still used, but it is driven by machinery, and the crucible is formed in a mold instead of being fashioned wholly by the hand of the workman, as heretofore.

In the old process, the black lead, after being assorted, ground, mixed with its proper proportion of clay and water, and kneaded for a long time by hand to beat out any bubbles of air which it might inclose, was divided into lumps of a suitable size each for a crucible. The "thrower" seized one of these lumps, and dashed it down upon the center of his wheel, which was a disk of cast iron, about fifteen inches in diameter, driven by a treadle working horizontally. As the lump revolved, the workman with his wet hands drew it up in a rude conical form, and then pressing one hand down the center of the mass, he brought it into the shape of an irregular hollow cylinder. Keeping his hands constantly wet, and continuing his manipulations with great dexterity, he soon brought the crucible to the desired shape in all particulars. The only guides to the eye of the workman in this operation, were two wires projecting horizontally at different hights from a vertical standard, and by so making the vessel that its exterior surface would be very near the ends of these wires, the desired form and size were obtained.

The improvement consists in the use of a plaster mold, the interior of which is of the proper form for the exterior of the crucible. This mold is set upon the center of the wheel, which rotates much more rapidly than wheels driven by the foot, the lump of plumbago is dropped into it, and is partly driven out from the center by centrifugal force against the sides of the mold. A bent lever, which has the exterior edge of its vertical arm cut to the form desired for the interior surface of the crucible, is now turned down so as to bring this arm into the mold, when the fashioning of the crucible is quickly completed.

The mold, with the crucible in it, is then set aside to dry, and when the drying is completed the crucibles are packed in the kiln to bake—each one being set in a rough earthenware segger to protect it from the dust of the furnace.

Though crucibles made by the improved process answer perfectly well for melting steel or brass by anthracite fires, they do not prove durable when exposed to coke fires. Consequently, crucibles for the steel makers of Pittsburgh must still be fashioned by hand, and Messrs. J. H. Gautier & Co. continue to make them in the old way for the Pittsburgh market,

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DEEP GOLD-COLORED LACKER.—Seed-lac three ounces turmeric one ounce, dragon's blood one-fourth ounce, alcohol one pint; digest for a week, frequently shaking, decant and filter.

Lackers are used upon polished metals to impart the appearance of gold. If yellow is required, use turmeric, aloes, saffron, or gamboge; for red, use annotto, or dragon's blood, to color. Turmeric, gamboge, and dragon's blood, generally afford a sufficient range of colors.

BROMIDE OF POTASSIUM.

Considerable stir has lately been occasioned among the photographers in this vicinity, in consequence of the visits among them of the assignee's agent of Cutting's "Bromide" patent, who has made profitable collections of money as damages for past and future use.

The patent in question was granted to James A. Cutting, of Boston, Mass., July 11, 1854, and contains the following claim:—"The employment of bromide of potassium in combination with collodion." No suggestion or allusion is contained in the patent to the use of free bromine, or any salt or extract thereof, except bromide of potassium.

The original application for the patent was rejected. The applicant then asserted that he could prove the use of a bromide basis in collodion in the month of April, 1853. The Patent Office replied, citing references conclusively showing the use of bromine long anterior to that date. Among the salts thus used was bromide of ammonium. A patent was finally granted to Mr. Cutting, with a claim to the use of bromide of potassium in collodion, as quoted, and those who use that salt appear to be infringers; but the use of any other salt or form of bromine in collodion, is free to the public.

The effect of bromide of potassium in collodion is to increase its sensitiveness, and thus to render photographic pictures more brilliant in their details of light and shadow.

This salt also possesses peculiar medicinal qualities. It has a sedative and soothing effect upon the perceptive faculties, produces good humor, and brings on sleep. The assignee of the patent seems to have understood this use of the drug; for the leading photographic dealers have complacently joined in a certificate to the validity of the patent, have good naturedly paid over large sums for its use, and the patent is considered good for the collection of a million more. We congratulate all the parties concerned. We like to see patents well sustained and liberally paid for.

We have had frequent occasion to notice the great value of some small inventions, and in the above we have another example. Truly, it was a lucky thought of Mr. Cutting's to drop 2½ grains of the bromide into an ounce of collodion.

ON the 28th of October, 1808, there was submitted to the Emperor Napolean by General Clark, Minister of War, the quixotic plan of a person named L'Homond, designated as "ex-chief of the battalion of aeronauts," for making a descent on England by means of one hundred balloons of one hundred meters diameter each, the car of which could contain one thousand men with provisions for ten days, two peices of cannon with their amunition chests, twenty-five horses, and fuel for the balloons. The Emperor wrote a few words on the margin, ordering the plan to M. Monge, the celebrated mathematician, "to see if it were worth while to make so great an experiment."

WERE it not for the friction and the contraction of the vein, water would flow from a circular orifice with a velocity equal to that acquired by a body falling from the level of the surface to the level of the orifice, and in quantity equal to a solid cylinder moving with this velocity and equal in size to the orifice. In practice the flow is about two-thirds of this quantity.

STAVE, BARREL AND BRICK MACHINERY; ALSO HAND LOOMS FOR FLANNEL, ETC.—We have inquiries from our readers for the best mechanism of the above character. We advise the manufacturers to advertise in the SCIENTIFIC AMERICAN. Regular advertisements in our columns will doubtless bring them orders from all parts of the world.

UP to the year 1860, no less than fifty wells had been sunk in the great Sahara desert by the French. The total quantity of water given by these wells amounts to 7,920,000 gallons per day.

LACKER FOR TIN.—Any good lacker laid upon tin gives it the appearance of copper or brass. It is made by coloring lac varnish with turmeric to impart he color of brass to it, and with annotto, to give it the color of copper.

PATENT-OFFICE DECISIONS.

IMPROVEMENT IN PACKING FERULES FOR CONDENSERS AND REFRIGERATORS.

The Board, by Elisha Foote.—These ferules serve to make the joints between the tubes and head sheet steam and water tight, and at the same time allow the movement produced by expansion and contraction of the tubes from variations of temperature. The applicant has already a patent for these ferules. He has heretofore made them of lead, wood, and some other materials, but has found that paper best answers the purpose, and now he claims an additional patent for the substitution of that material. No change of any part of the apparatus was required for the use of one material rather than another.

As a general rule, the mere substitution of one matrial for another is not patentable—as in the prominent case of a porcelain door knob. A machine or instrument may be greatly improved by the use of steel, brass, etc, in place of poorer materials, but this involves the exercise of mechanical skill, rather than of the inventive faculties.

The rule, however, has its exceptions, and they apply in those cases where the result of the substitution is so decided and important as to give it the character of a new discovery or of ar invention.

We do not perceive any such advantages from the use of paper to the applicant's device, and consequently must affirm the Examiner's decision regarding the application.

IMPROVEMENT IN BREECH-LOADING FIRE-ARMS.

The Board, by Elisha Foote:—The reference given by the Examiner seems to fully anticipate the applicant's devise.

Besides there is a defect in his specification. In the apparatus shown, there is nothing to receive the recoil of the charge. The applicant states that he employes means for supporting the block against the force tending to cause it to recede during the explosion, but that these means being no part of his present improvement, need not be described. In this he is mistaken. He must show all that is necessary to carry his invention into practical operation. It is admissible to refer to what is already well known, or to what is described in some other patent, but nothing must be left to be devised by others or ascertained by experiment. A mechanic, skilled in the art, must be able by following the description and the drawings to construct the apparatus and make it practically operative and usetul.

In this case something would have to be invented before the applicant's device would be made practical. The decision of the Examiner is affirmed.

ISSUED FROM THE UNITED STATES PATENT-OFFICE FOR THE WEEK ENDING DECEMBER 26, 1865.

Reported Officially for the Scientific American.

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

51,675.—Combined Level Square, Compass, and Plumb Staff.—James R. Abbott, Midway, Ind.:

I claim the combined level square, compass and plumb staff, substantially as described.

51,676.—Machine for Boring Fence Posts.—John Agnew, Bath, Pa.:

I claim the post borer constructed as herein described, with sliding carriage, L, notched bar, O, clamps, P, racks, K, pinions, G, straps, H, and treadles, J, all arranged to operate substantially as and for the purposes set forth.

[This invention relates to a new and useful machine for boring tence posts, and it consists in the employment or use of a carriage arranged in such a manner that it may be readily moved towards and from the auger, the carriage being provided with a sliding gage, which is fitted on the carriage, and has the post to be bored clamped to it, all being arranged in such a manner that the posts may be bored very accurately and with the greatest facility.]

51,677.—Crutch.—George T. Allamby and John G. Bugbee, Bangor, Me.:

We claim the combination of the buffer, D, with the adjustable spur, C, inserted in a socket, A, placed on the lower part of a crutch; the spur, C, being provided with a spring, a, and knob, b, the knob through a slat, E, in the socket, A, all arranged to operate substantially as and for the purposes specified.

We also claim the sliding tube, c, in combination with socket, A, spur, C, spring, a, slot, E, and knob, b, when arranged to operate substantially as and for the purposes specified.

51,678.—Ore Separator.—Stephen F. Ambler, Brooklyn, N. Y.:

First, I claim the use and employment of the vertical hollow shaft, C, in combination with the basin, B, sieve, G, agitators, m, and branch tubes, F, arranged and operated as shown for the purpose specified.

Second, In combination with the same, I claim the scrapers, E, arranged and operated in the manner described and for the purpose specified.

51,679.—Safety Fuse.—Albert F. and John H. Andrews, Avon, Conn.:

First, We claim employing in the body of safety fuses, sliver of cotton or other suitable fiber, substantially in the manner and for the purpose herein set forth.

Second, We claim the combination of the tubular powder casing, D, the sliver, A, and the equivalent saturating material, M, the la-

ter being allowed to permeate through the sliver, A, by reason of its loose condition and to stop near the powder by reason of its impermeability, all substantially as and for the purpose herein set forth.

Third, We claim the spiral position of the covering of the sliver, F, adapted to closely but softly envelope and bind together the inner body of a safety fuse, substantially in the manner and for the purpose herein set forth.

51,680.—Cultivator.—James Armstrong, Jr., Elmira, Ill.:

First, I claim the shovel-carrying frame, D D, with the driver's seat, D', secured to its rear end, said frame being pivoted by its forward ends to two levers, which are secured rigidly to the carriage axle, B, and are provided with foot stirrups, m m, substantially in the manner and for the purpose described.

Second, The movable-stepped block, c, applied to the axle, B, of a cultivator carriage, for adjusting the shovel frame of the cultivator, substantially in the manner and for the purpose herein described.

Third, The longitudinal laterally-rocking rods, e e, in combination with the pivoted cap, d, applied in a cultivator, substantially in the manner and for the purpose herein described.

Fourth, The compound pivot joint, e i, for connecting the shovel standards, G G, to their supporting frame, and allowing the lateral vibration of the standards, as well as permitting the desired adjustment of the same, either to the right or left, substantially in the manner described.

Fifth, Constructing the shovels, S, with an embracing extension, t, which is pivoted to the standard in the manner described and represented, for the purpose set forth.

Sixth, The combination of the shovel frame, D D C', with the levers, C C, vibrating standards, G G, curved levers, I I, and tread les, H H, substantially as described.

51,681.—Coal Stove.—Robert Bailey, Cleveland, Ohio.:

First, I claim, in combination with a hot-air chamber, so located as to receive the heat directly from the fire chamber on one side, and from the escaping heated products of combustion on the other, the diving flue, C, the chamber, A, and the radiating flues, C', arranged and operating substantially as described.

Second, I claim the illuminating flame flue, F, formed by the combination of the vertical place, F', and the exterior wire gauze or perforated plate, F2, arranged and operating substantially as described.

Third, In combination with a hot-air chamber, receiving the heat directly from the fire chamber on one side and from the escaping heated products of combustion on the other side, I claim an illuminating flame flue into which heated air is introduced, in small currents or jets from said hot air chamber in its rear, and a supply of cold air is introduced through a wire-gauze or perforated plate in front, so that the currents of hot and cold air will meet in the flame flue, substantially as described.

Fourth, I also claim the perforated plate, dividing the the upper combustion chamber from the flue through which the products of combustion pass away, substantially as and for the purpose described.

Fifth, I claim the combination of the fire pot, the hot-air chamber, the illuminating flame flue, and the wire-gauze or perforated illuminating plate, all constructed and arranged substantially as shown and described.

51,682.—Cultivator Plow.—C. C. Baum, Oxford, Iowa:

I claim the combination of the bars, C, vertical shafts, D, cranks, b b, connecting rod, E, lever, F, heads, I, and axles, K, as and for the purposes set forth.

[This invention relates to a new and improved cultivator plow, and it consists in a novel construction and arrangement of the parts, whereby the device is placed under the complete control of the operator, and the plow rendered capable of being very readily manipulated, so as to conform to the sinuosities of the rows of plants, and to plow at a greater or less distance from them, as may be required.]

51,683.—Evaporator.—J. C. Bell, Pawnee City, Nebraska:

First, I claim the tilting rails, e, arranged in combination with the frames, E E', supported by wheels, C C', and supporting the pans, F F, and arch, G, substantially in the manner and for the purpose set forth.

Second, The rock shafts, c c', and hand levers, g g', in combination with the tilting rails, e, carriages, E E', pans, F F, and arch, G, all constructed and operating substantially as and for the purpose described.

51,684.—Wagon Brake.—George and William Bench, Auburn, N. Y.:

We claim the combination of the locking device with the wagon brake when constructed and operated in the manner above described.

51,685.—Tire Cooler.—Henry Bloedel, Fond du Lac, Wis.:

I claim, in the apparatus herein described, consisting of the frame, B, provided with the wheels, o, attached as shown, and the central stud, b, having the spiral grooves, i, in combination with the tub, A, provided with the inclines, a, secured to its bottom, and the central block, b, provided with its central hole and pins, c, when arranged to operate as and for the purpose herein set forth.

51,686.—Pump.—Joseph Alexander Bloom, Philadelphia, Pa.:

I claim the combination and arrangement of the parts, R C P R P H, and system of valves.

Also, in combination therewith, the lever, constructed and operated substantially as described.

51,687.—Grain Separator.—John S. Bodge, Bath, N. Y.:

First, I claim the jointed bars, G, for the rear portions of the screens to rest upon, to admit of the ready varying of the inclination of the screens as set forth.

Second, The combination with a screen or riddle adapted to move independently of its shoe of the triangular bar, H, so constructed and located as to confine the vibratory movement of the screen above the place which it occupies when at rest, or, in other words, prevent the ragging or depression of the screen while in operation, substantially as described.

Third, In combination with the board, m, or m*, or other device to prevent the longer grain from assuming a vertical position under the circumstances set forth, I claim a sieve or riddle whose apertures or openings are made of a certain determinate depth with a view to prevent the longer grain from passing through the sieve in any of the inclined positions into which it may be thrown by the movement of the sieve, substantially as described.

Fourth, The valve, J, arranged within the shoe, B, and in relation with the screen, C, substantially as and for the purpose specified.

Fifth, The hinged board, A', arranged substantially as shown, to form a connection between the two shoes, B B', when required.

[This invention relates to certain improvements in a grain separator for which Letters Patent were granted this inventor Nov. 10, 1863, and it consists in certain modifications and additions whereby the efficiency of the original machine is greatly augmented.]

51,688.—Machine for Boring Wagon Hubs.—Frederick Bremerman, Indianapolis, Ind.:

I claim the tool guide for boring out wheel hubs for boxes, when the same is constructed and operated substantially as and for the purposes set forth

51,689.—Broom Head.—D. J. Brougher, Harrisburg, Pa.:

I claim a broom head consisting of the thin metallic case, A, provided with the band, C, and bolts, a, all arranged and operating as shown and described.

51,690.—Revolving Fire-arm.—George C. Bunsen, Belleville, Ill.:

First, I claim a revolving fire arm adapted in the manner herein described to discharge the chambers of the cylinder successively through one barrel by a single pull of the trigger.

Second, I claim the cocker, K, for operating the hammer, constructed and operated substantially as above described.

Third, I claim the lever, a, for rotating the cylinder in combination with the crank that drives it and the fulcrum pins, b c, or their equivalents, substantially as described.

Fourth, I claim the disk, E, made in two sections with solid blocks, Y, in their perforations to receive the blows of the hammer, and prevent the escape of gas into the hollow butt, substantially as described.

Fifth, The combination with the lever, a, of the lever block, 13 14, operating upon the bolt, 15, as described, to lock and unlock the revolving cylinder.

Sixth, In combination with the parts specified in the preceding clause, I further claim the eccentric surface on the block, 13, to close the disk against the cylinder and the spring, 5, to withdraw said disk.

Seventh, I claim the combination of the fan wheel with the segment wheel, c, and the mechanism for rotating the disk, I, and operating the cocker and the lever, a, substantially as described.

Eighth, I claim the segment or fractional pinion, C', and its train of gearing, Q Q', etc., so arranged with the mechanism which cocks the hammer and rotates the cylinder as to be in action to retard the speed of the mechanism when the hammer is striking the cap, substantially as described.

51,691.—Fence.—Thomas R. Byrnes, Washington, D.C.:

I claim the fence herein described, the same consisting of the notched batten or uprights, A, and notched rails, B, connected or interlocked, substantially as described.

51,692.—Tweers.—W. P. Cain, Moravia, Iowa:

I claim as a new article of manufacture the tongue herein described, consisting of the spherical body, A, mozzle, B, tube, D, plug, E, and valve, arranged and employed in the manner and for the purpose described.

[This invention relates to a tweer of characteristic cheapness and simplicity. A tube is formed in one piece with the body of the tweer, and communicates therewith so as to receive the cinders, etc., and permit a supply of air to pass up to the fire when the work is temporarily suspended, such air being admitted into the tube through a small valve at is lower end.]

51,693.—Coffin Handles.—Augustus Clark, Amsterdam, N. Y.:

I claim the combination of the hinged-handle arm, b, and sustaining spring, g, constructed, arranged, and operating as described.

51,694.—Parallel or Other Rods.—Charles H. Clark, Wilmington, Del.:

I claim the combination of the divided cap, D, plate, E, set screw, d, and wedge key, k k', substantially as and for the purpose described. The hook, l, and screw, d, in combination with the keys, k k', constructed and operating substantially as and for the purpose specified.

[This invention relates to a novel arrangement of the boxes in the ends of parallel and other rods, such as are generally used to couple the wheels of locomotive engines or to transmit motion from one part of an engine or other machine to another.]

51,695.—Car Coupling.—G. E. Clarke, Racine, Wis.:

I claim the shackles, B, provided with hooks, a, at their outer ends, and fitted in the draw heads so as to work or swing vertically, and one catch over the inner end of the other, substantially as and for the purpose herein set forth.

I also claim the coil springs, c, attached to one of the journals of the shackles, for the purpose of keeping the latter in a horizontal position, as described.

I also claim the springs, D, placed within the draw heads, A A, when used in combination with the shackles, B, substantially as and for the purpose specified.

I also claim the chains, D, attached to the rear parts of the shackles, B, and having levers, E, connected to their rear ends, substantially as and for the purpose set forth.

[This invention relates to a new and improved car coupling of that class which are termed self-acting, or self-coupling, and it consists in a novel arrangement of shackles or links, springs, and a shackle-releasing mechanism, whereby the adjoining cars, when coming in contact, will be coupled with certainty, and readily uncoupled at any time when necessary, and made to uncouple or disconnect itself in case of a car being thrown from the track, so that said car cannot drag the others connected with it from the track.]

51,696.—Swing Jack for Railway Cars.—Joseph H. Clark, Westbrook, Me. Antedated Dec. 13, 1865:

First, I claim the employment and use of the joint at the base, D.

Second, The combination of the joint at the base, D, with the pieces, A B C, and the brace, G.

51,697.—Rubber Spring for Wagons.—Samuel G. Clough, Waupun, Wis.:

I claim the combination and arrangement of the cups, E E, the axle, M, and bolster, L, with the double-headed piston, F F, and cross bar, G, all constructed and operating substantially as set forth, for the purpose described.

51,698.—Railroad Car.—George W. Cook, Rock Island, Ill.:

I claim the self-adjustable conducting rollers, D, in combination with their elongated boxing, B, in which they play, when applied to railroad cars and locomotives, for the purpose herein described and set forth.

51,699.—Pressure Frame for Photographic Printing.—L. E. Denison, Winthrop, Conn.:

First, I claim the combination of the stationary cushion, B, with the pressure frame of photographic apparatus, substantially as described and for the purpose set forth.

Second, The combination of the clasps, D, two or more, with the stationary cushion, B, in the pressure frame of a photographic apparatus, substantially as and for the purpose set forth.

Third, The combination of the movable-spring negative frame, G, with the frame, F, and stationary cushion, B, in the pressure frame of a photographic apparatus, substantially as described and for the purpose set forth.

Fourth, The combination of the springs, I, or their equivalent, with the movable negative frame, G, and the frame, F, in the pressure frame of a photographic apparatus, substantially as described and for the purpose set forth.

[The object of this invention is to furnish a photographic pressure or printing frame which may be opened and the picture or representation examined without disturbing the position of the paper or interfering with the successful result of the operation, and it consists in combining with a stationary cushion two or more clasps for holding the paper, and in combining with the movable negative frame springs for regulating the pressure during the operation.]

51,700.—Composition for Lining Journal Boxes.—P. S. Devlan, Jersey City, N. J.:

I claim the composition as herein described, consisting of vegetable fiber, plumbago, soapstone, and gum, or the equivalent of the latter, as set forth.

51,701.—Composition for Lining Journal Boxes.—P. S. Devlan, Jersey City, N. J.:

I claim the compound substantially as described, consisting of silicate of soda or potash, vegetable fiber, plumbago, and soapstone, as set forth.

51,702.—Composition for Lining Journal Boxes.—P. S. Devlan, Jersey City, N. J.:

I claim the compound substantially as described, as a lining for journal boxes and other rubbing surfaces, and consisting of silicate of soda or potassa and vegetable fiber.

51,703.—Filters and Coolers.—Wm. P. Dickinson, Reading, Pa.:

I claim the arrangement of the sediment chamber, B, filtering box, c, water chamber, D, pipe, E, cooling chamber, T, discharge pipe, F, and cocks, S and G, as and for the purpose specified.

51,704.—Process for Pulping Wood, Straw, Etc.—John W. Dixon, Philadelphia, Pa.:

First, I claim the continual circulation of highly-heated water in a liquid state, under pressure, through a mass of woody matter, retained in a digester, whereby all mechanical treatment of the woody, fibrous material, while subjected to the action of highly-heated water under pressure, is obviated.

Second, The combined process of continually circulating highly-heated water in a liquid state, under pressure, through the mass of woody matter retained in a digester, and of injecting at intervals, or continually, fresh water into said circulating water within the digester, to supply the place of an equal quantity of refuse water forced out.

51,705.—Process for Treating Wood, Straw, and Other Vegetable Fibers.—John W. Dixon, Philadelphia, Pa.:

I claim subjecting wood, woody matter, straw, and other analogous vegetable matter, to the chemical action of highly-heated water under pressure, in a liquid state, within a digester, wherein the mass is merely stirred together, substantially as above described.

Second, In combination with subjecting wood, woody matter, and other fibrous material, to the action of highly-heated water in a liquid state, under pressure, in a digester, wherein the mass is merely stirred together, the injection of fresh water into the mass, while the pressure is maintained, either continuously or at intervals, to supply the place of an equal quantity of water escaping or forced out.

51,706.—Process for Treating Vegetable Fiber for the Manufacture of Paper Pulp.—John W. Dixon, Philadelphia, Pa.:

I claim subjecting wood, woody mater, straw, or other analogous vegetable fibrous material, to the chemical action of highly-heated water under pressure, in a liquid state, in a revolving digester, substantially as above described.

Second, I claim, in combination with subjecting wood, woody matter, straw, and other analogous vegetable fibrous material, to the chemical action of highly-heated water under pressure, in a liquid state, while revolved in a digester, the forcing into the woody matter, within said revolving boiler, either continuously or at intervals, fresh water to replace an equal quantity of refuse water forced out or escaping therefrom, substantially as above described.

51,707.—Grain Drill.—George W. Farley, Manchester, N. H.:

First, I claim in a seed drill the hooked rock shaft, M, in combination with the adjustable pawl, N O, and spiral spring, u, substantially as and for the purpose set forth.

Second, I claim the seed valve, K, in combination with the bed piece, G, and adjustable slides, R, all constructed and arranged substantially as and for the purposes set forth.

Third, I claim the cogs on the side of the wheel, C, in combination with the hooked rock shaft, M, the pawl, N O, and seed valve, K, all constructed substantially as and for the purposes set forth.

51,708.—Safety Stirrup Fastening.—Wm. Fawcett, New York City. Antedated Dec. 13, 1865:

I claim hanging the loop of a stirrup strap to and within a spring swinging frame of the upper end of the stirrup, having a hinged side, and arranged and operating substantially in the manner described and for the purpose specified.

[This invention consists in so constructing and arranging that portion of the stirrup through which the strap is passed and by which the stirrup is hung from the saddle, that in case of accident the stirrup can be disengaged, by the person riding, from the saddle strap.]

51,709.—Hay Press.—Edward A. Field, Sidney, Me.:

I claim the combination of the two opposite diagonal grooves, g', g', or their equivalents, with the press box and the compressing mechanism thereof, such grooves being arranged therein as described, and so as to receive one or more divisional partitions, in manner and for the purpose set forth.

I also claim the combination of one or more divisional partitions, i, with the press box and its platen or compressing machinery, and to operate therewith substantially as and for the purpose as specified.

I also claim the combination and arrangement of the rotary arm, p, or the same or its turn button with the spring, o, of the pawl lever, applied to the series of teeth or studs of the windlass wheel.

51,710.—Gate Latch.—E. Otis Frink, Indianapolis, Ind.:

First, I claim the said sliding latch, when the same is constructed with the projection, K, the slot, L, and handle, E, and operated substantially as set forth.

Second, The said shield or basket, M F F M, when constructed and applied substantially as set forth.

Third, The improved device as a whole, constructed and operated substantially as set forth.

51,711.—Hinge.—Samuel C. Fink, Indianapolis, Ind.:

I claim the combination of the said lug, D, the spiral groove, E, and the slot, A G, when the same are constructed and operated substantially as set forth.

51,712.—Whiffletree Attachment.—John C. Garner, Ashland, Pa.:

I claim the plate, C, provided with the lips, as shown, and secured to the bar, A, by the bolt, D, in combination with the tube, E, fitted in the whiffletree and the plate, F, at the front side of the latter, the bolt, D, passing through the tube, E, and all arranged to operate in the manner substantially as and for the purpose herein set forth.

51,713.—Rotary Pump.—Reuben C. Grover and James Nickelson, Newton, Mass.:

We claim the revolving cylinder, C, provided with two or more cams or abutments, F G, in combination with the outer casing, A, and gate, J, operating substantially as described.

51,714.—Manufacture of Plated Metal.—John Daniel Gruneberg, Philadelphia, Pa.:

I claim the aforesaid new and improved plated metal and covered metal, or any other substantially the same, and which will produce the intended effect.

51,715.—Automatic Car Brake.—John Hartman, Jr., Philadelphia, Pa. Antedated Dec. 14, 1865:

I claim the combination and arrangement of the check blocks, D, with the brake frame, B, by means of the suspension rods, a a and G, the journal boxes being rigidly attached to the said frame, and the whole being arranged and operating substantially in the manner and for the purpose above set forth

Second, Combining and arranging the india-rubber sheet, G, or its equivalent with the check blocks, D, substantially in the manner and for the purpose set forth.

Third, The combination and arrangement of the guard, I, with the brake frame, B, by means of the suspension rods, g, and bars, h, or their equivalents, substantially as described.

51,716.—Bee-hive.—John H. Hendricks, Clinton, Ill.:

I claim the perforations, e, at the lower part of one of the side pieces, a, of the hive when used in connection with the alighting boards, c c, end pieces, and inclined sides, a a, of the hive, and the bee entrance, d, all arranged substantially as and for the purpose set forth.

[This invention consists in a novel construction of the hive, whereby simplicity is obtained, the hive properly ventilated, and kept in a dry state to promote the health of the bees.]

51,717.—Green-house Sash.—Isaac F. Hersam, Stoneham, Mass.:

I claim a series of devices as hereinabove described for operating the sashes of green-houses, etc., by means of the expansion and contraction of the metallic bars, e e g g, etc., substantially as specified.

51,718.—Means of Closing Ship's Lights.—E. S. Hidden, New York City:

I claim a swinging arm or strap provided with both a cam and a screw, and hinged so as to vibrate as described, in combination with a top or glass frame or a ship's light, the combination being substantially such as hereinbefore described.

51,719.—Hoisting Machine.—Philip Higdon, Cropper's Depot, Ky.:

I claim the arrangement of the double-threaded worm wheel, F, the shafts, H J, and pulley, L, substantially as described and represented.

51,720.—Toy Blocks.—S. L. Hill, Williamsburgh, N. Y.:

First, I claim the employment or use of a series of building blocks marked on different sides with the parts of the surface of different buildings, substantially as and for the purpose described.

Second, The longitudinal grooves, b, in the boards, D, to operate in combination with the dowels, a, in the edges of the triangular pieces, c, substantially as and for the purposes set forth.

Third, The use of building blocks having marked on their different sides, parts of the same or of different buildings, the various sides being distinguished by different colors, substantially as and for the purpose described.

[This invention consists in the employment or use of a series o

building blocks which are marked on one side with parts of the outside of one, and on the opposite with parts of the surface of another building in such a manner that by turning the corresponding sides of all the blocks out, and placing them together in the proper order, two different buildings can be produced by the same series of blocks.]

51,721.—Cultivator.—William H. Howell, Ewingsville, N. J.:

First, I claim the frame, consisting of the diagonal slotted bars, A A, tongue B, and axle, D, arranged as shown and described.

Second, I claim the elbow lever, b, connected to the plow by rods, c, or its equivalent, in combination with the handle, a, and bar, f, provided with the hook, e, when arranged to operate as and for the purpose set forth.

Third, I claim the combination and arrangement of slotted bars, A, pendants, E, drag bars, F, and bar, C, as shown and described.

51,722.—Flour Sack.—J. M. Hurd, Auburn, N. Y.:

I claim the making of paper bags in the manner described, as a new article of manufacture.

51,723.—Process for Hardening Iron.—Thomas H. Jenkins, New York City:

First, I claim the process substantially as above described, for hardening malleable and non-malleable cast iron by plunging it while at or about a cherry red heat in a solution, substantially as herein described.

I also claim in combination with, and preparatory to the hardening in a solution substantially as herein described, the treatment of the iron in a heated state with a composition of prussiate of potash and charcoal, substantially as herein described.

51,724.—Substance for Making Cutlery, Edge Tools, Etc.—Thomas H. Jenkins, New York City:

I claim the new substance herein described, produced from malleable cast iron, by the process herein described, or any process equivalent thereto.

51,725.—Machine for Marking Corn Ground for Planting.—Gallatin M. Johnson, Decorah, Iowa.:

I claim a machine for the purpose of marking land with two independent adjustable axles arranged and operated substantially as described.

51,726.—Pump.—Niels Johnson, Ripon, Wis.:

First, I claim the lower springs, L, surrounding the bottom or foot of the pump and operating to hold that part steady in the well, substantially as described.

Second, I also claim the springs, H H, on the outside of the cylinder, made with pins, b b, in combination with the rotating spring plates, c c, by which the springs H, are forced against the sides of the well, substantially as described.

Third, I also claim the cross piece, m, and its arms, n, in combination with the eccentric, u, of the collar, G, substantially as described.

Fourth, I also claim the valves, t t, in the upper part of the cylinder, constructed as shown with springs placed about their spindles, so arranged as to admit air to the cylinder at the downward stroke of the piston, substantially as described.

[This improvement relates to the class of pumps whose cylinders are submerged. The pump is double acting, and the piston rod and piston are hollow. Among other novel features, is a device for securing the cylinder in its proper position in a well or reservoir which is operated from the top of the well.]

51,727.—School Desk.—W. Johnson, Topsham, Maine:

I claim the combination and arrangement of the hinged book rest, C, rack, c, stop or pin, d, and lid, B, as and for the purposes described.

51,728.—Compound for Tempering Steel Springs, Etc. L. W. Kelly, Brunswick, Ohio:

I claim the chemical compound as herein set forth for the purpose described.

51,729.—Electro-magnet for Oil Wells.—Millis Knickerbocker, New Lenox, Ill.:

I claim the combination with an electro-magnet having its legs protected by any suitable covering, of the grab-irons, n n, the whole being constructed, arranged and operated substantially in the manner described and for the purpose specified.

[The object of this invention is to provide a tool for the removal of loose pieces of iron from oil or other wells, and it consists in the use of an electro-magnet suitably arranged and constructed therefor.]

51,730.—Sand Pump.—Obadiah B. Latham, Seneca Falls, N. Y.:

I claim promoting the operation of a sand pump by the admission of a flow of air or water down and beneath the valve, substantially as shown and described.

51,731.—Potato Digger.—E. S. Lenox, New York City:

I claim an arrangement of mold boards, substantially such as described.

Also in combination with two mold boards arranged as specified, the stirrers which bring the potatoes to the surface of the ground

Also the combination of the center point with two mold boards arranged to turn the soil inward, substantially as set forth.

Also in combination with such mold boards operating as described, the guide wheels which gauge the depth of operation of the mold boards and guide and steady the implement in its progressive movement.

51,732.—Press.—James Lewis, Wilmington, Ohio, assignor to Nelson Bacon:

I claim the combination of the pressing levers, C C, the connecting ties, D D, the head piece, H, and the governing lever, G, with the frame, A, and the sliding beam, B, when constructed and arranged substantially as described and as specified for the purposes set forth.

51,733.—Shirt Fastener.—Henry Link, Little Falls, N. Y.:

First, I claim the manner herein described of fastering together shirt bosoms, or other garments, or of securing ornaments to persons, that is, when a device consisting of two parts, A B, are used, each part being so constructed that its lower portion is heavier than its upper, so as to cause it to remain in an upright or vertical position substantially as described.

Second, I claim the combination of the back plate, A, and ornament, B, substantially as described.

51,734.—Lifting Jack.—Joel Locke, Bridgeport, N. J.:

I claim a lifting jack, consisting of two legs, A B, lifting lever, C, and pawl, D, combined and arranged substantially as shown and described.

[This invention consists in the employment of two upright standards or legs, having the lifting lever pivoted to, or between them, and in the arrangement of a pawl in connection with teeth or stops in the lifting lever for locking or retaining the lifting lever at any desired point.]

51,735.—Material for Roofing, Tubing, Tanks, Wainscoting, Boats and Other Structures.—John K. Mayo, Portland, Me.:

I claim the application of scale boards or veneers in layers, the direction of whose grain is crossed or diversified, and which are connected together, forming a material for the construction, lining or covering of land and marine structures.

51,736.—Pump.—Reuben A. McCauley, Baltimore, Md.:

First, I claim the piston head, b", and the sliding valve, J, as arranged in relation to the cylinder and piston rod, all substantially as described, for the purpose set forth.

Second, Enlarging the piston rod above the play of the valve and throughout the extent of the cylinder when used in connection with head, b" and valve, J.

51,737.—Spring and Weight Piston Engines and Stamping Machine.—Edward F. and John McFarland, Worcester, Mass.:

I claim the employment of loaded springs which are suspended from the extremities of an oscillating beam, and guided in their upward and downward movements, substantially in the manner described.

51,738.—Horse Shoe.—James McPherson, Rockford, Ill.:

I claim the combination of the steel spring clasp with the shoe, when constructed and arranged substantially in the manner and for the purpose described.

51,739.—Breech-loading Fire-arm.—William H. and G. W. Miller, West Meriden, Conn.:

We claim the latch, E, arranged and operating in combination with the face plate, b, oscillating breech piece, B, and catch, i, substantially as described.

We claim the detent, r, in combination with the bar, o, and breech piece, B, constructed and operating substantially in the manner and for the purpose described.

51,740.—Buckle.—George O. Monroe, New York City:

I claim the combination of the angular lip, c, and cross bar, d, in the buckle frame, A, as specified, so as to receive and hold the end of the strap folded back upon itself and passing between the said cross bar and lip, as and for the purposes specified.

51,741.—Coffee Percolator.—James H. Mason, Franklin, Mass.:

I claim the construction of the coffee and water vessels, a b, with fluid joints, in the manner and for the purpose substantially as set forth.

51,742.—Hoisting Tackle.—J. W. Norcross, Middletown, Conn.:

First, I claim the clevis, B, constructed substantially as described and combined with the cast metal block, H, and axis pin, d, as explained.

Second, Forming the becket seat in the end of the block, as and for the purpose specified.

Third, The ribs, g, on the cheeks of the block, A', in combination with the bosses, h, on the ends of the shanks of the clevis, constructed and operating substantially as and for the purpose set forth.

51,743.—Clothes Wringer.—James O. Donald, Clinton, Ill.:

I claim the spring post, n, and the spring, a, in combination with rollers, R, dripping board, D, and the device for attaching the wringer to a tub or box, substantially as described.

51,744.—Machine for Making Netted or Laced Fabrics.—Herman A. Oesterle, Philadelphia, Pa.:

First, I claim the shuttles, P, each carrying a spool of thread, X, in combination with the devices herein described, or the equivalents to the same, for retaining and releasing the said shuttles on one side of the system of threads, Y, and with the devices described or their equivalents, for seizing the said shuttles, conveying them between the threads, Y, and releasing the same, all substantially in the manner described

Second, The vibrating or reciprocating cross bar, E, its recesses, a, and spring catch levers, F, in combination with the arms, Q, on the shuttles, and the projection, i, and the bar, O, of the rocking frame, M.

Third, The stationary cross bar, E', its recesses, a', and spring catch levers, F', in combination with the arms, Q, of the shuttles and the projection, i, and the bar, O', of the rocking frame, M.

Fourth, One or more reciprocating or sliding bars, G, or their equivalents, for guiding and laterally moving the threads, Y, in combination with the shuttles, P, to which the above described movements are imparted.

Fifth, The beaters, J and J', arranged to operate on the threads and the loops of the same, substantially in the manner described for the purpose specified.

51,745.—Process for Cleaning Cotton Seed.—John G. Page, Rockford, Ill.:

First, I claim the process of cleansing cotton seed or depriving the same of its lint by placing the seed with pebbles, stones or other hard substances, within a rotating or moving vessel, so that the attrition produced by contact of the moving seed and pebbles or other hard substances within the vessel will accomplish the end desired.

Second, I further claim the perforating of the vessel containing the seed and the pebbles or other hard substances, and also the employment of a plurality of perforated doors or removable sections to the cylinder, for the purpose of separating the fine foreign substances from the seed, while the latter is being cleansed or deprived of its lint, and also for separating the cleansed seed from the pebbles.

51,746.—Mowing Machine.—Aaron Palmer, Brockport, N. Y.:

I claim the special construction and arrangement of the bearing, D, consisting of the box, c, for receiving the shaft of the pitman wheel, the axis or journal, f, for receiving the bevel cog wheel and spur pinion, and the flange, b, or equivalent, for attaching to the tongue, the whole arranged so as to avoid the use of a main frame, substantially as herein set forth.

51,747,—Wagon Wheel.—Benjamin Pearson, Salem, Mass.:

I claim a metallic crown felly supporter, constructed and applied substantially as described, in combination with the rim and spokes of a wagon wheel at the point or points where the segments of the fellies meet, substantially as and for the purpose set forth.

[The object of this invention is to strengthen wagon wheels at their weak points, viz., at the points where the ends of the fellies meet. It consists in attaching to the rim of the wheel, at these points, an arched or crown brace or supporter, the ends of which rest against and are secured to the adjacent spokes.]

51,748.—Invalid Spoon.—David J. Pearson, Boston, Mass.:

I claim the construction or providing of a common spoon, with an adjustable lid or cover, a dial and a support, as herein described and for the purposes set forth.

51,749.—Condensing Milk.—Julius R. Pond, New Hartford, Conn.:

I claim the above-described process of condensing milk, consisting in combining the superheating in the manner substantially as set forth, with the evaporation in the pan of crude milk which has been run into the pan in a cold and uncoagulated state, substantially as described.

51,750.—Adjustable Harrow.—Hiram Pulse, St. Paul, Ind.:

I claim herein as new the arrangement of frame, A, fixed and folding harrow beams, B C C' D and D', and retaining devices, G H I i K, or their equivalents, for the purpose set forth.

51,751.—Manufacture of Paper.—John B. Read, Tuscaloosa, Ala.:

I claim the applicability of the stalks of the okra plant (hibiscus esculentus) including the fibrous, the ligneous portion and the pith of the entire plant, to the manufacture of paper, papier mache and its compounds. This is virtually a combination of dissimilar material which I claim, whether the resulting paper mass be used alone or in combination with other materials.

51,752.—Revolving Fire-arm.—James Reid, Catskill, N. Y.:

First, I claim the sliding stop, m o, fitted as specified, in combination with the frame, e g, and barrels for the purposes and as specified.

Second, I claim connecting the trigger shield, b, and handle, a, so as to form the bow, d, for the purposes and as set forth.

51,753.—Locomotive.—John B. Root, New York City. Antedated Dec. 13, 1865:

I claim the combination of cylinders, D, piston rods, E E, slotted cross heads, F F', driving wheels, C C', crank wrists c c', sliding boxes, b b', guide rods, d d', and guides, s e', the whole arranged in relation to the truck or frame, A, substantially as herein specified.

51,754.—Plating Iron and Steel.—Elliot Savage, West Meriden, Conn.:

I claim the process for electro-plating upon iron and steel, substantially as herein set forth.

51,755.—Bedstead Bottom.—George Schott, New York City:

I claim the bed bottom formed of slats with notched ends sustained by notched cross pieces, covered with felts or other yielding material, for the purposes and as specified, and in combination therewith, I claim the rails, a, notched to receive the cross pieces, b, and form a frame as set forth.

51,756.—Carriage Wheel.—John Scott, Ocala Florida:

I claim the making a cast-iron hub as described, with projecting flanges from the box which flanges are covered with a wrought-iron band, thus forming the oil chamber with openings, I and H, as shown and described.

In combination with hub band and oil chamber, as above described, the double set of spokes with the cleats constructed and arranged as set forth for the purposes specified.

51,757.—Pulverizing and Furrowing Device.—Charles Shabley, Brooklyn, N. Y.:

First, I claim the furrow openers or shares, l, attached to a frame mounted on wheels in combination with reciprocating toothed plates, G G, arranged and applied to the machine to operate in the manner substantially as and for the purposes herein set forth.

Second, The attaching of the plates, G G, to the machine by means of arms, E, two or more fitted on a bar, F, and arranged substantially as shown to admit of the raising and lowering of said plates as described.

Third, The operating of the plates, G G, from the driving wheels through the medium of crank shafts and pinions, I, J, and connecting rods, f, the shafts, I, having their bearings in sliding or adjustable rods or shafts, H H, connected to a lever, K, by which the plates, G G, may be readily rendered operative or inoperative as desired.

51,758—Egg Beater.—William B. Smith, New York City:

I claim the beating or agitating device, consisting of the ring, a, bars, c, and knives, d, all arranged and combined with the rod, D, passing through the cover, substantially as herein specified for the purposes described.

51,759.—Low Water Detector.—Jonathan R. Supplee and Robert K. Wright, Philadelphia, Pa.:

We claim the combination and arrangement of the valve, C, cylinder E, pipes, A F G, attached to the outside of a boiler whereby to indicate the height of water in the boiler, as herein described.

51,760.—Turbine Water Wheel.—George Tallcote, New York City:

I claim the annular water box D, placed over the joints formed by the junction of the periphery or rims of the wheel and the inner edges of the scroll, helix or box, in which the wheel is placed or fitted, substantially as and for the purpose herein set forth.

51,761.—Scroll Sawing Machine.—Joseph A. Talpey, Somerville, Mass.:

I claim the flexible strap and cam in connection with a spring, or its equivalent, arranged and applied to a saw to operate substantially in the manner and for the purpose specified.

[This invention relates to a sawing machine of that class in which the saw is strained and driven or operated without a sash or frame, and which are used principally for fancy scroll or curved work. The invention consists in a novel and ingenious means for operating the saw, whereby a very compact machine of the kind is obtained, and one which may be operated by hand or by the foot of the operator through the medium of a treadle, with the greatest facility.]

51,762.—Process for Tanning.—William H. Towers, New York City:

I claim the process of tanning or curing hides or skins, in alcohol, as and for the purpose above set forth.

51,763.—Lock.—Benjamin M. Van Der Veer, Clyde, N. Y.:

I claim the combination of the wheel, n, and tooth wheel, t, with the traverse dog, g, of a lock arranged with regard to each other, substantially in the same manner described, and operating as and for the purpose specified.

[This invention relates to certain improvements in locks, particularly applicable to a lock invented and patented on the 25th day of April, A.D., 1865, and it consists in a novel arrangement of parts in connection therewith, the object of which is to enable the devices constituting the lock, to be so set or adjusted as to be only susceptible of being unlocked by the person acquainted with such adjustment, the advantages resulting from which are obvious.]

51,764.—Steam Engine Governor.—John H. Wait, Portsmouth, Ohio:

First, I claim the combination and arrangement of the rod, b, moveable box, c, notched pendulous bar, d, rods, f and k, and cams, h i, substantially as and for the purpose explained.

Second, I claim the combination and arrangement of the governors r r, series of cogs, u u u, stirrups, n, spiral spring, o, and rod, m, as and for the purpose set forth,

51,765.—Machines for setting Spokes in Wagon Wheels.—Richard Walker, Batavia, N. Y.:

I claim making an adjustable gage for setting the spokes and regulating the size of wheels, in the manner herein described and particularly set forth, and for the purpose described,

51,766.—Flour and Sauce Sifter.—Joseph Wells, Brooklyn, N. Y.:

First, I claim the construction of the hinged wings, G G G, and the radial arms, F F F, when the same are constructed and combined to operate substantially in the manner and for the purpose described.

Second, The combination of the radial arms, F F F, hinged wings, G G G, springs, H H H, and wire gauze, I, for the purpose specified.

51,767.—Calipers.—Seth Whalen, Burnt Hills, N. Y.:

I claim the rule, a, in combination with the adjustable cross heads or Ts, b and d, forming calipers for external and internal measurements as specified.

51,768.—Seeding Machines.—J. B. H. Whiting, Ripon, Wisconsin:

First, I claim the eccentric lever, l, sliding in slot, t, in conjunction with the standard playing through the vertical slot, s, of the beam, D, substantially as described.

Second, The stop guards, n, applied to the upper sections, n, of the toothed standards, substantially in the manner and for the purposes described.

Third, The two jointed sections, n n, united to the brace rod, r, and connected to the drag bar, D, substantially as described.

Fourth, The combination of the pivoted notched arms, j j, eccentrics, k k, rock shaft, k, drag bars, D D, and lever, k2, substantially in the manner described.

51,769.—Air Pumps.—John H. Wilhelm, Chicago, Ill.

I claim the air pump, c, contained in the elevated air chamber, L, and water tank, A, substantially as set forth.

51,770.—Combination Spring and Caster for Furniture.—J. H. Wilhelm and Frederick G. Ensign, Chicago, Ill.

We claim the combination of the curvilinear springs, A B, adjusted to the stem, D, of the caster wheel, E, and strengthened by the helical spring, C, as set forth.

51,771.—Manufacture of Iron.—John D. Williams, Allegheny, Pa. Antedated Dec. 14th, 1865:

I claim the process herein described for puddling or boiling iron, which process consists in pouring in on melted iron an acid or saline solution prepared substantially as described, the melted iron and furnace being manipulated in the manner herein described and for the purpose set forth.

51,772.—Baby Swing.—Jacob Wolf, Cleveland, Ohio:

I claim the seat, C, with the tubes, E E, and cross pieces, D D, arranged and used as and for the purpose specified.

51,773.—Carriage Wheel Hubs.—McClintock Young, Frederick, Md.:

I claim, First, The channel, c, in or on the journal and curved outward and upward through the collar, and furnished with a hinged stopper for the purpose of introducing, holding and retaining a supply of oil or similar fluid lubricator, substantially as and for the purpose described.

I also claim in combination with the close band, D, and nut, E, each furnished with a hole, a pin or stud, introduced from the outside, for the purpose of forming a lock, or tie between said band and nut to run the nut off from, or on to the journal of the axle, substantially as herein described and represented.

51,774.—Apparatus for Graining Wood.—Robert A. Adams, Chicago, Ill., assignor to himself and Edwin Lee Brown, of the same place. Antedated Dec. 13, 1865.:

First, I claim the hollow elastic air bag or drum to be used in a graining machine, in the manner and for the purpose substantially as above described.

Second, The combination of the said endless graining belt and elastic air bag used and operating for the purpose and in the manner substantially as above described.

Third, The device substantially as described for inflating and collapsing the hollow bag or drum by means of the hollow axle and valve.

Fourth, The device substantially as described for regulating the width of the hollow bag or drum by means of the packing box, axle and set screw.

51,775.—Method of Preventing Incrustation in Steam Boilers.—Wm. Brown, Morrison, Ill., assignor to M. G. and F. H. Jacobs, of the same place:

First, I claim in the construction of the filter the space left above the tops of the partitions, F G and H, and the cover for the free passage of steam from the cylinder into the filtering compartments, B C and, D, for the purpose of heating the water, as herein set forth and described.

Second, I claim the application of hay as filtering material to be put into compartments B C and D, for the precipitated lime to adhere to, as and for the purposes herein set forth and described.

51,776.—Manufacture of Lenses for Spectacles.—Charles Buckley, West Meridian, Conn., assignor to Charles Parker, of the same place:

I claim forming the lenses by casting the blanks therefor in molds which will give to the edge of the blank the exact form and finish which it is desired that the edge of the lens shall have, and finishing the lens by grinding and polishing the faces of the blank, substantially as set forth.

51,777.—Animal Trap.—G. E. Clarke, Racine, Wis., assignor to himself and Sylvester Bullen, of the same place:

I claim the combination of the pivoted bar, H, levers, h, F K, d d, connecting bars G E L, and doors, D D, when arranged as and for the purpos s specified.

[This invention relates to a new and improved animal trap, designed more especially for catching rats and mice, and of that class which are self-setting.]

51,778.—Elastic Syringe.—Herman E. Davidson, Gloucester, Mass., for himself, and as administrator of the Estate of C. H. Davidson, deceased, late of Charlestown, Mass.:

I claim the improved elastic syringe bulb having flexible pipes made in one piece therewith.

51,779.—Machinery for Grinding Knives.—William Fosket, Meriden, Conn., assignor to The Meriden Cutlery Co., of the same place:

I claim a cylinder arranged with fixed matrix or matrices revolving in the manner substantially as described in combination with the bearings L, cam wheels K, and the prejections thereon, constructed and arranged to operate substantially in the manner and for the purpose described.

51,780.—Turn-out Wagon Seats.—George Gregory, New Haven, Conn., assignor to Lawrence, Bradley and Pardee, New York City:

I claim the above described construction and arrangement of a turn-out seat, for wagons or other vehicles substantially as, and for the purpose set forth.

51,781.—Manufacture of Artificial Leather.—W. W. Waite, South Natick, Mass., assignor to Flax, Leather Manufacturing Co., Boston, Mass.:

I claim as a new article of manufacture an artificial leather made of animal and vegetable material combined, substantially as set forth.

52,782.—Postage Stamps, Etc.—George W. Bowlsley, Monroe, Mich.:

I claim the destruction of the postage stamp by tearing a portion of it by the postmaster before it enters the mails.

I also claim the preparation of the stamp in the manner substantially as described so that this may be done.

51,783.—Portable Hog Scalder.—Arthur Clarke, Philadelphia, Penn.:

First, I claim the combination of the table, C, and roller, D, with the boiler, B, arranged and operating substantially as set forth.

Second, The furnace, A, and boiler, B, and table, C, in combination, when the latter can be raised as a cover for the boiler as well as a table, substantially as set forth.

REISSUES.

2,134.—Door Bell.—H. H. Abbe, Chatham, Conn. Patented July 11, 1865.

I claim the employment or use in a door bell or gong of a lever or clapper stem, operated under the pull by a grooved slide or other suitable mechanism, having a spring attached to it whereby the lever or clapper stem, although operated after the pull by the spring is not directly connected with the latter.

2,135.—Corn Planter.—John H. Alexander and David R. Alexander (assignees by mesne assignments of John Gross), Decatur, Ill. Patented June 6, 1865:

I claim, First, The employment or use of four seed holes, h, in seed plate, K, from which the seeds are discharged consecutively while the remaining holes are being filled or charged, substantially as and for the purpose described.

Second, The employment or use of circular intermittingly rotating plates, N, provided with openings or holes, j j, in combination with the vibrating seed plates, K, substantially as and for the purpose specified.

Third, The vibrating bars, O, placed below or underneath the plates, N, connected with the plates, H, and receiving their motion therefrom, and provided with pawls, m, for the purpose of operating the plate, N, as set forth.

Fourth, The circular gages, P, placed underneath the plates, N, as arranged substantially as shown for graduating the capacity of the holes, h, in the plates, K, as set forth.

Fifth, The arranging of the cut offs or strikes, d, with springs or elastic rods, N', in the manner substantially as, and for the purpose specified.

Sixth, The scrapers, Q Q, at the outer ends of the arms R R, which are connected by rods, t, to treadles u, substantially as and for the purpose specified.

2,136.—Meat Mincer.—Albert W. Hale, New York City. Patented March 15, 1859:

I claim, First, The use and application of a flanged cylinder or cylinders, having the grooves between such flanges tapering and diminishing in depth, substantially as set forth.

Second, The use and application of a cylinder or cylinders having spiral flanges with grooves between them diminishing or tapering in depth, substantially as set forth.

Third, The combination of two cylinders with spiral flanges so arranged that the flanges of one cylinder overlap those of the other, so that the cylinder operated by the power or crank will give motion to and rotate the other without the interposition of other gearing.

Fourth, The combination of a cylinder or cylinders having spiral flanges or tapering grooves with a shearing knife, and a case having spiral ribs on its inner surface, substantially as set forth.

Fifth, The combination of two cylinders or conic frusta having straight or spiral flanges, or tapering grooves, with a knife or case with or without spiral ribs.

Sixth, The combination of two cylinders having spiral flanges and tapering grooves with a shearing knife and a case having spiral flanges.

2,137.—Cotton Picker.—George A. Howe, Brooklyn, N. Y. Patented Dec. 4, 1855:

I claim, First, In a hand cotton harvester, an endless toothed chain, with a rotary motion, to detach and gather the cotton boll from the bolt, substantially as described.

Second, The endless toothed chain or gatherer, F, in combination with an exterior case or frame, A, or stripper, H, and a bag or other receptacle, R, constructed and arranged substantially as and for the purposes described.

2,138.—Cotton Picker.—George A. Howe, Brooklyn, N. Y. Patented Dec. 4, 1855:

I claim a toothed chain, constructed substantially as herein described.

2,139.—Punching Press.—Norman C. Stiles, Meriden, Conn. Patented Jan. 26, 1864:

I claim, First, The compound eccentric, D, consisting of an eccentric wrist pin, a, adjustable disk, b, and clamp, d, or its equivalent, constructed and operated in the manner and for the purpose substantially as set forth.

Second, The V-shaped faces, g, on the slide, E, in combination with the jaws, G, cast solid with the stock, A, and with the triangular gib, h, all as and for the purpose specified.

Third, The touch-off device, k H, arranged in combination with clutch pin, m, substantially as shown and described, so that said clutch pin is thrown in either direction by the direct action of the cam.

Fourth, The loose clutch pin, m, applied in combination with the band wheel, C, and shaft, B, in the manner and for the purpose substantially as specified.

Fifth, The button on the shaft, B, in combination with the spring catch, k, clutch pin, m, and n, and cam, H, arranged substantially as described, so that the cam is released automatically after the punch or cutter has completed his stroke.

Sixth, The yielding coupling pin, n, in combination with the clutch pin, m, and touch off device, K H, constructed and operating in the manner and for the purpose substantially as specified.

Seventh, The yielding fulcrum pin, j, arranged in combination with the cam, H, clutch pin, m, and band wheel, C, substantially as and for the purpose set forth.

DESIGNS.

2,234.—Design for a Fan.—Gustavus Anton (assignor to himself, Jacob Hirner and F. Brurein), Philadelphia, Pa.

2,235.—Design for a Masonic Group of Statues.—William Christiaenssen, New York City.

2,236.—Design for a Floor Oil Cloth.—James Paterson, Elizabeth, N. J. assignor to Edward Harvey, Brooklyn, N. Y.

2,237.—Design for a Hasp Hook.—Samuel M. Richardson, New York City.

2,238.—Design for a Trade Mark.—William P. Weyman and Benjamin F. W. Weyman, Pittsburgh, Pa.

THE FOLLOWING PATENTS BEAR DATE DEC. 19, 1865.

51,568.—Manufacture of Paper.—John W. Dixon, Philadelphia, Pa.:

I claim the process of treating wood or other vegetable substances by boiling in soda ash (carbonate of soda) under pressure as a process or preparatory process for making pulp for the manufacture of paper from wood, straw, or other vegetable fibrous substances, substantially as described.

51,569.—Process for Bleaching Paper Pulp.—John W. Dixon, Philadelphia, Pa.:

I claim, First, The process of bleaching pulp by the action of a solution of chlorine or chloride of lime at a high temperature and under pressure.

Second, Circulating the bleaching solution through the mass to be bleached in the digester while highly heated, and under pressure by means of a pump or its equivalent, substantially as above described.

Third, I claim pulping, washing and bleaching wood, straw or other vegetable fibrous material, in the same digester, under pressure.

51,570.—Manufacture of Paper Pulp.—John W. Dixon, Philadelphia, Pa.:

I claim the process of treating wood or other vegetable substances by boiling in a solution of chloride of lime or chlorine, in highly heated water under pressure, as a process or preparatory process for making pulp in the manufacture of paper from wood, straw, or other vegetable fibrous substance, substantially as described.

51,571.—Manufacture of Paper Pulp.—John W. Dixon, Philadelphia, Pa.:

First, I claim the combination of a pump, P, to force highly heated fresh water into and through the wood or other material contained in a digester with a strainer and an exit pipe for the escape of water at the bottom of the digester, strained from the woody fiber.

Second, The combination of a pump, P, for forcing heated fresh water into the digester (containing the material to be pulped by highly heated water under pressure) with a coil, R S T N, or equivalent heating apparatus to heat the fresh water thus forced into the digester.

Third, The combination of the pump, P, for forcing fresh water into the digester containing the vegetable fibrous material to be pulped by highly heated water under pressure, with the intermediate heating boiler, K, or its equivalent, in which the fresh water is heated by the escaping effete water from the digester.

Fourth, The combination with the digester, A, of the pump, P, for forcing fresh water into and through the material in the digester to be pulped by highly heated water under pressure, the heating tank, K, or its equivalent, and the coil, R S T N, or its equivalent, for further heating the incoming fresh water.

Fifth, The combination of the pump, P, and the heating coil, R S T N, and intermediate tubing for forcing into the digester heated fresh water and the pump, X, for producing an auxiliary circulation of highly heated water from the bottom to the top of the digester.

51,572.—Process for Making Paper Pulp.—John W. Dixon, Philadelphia, Pa.:

I claim the process of treating wood or other vegetable fibrous substances by boiling in a solution of caustic lime, under pressure as a process or preparatory process for making pulp for the manufacture of paper from wood, straw or other vegetable substances, substantially as described.

Notes and Queries

J. T. B. asks:—"If a patent is granted for a composition to be used in the manufacture of certain articles named in claim, can the holder of the patent sell the right of territory to manufacture one or more of those articles without invalidating the balance? For instance, I have taken out a patent for the manufacture of picture frames, busts, and other ornamental work, besides match plates and follow boards in founderies. Can I sell the right of territory for match plates and follow boards, reserving the remainder, without invalidating the claim to the other portion of my patent?" ANS.—Yes. You can subdivide your patent and sell as many different rights as you choose.

J. R. W. asks:—"Will you have the kindness to state the best apparatus for an amateur photographer; also the best process?" ANS.—For an amateur the best instrument will be a stereoscopic, so that stereoscopes can be taken, or single pictures An amateur should commence with the wet process, which is that commonly practiced in the galleries, and after becoming familiar therewith, take up the various dry processes, of which the tannin process is the best. In either process the first thing to be learned is to make negatives. Then comes printing. In the latter branch the production of porcelain pictures will be found very simple and interesting. Buy your apparatus from the first establishment whose advertisement you find in the SCIENTIFIC AMERICAN.

J. H. W. asks:—"Suppose a man has two patents, both designed to accomplish one object, but one or either can be used independently, can he sell one for any special purpose, and yet reserve the use of it for other purposes?" ANS.—Yes. "Suppose a man has one patent adapted to two or more different purposes, as for example, a furnace which may be used by a tinner, and also by a blacksmith, can he sell the right for the use of one mechanic and reserve the right to himself to sell for other purposes?" ANS.—Yes.

J. F. asks:—"If one or more of a certain person's claims, in a combination patent, can be used by another party in another combination for the same purpose, or for another purpose, can it be done without first obtaining consent?" ANS.—We do not fully understand the above inquiry. What do you mean by a combination patent? No person can use a patented device without the consent of the owner of the patent.

J. H., of Kansas.—A good "dip" for cast brass is sulphuric acid, 1 qt.; nitric acid, 1 qt.; water, 1 qt. Gold lacquer for undipped brass is alcohol, 4 gals.; turmeric, 3 lbs; Gamboge, 3 oz; sandarach, 7 lbs.; shellac, 1½ lbs; turpentine varnish, 1 pint. Green bronze dip is wine vinegar, 2 qts.; verditer green, 2 oz.; sal ammoniac, 1 oz.; salt, 2 oz.; alum, ½ oz.; French berries, 8 oz.—boil together.

E. C., of Pa.—A horse-power is the power that will raise 33,000 lbs. one foot in each minute; 33,000 lbs. of water falling one foot in each minute exerts one horse-power. A cubic foot of water weighs 62½ lbs. To get the horse-power of a stream, therefore, multiply the number of cubic feet which flow in a minute by 62½, and by the height of the fall in feet, and divide by 33,000,

G. L.—If you correspond with the advertisers of the mills which, from time to time, you see in the SCIENTIFIC AMERICAN, you will get the information you desire.

W. T., of S. C.—British subjects can obtain patents on the same terms as American citizens.

T. H. Mc. asks:—"If an inventor assigns an invention so another party, on condition of receiving a certain sum when the patent is issued, and if the assignee transfers the invention to a third party, whose interest it is not to have the patent issue, can the inventor apply independent of the other parties and take out the patent?" ANS.—Yes. It is not new to attach runners to wheeled vehicles, as you propose.

D. F. W., of R. I.—We have found ground slippery elm very efficacious in preventing scale, such as forms in your boilers Try it. The scale you send us seems to be chiefly mud. You might prevent the scale from entering the boiler by putting fine brush wood on your heater. The scale will form in a great measure on this brush, and thus purify the water before entering the boiler.

W. P. B., of Wis.—For your varnish receipt see another column. A good hygrometer indicates the degree to which the air is saturated with moisture, but it would require a long series of observations to determine the relation of such saturation to changes in the weather, and we are not aware of any such series of observations having been made.

C. R. A., of Pa.—You will find minute directions for making an electrical machine in "Silliman's Philosophy," and in some cheaper school philosophies.

A. C. T., of N. Y.—There are schools of mines now connected with Harvard, Yale, and Columbia Colleges, but we know of no college in which mechanical engineering is taught as a separate course.

THE GREAT PARIS EXPOSITION OF 1867.

TO THE MANUFACTURERS, MECHANICS, INVENTORS, PRODUCERS, ENGINEERS, ARCHITECTS, ARTISTS, AND SCIENTIFIC AND EDUCATIONAL ORGANIZATIONS OF THE UNITED STATES.

OFFICE OF THE UNITED STATES AGENCY OF THE EXPOSITION,
No. 5 Spruce street, Tribune Building, and
No. 40 Park Row, Times Building, New York.

The undersigned, having been appointed by the Secretary of State to the above-named agency, and being desirous of the co-operation of his countrymen in his efforts to make as complete, interesting, and creditable as possible the representation of our country at the great exhibition, adopts this method of conveying to them information and suggestions upon the subject.

In compliance with a request made through our Minister at Paris the time for filing applications from the United States has been so far extended that all which reach the undersigned before the 20th of January next may be in season. When examined and considered, the decisions will be duly made known.

Parties wishing to exhibit are requested to apply immediately to the undersigned for correct forms of application and instructions, inclosing postage stamps for reply.

Articles accepted should be delivered at New York prior to Jan. 31, 1867.

Accepted articles will be shipped from New York to Paris and returned at Government expense, if the expected necessary action of Congress obtains.

To prevent unnecessary trouble, it should be understood that it is a primary object to make the representation of the United States as complete as possible in all the groups enumerated below, and that it will therefore be necessary to select representative articles in every group, rather than accept an excess in any one.

In order to secure the universality of character above indicated, it is suggested that in each city or neighborhood those classes of manufacturers, artisans, and others who produce articles for very general use or consumption, should, without any delay, agree among themselves as to the specimens for which space should be applied for.

Every effort should be made to bring forward new and useful mechanical inventions, combinations and fabrics, and pains should be taken to have all articles neatly and thoroughly finished and prepared for exhibition.

The selections of products will be limited in quantity to the area they are to occupy; but in variety and character they should comprise a full and fair representation of American products, industry, arts, and science.

In each section assigned to exhibitors of the United States, the objects exhibited will be divided into ten groups, namely:—

GROUP 1—Works of art.
GROUP 2—Materials and applications of the liberal arts.
GROUP 3—Furniture and other household articles.
GROUP 4—Clothing (including cloths) and other wearing apparel.
GROUP 5—Mining, rough and wrought products.
GROUP 6—Instruments and processes of the mechanical arts.
GROUP 7—Food, fresh and preserved, in its various states.
GROUP 8—Live agricultural products and specimens.
GROUP 9—Natural horticultural products and specimens.
GROUP 10—Objects especially exhibited for the purpose of improving the physical and moral condition of the population.

Applicants will please indicate in a note appended to the application:—

1. If it is desired to exhibit machines or other objects requiring foundations or special constructions, give the dimensions of those foundations or constructions.

2. If it is desired to exhibit apparatus requiring the employment of water, of gas, or of steam, what quantity or what pressure of water, or gas, or steam will be necessary.

3. If it is desired to put machinery in motion, what will be the velocity proper to each machine, and what motive power will be required, expressed in horse-power.

4. In general, whatever information will be of use in the placing of the machine, and, wherever possible, a plan upon a fixed scale.

Producers who apply for room in the park, and propose to establish there constructions of any kind, or agricultural buildings, or gardens, will take care to give a plan, with a scale of the establishment proposed, with an indication of the extent of ground which will be necessary.

The amount of space assigned to the United States in the Exhibition Palace is about thirty thousand feet. The space to be assigned to them in the surrounding park for agricultural and other purposes has not yet been decided upon, and as it depends upon the nature of the applications for space there, it is very desirable that such applications should be sent in as soon as possible.

As much promptness as may be consistent with due deliberations is earnestly recommended in all applications, as it is possible that those received at New York after the middle of January, 1866, may be too late.

Due notice will be given to applicants as to the acceptance or rejection of their applications. If accepted, the applicants will have until January, 31, 1867, to prepare and transport their specimens to New York.

Detailed plains, on the scale of 0m.020 to the metre, showing the place assigned to each exhibitor and each individual mode of exhibiting, together with a list of the exhibitors, will be transmitted by the Government agent prior to Jan. 31, 1866, in order that the Imperial Commission may regulate the interior partitions of the building in accordance with the requirements of this nation.

Each nation can claim, as its special park, that part of the Champs de Mars adjoining the space allotted to it in the palace of the Exposition.

It is apprehended that individuals may not fully appreciate the importance of providing a complete representation of the great staples and the crude agricultural and mineral productions of their States; and he submits the expediency of causing some competent person to be instructed in each State to cause to be collected, labeled and forwarded to the Agency specimens of the character indicated, space for which will be reserved.

No rent will be charged to exhibitors, whether French or foreign, for the space they occupy; but all the expenses for fitting up and decorating the same, either in the palace of the Exposition or the park, will be paid by them.

For further particulars address

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PARTIES DESIROUS OF MANUFACTURING A NEAT One-horse Iron Mower, for the Eastern States, or the neatest and lightest Hand Lawn Mower in the world, will please address
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Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

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Improved Rigged Oars.

Men who paddle their own canoes, in popular phrase, often do it with a reckless disregard of the consequences. With the old-fashioned oars and method of using them, it is impossible to see the direction one is going unless by occasional convulsive twists of the neck which threaten to dislocate it. If a man should ride horse-back, with his face to the tail, he would present an absurd spectacle; yet this is, in effect, what oarsmen of the period do.

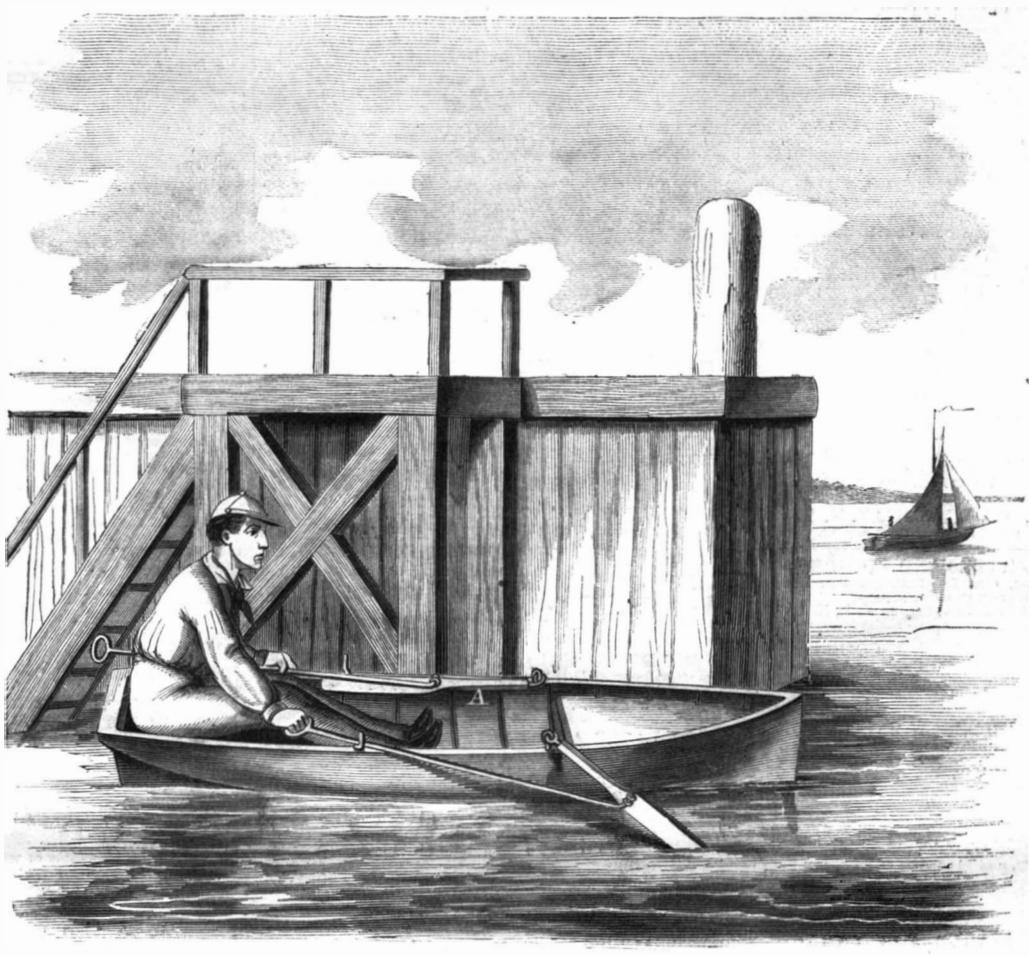
The engraving shows a new plan of propelling boats with oars. They are so fixed that the rower faces the bow, and is able to direct the boat to avoid danger or otherwise with great ease and comfort.

The manner in which this is done is so clearly shown by the artist's pencil, that explanation is superfluous.

It will be seen that the oars can readily be shipped aboard at any moment, as at A, to avoid collision with the dock or any obstacle, or to stop the boat entirely.

It is claimed that this plan is much easier than the old one—that the capacity of a boat of a given size is greater, that it is more easily steered by the oars, that the oarsman cannot make a false stroke or "catch a crab," since the oar is fast and is not liable to turn in the hands, and that the oars may be suffered to float alongside without danger of losing them; also, that the boat is steadier in a sea-way.

A patent for this invention was obtained through the Scientific American Patent Agency, Sept. 12, 1865, by R. Smith; a working model may be seen by applying to him at No. 189 Front street, Brooklyn, N. Y., where, also, further information can be had.



SMITH'S RIGGED OARS.

SPECIAL NOTICES.

Martha M. Jones, administratrix of the estate of Samuel T. Jones, deceased, of Staten Island, N. Y., has petitioned for the extension of a patent granted to him on the 24th day of February, 1859, for an improvement in the manufacture of zinc white.

Parties wishing to oppose the above extension must appear and show cause on the 5th day of February next, at 12 o'clock, M., when the petition will be heard.

Simeon Savage, of Pomfret, N. Y., has petitioned for the extension of a patent granted to him on the 2d day of March, 1852, for an improvement in machines for printing floor cloths.

Parties wishing to oppose the above extension must appear and show cause on the 13th day of February next, at 12 o'clock, M., when the petition will be heard.

Lewis Lewis, of Vicksburgh, Miss., has petitioned for the extension of a patent granted to him on the 2d day of March, 1852, for an improvement in cotton presses.

Parties wishing to oppose the above extension must appear and show cause on the 12th day of February next, at 12 o'clock, M., when the petition will be heard.

Charles Neer, of Brooklyn, E. D., has petitioned for the extension of a patent granted to him on the 9th day of March, 1852, for an improvement in canal-lock gates.

Parties wishing to oppose the above extension must appear and show cause on the 19th day of February next, at 12 o'clock, M., when the petition will be heard.

Nicholas Taliaferro, of Augusta, Ky., and William D. Cummings, of Maysville, Ky., have petitioned for the extension of a patent granted to them on the 30th day of March, 1852, for an improvement in smoothing irons.

Parties wishing to oppose the above extension must appear and show cause on the 30th day of March next, at 12 o'clock, M., when the petition will be heard.

John M. Thatcher, of New York City, has petitioned for the extension of a patent granted to him on the 23d day of March, 1852, and reissued the 11th day of Sept., 1855, for an improvement in air-heating stoves.

Parties wishing to oppose the above extension must appear and show cause on the 5th day of March next, at 12 o'clock, M., when the petition will be heard.

The Way "Serpents' Eggs" are Made.

Mr. C. H. Wood gives, in the *British Journal of Photography*, the following directions for making the curious and popular toy, Pharaoh's Serpents:—

"The toy consists of a little cone of tin foil, containing a white powder, about an inch in hight, and resembling a pastile. This cone is to be lighted at its apex, when there immediately begins issuing from it a thick, serpent-like coil, which continues twisting and increasing in length to an almost incredible extent. The quantity of matter thus produced is truly marvelous, especially as the coil which so exudes is solid and may be handled, although, of course, it is extremely light and somewhat fragile.

"Having a little of the white powder, with which the cones are filled, placed at my disposal by a friend, I submitted it to analysis, and found it to consist of sulphocyanide of mercury. This salt, when heated to a temperature below redness, undergoes decomposition, swelling or growing in size in a most remarkable manner, and producing a mixture of *mellon* (a compound of carbon and nitrogen) with a little sulphide of mercury. The resulting mass often assumes a most fantastic shape, and is sufficiently coherent to retain its form. It presents a yellow color on the exterior, but is black within. The 'serpent' shape, of course, results from the salt being burnt in a cone of tin foil.

"Both the mercurous and mercuric sulphocyanides decompose in the same manner, but the mercuric salt, containing more sulphocyanogen, seems capable of furnishing a larger quantity of mellon, and is the one used in the French serpents. A solution of pernitrate of mercury is readily precipitated by sulphocyanide of ammonium, and the mercuric sulphocyanide may be easily so prepared. It is best to use the mercurial solution as strong as possible, and to keep it in excess throughout the precipitation. Solution of perchloride of mercury is not so easily precipitated as the pernitrate, probably owing to the solubility of the mercuric sulphocyanide in the chlorides.

"Perhaps I may be excused for adding that sulphocyanide of ammonium, suitable for the above purpose, may be very easily and economically prepared as follows:—One volume of bisulphide of carbon, four volumes of liq. of ammon. fort., and four volumes of methylated spirit are put into a large bottle, and the mixture frequently shaken. In the course of one or two hours the sulphide of carbon will have entirely dissolved in the ammoniacal liquid, forming a deep red solution. When this result is attained the liquid is boiled until the red color disappears and is replaced by a bright yellow. The solution is then evaporated at a very gentle heat (about 80° or 90° Fah.) until it caystallizes, or just to dryness. The product is sulphocyanide of ammonium sufficiently pure for the above purpose. One recrystallization in alcohol will render it quite white.

"One ounce of bisulphide of carbon yields, by this process, exactly one ounce of sulphocyanide of ammonium."

FROM THE STEAM PRESS OF JOHN A. GRAY AND GREEN.