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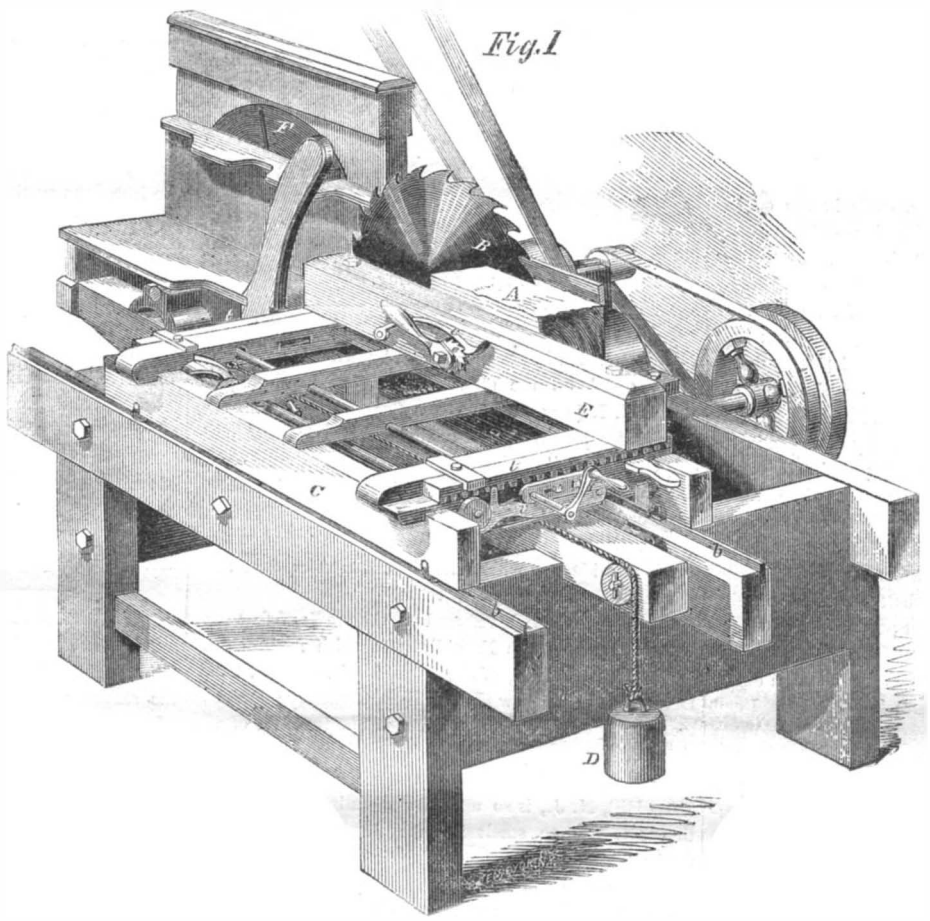
IMPROVED SHINGLE MACHINE.

Notwithstanding all the ingenuity which has been expended on shingle-making machines, and notwithstanding the apparent perfection with which some of them work, our inventors still discover improvements which may be made in them, to secure either greater simplicity or more accurate operation. The annexed cuts represent a machine which possesses several novel arrangements, which is very simple, and produces admirable work.

Fig. 1 is a perspective view of the machine, A being the block in the act of being sawed into shingles, B the saw and C the movable carriage to which the block, A, is clamped. The feed motion, by which the block is moved to the saw as the latter takes off the shingle, is effected by means of the pinion, *j*, Fig. 3, which meshes into the rack, *k*, which rack is pivoted at its left hand end to the carriage, C; the revolutions of the pinion sliding the carriage along the ways, *l l*, to the left. The two flat pins or studs, *m* and *n*, are driven firmly into the side of the rack, *k*, and project under the metal plate, *o*, which is firmly secured to the solid parts of the machine, and thus the rack is held down in gear with the pinion; but when the forward motion of the rack has carried the stud, *m*, from under the plate, *o*, the weighted lever, *p*, by pressing upwards against the studs, *m* and *n*, lifts the rack, *o*, out of gear with the pinion, *j*, and thus the forward motion of the carriage is stopped. The stud, *m*, instead of being driven firmly into the side of the rack as stated, is, in fact, the bent end of a long rod reaching from the end of the machine, which passes through a slot in the rack and may be slipped longitudinally to adjust the stopping point of the forward passage of the carriage to the length of the shingle block. The weight, D, is attached by a rope to the carriage, and is consequently drawn up as the carriage moves forward; but when the pinion, *j*, is released from its hold on the carriage by the lifting of the rack, *o*, the weight, D, draws the carriage back to the right, bringing the left end of the block again to the edge of the saw. In this backward passage, the studs, *m* and *n*, slide along on the upper edge of the plate, *o*, thus holding the rack clear from the pinion, *j*, until the stud, *n*, slides from off the end of the plate, *o*, when the rack falls again into gear with the pinion, *j*, and the rotations of the latter being continuous, the forward motion of the carriage is resumed. When it is desired to stop the motions of the carriage to put on a block, without stopping the rotary motions of the saw or of the pinion, *j*, the catch, *p*, on the rod, *r*, is moved horizontally sidewise so that the latch, *s*, which is pivoted to the rack, *k*, may seize upon the catch, *p*, as the rack, *k*, rises, and thus the rack may be prevented from falling into gear with the pinion, *j*. The lateral motion of the block after each shingle is cut, by which the block is placed in position for cutting the succeeding shingle, is illustrated in Figs. 1 and 4. The timber, E, to which the block, A, is clamped, is fastened at its ends upon two racks, *t* and *t'*, which slide in smooth grooves fastened to the solid parts of the machine. One of these racks is represented in Fig. 4, and its fellow is precisely similar. The cam, *u*, is secured rigidly to the end of a rod which is turned one-fourth of a revolution at the end of each backward passage of the carriage, by means of a spiral groove in a cylinder which is fastened upon it, coming in contact with a pin or spring which is rigidly secured to the solid parts of the machine. As the cam, *u*, is turned it presses down the spring catch, *v*, and slides along the rack, *t*, one cog, allowing the catch to return to its hold upon the rack. At the opposite end of the rod, a cam similar to *u* is fastened at right angles with *u*, so that, when the succeeding passage of the carriage turns the rod, *u* is merely brought in position ready to act while the cam at the opposite end of the rod moves its rack, the spring catch, *v*, holding meanwhile the rack, *t*, from moving. Thus, the two ends of the timber, E, are moved forward alternately, feeding the block laterally to the saw in a manner to cut the shingles of the proper wedge-shaped form. The mode in which the block is clamped to the side of the timber, E, forms a material portion of this invention, and is illustrated in Fig. 2. The claws or dogs, *h h*, are attached to the racks, *i i*, which gear into the pinion, *f*; the axle of this pinion passes through the timber, E, and has a handle upon its end, as shown in Fig. 1, by which the pinion may be turned, and thus the dogs are carried apart to receive the block and then brought with force against its ends, where they are held by the ratchet wheel, *e*, and spring catch, *c*. F is a revolving plane for jointing the edges of the shingles. The inventor says that one man only is required to operate this machine, and that with it he can saw and joint 1,000 shingles per hour, producing as handsomely sawed shingles as ever were made.

A patent for this invention was issued through the Scientific American Patent Agency, July 13, 1858, and persons desiring further information in relation to it will please address the inventors, Erastus Hall and Joel F. Stewart, at East Randolph, N. Y.

Fig. 1



HALL & STEWART'S SHINGLE MACHINE.

Fig. 2

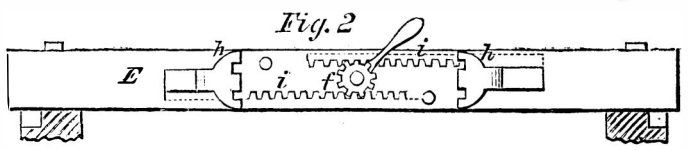


Fig. 3

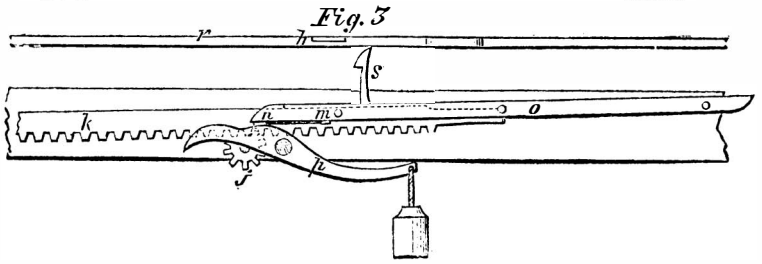
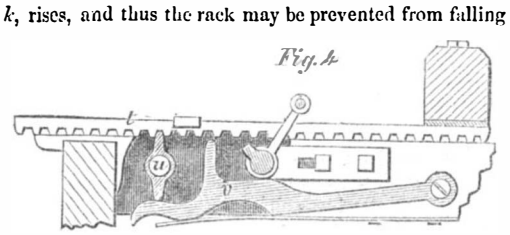


Fig. 4



THE NORTH ATLANTIC TELEGRAPH LINE.

Our countryman, Col. T. P. Shaffner, has been astonishing the *douce* people of Glasgow, Scotland, with his enterprise and adventures in the northern seas and Greenland. It is well known that Col. Shaffner has obtained a charter from the King of Denmark to run a telegraph line through Greenland (part of the way) and to occupy Iceland as a station for his proposed telegraph route of several short cables to avoid a long submarine circuit. To determine the practical character of his northern route, he chartered a vessel—the *Wyman*—and, with a competent crew, went on a survey in August last. He has accomplished his object, and has arrived in the Scottish commercial metropolis, where, on the 28th of November, he delivered a lecture on his adventures, before a very large audience in the Merchants' Hall of Glasgow. We will condense the leading features of his lecture which has been reported very fully in the *Herald* of that city.

Col. Shaffner was introduced to the audience by the Dean of Guild, who paid him a very high compliment for his enterprise and daring. The lecturer stated he had no pecuniary object in view; his aim was to communicate personal knowledge of the subject. In 1853, he commenced to devote his energies to the construction of a telegraph line between Europe and America. "In the latter part of 1853," said he, "I commenced to advocate the practicability of laying a cable in the ocean. That was the first point for consideration—Was it possible to lay a cable in the deep sea? The next was—Was it practicable to *work* a cable in the deep sea? The latter I admitted; the first was a point of discussion. I dared not venture my reputation as a telegrapher, at that time, to deal heavily with the question. I had no doubt of the practicability of laying a submarine electric cable on the bottom of the ocean, and I had to fight for that point. Telegraphers assailed me in every direction in regard to it—so much so that the most prominent gentlemen engaged in the telegraphing at that time, made such a remark as this (as will be found in the American prints): 'Would Mr. Shaffner risk a cable, such as we find necessary to span inland waters a mile in length, where they have a soft sandy bottom, as is usually found, to the caprice and unknown powers of the ocean, where the heaviest cable would float, without gravity, to reach the ocean's bed?' Such was the opinion entertained at that time by telegraphers in America. I can find no report of scientific telegraphers advocating that the measure was practicable. About the same time, and after satisfying my friends, that it was possible to lay a cable at the bottom of the sea, arose a philosophical question denominated among telegraphers the 'retardation of the electric current' in sub-aqueous conductors—that is to say, that when a current of electricity is transmitted through a wire in a submarine cable, there is a power in nature which arrests that current which you propose to transmit; hence it requires more or less time for it to get to its termination. On air lines we have nothing of that kind."

When Faraday then discovered that a submarine cable became like a long Leyden jar, Col. Shaffner was perfectly convinced that a telegraph cable between Newfoundland and Ireland was impracticable for commercial purposes; and in 1854 he visited Europe for the express purpose of satisfying himself of the correctness of his views; and the Atlantic cable has since that time more than confirmed them. He early advocated a northern route, but he was ridiculed for advancing such opinions. People said that icebergs and currents would sweep away the best cable that could possibly be laid. To remove such opinions was the object of his late researches in the northern seas; and on the 29th of August, 1859, he left Boston, provided with very perfect apparatuses both for surveying and sounding, and proceeded northward through Belleisle Straits to the coast of Labrador, where he explored various inlets and bays, and came to the conclusion that the best starting point for the cable would be between the 54th and 55th degrees of north latitude. From thence he shaped his course to Greenland, a distance of about 500 miles, and found that the greatest depth was 2,000 fathoms. The bottom gradually sinks as it recedes from the west, until about 100 miles from Labrador, where it is found at 1840 fathoms. After this a basis of nearly the same depth succeeds, until within 80 miles or so of the Greenland coast, when it sinks to 2,000 fathoms, and from thence rises somewhat abruptly. The ascent, however, does not terminate at the coast line, but continues up the *fjords* or bays, on which there are several along the coast. These *fjords* are, in fact, exceedingly numerous all along the Greenland shores, extending even as far as 50 miles inland, and are never frozen. Having finished his sounding operations, Col. Shaffner next proceeded to examine the coast as far north as 63 degrees, and then struck out for the interior, in order practically to ascertain how far the country was adapted for laying the wires, and came to the conclusion that the thing could be done without the great destructive effect which it was hitherto supposed would ensue from the frost. He penetrated into the interior, and found the climate far milder than he expected. During the sojourn of the exploring party in Greenland, they were most hospitably received at all the places they visited; illuminations even, in some places, having been got up in honor of their arrival. After surveying the southern coasts of the country, they proceeded to the east, which is of a similar character to the west. From thence the bottom makes an abrupt descent at rather over the angle of 45 degrees until a short distance from shore, whence there is much more gradual ascent until Iceland, 200 miles off is reached. The remainder of the voyage showed 800 to 1,000 fathoms' depth from this island past the Faroes to Cape Wrath, in Sutherlandshire; the submersion of the cable being 272 and 200 miles respectively.

Col. Shaffner concluded his lecture by showing a number of Esquimaux curiosities, and a hearty vote of thanks was accorded to him by the meeting.

FRANKLINITE METAL.

Our attention has been directed by two correspondents to an article on the above subject, published on page 398, Vol. I. (new series) of the SCIENTIFIC AMERICAN, which we copied from and credited to the "New American Cyclopedia." We are informed that a number of the statements in that article are incorrect, and proof is furnished us to confirm the veracity of the objections made to their reliability. We will point out the statements and ideas to which the objections refer, and then present the evidence against them.

First: In the article referred to, the credit of first successfully working the Franklinite ore with anthracite is given to Mr. E. Post, of Stanhope, N. J., and Mr. C. E. Detmold, of the New Jersey Zinc Company; and the idea conveyed is, that Mr. Post is the inventor of the method.

Second: It is also stated that the Franklinite ore at Mine Hill, N. J., is so unfit for metallurgical purposes that attempts to smelt it were unsuccessful and the works abandoned.

In answer to the first paragraph, as a correction, we are informed that the experiments undertaken at Stanhope were projected by Mr. Thaddeus Selleck, of Winchester, Conn., who was engaged for this purpose by the Zinc Company at Newark, N. J., and that he is the inventor of the process whereby the Franklinite ore was first smelted successfully to obtain the metal. He was granted a patent for this invention on Jan. 30, 1855, and it was issued after a severe contest in the Patent Office. He produced ample testimony regarding the originality of the invention. We have examined this patent, and the claim is for the process of reducing Franklinite ore to obtain iron and the white oxyd of zinc by working it under a light head in a vertical walled, low cupola furnace.

The furnace described in the "Cyclopedia," which is now employed for smelting the Franklinite, is stated to be 18 feet high. This is a "light head," as the common iron furnaces are about 40 feet high; it therefore embraces the leading idea in Mr. Selleck's patent. The drawing in the patent represents a low cupola furnace with a dome-shaped top, and it has oblique air channels near the upper surface of the charge for injecting air into the top of the fire to produce perfect combustion by uniting with the carbonic oxyd, This arrangement also furnishes oxygen for the zinc; a more intense heat is the result, and the furnace never chokes up at the mouth. We are told that this furnace and process were perfectly successful, excepting in one feature, viz.: the oxyd of zinc produced was a beautiful durable yellow instead of a white paint. The reduction of the ferruginous part of the ore to metal was all that could be expected, and it was the "light head" of the furnace which secured the desired results.

We have only to state, in regard to the second statement referred to, that the smelting of the ore at Mine Hill was as successful as could be expected; and it was not on account of the ores that the works were abandoned, but difficulties in the company owning the mine. The ore is capable of producing a good Franklinite metal with a properly constructed furnace.

The pig metal obtained by the smelting of Franklinite ore is very different from pig iron; it has the qualities of a peculiar alloy. In color it is much whiter than iron, and when cold, it is much harder; in this respect it resembles steel and specula metal. It melts at a much lower temperature than iron, and it flows something like tin. Thus, take a piece of this metal, and put some borax on a piece of iron, and lay the Franklinite on the top of this; put it into a blacksmith's fire and it will melt, flow over it, and adhere to the iron more firmly than any two pieces of metal brazed together. Mr. Selleck obtained a patent on July 5, 1859, for coating the surfaces of iron with Franklinite metal in this manner. Applied to the sharp heel-pieces of horse-shoes it forms a durable thin sharp edge, as it is harder than the iron; and as the latter wears faster, the heel "corks" never grow dull, as in common horse-shoes. The Franklinite metal may also be thus brazed on faggots of iron and rolled out into plates, so as to leave a very hard surface that will protect the iron from rusting so rapidly, and at the same time add to its strength. Iron plates thus made may be superior to the thin steel plates which are now coming into use in England in shipbuilding; but it will require experiments to determine this, and we earnestly suggest that they be made. If successful, it will be of great benefit to this country, because the Franklinite ore is exclusively American—all that has yet been found in other parts of the world is not worth mentioning. It alloys with copper, welds with iron, and is adapted for coating the treads of wheels, the tops of rails and the edges of tools. About 5 lbs. of Franklinite metal smelted in a crucible (in the usual manner) with 100 lbs. of wrought iron will make very good steel. This peculiar metal deserves more public attention than it has yet received.

WATER PURIFIED FROM LEAD.

In answer to the inquiries addressed by the British Trinity House Board to Professor Faraday, relative to the sanatory condition of the water used by lighthouse-keepers, and the best methods of purifying the same, so as to be fit for drinking and cooking purposes, the professor remarks:—"As lighthouses are often of necessity placed in situations where water is obtained with difficulty, those who keep them are frequently dependent, more or less, upon that which is gathered from rain falling upon the leaden roofs, galleries, and gutters of the towers and cottages occupied as dwellings, Now, the salt of the sea spray, which often reaches these roofs, &c., even when they are half a mile or more from the shore, causes the rain water which falls upon them to dissolve a portion of the lead, which is larger or smaller under different circumstances, and at times rises up to a quantity injurious to health and poisonous. The water thus contaminated by lead, or rather chloride of lead, is peculiar in this, that it does not lose the poisoning substances either by boiling or by exposure to air, for the metal remains soluble after one or both of these processes."

He has ascertained that if a little whiting or pulverized chalk (carbonate of lime) were added to such water, and the whole shaken or stirred together, the lead immediately assumed the insoluble state; so that when the water was either filtered or left to settle, the clear fluid was obtained in a perfectly pure and salubrious condition. The process of purification is therefore exceedingly simple, for if some powdered chalk or whiting is put into the cistern in which rain water is collected, and stirred up occasionally after rain, the water may, with the greatest facility, be obtained in a state fit for all culinary and domestic purposes.

REPORT OF THE SECRETARY OF THE INTERIOR.

The following are two extracts from the report of the Secretary of the Interior—Hon. J. Thompson. They do honor to his head and heart, and will be found very interesting to our inventors and farmers:—

PATENT OFFICE.

The record of the operations of the Patent Office during the past year furnishes, as usual, a most satisfactory exhibit of the steady progress of our country in the application of science to the arts.

During the three quarters ending September 30, 1859, five thousand one hundred and sixty-seven applications for new patents were received; eight hundred and thirteen caveats filed, and three thousand three hundred and thirty-four patents issued and re-issued.

By a reference to my report of last year, it will be seen there has been an increase in the business of the office for the past nine months, over the corresponding months of 1858, of one thousand and seventy-six applications for patents, one hundred and seven caveats, and five hundred and eighteen patents granted.

The receipts for the three quarters were $188,538 77, being an increase of £37,554 86 over the corresponding period of last year. The expenditures were $157,101 15, leaving a surplus on hand of $31,437 62.

Congress in its last session, in making provision for the publication of the mechanical portion of the Patent Office report, directed the Secretary of the Interior to cause the report "to be prepared and submitted in such manner as that the plates and drawings necessary to illustrate each subject shall be inserted so as to comprise the entire report in one volume, not to exceed eight hundred pages." With an anxious desire to comply in all respects with the expressed will of Congress, I have given to the subject unusual attention. The plates without descriptions and claims would be unintelligible; the descriptions and claims would be of no value. The plates reduced to the smallest possible dimensions, and the descriptions and claims drawn up without a single redundant word, printed in the type required for all Congressional documents, will necessarily occupy more space than eight hundred pages. A literal compliance with the law is, therefore, a physical impossibility. Yielding to the necessities of the case, I have directed the plates to be prepared with the greatest possible economy of space, and the descriptions and claims with the utmost brevity consistent with perspicuity, and submit the matter to the consideration of Congress, with a frank admission that the law has not been obeyed because it reqired an impossibility.

The principle upon which the Patent Office was organized, and has been conducted up to this time, is, that its business should produce so much in the way of fees as would prove sufficient to defray its necessary expenses. It has developed no burden upon the Treasury of the United States. It sustains itself; and for this reason its friends have felt the greater confidence in appealing to Congress for such legislation as may be required to perfect its organization. For several successive years the attention of Congress has been earnestly invoked to the necessity of certain amendments in the existing laws, which experience has proved to be highly important, if not absolutely necessary.

The committees of Congress to whom the subject has been referred have uniformly approved these amendments, and reported in favor of their adoption; but in every case Congress has failed to consider and act upon the reports.

An increase of the business of the bureau, without a corresponding increase of force to manage it, results necessarily in one or two serious evils; either, on the one hand, vexatious delay, or, on the other, hasty and imperfect examinations of applications for patents. A few facts will suffice to illustrate this: In 1855 when the examining force of the bureau was increased to its present number, there were four thousand four hundred and thirty-five applications for patents. The number of applications for the year 1859, taking the average number of applications per month for the past ten months as the basis of the estimate, will be six thousand nine hundred; showing an increase of business for 1859 over 1855 of two thousand four hundred and sixty-five cases. In 1855 each examining room disposed of three hundred and sixty-nine applications; in 1859 each examining room will dispose of five hundred and seventy-five cases, being an increase in the amount of labor performed of fifty-five per cent. To this it may be added that the labor of making a thorough examination of any application for a patent increases from year to year somewhat in proportion to the similar applications previously received. Under these circumstances it is impossible for the office to do full justice in the transaction of its business either to itself or to the public. This is not right. The income of the office is amply sufficient to meet all the expenses which may be incurred in re-organizing it upon such a basis as will give it the greatest efficiency, and enable it to meet promptly all the demands of the country. The inventors pay for having their business done, and it is therefore but simple justice that it should be done with a proper and careful examination, and without unnecessary delay. It would be judicious, then, in Congress to authorize the appointment, from time to time, of such additional examiners, and first assistant-examiners as may be required to transact the business of the office with dispatch, provided the annual expenses of the office shall in no case exceed the annual receipts.

I take occasion here to renew the recommendation, contained in my report of 1857, that the fees required from British subjects should be reduced. Her Britannic Majesty's representative at Washington has recently called the attention of this government to this subject. In the kingdom of Great Britain no discrimination is now made between American citizens and British subjects. I think this courtesy should be reciprocated, and that, in respect to office fees, British subjects should be placed on the same footing as citizens of the United States.

Long experience and great familiarity with the working of this important bureau induce me to renew, not only the preceeding but all the recommendations contained in my previous reports, with still greater confidence in their propriety and correctness; and I must add that the inventors of our country, now grown to be a large, worthy and most useful class, have a right to claim a share of the time and attention of the law-making branch of the government, and to complain when their interests and business are wholly neglected or overlooked.

AGRICULTURE.

The following is the more important part of the report relating to this topic:—

The last Congress having greatly reduced the appropriations below former estimates, the policy of distributing seeds of domestic growth was abandoned, and no portion of the appropriation has been expended for their purchase. It is believed to be both wise and just to confine operations to the purchase and distribution of such varieties of plants, seeds, cuttings, &c., as have not already been introduced into the country.

The tea seed has been introduced from China, and germinated in houses prepared for that purpose in Washington. The step next to be taken is to convey the plants to suitable localities, and to cause them to be tested under the supervision of intelligent and responsible persons. This will be done at the earliest practicable period, and with no apprehension as to their successful growth in all cases in which proper attention shall be given.

The successful cultivation of the vine in this country no longer remains an experiment. The breadth of land planted in vineyards is every day extending, and the yield is large and remunerative. The estimate is that we now have more than eleven thousand acres devoted to this culture; and while the product of some vineyards, in the most favorable season, has been eight hundred gallons to the acre, the average crop per acre of the whole country will compare favorably with that of the most successful wine-producing countries of Europe, and its value is five or six hundred per cent greater at the several places of production. The different species of native grapes have been sought for, and, as far as practicable, the value of each for the manufacture of wine has been tested by chemical analysis. The modes of cultivation, and the processes of making and preserving wine, have been examined, and much interesting and valuable information obtained. A large number of cuttings, of the best and most approved varieties, have been prepared for distribution.

Steps have been taken to introduce from foreign countries a variety of seeds, plants and trees, which may be usefully cultivated and grown in this country.

A number of scientific gentlemen in various parts of the United States have been engaged for sevaral years past, without compensation, in making meteorological observations, which have been regularly communicated to the Patent Office; the necessary instruments being provided at the joint expense of the Patent Office and the Smithsonian Institution. To reduce these observations to a condensed tabular form has involved an expenditure which has also been jointly sustained. These observations, thus condensed, are now ready for the press, and will accompany the annual report of the Commissioner of Patents. They exhibit the mean temperature of the seasons in different parts of the country, and thus furnish data esteemed of high importance in scientific agriculture, and as of great value in supplying the facts on which are based important theories of the winds and storms that sweep over the continent.

In justice to the gentlemen who have devoted their time and labor in this behalf, these tables should be printed; but whether the expense should be defrayed by the Smithsonian Institution or by the government is a question submitted to the determination of Congress.

REPORT OF THE SECRETARY OF WAR.

We give a few interesting extracts from the Report of the Secretary of War, as they relate to inventions, the arts and sciences:—

ORDNANCE, ARMS AND EQUIPMENTS.

I have ordered the estimates from the Bureau of Ordnance to be made mainly in conformity to the policy which the action of the last Congress seemed to indicate by its appropriations. I cannot forbear to express the opinion, however, that to abridge the manufacture of arms is, to say the least, a measure of very doubtful economy, and may prove in the end to be both dangerous and expensive. A foreign war would create an immediate demand for an immense number of arms, probably enough, nearly, to strip all our arsenals, and to require the purchase of further supplies from private manufacturers, at whose mercy the government would be in the emergencies of war.

That constant progress in the improvement of arms and other appliances of warfare which has of late characterized the military service of other nations, has been, up to this time, no less active in ours. The experiments which have been in progress for some time past to ascertain the fitness of iron for the construction of gun carriages for sea-coast and garrison cannon, have resulted in complete success. They demonstrate the practicability of using iron in place of wood for the fabrication of such carriages, not only to very great advantages in point of economy, but also in quality. The ultimate saving to the country by this manufacture can hardly be estimated. Gun carriages heretofore have been not only expensive, but it has been found impossible to preserve the wood of which they were constructed from decay; so that each gun in all our forts must be remounted once every ten years to be fit for service. The substitution of iron for wood has remedied this perfectly, and the gun carriage may now be considered as indestructible. Models of wrought-iron sea-coast and garrison carriages have accordingly been adopted, and iron will be used in their fabrication hereafter.

Improvement has been introduced, also, in the forms of cannons, greatly increasing their endurance under repeated discharges, and rendering them consequently more reliable for service. In view of the not unfrequent accidents from the bursting of iron cannon, and the disastrous consequences that may result therefrom, it is important that the adopted models should be the best adapted for strength, and that none but the best material should be used in, and the best processes applied to, their fabrication. Experiments to ascertain the best model have been instituted and carried on with satisfactory results. They are still in progress, with special reference to a class of cannon of heavier caliber, for the more complete determination of the best mode of distributing the given weight of metal throughout the different parts of the cannon so as to obtain the greatest strength.

The subject of rifled cannon and projectiles has received much attention, and careful experiments have been instituted to test a variety of such contrivances. It is not deemed advisable to proceed to the manufacture of such cannon, beyond those required for experimental purposes, until full and fair trials shall have demonstrated, practically, which of the various inventions possesses

most advantages, or whether a combination of the advantages peculiar to several of them may not furnish the best government model.

BREECH-LOADING ARMS.

Under the appropriations heretofore made by Congress to encourage experiments in breech-loading arms, very important results have been arrived at. The ingenuity and invention displayed upon the subject are truly surprising, and it is risking little to say that the arm has been nearly if not entirely perfected by several of these plans. These arms commend themselves very strongly by their great range and accuracy at long distances; for the rapidity with which they can be fired, and their exemption from injury by exposure to long continued rains. With the best breech-loading arm, one skillful man would be equal to two, probably three, armed with the ordinary muzzle-loading gun. True policy requires that steps should be taken to introduce these arms gradually into our service, and to this end preparations ought to be made for their manufacture in the public arsenals.

CAMELS AS "SHIPS OF THE DESERT."

The experiments thus far made (and they are pretty full) demonstrate that camels constitute a most useful and economical means of transportation for men and supplies, throughout the great deserts and barren regions of our interior. A camel will go safely with its burden over ground so rough and precipitous that a mule will scarcely pass over it unladen without assistance. They require no forage but what they gather in the most sterile and barren parts of our continent, and for many days together live conveniently without water. An abundant supply of these animals would, beyond all doubt, enable our army to give greater and prompter protection to our frontiers, and to all our interoceanic routes, than three times their cost expended in any other way. As a measure of economy and efficiency, I cannot too strongly recommend the purchase of a full supply to the favorable consideration of Congress.

MILITARY SIGNALS.

Assistant-surgeon Albert J. Myer, of the medical corps of the army, having submitted to this department a system of military signals for the purpose of communicating intelligence or orders between distant points of land, a board was convened in March last to examine into its merits. The board reported favorably to the adoption of this plan for the uses of the army. A series of experiments with the field signals, instituted under special instructions from this department, have developed results which promise to be of value to the service. With an equipment simple, strong, weighing but sixteen pounds, and so compact as to be readily carried from place to place by a soldier mounted or on foot, which requires for its use but a single man, communication has been kept up and messages transmitted by day, and at night, a distance of fifteen miles. Messages have been sent five miles without any apparatus specially provided for the purpose.

For the distances at which communication by signals would be needed for military uses, the plan appears to be ready and reliable. The trials in progress give reason to believe that by the use of such signals there may be secured to the service a mode of communication more easy, safe and available than any hitherto known.

FORTIFICATIONS AND GAS-LIGHT THEREFOR.

I regard the statistics of the combined naval and military operations of the French in the recent Italian war as indications of the correctness of my estimate of our danger from such attacks, and as warranting the renewal of my recommendation to Congress to take steps toward carrying out the plan sketched in my last report for the defense of New York, in particular, from such attempts. The appended memoir on "American Fortification," prepared at my instance by Lieut. Morton, of the engineer corps, explains the details of the plan in question, with the aid of an accurate topographical map. It also contains an analysis of the general subject of coast defense, which I deem worthy of your notice.

It is eminently desirable that our completed permanent forts should be lit with gas, and I recommend that a small appropriation be made to introduce it into the most important ones without delay. By that improvement the risk would be diminished of accidental fires breaking out in the officers' quarters or the barracks, now to be apprehended from the vicinity of the magazines. The introduction proposed may also be recommended on the ground of economy. The post of West Point has been lighted in this manner with satisfactory results.

EXPLORATIONS—ARTESIAN WELLS.

A second expedition was sent into the Territory of Nebraska to explore certain tributaries of the Yellow Stone, the sources of that river, and of the Missouri. A portion of its labors has been accomplished, and the operations will be resumed in the ensuing spring.

A large amount of geographical and scientific information has been added, at small cost, through the labors of the different field parties, to our knowledge of the resources of the regions west of the Mississippi. Considerable tracts of country yet remain unknown, and the economy of continuing these explorations is evident when it is considered that they may open the country to travel, develop its mineral and agricultural wealth, shorten and afford new information concerning emigrant routes, and designate those portions of the wild territory that are susceptible of settlement.

I would respectfully invite your attention to the report of Lieut. Michler, who, under assignment of the War Department, was engaged upon the survey of an interoceanic ship canal near the Isthmus of Darien, *viâ* the Atrato and Truando rivers. Since his return from the scene of his field operations, considerable progress has been made in the reduction of observations and preparing the maps, until the want of means compelled him him to suspend progress and discharge the computers and draughtsmen. The valuable information procured by Lieut. Michler should not be left in its unfinished condition in the archives of the bureau, to prevent which a small appropriation will be required.

The wagon road upon the thirty-fifth parallel, reaching from Fort Smith, Arkansas, to the Colorado of the West, is completed as far as the appropriation would do it. It is now sufficient for any travel of troops, military supplies or immigrants. This route abounds in grass and water, offering very great advantages at this time for travel, which will be still further enhanced when the posts contemplated shall have been added to those already on the line.

The experiment of sinking artesian wells upon public lands has been further prosecuted, but still without attaining the desired results, and the appropriation for the object having become exhausted, it was directed that the work should be suspended. The details of the experiments are set forth in the accompanying reports. It may be considered now as demonstrated that to bring water from subterranean streams, to overflow the surfaces of the great western plains, is, for any reasonable amount of expenditure, impracticable.

REPORT OF THE SECRETARY OF THE TREASURY.

It is a very curious circumstance that, in this long and elaborate report, there is no clear statement of the total receipts and expenditures for the year, or of the amount of the public debt. There are, however, data from which the first of these important facts may be obtained, and we have taken the trouble to put them together for the convenience of our readers.

The revenue of the government for the year ending June 30, 1859, was—

Customs	$49,565,824 38
Public Lands	1,756,687 50
Miscellaneous	2,082,559 33
Total	$54,405,071 01

The expenditures for the same period were—

Civil foreign intercourse and miscellaneous	$23,635,820 91
Interior Department (Indians and pensions)	4,753,972 60
War Department	23,243,822 38
Navy Department	14,712,610 21
Total	$66,346,226 13
Year's Deficit	$12,941,155 12

There are a number of figures given in regard to the public debt, but in such a manner that we are unable to understand them with certainty; and we accordingly await the receipt of the schedule which presents a full statement of all the items and the amount, before attempting to give our readers the simple truth in regard to this important matter. The fact that the national debt—whatever its amount—was increased during the last fiscal year more than $12,000,000, in a time of profound peace, is disgraceful to the government, and induces us to respond heartily to the recommendation of the President, that some efficient means should be adopted to stop this ruinous practice of borrowing. We do not want to see the capital of the country—even now insufficient for the demands of business—absorbed in the maelstrom of an ever-growing public debt, and the industry of our people saddled with the support of a host of idle fund-holders, such as those under which the nations of Europe are staggering. The total imports for the year were $338,768,130, whilst the exports for the same period were $356,789,462.

REPORT OF THE POSTMASTER-GENERAL.

From the able report of Postmaster-general Holt, we learn that the expenses of the department for the year ending June 30, 1859, were $14,964,493 33, while the revenue amounted to $7,968,484 07; showing an excess of expenditures over receipts of $6,996,009 26. This enormous annual deficit Mr. Holt proposes to reduce in accordance with the following plans and estimates:—

Retrenchments already adopted, mostly in the subsidies to steamships	$1,539,221 00
Abolition of the franking privilege	1,800,000 00
Reduction in the exorbitant pay of railroads	1,084,558 00
Overland mails to California and Utah	1,229,756 36
Total	$5,653,535 36

The last item—the overland mails—the Postmaster-general proposes that the government should pay from the Treasury, as they have been established for purposes of state policy, and yield no revenue to speak of. The remaining deficit of $1,342,473 90, Mr. Holt thinks would be overcome in a few years by the increase of receipts, and by the adoption of still further practicable curtailments; and thus this great and important department of the government might be restored to the independent, self-sustaining position which it always occupied until within a few years. We cordially endorse the recommendation of these reforms.

THE LIME LIGHT AT THE LONDON CRYSTAL PALACE.

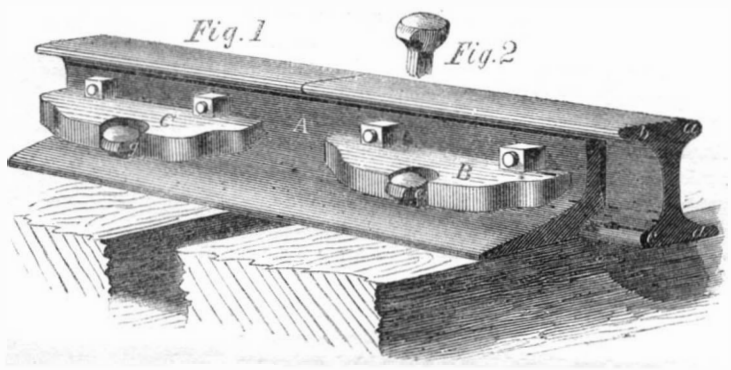
"The gas monopoly of the day is becoming so obnoxious that the introduction of any improvement in artificial light that can break in upon the present system will be sure to meet with public encouragement. This is very likely to be brought about by the Lime Light Company, whose brilliant light was exhibited at the Crystal Palace, a few evenings ago, before a large company of professional gentlemen. The power of this lime light is immensely in advance of the gas, which presents a very dull and miserable effect in contrast. The present Trinity House lamp, assisted by the most powerful reflectors, transmits light to about twenty miles, while the lime light, under similar circumstances, can be seen at a distance of ninety-five miles. On the evening in question one of these lights was placed in the Crystal Palace, at the end of the long transept, and emitted a light so intense as to illumine the whole length of the building, so that the smallest print could be read with the greatest ease at the extreme end. The great advantages of this light over the electric and other lights are its volume and continuity, as well as its economy, being the cheapest of any known light. It is admirably adapted for coast lights, for which we now pay £353,000 a year, one-half of which may be saved by the lime light."

[A correspondent sends us the above which he says he cut from an English paper; and asks us how the light is produced. The lime light—calcium light—Drummond light—as it has been variously named, is produced by the burning of a bit of lime in the flame of the compound blow-pipe. It has been known many years, and various efforts have been made to turn it to a practical use, but without success. One of the difficulties has been the delicacy of the manipulations required to keep up the supply of gases. The compound blow-pipe consists of two reservoirs, one of pure oxygen and one of pure hydrogen, with a small pipe leading from each so as to bring the gases together just before they issue from the jet. In volume twice as many gallons of hydrogen are required as of oxygen, though as oxygen is sixteen times heavier than hydrogen, the weight of the oxygen consumed is eight times that of the hydrogen. The result of the combustion is pure water. The compound blow-pipe was invented by Dr. Hare, of Philadelphia, and it produces the most intense artficial heat known. If the lime light will succeed anywhere, the Crystal Palace at Sydenham is just the place for it, as a large quantity of light is required, and a chemist competent to perform the necessary delicate manipulations may be profitably employed.—EDS.

BAYLEY'S RAILROAD JOINT AND SPIKE.

The invention which we here illustrate is worthy the attention of engineers and superintendents of railroads; it comprises a new form for the rail, a new device for securing the joints, and an improved spike head.

The form of the rail is that which would be produced by splitting the common T-rail vertically in the middle, reversing the outside half, and placing the two pieces together; this forms a symmetrical rail with a narrow thick lip, *a*, at the top on the inside, and and a broad thin lip, *b*, on the outside, furnishing a firm table for the wheel, and with a narrow thick lip, *c*, at the bottom on the outside, and a wide thin lip, *d*, on the inside, making a broad base for the rail. This rail, having the same form at top and bottom, is reversible, so that when the top becomes worn too much for use, it may be turned over and used as long with the opposite edge uppermost.



NEW RAILROAD JOINT AND SPIKE.

For fastening the ends of the rails together, the plate, A, is fashioned to fit the outside of the rails, and is bolted to them as shown in Fig. 1, the holes for the bolts being elongated to permit the expansions and contractions of the rails. To prevent the nuts on the bolts from turning, the blocks, B and C, are placed snugly under them and secured by the spikes, *e* and *g*. The spike head is made of the solid and strong form shown in Fig. 2 and is provided with a hooked projection by which it may be drawn from the tie by means of a crowbar without injury.

This invention is protected by two patents, secured through the Scientific American Patent Agency; one dated Nov. 1, 1859, and the other Dec. 3, 1859, and persons desiring further information in relation to it will address the inventor, G. W. R. Bayley, at Brashear, La. Patents have also been secured in England for this invention.

OUR STEAM FIRE ENGINES.

A large fire occurred in Beekman-street, this city, on the morning of Thursday, Dec. 29th, by which the paper warehouse of Cyrus W. Field and several other buildings were entirely consumed. At this conflagration two new steam fire engines exhibited their superiority as fire-extinguishers in a most gratifying manner. The *Manhattan*—(belonging to Engine Co., No. 8,) drawn by hand, and weighing only 5000 lbs.—threw two streams of of 1⅛th inch each, being about 500 gallons per minute; and the *Niagara*—a self-propeller—threw two streams of 1½ inch each, being about 700 gallons per minute. One of these engines commenced working at 5 A. M., and the other at 6 A. M.; and they never ceased pumping until the fire was completely subdued; being kept constantly working, for nearly ten hours. The firemen who were engaged on the hand engines at the fire were soon exhausted as the day was bitterly cold; but the steam machine never gets tired. These engines were built by Lee & Larned, of this city, and are each provided with Cary's rotary pump. It affords us pleasure to see these agencies adopted by our heroic firemen.

During the time the fire was raging, the Mayor of Philadelphia kindly telegraphed to the Mayor of New-York, that, if help were wanted, two steam fire engines were ready to start to assist in extinguishing the conflagration. The value of loss sustained is estimated at $500,000; it would have been double this amount, it is believed, but for the steam engines.

DOES A RED-HOT STOVE BURN THE AIR?

There is a very common notion that if stoves or furnaces are heated red-hot, the iron will combine with the oxygen of the air, in other words burn it, and render it unfit for breathing. If we examine the facts we find that this idea is true to so small an extent as to make it of no practical importance. The compound which is formed by burning iron in atmospheric air is principally the black oxyd, which consists of three equivalents of iron and four of oxygen, (Fe_3O_4) that is, 82 lbs. of iron to 32 lbs. of oxygen. Consequently, it will require 32 lbs of oxygen to entirely consume a stove weighing 82 lbs. Now 100 cubic feet of air weighs about 122 ounces avoirdupois, of which the oxygen forms about 28 ounces. It would consequently take all the oxygen in 1,800 cubic feet of air to entirely consume a stove weighing 82 lbs. A stove heated red-hot and exposed to the air would certainly last as long as 10 months, and if it were completely burned in 300 days it would consume the oxygen in six cubic feet of air per day. Lavoisier and Sir Humphrey Davy estimated that a grown person consumes 24 cubic feet of oxygen per day, which is the quantity contained in 115 cubic feet of air; consequently it would require at least 19 red-hot stoves to burn the air as fast as one pair of human lungs. We have made a safe estimate, and it is probable that a stove would last much longer than ten months, and therefore, that, in fact, 50 or 100 stoves would not consume oxygen as fast as the breathing of one man.

There are other considerations, however, to be taken into account in estimating the effects of red-hot iron on the human system. Heat from warm iron, below the temperature at which it is luminous, passes through crystals of rock salt as freely as any other heat, but this heat will not pass through glass, while that from red-hot iron will; showing that there is a difference in the nature of heat coming from red-hot iron and that from iron at a lower temperature. It may be that the effects of these different kinds of heat upon the human system are as different as their effects upon glass. The mode in which heat operates upon the various viscera of our bodies is very mysterious, and if there is sufficient evidence that heat from red-hot iron is injurious to our health, the truly philosophical method is to accept the fact and act upon it, whether we can find what is called an explanation or not.

THE SKATING CARNIVAL.—Crowds enjoyed themselves happily by skating at the Central Park last week. Although the weather was severely cold, the ice was splendid and the animal spirits "tip-top." Statements have been made that about 600,000 pairs of skates have been sold in this city since the present winter commenced, and the recently patented kinds seem to be great favorites. The Philadelphia *Ledger* gives the New Yorkers a spice of its feelings in regard to skating as follows:—"New York boasts of her 20-acre skating pond, at the new park, scarcely larger than some of our brick ponds. If the citizens of that city wish to know what skating is, they should visit Philadelphia in winter, when they would see the Schuylkill frozen over for a hundred miles in length, and enough not only for all the citizens of the commercial metropolis, but sufficient besides for all the skaters in the Union. If the Manhattan Islander goes crazy over a 20-acre skating pond, what would he do with the Schulykill, Wissahicken, Hollander's Creek, and the hundreds of other sources of enjoyment of that exercise which the youth of Philadelphia have at their command?"

PRESERVING MEAT.—A correspondent writing from Ickesburgh, Pa., says:—"It is not generally known that fresh meat may be properly covered with salt and pickle, and remain there for the usual length of time, and yet spoil after being smoked, from exposure, when in pickle, to too great a degree of cold. Fresh meat will freeze in salt pickle as soon as the temperature of the pickle is sufficiently low to freeze fresh water, and so long as meat remains frozen it will take salt very slowly."

THE CHEMISTRY OF TANNING.

MESSRS. EDITORS:—I noticed on page 411, Vol. I. (new series) of the SCIENTIFIC AMERICAN, that A. F. O. of Albany, states certain results without assigning a cause. The effect produced by electricity on hides while in the "bait" is to soften and rot them. That the entire process of converting animal gelatine into leather (except the finishing) is purely a chemical transaction, I think may be fully established, by the simple fact that no mechanical appliances can convert hides and skins into leather without the aid of chemical combination. We concede that various mechanical arrangements are necessary to the production of leather, either as a preparatory or as a completion of the leather, after we have arrived at a chemical change.

The use of lime for the purposes of depilating, and the process of baiting and tanning following, are all chemical. Lime acts chemically on the hide for the purpose of loosening the hair. The use of hen manure, uric acid, for the purpose, as is commonly said, of "taking out the lime," is a chemical operation of the uric acid on the lime for the purpose of neutralizing the lime in the hide before tanning.

The effect of electricity generated from a battery, or atmospheric electricity in the lime bait or tan vat, is to concentrate the action of the lime in loosening, and the acid in baiting, and the tan in tanning, in each and every case objectionable. Atmospheric electricity during the process of bait universally accelerates and concentrates the action of the acid, rotting the hide in spots, finally irretrievably damaging the whole pack; the same result attends a long immersion in the baiting solution, which is one chemical reason at least for the lack of durability in leather exposed to the action of electricity. The same objections may be raised to the use of many salts, acids, &c., that are used for the purpose of saving time in tanning, also the use of chlorine (muriatic acid), and alum, as a preparatory to tanning; the last named, though old in the form of alum and salt, are exceedingly objectionable, either as preparatory or for *tawing*, (not tanning) its introduction as a preparatory must fail, for the good reason that the combinations are *forced* not *natural* chemical combinations.

W. S. B.

Cleveland, Ohio, Dec. 31, 1859.

FINANCIAL CONDITION OF THE "GREAT EASTERN."—The shareholders of the *Great Eastern* are sinking into an awful state of depression. The surveyor's report declares that not less than $250,000 more must be expended upon her before she can be fairly said to be in a fit state for ocean voyages. The new company is said to be in debt, and her shares are at so low a figure that they can only be dealt in at a ruinous loss. Some of the proprietors, it is rumored, contemplate instituting proceedings through the Board of Trade, or in equity, to obtain a full account of the stewardship of the board of management. Something will have to be done, and that immediately. The shares are quoted at one-half, with one paid up. It is supposed that another new company will be formed, in order to get rid of the present board of management, and then, by the issue of 100,000 preference shares, to raise $500,000 more, complete the vessel right off, and set her to business. Up to this time she has cost $5,000,000.

COLD WEATHER.—The first severe cold weather that we have experienced this winter, came upon us on Tuesday night, the 27th ult. Wednesday morning at 6 o'clock the thermometer stood at zero, on Brooklyn Hights, and on Thursday morning it was 7° lower down still. Persons from the dry regions of the Nnorthwest say they experience a keener sensation of cold in New York city with the thermometer at zero than in St. Paul, Minn., at 30° below

A SMILE FROM CALIFORNIA.—J. G. Carson, writing from San Francisco, bestows upon us the following happy compliment:—"If the editors of the SCIENTIFIC AMERICAN have enjoyed the production of the "new series" half as much as the readers have had pleasure and instruction from its perusal, it can no longer be said that 'the editorial chair is cushioned with thorns.' The very idea must be considered obsolete."

A NEW METHOD OF MANUFACTURING AMMONIA.

We reprint from the *Journal of the Society of Arts*, (London) the following able article, which was written by Mr. Alex. Williams, and discusses a subject of great consequence to our country. If we could obtain cheap ammonia, guano would very soon fall in price, as it is the principal fertilizing ingredient in it:—

The importance of ammonia and its sister compound, nitric acid, in an agricultural point of view, as forming probably the chief sources whence the nitrogen of plants is obtained, and the high commercial price of compounds containing either of these substances, have led practical chemists to look upon any new method of obtaining them as one of the great desiderata of the day.

The atmosphere, with its water, contains the elements necessary for the formation both of ammonia and nitric acid, and during the passage of electricity both are formed; but so far as our present knowledge extends, and from a long series of experiments on the subject, I am led to believe that it will be some time ere the Society's premium will be claimed "for the production of ammonia or nitric acid *from their elements*, by methods which would admit of practical application."

After having been engaged for many years in experiments on this subject, I have arrived at the conclusion that, except under peculiar circumstances, nitrogen and hydrogen in their gaseous or elementary state will not combine together in sufficient quantities to be commercially available. To make them unite in any quantity it is necessary that the nitrogen should, in its nascent state, be brought in contact with the hydrogen, when union will take place, but this combination is much more readily effected if both be in their nascent state.

To obtain nascent nitrogen it is, of course, necessary to decompose one of its compounds, and thus far I had only arrived at the same conclusion as every one else. The object of this paper is to direct attention to a bye-product of one of our most important chemical manufactories, which is exactly adapted to our purpose.

The animal and vegetable kingdoms have been so thoroughly searched by the shoals of manure manufacturers of this and other countries, that the discovery of any new nitrogen compound in these kingdoms seems to be altogether improbable; one is therefore naturally led to the mineral kingdom, and our ideas as naturally become fixed on nitrate of soda as the cheapest source. It has been known for years that nitric acid, or other compounds of nitrogen and oxygen, could be converted into ammonia, and therefore the use of a nitrate would present no novelty; but if we can obtain the nascent nitrogen from nitrate of soda as a bye-product, we shall have made a grand step towards facilitating the manufacture of ammonia.

This, I believe, I have accomplished. Of the thousands of tuns of nitrate soda annually imported into this country, I have been told, on good authority, that about half is used in the manufacture of sulphuric acid. It is well known that sulphuric acid is usually manufactured in a large leaden chamber having attached to it a burner where sulphur is kept constantly burning, by which it is converted into sulphurous acid. The great difficulty of the manufacture is to give another atom of oxygen to this sulphurous acid ($S O_2$) to convert it into sulphuric acid ($S O_3$), and it is for this purpose that the nitrate of soda (cubic nitre) is used, and usually in the following manner:—One or more movable iron pots are placed in the burner. Into each of these pots is put, as often as required, a few pounds of nitrate of soda, and with a sufficient quantity of sulphuric acid to decompose it. Sulphate of soda (salt cake) remains in the pot, whilst nitric acid and probably other compounds of nitrogen and oxygen pass with the sulphurous acid into the leaden chamber. The sulphurous acid ($S O_2$) gains an additional atom of oxygen from the nitrogen compounds, and becomes converted into sulphuric acid($S O_3$) which, with water afforded by steam jet or otherwise, condenses as a liquid at the bottom of the chamber, whilst a quantity of gas escapes.

Such is a rough sketch of the first part of the process usually adopted for making sulphuric acid or oil of vitriol, and the gas which escapes from the vitriol chamber must now be the subject of our inquiry,

On referring to Dr. Ure, our great authority on manufacturing chemistry, I found that he asserts that in a properly working chamber nothing but nitrogen gas should escape; in fact, that the whole of the oxygen should be taken up, and that the nitrogen should be reduced to its elementary condition. This, although the generally received opinion of the manufacturing chemists of the present day, appeared to me fallacious; as, on considering the affinities, I did not think it probable that sulphurous acid, although it is known to form a compound with nitric oxyd ($N O_2$), should, under the circumstances occurring in the vitriol chambers, be able to decompose it. Experiments were immediately instituted to ascertain the truth, and they led to the knowledge of the fact that a chemical compound of nitrogen and oxygen was escaping, and not free nitrogen. What particular compound of nitrogen and oxygen it is has not been ascertained, as the fact of its being a *chemical* compound was sufficient for the purpose intended, viz., of applying this waste product for the manufacture of ammonia.

At the commencement of the year 1856, I transferred a portion of the gases escaping from a vitriol chamber to my own laboratory, and there and then succeeded in converting them into ammonia.

This was an important step, but I did not feel satisfied until I had tried the process on a large scale; therefore, in November in the same year, an arrangement was entered into, for this purpose, with Messrs. Lewis and Pollard, of Pontardawe Vitriol Works, whose kind assistance in the matter I take this opportunity of acknowledging. The apparatus fitted-up was of the following description:—A furnace was built above the exit tube of one of their vitriol chambers, and a brick gas retort, about 14 inches in diameter, 8 feet long, and open at both ends, was passed through its whole length. This retort was filled with charcoal, and kept at a red heat; the exit tube of the chamber, and a steam jet to supply the hydrogen, were attached to one end, whilst to the other end was fixed an upright leaden cylinder filled with coke, and moistened with diluted sulphuric acid. On passing the waste gases and steam through the retort containing red hot charcoal, both were decomposed, the oxygen of each uniting with the charcoal to form carbonic acid ($C O_2$); the nitrogen and hydrogen combining to form ammonia ($N H_1 O$, or, without water, $N H_3$); then together, probably forming carbonate of ammonia ($N H_4 O_1 C O_2$) which was again decomposed by diluted sulphuric acid, the sulphate of ammonia being found remaining in solution. This solution was then evaporated, and in July, 1857, I first had the pleasure of obtaining any quantity of crystals of sulphate of ammonia, by this process, from a vitriol chamber in actual work.

It was the intention at that time to have secured the invention by patent, and therefore, when the above comparatively rough result had been obtained, the further prosecution of the experiments to ascertain yield, &c., was not proceeded with, lest the process should become public. Several circumstances have since prevented their renewal. I therefore merely wish to offer the process, as it is, to those interested in the matter, hoping some one else may apply it more profitably than I have, and feeling sure that—as there seems no reason why it should not be successfully carried out—it will be the means of advancing the "arts, manufactures, and commerce" of this country, by increasing the supply of one of our most valuable fertilizers.

Perhaps it may be thought that the process is only adapted to such gases as escape directly from the chamber, and that, if any of the late improvements as coke cylinders, &c., be used, it cannot be applied; but provided the assertion be correct that sulphurous acid is incapable of reducing compounds of nitrogen and oxygen to their elementary state, then the process will be available after all of these improvements have been carried out, and not only to the waste gases, but also, by a slight modification, to any nitrogen compounds that may have been absorbed by the dilute sulphuric acid, and be given off in its evaporation, so that really a very minute portion only of the nitrogen contained in the nitrate of soda need be lost.

With regard to the quantity obtainable by these means, I have not as yet been able to ascertain with certainty the amount of nitrate of soda imported, but, as already stated, it appears probable that about half of the whole quantity arriving in this country is used in the manufacture of the oil of vitriol, or sulphuric acid. Now, every thousand tuns of this cubic nitre, allowing 10 per cent. for impurities, would, if the whole of its nitrogen were converted into chloride of ammonia ($N H_4 O$), yield about 565 tuns of this substance, which, at £30 per tun, would be worth nearly £17,000, and there are, doubtless, many thousands of tuns of ntirate of soda used by the vitriol makers of this country.

Although these figures give, of course, no approximation to the practical yield likely to be afforded by this process, yet they enable us to form a very good idea of the enormous amount of valuable material daily wasted. The process suggested, or some modification of it, may render this waste unnecessary, and thus save the pocket of the manufacturer and at the same time benefit the public.

RECIPES FOR MAKING FANCY INKS.

The following are a few recipes for making uncommon inks, which may be used by fancy writers; and as they are not to be found on sale, they must be very useful to some of our readers:—

Gold Ink.—Mosaic gold, 2 parts; gum arabic, 1 part; are rubbed up with water until reduced to a proper condition.

Silver Ink.—Triturate in a mortar equal parts of silver foil and sulphate of potassa, until reduced to a fine powder; then wash out the salt, and mix the residue with a mucilage of equal parts of gum arabic and water.

Brown Ink.—Digest powdered catechu, 4 parts, with water, 60 parts, for some hours; filter and add sufficient of a solution of bichromate of potassa, 1 part in 16 of water.

Yellow Ink.—Macerate gamboge, 1 part (or 1½); alum, ½ part; gum arabic, 1 part, in acetic acid, 1 part; and water, 24 parts.

Blue Ink.—Triturate best Prussian blue, 6 parts, with a solution of 1 part of oxalic acid in 6 of water, and towards the end of a quarter of an hour or so, add gradually gum arabic, 18 parts, and water, 280. Pour off clear.

Red Inks.—1. Pernambuco wood, 4 parts; alum and cream of tartar, of each, 1 part, with 30 of water; boil down to 16 parts, let stand, pour off, filter and dissolve in the liquid gum arabic, 1½ parts, white sugar, 1 part.

2. Digest powdered cochineal, 8 parts, and sal tartar, 16 parts in 144 of water, for 24 hours. Then boil up with powdered (potash) alum, 4 parts, and add 24 of cream of tartar, with 3 parts of tartaric acid, and when effervescence has ceased, another part of the acid, or enough to produce the color. Let cool, filter, and boil the residue on the filter with 12 parts of water; filter again, mix the liquids and dissolve in them 24 parts of gum arabic, and lastly ½ part of oil of cloves. No iron vessels must be used in this process.

3. Digest powdered cochineal, 16 parts; oxalic acid, 2 parts; dilute acetic acid, 80 parts; distilled water, 40 parts for 36 hours. Then add powdered alum, 1 part; gum arabic, 1 to 10, shake up, let stand for 12 hours and strain.

4. Dissolve 1 part of carmine in 8 to 10 parts of aqua ammonia, and add mucilage of gum arabic sufficient to reduce it properly.

Violet Ink.—8 parts of logwood and 64 parts of water; boil down to one-half, then strain and add 1 part of chloride of tin.

Green Inks.—1. Digest 1 part of gamboge with from 7 to 10 parts of the blue ink.

2. To powdered bichromate of potassa, 8 parts, contained in a porcelain dish, add oil of vitriol, 8 parts, previously diluted with 64 of water; then heat and while evaporating add gradually 24 parts of alcohol, and reduce to 56 parts, which filter, and in the clear liquid dissolve 8 parts of gum arabic.

Crimson Ink.—A beautiful crimson ink is made by mixing red ink, No. 1, with the violet ink; about equal parts will answer.

The parts given are those of weight, not measure. The mucilage of gum arabic prevents the fine particles of color falling to the bottom in the form of a sediment. Sugar gives to inks a glossy appearance, but very little of it should be used, as it is liable to make the ink sticky.

CIRCULATION OF GOVERNMENT BOOKS.

Hon. John B. Alley, who represents the Sixth Congressional district of Massachusetts, has published the following card addressed to his constituents:—

"I have received many letters from persons in my district, asking me to forward to them Patent Office Reports and other public documents. In order that all may understand the reason that they are not furnished, as desired, I would state, in the first place, that all the public documents issued prior to the commencement of the present session of Congress were sent to my predecessor, which he had a legal right to claim. There will be but very few more issued before July or August next. In the second place, I am opposed to this whole system of distributing these Congressional works to private individuals. They are produced at an enormous expense to the government. The cost of printing and stationery for Congress, the last six years, amounts to the incredible sum of more than five millions of dollars. Each member of the last Congress received over 2,500 copies of books, costing the government nearly as much as the amount of their whole salaries. The customary disposition of documents heretofore, in sending to partisan favorites, personal friends, and relatives, is, in my judgment a perversion of the avowed objects of the act of distribution; and my vote and influence shall never be wanting to reduce appropriations for this purpose.

"I propose, in order to carry out the design and secure the objects for which the power of distribution is given to members of Congress, to send to every newspaper in my district a copy of everything issued by Congress, as these works are of such a character generally that every editor, whose business it is to enlighten the public, finds them valuable as works of reference; also to all public libraries, where such works ought always to be found; also to agricultural societies or farmers' clubs, and to the several cities and towns in proportion to the number of inhabitants in each, to be placed at the public archives, where they will be accessible to all who choose to peruse them. In this way the whole people will be served, as they ought to be in such a matter as this, without personal favor or distinction of party."

AMOUNT OF TANNING IN SOME MATERIALS.

The following table we have taken from the *Irish Agricultural Review*, whose editor is an excellent chemist. The names, Mulligan and Dowling, are those of two chemical students belonging to the Museum of Irish Industry in Dublin. Their analysis is quite recent, and will be very interesting and useful to our tanners:—

	Per cent.	Authority.
Oak bark formation, 100 years old...	8.45	G. Muller.
" young	13.87	G. Muller.
" British, 50 years old	8.90	Mulligan and Dowling.
" " age about 50 years.	9.76	Mulligan and Dowling.
" " " 70 years.	6.13	Mulligan and Dowling.
" Southamp'n, age a'bt 50 y's	8.80	Mulligan and Dowling.
" coppice, picked sample	12.35	Mulligan and Dowling.
" Irish, pick'd sam'le, 45 yr's,	9.50	Mulligan and Dowling.
Oak, old, white inner bark	21.00	Cadet de Gassincourt.
Oak, old, white inner bark	14.20	Sir H. Davy.
Oak, young	15.20	Sir H. Davy.
" colored or middle bark..	4.00	Sir H. Davy.
" entire bark	6.00	Sir H. Davy and Geiger.
" spring cut bark	22.00	Sir H. Davy.
Oak bark, Belgian popering	8.33	Mulligan and Dowling.
" " h'vy cop. pe' s'l.	10.74	Mulligan and Dowling.
" " light " "	8.52	Mulligan and Dowling.
" Eschurgh	19.35	G. Muller.
Munosa bark	17.97	Mulligan and Dowling.
Munosa bark	31.16	G. Muller.
Willow bark	3.95	Mulligan and Dowling.
" Leicester, white inner bark	16.00	Sir H. Davy.
" " col'd or middle b'rk	3.10	Sir H. Davy.
" " entire bark	6.80	Sir H. Davy.
" weeping	16.40	Cadet de Gassincourt.
Larch bark	3.51	Mulligan and Dowling.
Larch bark	1.60	Sir H. Davy.
Cork tree bark	12.16	Mulligan and Dowling.
Hemlock bark	13.92	Mulligan and Dowling.
Divi-Divi	29.80	Mulligan and Dowling.
Divi-Divi	49.25	G. Muller.
Valonia Smyrn	34.78	Mulligan and Dowling.
Myrabolams	20.91	Mulligan and Dowling.
Shumac	19.35	G. Muller.
" Palermo	24.37	Mulligan and Dowling.
" Palermo	16.20	Sir H. Davy.
" Messina	10.40	Frank.
" Carolina	5.00	Cadet de Gassincourt.
" Virginian	10.00	Cadet de Gassincourt.
Catechu, Bombay, light color	26.32	Mulligan and Dowling.
Catechu, Bombay, light color	55.00	Sir H. Davy.
" Pegu, dark brown color	46.88	Mulligan and Dowling.
" Bengal	44.00	Sir H. Davy.

RESIN OIL FOR STEAMERS.

MESSRS. EDITORS:—In your article on "Oil Fuel for Steamers" (page 415, Vol. 1, new series, SCIENTIFIC AMERICAN) you appear to have given your attention to only one kind of oil, as the cheapest and best: and you overlooked what I know to be the great desideratum—crude resin oil. My attention for two years past has been turned towards its introduction for the purpose named, the difficulty was its method of application. Crude (or "first run") resin oil can be made in New York, and pay the manufacturer (resin costing $1 60 for each 280 lbs.) at 10 cents per gallon. At the South, it can be made at 6 cents per gallon; the manufacturer retaining the naphtha, which is more valuable than the oil. The amount of carbon contained in resin oil, compared with that of coal oil, is much greater; it is free from the offensive smell that even the pretended deodorized kerosene oil will retain, and in the coldest weather it remains limped, while the crude coal oil must be cut out with a shovel, or steamed out of barrels.

Coal oil is more easily treated for light, and is a better lubricator than resin oil; but the latter is used as a mixer for lubricators, for paint oils, for tanners' oils, wool and printers' oils; but in fact it is good only for fuel, and in that capacity it is unapproachable on account of its cheapness, amount of carbon, and not unpleasant smell, when freed from its naphtha. In these remarks my deductions are made from *practice*, not theory, and I think you will only have to start the movement in your widely-circulated and justly-appreciated journal, and let the practical men introduce it. H. H. I.

Brooklyn, N. Y., Jan. 3, 1860.

TELEGRAPHS AND RAILROADS IN RUSSIA.—Russia is making great progress. Her railroads and telegraph lines, which are the chief works undertaken since the termination of the war with the western powers, are evidently designed chiefly to supply a want that was greatly felt by her during the progress of hostilities. There are now railroads from St. Petersburgh to Moscow, 398 miles, and Pokoff, 170, besides the short lines from the capital to Peterhoff and Pavlovsk, and that from Warsaw to Tshentokhoff, on the Russian frontier, and 25 versts beyond, the total length of which is 182 miles. Other lines are in course of construction, or projected, from Pskoff to Warsaw, 462 miles, completing the railroad communication between the capital of the empire and that of Poland; from Dunaburg to Riga, 145 miles, to be afterwards continued to Libau, 53 miles further; and from Moscow, to Theodosia, 990 miles. Telegraphic communication already exists between St. Petersburg and Cronstadt, Abo, Libau, Kowns, Keyeef and Simpheropol, and between Nicholaieff and Odessa. There is one feature that presents a peculiar interest for the United States, namely, the Russian government has just given its sanction to a grand scheme for connecting St. Petersburg and New York by telegraph, *viâ* New Archangel and Behring's Straits, having stations at the Amoor, Irkutsk, and other central points on the way, across the vast continents of eastern Europe and Asia. The American section of the line will unite New York and San Francisco.

MAUVE DYE.—This dye was invented by Mr. Perkins, of Greenford Green, near London. It is prepared by taking equal proportions of sulphate of aniline and bi-chromate of potash, dissolving them in water, mixing and allowing them to stand for several hours. The whole is then thrown upon a filter, and the black precipitate which is formed is washed and dried. This black substance is then digested in coal-tar naphtha, to extract a brown resinous substance; and finally digested with alcohol to dissolve out the coloring matter, which is left behind on distilling off the spirit, as a coppery friable mass. This is the dyeing agent producing all the varieties of purples known by the name of *mauve*. The particularity of these purples consists in the peculiar blending of the red and blue of which they are constituted. These hues admit of almost infinite variation; consequently, we may have many varieties of red mauve, and as many of blue mauve, and any depth of tint can be secured. The permanence of these combinations is their strongest recommendation.—*London paper.*

SOUTHERN DEMAND FOR MACHINERY.—As one of the results of the existing excitement in the political affairs of the country which now so unhappily prevails, there has sprung up from the southern States an unusual demand for machinery of various kinds; and if northern manufacturers desire to make themselves known throughout the South, they cannot find a more sure medium of communication than through the columns of the SCIENTIFIC AMERICAN, which circulates very widely in all the southern States. We have had, within a few days past, applications for machinery for making cotton and woolen goods, paper, brooms, chairs, spools, bobbins, and a variety of other articles of northern manufacture which are very largely consumed at the South.

A COLUMN OF VARIETIES.

Iron may be cast upon brass, so that both will be perfectly united, by fusion. For this purpose, the brass part of the compound casting must be made with a large proportion of copper, so as to be very hard. When that part (already cast separately, and cooled before pouring the iron) is placed in its proper position in the mold, the iron may be poured in the usual manner.....In some of the locomotive boilers made by Mr. Allan, of the Scottish Central Railway, the fire-box is a cylindrical continuation of the boiler, and is wholly surrounded by a water space, with the exception of an opening like a man-hole, for the admission of air to the internal grate. .....A cylindrical boiler, four feet in diameter, with an internal flue, has been made with welded joints throughout, not one rivet being used. The plates were of 7-16 inch iron, and the boiler was tested, without leakage, to a pressure of 150 lbs. per square inch.....Owing to the prevalence of westerly winds and the influence of the Gulf Stream, the westward steamship passage between Europe and America generally occupies about one-tenth or one-eighth more time than the eastward passage..... Some of the cannon cast at Adrianople, in the middle of the fifteenth century, were capable of throwing stone shot of 600 lbs. weight. Larger calibers, capable of throwing granite shot of 1,200 lbs., were afterwards cast. .....In testing a 10-inch (or 130 lb.) gun at Deal, in England, it was found that 6 lbs. out of 32 lbs. of powder were blown out of the gun unignited, and that the range with 32 lbs. was less than with 26 lbs.....The *Great Eastern* steamship has cost nearly $5,000,000; the company that built her got tired of expending money and sold her for less than half her cost to a new company; and the stock of the new company is now selling for 50 cents on the dollar.....In the engines of the English steamer *Thetis*, the steam is expanded to 15 times its original volume; the boiler pressure being 115 lbs. per square inch, and the condensation being effected by superficial contact. The consumption of coal per horse-power, per hour, was found by Professor Rankine to be but 1.018 lb.; being 230 lbs. per hour for 226 horse-power.....In the case of a fatal boiler explosion which occurred at Toronto, Canada, in 1857, the coroner's jury stated in their verdict, that the introduction of spirits of wine, oatmeal and sal ammonia into the boiler, for the purpose of removing the scale, had caused the water to foam, thereby deceiving the firemen as to the true water level, and thus leading to the explosion.....The Winans steamer has made a trial trip, and is to be lengthened; thus removing the propeller from the center, as we advised.....The latest coal-burning engines of the London and Southwestern Railway, having tubes of but 22 inches (1 foot 10 inches in length), have but 200 square feet of tube surface. The fire-box surface is 107 square feet, besides 75 square feet in the combustion chamber. These engines, with 15-inch cylinders, 21-inch stroke, and 6-feet 6-inch wheels, are understood to make an abundance of steam, evaporating from 80 to 100 cubic feet of water per hour.....A remarkable proportion of evaporation to the extent of heating surface employed was reported by Daniel Gooch, in 1845. The engine *Ixion*, 97 square feet of fire-box surface, and 135 tubes, 2 inches diameter and 10 feet three inches long, presenting 724 square feet of exterior surface, evaported 200½ cubic feet of water per hour. This is about twice the usual evaporation per unit of heating surface.....The widest arch of masonry now standing is on the line of the Washington Aqueduct. The aqueduct bridge over "Cabin John's Creek" has a single granite arch of 224 feet span. The next widest masonry span is that of Grosvenor Bridge, over the Dee, at Chester, the width of opening being 200 feet.....An incline of 1 in 26, on one of the Belgian railways near Liege, at first worked by stationary power, was afterwards worked by locomotives; but more recently, stationary engines have been again resorted to, as being the best and most efficient. .....At Posen, Prussia, is a railway, 1 mile 200 yards in length, consisting of a single line of iron bars supported upon columns, the carriages being suspended at the sides from the axles of large wheels running along the rails.....Photographic apparatus has been lowered to, and photographic impressions taken at, a depth of three fathoms in Weymouth harbor, England.....An ingot of cast steel, exhibited at the Paris Exhibition of 1855, by Frederick Krupp, of Essen, Rhenish Prussia, weighed 11,030 lbs.

ULLMAN'S HYGROMETER.

The quantity of aqueous vapor in the atmosphere is constantly varying; evaporation from seas and lakes, and the combustion of inflammable substances are constantly adding to it, while the deposits of rain, snow, hail, and dew in some portions of the earth are perpetually removing it. In meteorological observations, it is very important to ascertain the proportion of aqueous vapor in the atmosphere at stated and frequent periods, and much ingenuity has been expended in the invention of convenient instruments for this purpose. For the use of scientific institutions Mason's hygrometer has nearly or quite superseded all others; when carefully protected and kept in order it operates admirably, but it is expensive, does not bear low temperature, and is open to other objections. The hygrometer which we here illustrate may probably be made as simple as any of which it is possible to conceive. There are certain plants such as the *chahajin* or *chalan* of Arabia, and the *geranium erodium* of this country and Europe, which have attached to the capsules of their seeds, long tail-like appendages of a spiral form, which tend to twist and untwist as the air in which they are placed contains more or less moisture; and the hygrometer represented in the annexed cuts consists simply of one of these vegetable spirals, placed in a suitable box, and furnished with a light in dex and a dial plate, to indicate its degree of torsion as that varies with the dampness of the air.

A B (Fig. 1) is the box with the dial plate and index, *f*. In Fig. 2, *d*, is the spiral tail-like appendage of the capsule of the Arabian chahan, fastened by a bit of cement to the bottom, *a*, of the box, and supporting the light index, *f*, at its upper end above the dial plate, *b*. J, *j*, are holes for the admission of air to the box, and *h*, is a glass for protecting the index. A small collet, *g*, presevers the point of the capsule from displacement. Dry air causes the vegetable spiral here described to twist, while moisture diminishes the torsion. It forms an exceedingly cheap and simple hygrometer; and Professors Henry of the Smithsonian Institute, Draper of the New York University Medical College, and J. Lawrence Smith, have born testimony to its sensitiveness and reliability.

The patent for this invention was issued, through the Scientific American Patent Agency, Sept. 13, 1859, and any further information in relation to it may be obtained by addressing the inventor, Louis S. Ullman, at Columbia, Tenn.

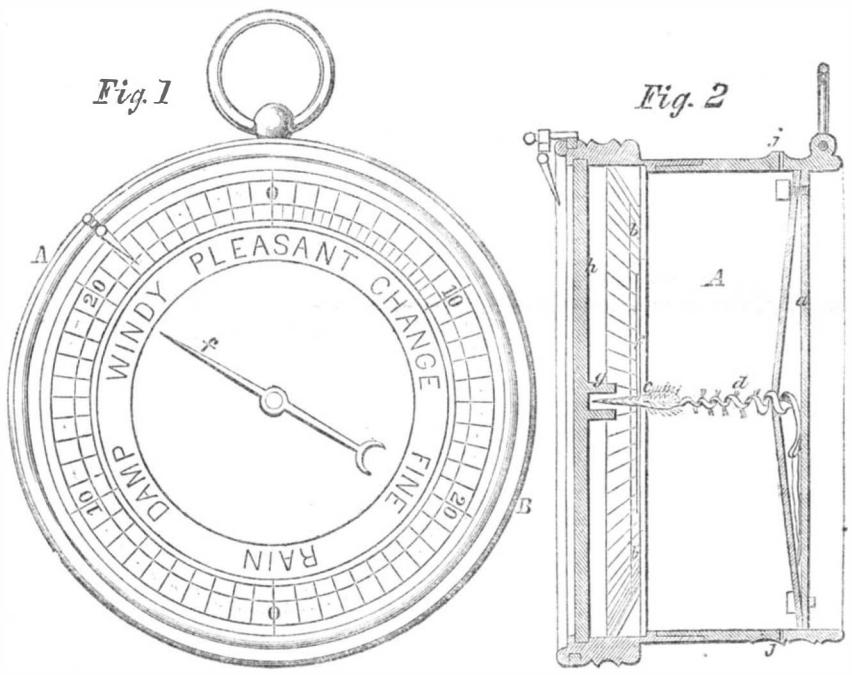
IMPROVED CATCH BOLT.

The object of the invention here illustrated, is to diminish the friction, wear and noise caused in shutting doors furnished with spring bolt locks or latches.

To the bolt, D, the lever, C, is pivoted at *a*, so that when the lever, C, is forced back, it carries the bolt with it. The front convex end of the lever, C, extends a little beyond the end of the bolt, so that it, instead of the bolt, may strike the nosing in closing the door. As the door is closed and the convex end, *d*, of the lever is pressed against the nosing, the projection on the back of the level is forced through the slot, *f*, in the lock, and the curved edge, *c*, of this projection is pressed against the edge, *e*, of the slot, thus forcing back the lever, C, and with it the bolt, D. It will be seen that this pressure of a concave surface, accompanied by the laterally yielding motion of the lever, is attended with much less jar and friction than results from the ordinary bolt striking the nosing, when the bolt is firmly held from any yielding side motion. The parts are intended to be cast so as to be put together without any drilling or riveting whatever.

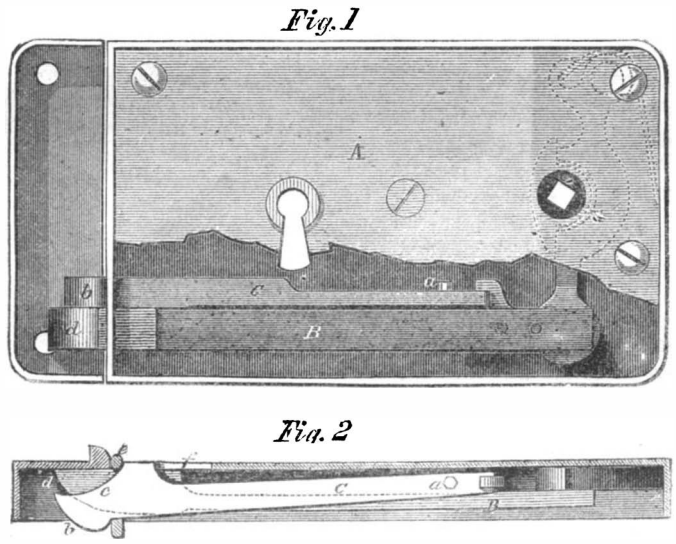
The patent for this invention was obtained through the Scientific American Patent Agency, Nov. 29, 1859, and persons desiring further information in relation to it will please address the inventor, William Salisbury, at Wheeling, Va.

ULLMAN'S IMPROVED HYGROMETER.



PHILADELPHIA-BUILT WAR STEAMERS.

The Philadelphia people claim to be the best builders of war steamers in the country. The Philadelphia *Ledger*, of the 29th ult., says:—"It is a matter which we can refer to without laying ourselves open to the imputation of boasting, that the Philadelphia Navy Yard builds the best and most efficient vessels of war of any naval station in the country. The *Wabash* is a splendid success, while the *Niagara*, built at New York, under George Steer's direction, is a miserable failure. The *Minnesota*, built at one of the southern ports, has the dry rot already. The *Lancaster*, another of our steamers, has just shown herself to be a fast sailer. The *Germantown*, built here, beats all the sloops-of-war of the same class in the navy. The *Pawnee* is another fine steamer, built here, which will soon add to the fame of her constructor. The *Iroquois*, built at New York, has just made her trial trip, and, with only a portion of her armament, is described as a wet boat, and strongly inclined to roll, and it is a question whether or not her armament is too heavy, and calculated to weaken her amidships, and make her top-heavy with too much metal." As confirmatory news in this opinion, the steam sloop-of-war *Naraganset*, built at Norfolk, returned from a second trial trip on the 28th ult., and it was telegraphed to this city that her performances were very unsatisfactory. It is said that she was thoroughly tested, and competent officers were on board. Her machinery was defective, and the greatest speed attained was 7¾ knots an hour.



SALISBURY'S IMPROVED CATCH BOLT.

DURABILITY OF AMERICAN SHIPS.

In connection with this subject, we have received a pamphlet from Mr. Donald McKay, the eminent shipbuilder in Boston, who has just returned from Europe, and who, while in England, has been endeavoring to remove the prejudices of the ruling merchants in that country regarding the durability and strength of American-built timber vessels. The ruling merchants, who exercise great influence in regard to the character of ships in England, are those who form Lloyds' Committee. These have entertained the notion that ships built of American timber—such as live oak, white oak and pitch pine—are inferior in durability, efficiency and safety to those built of English oak. Mr. McKay's pamphlet, which is extracted from the manuscript of a work on naval architecture he is about to publish, contains statistics relating to the durability of American vessels, which prove conclusively that they are at least equal in durability to English vessels, and it is well known they are superior in many respects—speed being an important one. Of the age of our war vessels 9 line-of-battle ships average 38½ years; 5 frigates have been in service for 26 years; 19 sloops 22; 4 brigs 20; 9 steamers 14½ years. Live oak is used exclusively for the frames of our war ships, and it is considered by all naval men to be almost imperishable. The tensile strength of American white oak is 11,501 lbs. per square inch; that of English oak 10,224 lbs.; the transverse strength of the former oak is 1699 lbs. that of the latter 1629 lbs. The American oak is lighter than the British and yet it is stronger. Of 102 of our merchant ships their average age is 24 years; of 40 barks 25½; of 54 brigs 25 years; and of 12 steamers 18½ years.

The term assigned as to the average duration of British war ships is 15 years, after which they require complete and extensive repairs. Mr. McKay considers that the navy of England cannot present such satisfactory results of durability as the American one, and he undoubtedly is correct.

A very general opinion prevails that American-built ships are not so strong as the British. This is very erroneous and should be corrected. Our ships are in general very much stronger than the English timber ships of the same class, and British merchants concede this. Some of the best ships, now in the British mercantile navy, were built in the United States. The colonies of New Brunswick and Nova Scotia, also built some splendid ships for English and Scotch merchants.

About one-third of the roof of the Union Railroad depot fell at Troy, N. Y., on the morning of the 30th ult. The cause of the accident was the contraction of the iron chords of the arch by the intense cold. This depot is the largest in our country, we believe.

The suspension bridge over the Dordogne, at Cubzac near Bordeaux, has five spans of 400 feet each, 125 feet above high water. There are also 2,000 feet of stone arcades and embankments on each side, making the entire length of the structure 6,000 feet.

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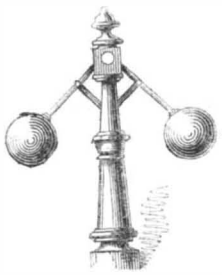
VOL. II., NO. 2.....[NEW SERIES.].....*Fifteenth Year.*

NEW YORK, SATURDAY, JANUARY 7, 1860.

STEAM ENGINEERING IN 1860.



HERE is no subject of greater importance to the commercial, manufacturing and engineering community, than that of saving fuel. That man who makes one pound of coal do the work of two, in driving machinery, is equally as great a benefactor as he who has made two ears of grain come forth from ground where only one was raised before. This assertion is more especially true as it relates to steamships, because every tun of coal saved in one of these is not only a direct gain, but affords a double benefit, as it also permits, in the same proportion, a gain in carrying payable cargo. Thus, in a voyage from New York to Liverpool, it requires 100 tuns of coal per diem for the largest steamers; now, if this amount were reduced one half, and the same speed and power maintained in the engines, a saving of $2,000 for coal—at $4 per tun—would be secured in ten days, besides a paying cargo of 500 tuns added to the profits. This single example will show the immense benefits resulting from the saving of fuel. But some persons appear to have considered the steam engine perfected; hence they have sought to obtain other and more economical motors to supersede it. Again and again we have called attention to the fact that most steam engines did not give out more than about one-fourth of the power in the fuel which was consumed to drive them; and while this was the case, there was vast room for improvement. We are happy to say that very great improvements have been chronicled during the past year, and we commence 1860 with a decided advance in steam engineering.

On page 125, Vol. XIV. (old series) of the SCIENTIFIC AMERICAN, we earnestly invited the attention of marine engineers to the performances of steamers belonging to a British company running between Valparaiso and Panama; and we stated that they were doing as much duty as most other steamers of the same capacity and power, with one half the amount of fuel. During the year 1859, more facts have come to light regarding these vessels. Three steamships on this route, named the *Callao*, *Lima* and *Bogota*, each 245 feet long, 36 feet broad and 23 feet deep—pretty large vessels—were originally fitted with the first-class ordinary marine engines. With these they used to consume 1,150 tuns of coal per round trip: and as coals cost $10 per tun in that region, it was a question of vital importance to decrease the amount and still maintain the same power and speed. This was undertaken by Messrs. Elder & Randolph, engineers, of Glasgow, by removing the old engines and replacing them with new and highly expanding ones. These are peculiar and deserve a short description:—Each engine has two cylinders; one is small, of 25 inches diameter, and receives the steam first at 42 lbs. pressure, which is cut off at one-third of the stroke and is allowed to expand to three times its volume; then it exhausts into a large cylinder of three times its capacity, and is thus expanded to nine times its volume; becoming gradually reduced in pressure to 4 2-3 lbs. before it exhausts into the condenser. With this class of engines these vessels now use only one-half the fuel they formerly consumed, and yet maintain the same power. The cylinders of the engines have jackets, and the small cylinder especially is kept at a temperature (on the outside) of 400° Fah by superheated steam, so as to prevent any condensation in the inside. The eduction valve of the small cylinder also answers for the induction to the large cylinder; each is of five feet stroke. The eduction port remains open during the entire stroke of the piston, thus giving free egress to the steam.

We have no marine engines of this character in any of our steamers or river boats, in fact, we have paid too little attention to the saving of fuel, and there are some engineers who contend that no saving can be effected by high expansion. Either one or two of our old North river boats were fitted with Woolfe's double cylinders; and we believe that no gain was experienced in them over single cylinders of large capacity for expansion; but our engineers must try steam jackets and superheated steam, in 1860 and see what new results they will secure.

Another great saving in fuel has also been effected in the use of combined saturated and superheated steam, according to the patent of the Messrs. Wethered, of Baltimore, Md., which was illustrated on page 45, Vol. X. (old series) of the SCIENTIFIC AMERICAN. This system has been applied to the British royal mail steamship *Avon*, running from Southampton to Brazil, and with such success that the company report a saving of 30 per cent in fuel. This steamer has now run 125,000 miles with the superheating apparatus on board, and the tubes are nearly as good to-day as when first put in. Several of the steamships of the British navy have also had this system applied to them, and it has given satisfaction It has now engaged so much favorable attention in England that one of the firm finds it necessary to remain constantly in that country. On the continent of Europe, also, several steamboats running on the Danube now use the Wethered system of steam; and yet it is remarkable that, while this improvement is extending in the Old World, and is very favorably regarded there, it is but little known at home. One of the large steamboats on the Chesapeake Bay is now being fitted-up with this arrangement; but this is the only application of it (known to us) upon a scale worthy of consideration in our country. The ill-fated *Arctic*, of the Collins' line, was provided with such an arrangement; but it proved a failure on account of mechanical difficulties in the *application*, not in the principle. These facts are all worthy of the attention of our engineers in 1860; and afford matter for discussion and consideration in commencing the year. It is no uncommon thing to find our steamships and river boats consuming from three to seven pounds of coal per horse-power, per hour; with proper appliances, they should not use more than two pounds to do the same work. With the use of the Blanchard combustion system in the furnaces—illustrated on page 412, Vol. XIII. (old series) of the SCIENTIFIC AMERICAN—superheated steam, high expansion and steam jackets, the amount of coal hourly consumed may yet be reduced to only *one* pound per horse-power in our steamboats and ships; the year 1860 should at least make considerable strides towards the attainment of such a result.

AN IMMENSE YEAR'S BUSINESS!

In our last number we announced that we had associated with us the *Hon. Judge Mason, of Iowa, the late Commissioner of Patents*; and we stated that, on the first day of January, 1860, we found ourselves conducting the most extensive and best arranged agency in the world for the procuration of Letters Patent. This fact will be made perfectly clear by the use of a few figures. During the year 1859 there issued from the Patent Office (according to the list of patents published in the SCIENTIFIC AMERICAN from week to week) about four thousand, one hundred and seventy-five Letters Patent. Of this number *fourteen hundred and forty* were granted to the clients of the Scientific American Patent Agency, or more than *one-third* of the whole! If this large number of patents issued to our clients is substracted from the whole number granted, the remainder shows that only twenty-seven hundred patents are left to be divided among the other (at least) three hundred patent agents located in the various cities and towns of the United States—an average of less than *ten* patents each during the whole year!

The vast amount of business done by the firm of MUNN & COMPANY is a sure indication that the inventors of the country well understand where they can look for the greatest skill, fidelity and vigor in the prosecution of their cases before the Patent Office. Of course, we should not expect, under the most thorough and complete system that human ingenuity could devise, to secure patents for *every* application that we are called upon to make; neither do we expect, as long as we do business of any kind whatsoever, to please *everybody*; but there is one fact which is well understood by all who know anything about such matters, namely, that the Scientific American Patent Agency will not allow any one of the cases of its multitudinous clients to fail for want of careful preparation and prosecution. Whenever an invention contains any patentable novelty at all, we are bound—if the applicant desires it—to insist upon its recognition by the august functionaries of the Patent Office; and if we cannot secure the rights of our clients before that bureau, we have the facilities to obtain those rights elsewhere. We are happy to state that the officers of the Patent Office, from Commissioner Bishop downwards (with few exceptions), realize the truth that that important department was established to foster inventive genius and to encourage inventors to seek its protection.

The recognized ability of Judge Mason, and the high character which he sustained as an able and faithful Commissioner of Patents, together with our own experience of nearly *fifteen* years in the examination of inventions and the preparation of all kinds of patent documents, combine to render the Scientific American Patent Agency as thorough and complete as it can possibly be made, unless, indeed, the whole Patent Office itself should be turned into our lap!

EXTENSION OF AN IMPORTANT PATENT.

The Commissioner of Patents has granted an extension, for seven years, of the patent issued on Dec. 20, 1845, to Calvin B. Rogers, of Saybrook, Conn., for an improvement in machinery for dressing combs. The invention was chiefly intended for the manufacture of fine toothed ivory combs; but it is adapted to the cutting of almost any material.

It appeared from the testimony that, prior to Rogers' invention, the "blanks" or bits of ivory of which the comb was to be made were fashioned into proper form almost exclusively by hand; and that a good workman was enabled to dress about 600 blanks per day. The workman was compelled to hold each bit of ivory separately against the cutting tool, and to depend upon his eye for the form given. The hand-dressed blanks were of course wanting in uniformity to a greater or less extent.

In the use of Rogers' machine the blanks in large quantities are put into a sort of hopper, and the apparatus is set in motion by steam or other power. The blanks are automatically taken from the hopper and presented to the various cutting tools, and dressed, beveled and delivered from the machine in a finished condition, at the rate of about 3,000 blanks per diem. The pieces thus dressed are all beveled and finished with the utmost exactitude and nicety The evidence further showed that about 400,000 dozens of combs of the above character are annually made in this country; and that a single workman with five of Rogers' machines would be able to supply the entire trade.

Mr. Rogers appears to have been the first person who ever invented self-acting machinery for comb dressing. It is but just that he should receive an extension of his patent, and we trust that, through it, he and his assignees will be abundantly rewarded for his ingenuity. His discovery is a public benefit. The extension was obtained through the Scientific American Patent Agency.

BOUND VOLUMES OF THE SCIENTIFIC AMERICAN.—We are now prepared to furnish bound volumes (I., new series) in any quantity that may be desired. The volume is composed of 420 pages, between two and three hundred original engravings, and is bound in handsome style with illuminated gilt sides. Price $1.50. They may be had of most of the booksellers and periodical dealers in the country. We believe it is the cheapest book published and sold this season.

TREATING FURS.—When furs have been laid away for some months they acquire an old squeezed appearance which may be remedied in a great measure as follows:—Warm some new bran or fine sawdust in a pan, but do not let it burn; then rub it thoroughly into the fur with the hand. Repeat this two or three times; then shake and brush the fur until free from dust.

WEEKLY SUMMARY OF INVENTIONS.

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

SUGAR PROCESS.

This invention and improvement in furnaces for evaporating the juices of sugar cane consists in arranging in the front end of the furnace a vertical boiler which serves as a steam boiler to generate steam for the machinery employed in the crushing of the cane, and to construct this vertical boiler, so that the cane trash or bagasse may be fed down through the center and be supplied to the fire in a state fit for combustion, so that the bagasse may be used directly from the crushing mill as a suitable fuel. It further consists in combining with the vertical boiler a horizontal concentrating boiler of a peculiar shape, and surrounded with a water jacket, the water communicating with and receiving its heat from the vertical boiler, this boiler being divided into separate compartments by portable partitions. The patentee of this invention is Eugene Duchamp of St. Martinsville, La.

WATCHES &C.

This invention consists in controlling the active length of the pendulous spring or, as it is generally termed, the "hair spring" of a watch or other time-keeper, governed by a balance, by means of combined laminæ of brass and steel, or other metals which expand and contract differently with the same changes of temperature, so applied to that end of the said spring which has heretofore been fixed, as by their expansion and contraction to cause the said spring so be taken up through the curb pins, as it expands with an increased temperature, and to be let out as it contracts with a reduction of temperature. The credit of this contrivance is due to Henry B. James, of Trenton, N. J.

VISE AND SAW-SET.

The object of this invention is to combine a vise and saw-set in such a way that a very convenient tool will be obtained for facilitating the filing and setting both of circular and straight or reciprocating saws. The invention consists in attaching a saw-set to a slotted bar which is hinged to a vise and secured with an adjustable center; the parts being so arranged that when the vise is required to be used in order to hold the saw while being filed, the slotted bar is allowed to hang by the side of the vise out of the way, and when the saw-set is required for use, the bar of the saw-set is allowed to be secured in the vise in a proper working position. The inventor of this improvement is Norman Allen, of Unionville Conn.

TOBACCO PRESS.

This invention relates to certain machinery intended as a substitute for hand labor, in forming or rolling the lumps of tobacco; which result is obtained by means of a series of rollers arranged around a large drum or cylinder between which are interposed endless belts, and between these belts the tobacco is passed and compressed and formed into a compact continuous sheet, of the proper thickness, which when pressed passes out from between the rollers and is cut into plugs or lumps of the proper size, by rotary cutters. This patent was granted to Walter J. Van Horn, and William Alexander of Louisiana, Mo.

GUNPOWDER.

The nature of this invention consists in the employment of alcohol, either pure or slightly diluted, as a vehicle for mixing with and combining the separate dry ingredients of which the gunpowder is composed. V. L. Maxwell, of Wilkesbarre, Pa., is the inventor.

AMERICAN SHIPS AND SHIPBUILDING.

A lecture on this important and truly interesting subject was delivered at Clinton Hall, this city, on the evening of the 29th ult., by the Hon. John McLeod Murphy, senator-elect to the State Legislature. He said that the salient points of American-built ships were safety, capacity and speed. The models of American-built vessels had always challenged the admiration of the world, while for speed they were unrivaled. He passed a high eulogium on George Steers, one of whose plans in shipbuilding was to fashion a vessel in such a manner that in case of being wrecked she would go to the beach with head on, and be saved from breaking to pieces.

Alluding to ocean steamers, Mr. Murphy said that in June, 1819, the steamer *Savannah* successfully demonstrated the possibility of crossing the ocean by steam. She was built by Hickett & Crockett, at the Novelty Iron Works, and differed much from steamships now-a-days, her wheels being unprotected by guards.

Up to 1816 a wooden model of a ship was unknown in this city, all vessels being built from designs on paper. The first model was made by Christian Burke, with the assistance of Dr. Vincent. To Henry Eckford, the father of naval architecture in this country, we are indebted for that style of shipbuilding which is purely American. To Eckford and Fulton America owes a debt never to be paid. Mr. Murphy proceeded to give a sketch of Eckford's life, from the time that he worked at a boat-builder's shop, in Dover-street, at $1.25 a day, till he died in Constantinople, in 1832. He gave to this country that naval supremacy which is acknowledged over the civilized world. In the war of 1812, he contracted with the United States government to construct war ships for the Lakes, and his fame is thus linked with that of Perry and Macdonald.

The first steamship built in this country was the *Clarcmont*, in 1807, by Charles Brown. The speed of steamships in 1812 and 1813 may be judged of from captions in the newspapers. Here is one of them:—"Twenty-four hours later from Albany, with news of Gen. Scott's proceedings. Very late intelligence." Christian Burke's first essay in New York was a pilot boat, and to him is owing the race of that useful class of vessels. Our ferry boats we owe to R. L. Stevens and his cotemporaries. The city of Brooklyn, since 1824, has been built up by the ferry boats. It was only a village before. Its importance has been made by the application of steam to ferry boats. It was not unreasonable, the lecturer thought, to predict that boats would soon be built that would run 25 miles an hour.

Apropos of the *Great Eastern*, Mr. Murphy considered her the saddest failure of all commercial and mechanical speculations, and he was sorry she was so. He had reason to know that our mechanics mingled their condemnation of her with very great regret. There were many reasons why she must prove a failure. The time allowed for her in port would not be sufficient for her to take in freight and get a complement of passengers. A smaller vessel would make the voyage while she was filling. She is also a failure in her model. Her draft of water is ten feet too many. Each cubic foot of water would strike her sides with a resistance of sixty-four pounds. She is deficient in strength, and cannot work the side wheels and screw with equal speed. That "irrepressible conflict" opened up some interesting mechanical questions regarding the possible remedy. If anything could be done, it would be the taking away the screw, and applying the whole steam power to the wheels alone, if, indeed, the boilers were strong enough to resist the pressure of the accumulated steam. But there were still radical faults in her model which defied all correction. A larger ship would yet be built in this country, but her keel would not be laid till it was clearly shown that she could be made to pay.

Iron steamships are not, it would appear, favorites with Mr. Murphy. While usually we consume less coal in our steamships than either England or France do in theirs, the outfit of our vessels cannot compare with that of England. In that country the officers are retained in one ship, so that they get a perfect familiarity with her; with us, too often, captain and crew come on board together.

The lecturer glowingly eulogized the artisans and mechanics of our ship-yards. There may be found there men of intelligence, physical endurance and steady habits, who must challenge admiration. Nor were the merchants of the country to be forgotten. Their patriotism and liberality in encouraging shipbuilding were great. It was to be regretted that the government of the United States had not established a school of instruction for youth in naval architecture—an institution which should, in its devotion to art, be free from all political influences. Nobody who loves art would insult the artist of the "Heart of the Andes," or of the "Greek Slave," by asking what ticket they voted, or to what political body they belonged.

Mr. Murphy gave an interesting account of his early connection with the sea, his love of the works of Falconer, Dibdin and Capt. Basil Hall; and after the recita- of a nautical poem, he concluded a lecture which was listl ened to with great interest, and which was continually interrupted with great applause.

MANUFACTURE OF MAMMOTH CANNON.

A cannon weighing 35 tuns was successfully cast at the Fort Pitt foundry, Pittsburgh, on the 23d ult, under the superintendence of Lieut. Rodman, of the Ordnance Department. This is stated to be the largest cannon in the world. The casting is fifty inches in diameter, and nineteen feet five inches long. Seventy-eight thousand pounds of metal were melted for it in three reverberatory air furnaces, within four and a half hours after the fires were lit. The furnaces were tapped in succession, and the iron run in separate channels into a common reservoir, from which it passed into the mold—the latter being filled within twenty-one minutes after the first tap. The mold was a ponderous structure, and was placed vertically in a pit prepared for the purpose.

The gun has been named the "Floyd," in compliment to the Secretary of War, whose zeal for the improvement of artillery prompted this laudable experiment in gunnery. The model of the gun was designed by Lieut. Rodman, and made under his supervision from a plan of which he is the inventor, for casting guns hollow, and cooling them by circulating a stream of water through the interior of the core. The cold water enters at the top, passes down through a pipe in the center of the core, and is discharged at the bottom of the hollow part, and then, passing up through the core, becomes heated and is discharged at the top. It circulates a constant stream at the rate of about forty gallons per minute, and is continued until the casting becomes cool.

The drawings, patterns and computations were made by Mr. N. R. Wade, junior member of the firm of Knapp, Rudd & Co. The molding and casting were conducted by Mr. J. Kaye, and Joseph Marshall melted the iron. The ease, regularity and thorough success with which the different processes were conducted, were astonishing, and sufficiently manifested the extraordinary practical skill and judgment of all concerned in the operation.

PRACTICAL BENEFITS OF THE COOPER INSTITUTE.—Since November 1, 1859, the first course of free instruction has been in progress at the Cooper Union, this city. About 2,000 pupils now participate in the educational advantages of the institution, 420 of whom are in the drawing-classes; 300 in the vocal music classes; 300 in the chemistry class; 200 in that pursuing mathematics, and 150 in that which devotes its energies to natural philosophy. The School of Design for women has 120 pupils, but a very small proportion of whom (only 12 out of 120) pay for tuition. These are the only ones in the building, moreover, who pay anything. There are lectures or classes every evening in the week, free to all, upon application with certificate of good moral character. The free reading-room is one of the largest in the country, including a great number of periodicals, sent free of charge, besides a subscription-list for publications of this class, amounting to $1,200 per annum. All the leading foreign and domestic journals are received. The picture-gallery contains a large number of paintings by the old masters, including an original Raphael. A large portion of the Bryan collection is temporarily in the gallery. The expenses of the institution are partially maintained by rents of offices and stores. The revenue from this source is, however, smaller than it should be, owing to the unfinished state of Tompkins Market, and the uncouth sheds temporarily erected in its stead. Mr. Cooper has authorized the trustees to draw upon him for $10,000, to make up the deficit in the first year's receipts.

EXTRAORDINARY TELEGRAPHING.—There were sent on Tuesday, 28th ult., over the wires of the Atlantic and Ohio telegraph (Morse) lines, extending between Philadelphia and Pittsburgh, five hundred and seventy-eight private despatches, over five thousand words of news for the Associated Press, and an entire copy of the President's Message, containing over fifteen thousand words, to the Pittsburgh *Post*, and all during the regular business hours of the day. The President's Message was transmitted, on two wires, in five hours and fifteen minutes. Two thousand and eighty-three words were transmitted by one operator—Mr. Zeigler—in an hour; Mr. Fleming, of Pittsburgh, taking it down by the "tick." —*Philadelphia Ledger.*

WATER flowing in streams, with a velocity of 3 feet per second, moves stones the size of a hen's egg.

FOREIGN NEWS AND MARKETS.

The Sheffield steel trade continues very active; this is owing to the adaptation of steel to several new branches of manufacture. The casting of steel bells has become quite an extensive business. One firm in Sheffield has made 1,300 during the past six months, and some of very large dimensions are about to be cast. Steel is cheaper than regular bell-metal; and as it is much stronger, less metal is required in a bell. Kettle drums, for the British army, are now also made of steel, and they have attained considerable success.

Statistics have been collected of the destruction caused on the coasts of England by the hurricane which took place on the 24th of October last; and the disasters appear to have been the most numerous on record. There were 325 shipwrecks, and 748 lives lost.

Batteries of the Armstrong breech-loading rifled cannon are being manufactured with great rapidity No less than 30 of these guns, some of which are of large caliber, are being sent with great despatch by the overland route to China.

It is proposed to build a monster hotel near the old London Bridge, having 250 sleeping apartments. The returns of the different railways which have their termini at London Bridge, show that not less than 18,000,000 of persons travel annually upon those lines. This hotel, however, will not equal, in size, some of the largest ones in New York.

A farmer—Mr I. Cutts—in the county of Essex, England, lately opened up, for public inspection, a large building like a factory, for doing the inside work of the farm. There is a steam engine in it of 12-horse power, which cuts the hay and straw, grinds the meal, mixes the food for the cattle, and conveys it to the stables. It also threshes the grain and drives a circular saw At the end of the building, there is a piggery and apparatus for steaming all the pig and cattle feed. The food for the animals is conveyed on iron trucks, which run on tram rails, and traverse the building. The cost of the structure and machinery amounted to £3,000 (nearly $15,000). This affords some evidence of the perfection to which indoor farming operations has attained in England.

The French government has just opened a free school in Paris to teach the youth of both sexes the art of drawing and engraving on wood. One of the most eminent painters in Paris has been chosen its drawing-master.

At the Gobelins' factory, in Paris, there are finishing a series of portraits of eminent sculptors, painters and artists of the sixteenth century. They are to adorn the gallery of Apollo, at the Louvre.

At all hours of the day and night there are persons in the thoroughfares of Paris who keep a record of the number and class of vehicles which pass. As the streets are macadamized, instead of being paved, the object of keeping a record of the vehicles is to ascertain the amount of wear they exert upon the streets.

There has been no change in the British metal market since our last issue, excepting that pig iron was somewhat more active, at former ruling prices. Cotton, in Liverpool, had been rather flat.

NEW YORK MARKETS.

CANDLES.—Sperm, city, 38c. a 40c. per lb.; sperm, patent, 50c.; wax, paraffine, 50c.; adamantine, city, 18c. a 21c.; stearic, 27 a 28c.

COAL.—Anthracite, $4.50 a $5; Liverpool orrel, $11; cannel, $12.

COPPER.—Refined ingots, 23c. per lb.; sheathing, 26c.; yellow metal, 20c.

CORDAGE.—Manilla, American made, 8¼c. per lb.: Rope, Russia hemp, 12c.

COTTON.—Ordinary, 8¼c. a 8¾c.; good ordinary, 9¼c. a 10c.; middling, 11½c. a 11⅝c.; good middling, 11½c. a 12⅛c.; middling fair, 11¾c. a 12⅜c.

DOMESTIC GOODS.—Shirtings, brown, 30-inch, per yard, 6c. a 7¼c.; shirtings, bleached, 26 a 32-inch, per yard, 6c. a 8c.; shirtings, bleached, 30 a 34-inch, per yard, 7c. a 8½c.; sheetings, brown, 36 a 37-inch, per yard. 5½c. a 8¾c.; sheetings, bleached, 36-inch, per yard, 7½c. a 15c.; calicoes, 6c. a 11c.; drillings, bleached, 30-inch, per yard, 8½c. a 10c.; cloths, all wool, $1.50 a $2.50; cloths, cotton warp, 85c. a $1.37; cassimeres, 85c. a $1.37½; satinets, 30c. a 60c.; flannels, 15c. a 30c.; Canton flannels, brown, 8½c. a 13c.

DYEWOODS.—Barwood, per tun, $18 a $20; Camwood, $130; Fustic, Cuba, $35 a $36; Fustic, Tampico, $22; Fustic, Savanilla, $19 a $20; Fustic, Maracaibo, $18.50 a $19; Logwood, Laguana, $22 a 23; Logwood, Tabasco, $21; Logwood, St. Domingo, $13 a $13.50; Logwood, Honduras, $16 a $17; Logwood, Jamaica, $12.50 a $12; Lima wood, $65 a $75; Sapan wood, $45.

FLOUR.—State, superfine brands, $5.15 a $5.20; Ohio, common brands, $5.30 a $5.35; Michigan, Indiana, Wisconsin, &c., $5.15 a $5.30; Genesee, extra brands, $5.75 a $7.50; Missouri, $5.30 a $7.50; Canada, $5.40 a $6.50; Richmond City, $6.25 a $7.25; Rye flour, fine, $3.60 a $3.90; corn meal, $3.75.

HEMP.—American undressed, $120 a $150; dressed, from $160 a $200. Jute, $87 a $90. Italian, $275. Russian clean, $190 a $200 per tun. Manilla, 6½c. per lb. Sisal, 5½c.

INDIA-RUBBER.—Para, fine, 55c. per lb.; East India, 50c.

INDIGO.—Bengal, $1 a $1.55 per lb.; Madras, 70c. a 95c.; Manilla 60c. a $1.15; Guatemala, $1 a $1.25.

IRON.—Pig, Scotch, per tun, $24 a $25; Bar, Swedes, ordinary sizes, $35 $36: Bar, English, common, $42.50 a $43; Refined, $52 a $54; Sheet, Russia, 1st quality, per lb., 11¼c. a 11⅝c.; Sheet, English, single, double and treble, 3¼c. a 3⅞c.; Anthracite pig, $24 per tun.

IVORY—Per lb., $1.25 a $1.80.

LATHS.—Eastern, per M., $2.25.

LEAD.—Galena, $5.80 per 100 lbs.; German and English refined, $5.65 a $5.70; bar, sheet and pipe, 5¾c. a 6c. per lb.

LEATHER.—Oak slaughter, light, 29c. a 30c. per lb.; Oak, medium, 30c. a 32c.; Oak, heavy, 28c. a 31c.; Oak, Ohio 29c. a 30c.; Hemlock, heavy, California, 19c. a 20c.; Hemlock, buff, 15c. a 18c.; Cordovan, 50c. a 60c.; Morocco, per dozen, $18 to $20.; Patent enameled, 16c. a 17c. per foot, light Sheep, morocco finish, $7.50 a $8.50 per dozen.; Calf-skins, oak, 57c. a 60c.; Hemlock, 56c. a 60c.; Belting, oak, 32c. a 34c.; Hemlock, 28c. a 31c

LIME.—Rockland, 80c. per bbl

LUMBER.—Timber, white pine, per M feet, $17.50; yellow pine, $35 a $36; oak, $18 a $28; eastern pine and spruce, $14 a $15.50: White Pine, clear, $35 a $40; White Pine, select, $25 a $30; White Pine, box, $14 a $18; White Pine, flooring, 1¼ inch dressed, tongued and grooved, $24.50 a $25; Yellow Pine, flooring, 1¼ inch, dressed, tongued and grooved, $29 a $32; White Pine, Albany boards, dressed, tongued and grooved, $20 a $21; Black Walnut, good, $45; Black Walnut, 2d quality, $30; Cherry, good, $45; White Wood, chair plank, $42; White Wood, 1 inch, $23 a $25; Spruce Flooring, 1¼ inch, dressed, tongued and grooved, each, 22c.a 24c.; Spruce Boards, 15c. a 17c.; Hemlock Boards, 12½c. a 14c.; Hemlock wall strips, 10c. a 11c.; Shingles, cedar, per M, $28 a $35; Shingles, cypress, $12 a $25; Staves, W. O. pipe, light, $55 a $5; Staves, white oak, pipe, heavy, $75 a $80; Staves, white oak, pipe, culls, $30 a $35; Staves, do. hhd., heavy, $70; Staves, do. bbl. light, $30 a $35; Staves, do. bbl. culls, $20; Mahogany—St. Domingo, fine crotches, per foot, 35c. a 45c.; St. Domingo, ordinary do., 20c. a 25c.; Honduras, fine, 12½c. a 15c.; Mexican, 13c. a 15c.

NAILS.—Cut, 3¼c. a 3⅜c. per lb.; American clinch, 5c. a 5½c.; American horse-shoe, 14½c

OILS.—Olive, Marseilles, baskets and boxes, $3.35 a $3.40; Olive, in casks, per gallon, $1.10 a $1.15; Palm, per pound, 9c. a 9¼c.; Linseed, city made, 57c. a 58c. per gallon; linseed, English, 57c. a 58c.; whale, fair to prime, 49c. a 52c.; whale, bleached 59c. a 60c.; sperm, crude, $1.35 a $140; sperm, unbleached winter, $1.45; lard oil, No. 1, winter, 87½c. a 92½c.; red oil, city distilled, 55c.; Wadsworth's refined rosin, 30c. a 40c.; Wadsworth's boiled oil for painting, 35c. a 40c.; Wadsworth's tanner's improved and extra, 30c. a 40c.; Wadsworth's machinery, 50c. a $1; camphene, 45c. a 47c.; fluid, 54c. a 56c.

PAINTS.—Litharge, American, 7c. per lb.; lead, red, American, 7c.; lead, white, American. pure, in oil, 8c.; lead, white, American, pure, dry, 7¼c.; zinc, white, American, dry, No. 1, 5c.; zinc, white, French, dry, 7¼c.; zinc, white, French, in oil, 9¼c.; ochre, ground in oil, 4c a 6c.; Spanish brown, ground in oil, 4c.; Paris white, American, 75c. a 90c. per 100 lbs.; vermillion, Chinese, $1.12½ a $1.22; Venetian red, N. C., $1.75 a $2.25 per cwt.; chalk, $4 per tun.

PLASTER-OF-PARIS.—Blue Nova Scotia, $2.75 per tun; white, $3.50; calcined, $1.20 per bbl.

RESIN.—Common, $1.60: per 310 lbs.; strained, No. 2, &c., $1.60 a $1.70: No. 1, per 280 lbs. $1.75 a $2.50; white, $2.50 a $3: pale, $3 a $5.50.

SOAP.—Brown, per pound, 5c. a 8c.; Castile, 8¾c. a 9c.: Chemical olive, 7c. a 7¾c.

SPELTER plates, 5¼c. a 5½c. per lb.

STEEL.—English cast, 14c. a 16c. per lb.; German, 7c. a 10c.; American spring, 5c. a 5½c.; American blister, 4¼c. a 5½c.

SUMAC.—Sicily, $60 a $80 per tun.

TALLOW.—American prime, 10¾c. per lb.

TIN.—Banca, 32c.; Straits, 30c.; plates, $6.25 a $9.30, per box.

WOOL.—American, Saxony fleece, per lb., 55c. a 60c.; American full blood merino, 48c. a 52c.: extra, pulled, 45c. a 50c.; superfine, pulled, 39c. a 43c.; California, fine, unwashed, 24c. a 32c.; California, common, unwashed, 10c. a 18c.; Mexican, unwashed, 11c. a 14c.

ZINC.—Sheets, 7c. a 7¼c. per lb.

The foregoing rates indicate the state of the New York markets up to December 29th.

There has been very little change in the markets during the past week; all kinds of manufacture and merchandize are in a state of inactivity, but this is usually the case during the last month of the year.

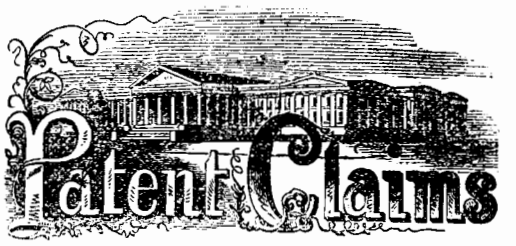
There is a good demand for furs of all descriptions. Capes are enlarged in their dimensions this winter, and full robes of fur, such as are worn by the ladies of Russia, are becoming more common. Otter skins are selling at from $3.50 to $5.50 each; those of the black and the silver fox, from $10 to $50; the dark marten, $5 to $6; the dark mink, $2.50 to $3; the beaver, $1.20; and the skin of the black bear, for sleigh robes, from $6 to $8.

There has been a steady demand for hemlock sole, and a further advance has been obtained on all descriptions of leather. Oak sole continues in fair inquiry, without variation in prices.

No less than $39,975,750 arrived from California last year, being an increase of $3,796,406 over the year previous. The latest mining news from California is highly favorable, and promises well for the gold crop and recently-discovered silver crop. So, also, the gold news from Oregon represents everything in that quarter in a flourishing condition.

The cotton exports this season have been 902,000 bales, against 729,000 bales of last season. The best qualities of cotton are rather scarce in the market.

RAND'S FLOUR MILL.—Some months ago, we solicited a patent for Christopher Rand, of Peoria, Ill., on a flour mill constructed on an ingenious and novel plan; and, if the statements are true, it has proved one of the most valuable improvements ever made in flour and grain mills. The stones are made in the form of rings so that the whole of the grinding surface has a much more nearly uniform speed than in the usual plan. A radial fan is placed within the rings, which blows the flour out from between the stones as it becomes sufficiently fine; thus relieving it from the continual action of the stones, which tends to heat it and consumes power uselessly. The upper stationary stone is hung upon universal joints, which secures a perfect adjustment of the faces and keeps them in "tram."



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 27, 1859.

[Reported Officially for the SCIENTIFIC AMERICAN.]

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

26,553.—Norman Allen, of Unionville, Conn., for an Improved Vise and Saw-set:

I claim the vise formed of the bars, A A, with jaws, b b, attached, the movable bar being actuated by the treadle, B, rod, C, and toggle, D, or their equivalents, in combination with the saw-set formed of the bar or bed, G, attached to the vise by the rod, F, and provided with the beveled plate, i, gage, j, and adjustable center, H, substantially as and for the purpose set forth.

26,554.—Wm. H. Baker, Daniel Dean, and B. L. Fethcrolf, of Tamaqua, Pa., for an Improvement in Straw-cutters:

We claim, first, The double-edged reciprocating knife, C, in connection with the bed, P, arranged to operate substantially as and for the purpose set forth.

Second, The arrangement of the eccentric, H, yoke, I, slide, J, lever frame, M, and bars, O, substantially as shown and described for operating conjointly the feed bar, L, and pressure bed, P.

Third, The eccentric plate, G, placed on the shaft, i, when used in connection with the slide, J, to control its longitudinal movement for the purpose set forth.

[The object of this invention is to obtain a machine that will cut hay, straw and stacks for fodder with great rapidity, perform the work well, and be capable of having certain parts graduated so as to regulate, as may be desired, the length of the pieces into which the stuff is to be cut.]

26,555.—Wm. Banham, of San Francisco, Cal., for an Improvement in Machines for Pulverizing Quartz:

I claim the circular troughs T T', constructed as described, in combination with the drags, D D', at the extremities of the radial arms, a, the whole constructed and operated substantially in the manner and for the purpose set forth.

26,556.—R. D. Bartlett, of Bangor, Me., for an Improvement in Veneering Machines:

I claim the application of the throat gage to the main and secondary cutters, so that both the gage and secondary cutters can be turned upward away from the log, under circumstances and for the purpose or objects substantially as set forth.

26,557.—G. W. Beardslee, of Flushing, N. Y., for an Improved Magneto-electric Machine:

I claim the mode of operation of the pole-changer, by which the current is made to travel in the same direction, substantially as described.

26,558.—G. W. Beardslee, of Flushing, N. Y., for an Improved Magneto-electric Machine:

I claim the compound magnet described, consisting of radial poles, arranged about a common center, and connected together at their inner ends, substantially as and for the purpose described.

I also claim forming such a compound magnet, with radial poles, connected at their inner ends, by cutting out the radial poles and connecting rings from a single plate, substantially as and for the purpose specified.

I also claim, in combination with rotating magnets, the insulated rings to which the terminal wires of the helices are connected, substantially as described.

26,559.—James Bouton, of Macon City, Mo., for an Improvement in Seeding Machines:

I claim the arrangement of the wheels, b' b, pipes, C and D, coverers, E, springs, F, and u, and the yielding beam, c, in the manner described, and also the arrangement of the valve, f, in the hopper, P, in the manner described, for the purpose specified.

26,560.—Samuel Boyd, of Brooklyn, N. Y., for an Improvement in the Manufacture of Hoes:

I claim the combination with the drop, G, and anvil, B, of the drop opening, f, and mandrel, C, so that after the drop has given its blow, it will hold the hoe in place, and allow the mandrel, C, to be passed through it into the hoe, to form and finish the eye thereof, all as shown and described.

[The object of this invention is to reduce the manual labor attending the manufacture of hoes, and at the same time ensure a better finish and more desirable article than could be produced by the devices hitherto employed.]

26,561.—O. G. Brady, of New York City, for an Improvement in Guides for Sewing Machines:

I claim the combination of the presser, having its sole formed with a curve, d, a grooved toe, f, and a recess, e, as described, and the curved guide tube, g, arranged relatively to the curved edge and toe of the presser, as described, and operating as and for the purpose specified.

[This invention consists in a certain construction and arrangement relatively to each other, of a guiding tube and a grooved presser,

whereby I am enabled to insert the cord within a fold or between two thicknesses of fabric, in straight, curved or zigzag lines, and in such manner as to bring all the fullness produced by the cord on one side of the fold or plait, leaving the opposite side perfectly even or flat.]

26,562.—R. M. Brooks, of Greenville, Ga., for an Improvement in Cotton Seed Planters:

I claim the arrangement of the wheels, J E F G, and N, the seed-box, H, the handles, D D, the bar, S, the braces, L, coulter or opener, B, covers, J, arm, K, and brace, W, as described for the purposes set forth.

26,563.—R. M. Brooks, of Greenville, Ga., for an Improvement in Plows:

I claim the arrangement of beam, J, screw foot, F, notch, v, plow hoe, A, opening, P, moldboards, O, openings, U, nuts, E E, holes, J J J, constructed as described for the purposes set forth.

26,564.—Geo. Cook and H. I. Kimball, of New Haven, Conn., for an Improvement in Top Props for Carriages:

We claim the combination of the thimble or pipe, e or g, with the screw bolt or standard, a or b, and the joint bars, B B or C, when the whole is constructed and used substantially as described,

26,565.—S. F. Covington, of Indianapolis, Ind., for an Improved Register for Railroad Cars:

I claim the indicator, A, when operated in connection with the telegraph instrument or its equivalent, using the Roman numerals, or their equivalents, and operating the same, substantially as and for the purpose set forth.

26,566.—Isaac R. Crane, of Warsaw, Mo., for an Improvement in Ditching Machines:

I claim the arrangement of the plow, G', with the frame, A, and the scoop, Z, and elevator, F, and the described arrangement of devices for operating the said plow, in the manner described.

I claim the arrangement of devices, whereby the scoop and elevator of my machine is lowered in and raised out of the ditch, in the manner described.

I claim the arrangement of the guide wheel, P, with the frame, A, and with the arrangement of devices for operating the said wheel, as described.

26,567.—L. B. Miller, of Newark, N. J., assignor to A. D. Crane, of Boston, Mass., D. F. Tompkins, L. B. Miller, and C. T. Tompkins, of Newark, N. J., and D. Holsman, of Passaic, N. J., for an Improved Machine for Turning Irregular Forms:

1 claim, first, The double disk-cutter head, A A', constructed substantially in the manner and for the purpose described.

Second, I claim the consolidation of the separate cams, b b, Figs. 5 and 6, into a solid former, or consolidated cam, B Figs. 1, 2 and 7, and the use of such consolidated cam or former, in combination with the said Crane's lathe.

Third, I claim the use of the levers, m m Figs. 1 and 2, formed and adjusted in the cutter's head, substantially as described.

26,568.—J. G. Goshon, (assignor to himself, H. Ruby, John Wonderlich, and H. R. Ruby), of Shippensburg, Pa., for an Improvement in Railroad Car Couplings:

I claim the longitudinal moving shaft, A, in combination with the spring, s, bolt, a, arm, b, and projection, c, substantially as and for the purposes set forth.

26,569.—G. W. Dana, of Durand, Ill., for an Improved Lock:

I claim, first, The employment or use of a series of spindles, G K, provided with slots or recesses, h m, and with lettered caps, Q, connected by catches, p, the spindles being arranged directly with the bolts, as with C, or indirectly, by means of wheel, F, as with B, either or both, for the purpose set forth.

Second, The slide bar, D, provided with the projections, f f, arranged relatively with the slots, B C, and connected with the guard wheel, H, as shown, in connection with the wheel, F, and spindles, G, arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain a burglar-proof and powder-proof lock, one admitting of change or permutation, and one also that may be easily manip lated both as regards the effecting of the changes and the locking and unlocking of the lock.]

26,570.—Newell Daniels, of Milford, Mass., for an Improved Cloth-holder in Needle-work:

I claim, as a new article of manufacture, a ladies' work-holder, to hold the work by the action of the piece, B, towards and in connection with the solid part of the frame, A, when constructed and operating substantially in the manner and for the purpose as above set forth and described.

26,571.—John Danner, of Canton, Ohio, for an Improvement in Sleeping Chairs for Railroad Cars:

First, I claim the limb-supporting device, F G H, in combination with the seats, constructed substantially as described and for the purpose set forth.

Second, I claim the combination with the seats, C, and frames, B, of the backs, D, folding head rests, I, slotted pieces, b, arranged and operating in relation to and in combination with the limb-supporting device, F G H, substantially as and for the purpose set forth.

26,572.—L. A. Dole, of Salem, Ohio, for an Improved Washing Machine:

I claim the arrangement consisting of the tub, A, rubber, B, hinged rubber, C, slotted arms, a b, lever frame, D, and hinged inclined links, E E, in the manner and for the purpose described.

26,573.—Francisco Domenech, of Ponce, Island of Puerto Rico, for an Improvement in Clarifying Cane Juice. Patented in the Island of Puerto Rico, Aug. 17, 1858:

I claim the method of determining the amount of lime necessary to be added to the raw juice, to defecate the same, by the employment of the volumetric method, as set forth.

26,574.—Eugene Duchamp, of St. Martinsville, La., for an Improvement in Apparatuses for Evaporating Sugar Juices:

I claim, first, The arrangement of a vertical boiler, F, in front of the furnace, having a funnel, I, spiral conveyor, J, and cone, K, when the whole are combined for the purpose and in the manner set forth.

Second, I claim, in combination with the above vertical boiler, the semi-cylindrical concentrating boiler, N, when the same is constructed and arranged in the manner and for the purposes represented and specified.

26,575.—A. M. Dye, of Clinton, Ill., for an Improved Bed Bottom:

I claim the attaching of the traverse bars, d d, of the frame, A, to the side strips, c c, by means of the dovetail slides, e, and sockets or guides, f, provided with the screws, g, and attaching the bars, a, of the frame, B, to the side strips, b b, by means of the set screws, k, substantially as and for the purposes specified.

[This invention relates to an improvement in that class of bed bottoms in which wire upholstery springs are used to impart a requisite degree of elasticity. The object of the invention is to obtain a facile mode of straining or tightening the webbing of the bottom, and also to obtain a ready means for graduating the strength or elasticity of the springs, as circumstances may require.]

26,576.—Lucius Eddleblute, of Garden Valley, Cal., for an Improved Amalgamator:

I claim the combination of the bars, b, with the inclined or bevel slats, a, and inclined top, A, and bottom, B, as shown, so that the water has an easy access, and in its fall first strikes the edges of the bars, b, and thus avoids the washing out of the quicksilver, all as set forth.

[This invention relates to an improvement in the riffles which are used for catching gold, and it consists in giving to said riffle a peculiar form, and constructing the same out of two parts which can readily be taken apart, so that access can be had to the gold which accumulates in the bottom of the riffle. The top part is provided with a series of slats which give free access to the water, and the bottom parts deepens towards the outlet, and is provided with a series of cross bars which form mercury cups, and which are so situated in relation to the slats in the top part, that the force of the water is broken before it strikes the mercury.]

36,577.—Seraphin Espach, of Cincinnati, Ohio, for an Improved Bedstead:

I claim the described arrangement and combination of parts consisting essentially of the foundation, J, and its springs, L M, posts, A, rails, C D, hooks, F, and their sockets, the braces, P Q, and their adjusting screw, O, and the lattice work-head and foot-boards, all substantially as and for the purpose set forth.

26,578.—Francis J. Flowers, of Rahway, N. J., for an Improvement in Extension Seats for Carriages:

I claim the operation and combination of the raising bar, H, or its equivalent, with the parts, A and C.

Second, I claim the combination of the recess, I I, with the legs, B B.

Third, I claim forming the joints, L L L L, in combination with the boot, for the purpose set forth.

26,579.—Henry Garbanati, of Brooklyn, N. Y., for an Improved Carving Fork:

I claim the permanent spur guard, c, the fulcrum guard, b, in combination with a carving fork, substantially as described.

26,580.—Dennis C. Gately, of Newtown, Conn., for an Improvement in the Manufacture of India-rubber Belting:

I claim the improvement in the manufacture of machine belting or banding, composed wholly or in part of india-rubber or gutta-percha, the same consisting in rolling or winding up the belt or band with any suitable non-adhesive substance or composition interposed between its folds or layers, and then heating it, substantially in the manner and for the purposes described.

26,581.—Henry Gilliard, of Mount Hope, Wis., for an Improvement in Cultivators:

I claim the arrangement of the permanent circles, G, and jointed bars, J J, when the whole is constructed for joint operation, as set forth.

26,582.—John Gore, of Brattleboro', Vt., for an Improvement in Harvesters:

I claim the use of lever, M', constructed as described, in combination with the tapering draw bar, D, for elevating the cutting apparatus of the harvester, in the manner described.

26,583.—John Gray, of Nashville, Tenn., for an Improvement in Self-adjusting Counter Braces of Truss Bridges:

I claim the application, to counter braces in truss bridges, of a socket at the top, a heel and key at the bottom, by which the counter braces in truss bridges are made self-tightening and adjusting, as described.

26,584.—J. P. Grosvenor, of Lowell, Mass., for an Improved Machine for Planing Curved Surfaces:

I claim the employment or use of the adjustable or yielding feed rollers, L L, when combined with a bearing roller, M, or a proper bearing surface, and arranged relatively with each other, as shown and described, to admit of the feeding of circular, oval and serpentine forms to the cutters.

I further claim placing the rollers, L L, in an adjustable frame or box, G, fitted in an adjustable box, E, and used in connection with the elastic bars, N N, or their equivalent, and the bearing rollers, M, whereby the frame or pattern may be properly adjusted and retained in proper position between the rollers while being acted upon by the cutters.

26,585.—Joseph A. Grunwald, of New York City, for an Improvement in Circular Forms. Patented in France Sept. 20, 1859:

I claim, first, The manner of weaving in a horizontal circular plane by means of two or more wefts, and an arrangement of warps placed alternately above and below the weft threads, arranged and constructed in the manner substantially as described.

Secondly, I claim the arrangement of the weft bobbin carriage, in combination with the arrangement of regulating the tension on the weft thread, substantially as described.

Third, I claim the arrangement and construction of the tension levers, for the purpose of maintaining the tension of the warp threads as well as the friction against the warp bobbins, acting together in the manner and for the purpose substantially as set forth.

Fourth, I claim the arrangement of the serrated pulley, W, in combination with the rollers, W W' W'', operating together in the manner described, and for the purpose of delivering the manufactured article as fast as finished and at a regular tension, substantially as specified.

Fifth, I claim the arrangement of the disengaging gear, r, constructed as described, and for the purpose of throwing the loom out of gear as soon as one of the weft threads break, the same being operated by a lever attached to the weft bobbin carriage, and acted upon by the weft thread in the manner substantially as set forth.

26,586.—James Harrison, Jr., of New York City, for an Improvement in Sewing Machines:

I claim, first, The rotary needle guide disk, c, constructed and operated in the manner and for the purpose described.

Second, The arrangement of the following devices for holding and operating the shuttle, viz.: the arm, l, the revolving button, m, slotted to receive the arm, l, the shuttle case, o, rod, i, and its head, j, spring, k, and legs, h, all constructed and operating substantially as described.

Third, Constructing the shuttle with the ridge and holes and thread space, as described.

Fourth, Inserting the lever bar, x, in the needle bar, w, and operating it as described.

26,587.—T. S. Heptinstall, of Mendota, Ill., for an Improvement in Gang Plows:

I claim the arrangement of the wheels, A B B, shafts, C and D D, spindle, E, triangle, F, rod, G, lever pole, H, regulator, I, and rollers, K K, as described, for the purposes set forth,

26,588.—Homer Holland, of Westfield, Mass., for an Improved Process for Making Sulphuric Acid:

I claim the generation of sulphuric acid by treating sulphides and nitrates commingled in close vessels, in connection with the ordinary sulphuric acid chamber, and for the purpose substantially as set forth.

26,589.—Homer Holland, of Westfield, Mass., for an Improved Process for the Production of Sulphate and Oxyds of Copper:

I claim the production of sulphate of copper, together with the oxyds of copper, from its various sulphurets, by the use of the nitrate of soda, according to the process already described.

26,590.—Homer Holland, of Westfield, Mass., for an Improvement in the Mode of Treating Metalliferous Sulphurets:

I claim the treatment of metalliferous sulphides with the native nitrate of lime, or nitrate of lime and magnesia, in iron vessels, in the manner and for the purpose substantially as set forth.

26,591.—Jesse Jacobs, of Yellow Springs, Ohio, for an Improvement in Beehives:

I claim the "valve" composed essentially of the vestibule, D, an adjustable counter-weighted valve pedal, G, arranged and operating substantially in the manner and for the purpose specified.

26,592.—Aaron E. James, of Decatur, Ill., for an Improvement in Straw-cutters:

I claim feeding the straw towards the knife by means of two feed rolls between which the straw passes, when said rolls or cylinders are both operated simultaneously by the positive action of separate pawls, or their equivalents, working in ratchets made and arranged in said rolls, substantially in the manner and for the purpose described.

26,593.—Henry Bœhm James, of Trenton, N. J., for an Improvement in Watches:

I claim controlling the active length of the pendulous or hair spring of a watch, or other time-keeper governed by a balance, by means of combined laminæ of different metals, so applied to act upon the end of the spring which has been commonly fixed that, by an increase or diminution of temperature, the said spring is caused to be taken up or let out through the curb pins, or their equivalents, and so to compensate for the expansion and contraction of the said spring and the balance, substantially as described.

26,594.—Geo. Jaques, of Somerville, Mass., for an Improvement in Preparations of Tobacco:

I claim, as a new article of manufacture, the described preparation of tobacco, consisting of the soluble and volatile portions, as set forth.

26,595.—James M. Jay and John Darmer, of Canton, Ohio, for an Improved Apparatus for Heating Water:

We claim the combination and relative arrangement of the parts composing the water-heater, substantially as and for the purpose set forth.

26,596.—Charles Kesler and Fred. Reinhard, of Columbus, Texas, for an Improvement in Cotton Seed-planters:

We claim the arrangement, in a hopper, of the roller, B, with stirring teeth, a, and feeding teeth, b, in combination with the perforated partition, C, and the distributing roller, D, substantially as and for the purpose specified.

[This invention consists in arranging, in a hopper, a roller armed with stirring and feeding teeth, in combination with an inclined perforated partition and a distributing roller with seed cells, which are filled by the action of the toothed roller, so as to ensure a correct distribution of the seed.]

26,597.—John R. King, of Raleigh, Tenn., for an Improvement in Cotton Cultivators:

I claim the arrangement of the frames, p q b c, and wing or moldboard, m, cast solid together, extra landside, S, with its tenons, d n n, and brace, a, with the cotton scraper, g, as described, for purposes specified.

26,598.—John B. Koch, of New York City, for an Improved Folding Bedstead:

I claim the combined arrangement of the shoulder, S, and eccentric, E, both situated below the rails and inside the bedstead, to secure the side rails in their proper place when the bedstead is unfolded, and at the same time to relieve the pins, C, of the strain, in the manner and for the purpose substantially as specified.

26,599.—Samuel Lessig, of Reading, Pa., for an Improvement in Horse Hay Rakes:

I claim the singletree, g, sliding bar, 3, spring, n, braces, 6, axle, z, bar, g, sleeves, r, beam, 8, braces, j, slotted teeth guides, i, rollers, c, arms, f, and connecting bars, l l, the whole being constructed and arranged for operation, conjointly, as and for the purpose set forth.

26,600.—S. M. Logan, of Richmond, Ind., for an Improved Roofing Composition:

I claim the described composition, constructed and used substantially as and for the purpose specified.

26,601.—Thos. R. Markillie, of Winchester, Ill., for an Improved Excavating Machine:

I claim, first, The combination of the carrying wheel, C, as constructed and operated, with the reversible plow, so arranged for the purposes set forth.

Second, In combination with the carrying wheel, C, and plow, M, I claim the elevator, D, as arranged and operated for the purposes described.

Third, I claim the hinged wheel frame, b, as arranged and combined with the lever, d, and rack bar, f, for the purposes set forth.

26,602.—V. L. Maxwell, of Wilkesbarre, Pa., for an Improvement in the Manufacture of Gunpowder:

I claim the employment of alcohol in lieu of water as the vehicle to unite the particles of the ingredients of which the powder is to be composed, substantially as and for the purpose shown and described.

26,603.—Thos. J. Mayall, of Roxbury, Mass., for an Improvement in Apparatus for Forming Rubber Belting:

I claim, first, The use of the two rollers, u and v, acting together so as to form the belt into a gutter shape, whereby the first step in the process of folding the outside sheet or covering of rubber or gutta-percha over the body or inner fabric of the belt or band is effected, as set forth.

Second, The roller, x, having two tapering surfaces and a central disk, whereby the overlapping of the overlapping of the covering or outer sheet over the inner fabric is completed and the edges of the outer sheet or covering brought to a true and even line before being united.

Third, Bringing the two edges of the outer sheet or covering evenly together, so as to form a true and perfect joint and complete the formation of the belt or band by the employment of two or more rollers, arranged in relation to each other, so that the said belt or band shall be drawn partially around the periphery of either of all the said rollers, substantially in the manner as set forth.

Fourth, In combination with the machinery for forming the belt or band, I claim the device for cutting both the outer and inner sheets into straps of any desired width, as described.

26,604.—Wm. McLendon, of Greenville, Ga., for an Improvement in Cotton Gins:

I claim beveling the edges of the roll box from the saws, substantially as and for the purpose set forth.

26,605.—James T. Mercer, of Seneca township, Ohio, for an Improvement in Seed Planters:

I claim the arrangement of the handles, L, beam, M, pivot, i, stirrup, J, wheel, K, arms, b, lever, e, slide, d, hopper, c, spring, f, markers, a a, and coverers, h h; the whole being constructed as described for the purposes set forth.

26,606.—Peter Monaghan, of Camak, Ga., for an Improvement in Cotton Cultivators:

I claim, in combination with the hinged frame of a cotton cultivator, the spring, H, which is secured to the tongue of said cultivator, for the purpose of automatically raising the rear end of the machine when the same is released by the operator, substantially in the manner described.

26,607.—Richard Montgomery, of New York City, for an Improvement in Rolling Corrugated Metals:

I claim the combination and relative arrangement of the corrugating rolls, E E, with the holding and smoothing rolls, G G, forming roll, H, and carriage, e, operating in relation to each as and for the purposes set forth.

26,608.—Conrad Norpel, of Newark, Ohio, for an Improvement in Railroad Car Couplings:

I claim the arrangement, as described—

First, Of the jaw, A, with the beam, B, and pin, D, for the purpose aforesaid.

Second, Of the jaw, K, with the pin, L, combined with the coupling bar, q, and fish-tailed end, R, for the purpose described.

Third, Of the two wings, G G, combined with the slide, E, for the purpose described.

26,609.—A. B. Norris, of St. Louis, Mo., for an Improved Mode of Operating Sawmill Blocks:

I claim the use of a lever with a vibrating fulcrum, in combination with the dog or reciprocating carriage, f, or its equivalent, as the means of communicating motion to the slides or knees, P P, of saw mill head blocks, substantially as described.

And I also claim the combination of the cam lever, u, with the knee, P, and the means of operating the same for the purpose of securing the said knees, substantially as described.

26,610.—[Suspended.]

26,611.—Worden P. Penn, of Belleville, Ill., for an Improvement in Seeding Machines:

I claim arranging the grass seed hopper in front of the grain hopper, with the reflector, d, fixed against its under side, in relation to the grass seed box and the grain box, and the pipe, H, and the leader, T, as shown and described.

26,612.—Worden P. Penn, of Belleville, Ill., for an Improvement in Seed Drills:

I claim the arrangement of the endless chain, f, with the eccentric bar, T, and valve bar, t, with the valves, v, thereto attached, for the purpose of closing and opening the said valves and raising the flukes simultaneously, in the manner described.

26,613.—Napoleon B. Phelps, of Rochester, N. Y., for an Improved Auger:

I claim uniting and combining the terminating coil with the preceding one by means of the thin supporting wall, d, acting as a bruce to sustain and strengthen the cutting portion of the bit or auger, substantially in the manner and for the purpose shown as described.

26,614.—Bradford S. Pierce, of New Bedford, and Mason R. Pierce, of Mansfield, Mass., for an Improvement in the Manufacture of Porous Ware:

We claim the manufacture of porous drain pipes, and other vessels which require to possess the property of porosity, when formed from the ingredients set forth, and made to cohere by the process of tampering or other equivalent mode of pressure, as described, and receiving its porosity from the small proportion of water used in mixing the ingredients, as set forth and described.

26,615.—James W. Prentiss, of Pultney, N. Y., for an Improvement in Seeding Machines:

I claim the divided revolving cylinder, A, and slides, B, when made, arranged and operating as set forth, in combination with the peculiarly-formed spring teeth, G, with their cups, when made and used substantially as specified.

26,616.—Samuel N. Purse, of Ashley, Mo., for an Improvement in Harvesters:

I claim the arrangement and combination of the shafts, O and f, with the driving wheel and cutter, and the pinions, l m and n, as shown, for the purpose of changing the velocity of the knives in the manner described.

26,617.—Clinton Rice, of New York City, for an Improved Stair Carpet-fastener:

I claim the general combination and application of the main piece with the hook and eye, and the spring bolt and catching apparatus, as described and for the purposes set forth.

26,618.—Morgan L. Rogers, of Spring, Pa., for an Improvement in Cultivators:

I claim the arrangement of the hooked and double curved central box, C N, curved slotted arm, F, wheel, G, handles, H I, sliding plates, E D′, frame pieces, A B, and crosspiece, D, substantially as and for the purpose shown and described.

26,619.—Robert E. Rogers, of Philadelphia, Pa., for an Improvement in Steam Engines for Land Carriages:

I claim connecting the safety valve, the gage or try-cocks, and all the steam escape orifices of an engine and boiler, with a condensing apparatus, whereby the steam which may escape or be let off, either occasionally or continually, may be prevented from producing its peculiar harsh noise, as described.

26,620.—George W. Roney, of Bailey's Mill, Fla. (assignor to himself and Walter F. Lloyd, of same place), for an Improvement in Plows:

I claim, in combination with a beam, standard, handles and shoe, rigidly connected together, as shown, the hinging of the coulter, E, to the shoe at a, by its lower end, and the adjusting devices in the beam at its upper end, as stated and for the purpose set forth; the whole being constructed, arranged and operating as represented.

26,621.—Riley Root, of Galesburg, Ill., for an Improved Surveying Instrument:

I claim the arrangement of a revolving double spirit level adapted to a graduated circle, as seen in the drawing and set forth in the specification, for astronomical and engineering purposes.

26,622.—Christopher E. Rymes, of Charlestown, Mass., for an Improvement in Retainers for Hydraulic Presses:

I claim the arrangement and application of the two wedges and their operative screw shaft (provided with screws, as described) in the follower, and with respect to, and so as to operate with, slots formed and arranged in the bars, D D′, substantially as specified.

And, in combination with the slots and the wedges, and their operative mechanism applied to the follower, as described, I claim the elevating racks and pinions arranged in, and applied to, the follower and its upright bars, essentially in the manner as set forth.

26,623.—Richard S. Schevenell, of Athens, Ga., for an Improvement in Hernial Trusses:

I claim combining one or more spring pads, and one or more thigh straps, with the belt, by means of one or more clamps, c, screws, d, and nuts, e, applied substantially as specified.

[This invention consists in a novel mode of applying one or two spring pads, and one or more thigh straps, in combination with a belt for encircling the hips, whereby great facility is afforded for adjusting the pad to the person, and a truss is obtained which is very easy to wear and very effective in its operation.]

26,624.—Leander Shearer, of Duncannon, Pa., for an Improvement in Railroad Chairs:

I claim, in combination with the chair, B, formed with a lip, C, and ears, b b, the sliding securing block, E, and lugs, d′ d′ and d d, and cavities, e e, in the ends of the rails; the whole constructed and arranged to operate substantially as specified for the purpose set forth.

26,625.—Francis O. J. Smith, of Westbrook, Maine, for an Improvement in Electric Telegraphing Apparatus:

I claim the described new and improved mode of combination of apparatus, instruments and machines, used conjointly in the manner and for the purposes described, and dispensing therein with all artificial insulations of conducting circuits for telegraphic purposes.

26,626.—John Stephenson, of New York City, for an Improvement in Brakes for Horse Cars:

I claim arranging the brakes of a reversible car or other vehicle, substantially as described, so that the same can be applied from the driver's seat with equal facility, in whatever direction the car or vehicle may be turned.

[This invention relates particularly to one-horse city cars, which are usually so constructed that the body of the car revolves on the king-bolt, and that, at the termini of the route, the driver is enabled to drive the horse round, and to reverse the car without leaving his seat. Such cars were hitherto made without brakes, or so that the brakes could only be used in one direction. The object of this invention is a brake which can be applied with equal facility, in whatever direction the car may run.]

26,627.—B. F. Sturtevant, of Boston, Mass., for an Improved Lathe Attachment for Cutting Veneers:

I claim compressing the wood in the immediate vicinity of the edge of the knife, by means of the presser bar, C, or its equivalent, arranged and operating substantially as set forth.

Second, I claim the cutters, E E′ E2, or their substantial equivalents, for the purpose specified.

26,628.—Charles F. Taylor, of New York City, for an Improvement in Apparatuses for Relieving Spinal Curvature:

I claim, first, A spinal supporter or assistant, in which two longitudinal dorsal plates or supports are jointed together in sections, in the manner described for the purpose set forth.

Second, Arranging the dorsal plates in the manner described, by which the pressure which is exerted in a forward direction is thrown upon the angles of the ribs, as set forth, instead of upon the vertel braces or vertebral column, as formerly.

26,629.—Wm. Thomson, of Buffalo, N. Y., for an Improved Brush for Finger Nails:

I claim the combination of a stationary or movable cylinder, with a circular brush, as described, forming a new article of manufacture.

[The object of this invention is to form a neat and compact finger nail brush, with which the nail of each finger and thumb of one hand may be cleaned at the same operation. The invention will be fully understood by the above claim.]

26,630.—Samuel D. Tracy, of Vernon, N. Y., for an Improvement in Seed Cultivators:

I claim giving the zigzag or alternate opposite inclinations to the blades of the spur wheels, C C, in the manner and for the purpose set forth.

I also claim the combination of the movable or adjustable cutters, D D, and their slotted supports, g g, with the zigzag spur wheels, C C, in the manner and for the purposes specified.

I also claim the arrangement of the seed box, H, in grooves in the underside of the hinged seat, G, so as to be adjustable beneath it, removable therefrom, or turned up therewith, substantially as described.

I also claim the vibrating seed-distributor, I, constructed, operated and operating substantially as and for the purpose specified.

26,631.—John G. Treadwell, of Albany, N. Y., for an Improvement in Stoves:

I claim arranging the dampers, a and c, with the ventilating flue, E, and with the draft flue, in such a manger that the ventilating flue may be opened or closed while the draft flue is either open or closed, or vice versa; the damper, a, being made to subserve a double purpose, substantially as set forth.

26,632.—Walter J. Van Horn and Wm. Alexander, of Louisiana, Mo., for an Improvement in Machines for Preparing Plug Chewing Tobacco:

We claim a machine for preparing and cutting tobacco, consisting of a central cylinder, B, endless belts, C G, belt rollers, D, pressing rollers, F, receiving table, J, and cutting rollers, I I M N, or their equivalents, constructed, arranged and operating substantially as shown and described, so that the leaf tobacco, on being fed from the table, will be pressed, cut and delivered in the form of plugs, as set forth.

26,633.—Samuel Walker, of Kingston, Ga., for an Improvement in Plows:

I claim the arrangement of the beam, A, bars, D D, foot, B, and handles, E E, as shown and described, in order to admit of the adjustment of the parts as and for the purpose set forth.

[This invention consists in constructing the plow in such a manner that it will admit of being adjusted to suit the varying hight of teams, and also of men or boys who operate or hold it, as well as admitting of the adjustment of the share, as circumstances may require. The improvement is more especially designed for what are known as "shovel plows,' used in the cultivation of southern crops; but it may be applied with advantage to other small plows used as cultivators in tilling growing crops.]

26,634.—J. W. Wetmore, of Erie, Pa., for an Improvement in Railroad Chairs:

I claim the use of a yoke band (as C) passing through notches in the heads and webs of the "T" or "H" rails at the joint, and keyed by a wedge ander the plate, F; all combined, constructed and arranged substantially as described.

26,635.—Paul Williams, of Lodi, Miss., for an Improvement in Cotton Presses:

I claim the combination of the levers, H H and J J, with the levers, I I and K K, links, H′ H′, and projections, I′ I′; the whole arranged and operating substantially as and for the purposes set forth.

26,636.—Cyriel E. Brown (assignor to himself John Tenny and John Rhodes), of Millbury, Mass., for an Improvement in Spindles and Flyers:

I claim the arrangement of the secondary or tubular stationary bearing, d, with the flier and spindle as described.

Also the combination of a helical eye with the flier arm and its hook, and to open in the hook.

Also, making the top of the bearing, d, and that of the flier neck with an oil channel so arranged as not only to receive or catch the oil that runs off the spindle, but direct or conduct it between the rubbing surfaces of the said neck and bearing.

I do not claim an oil cap as ordinarily applied to the foot of a spindle, nor as applied to a cop tube and spindle, as shown in the United States Patent, No. 16,298; but I claim combining or arranging an oil receiver and bearing, e, with the secondary bearing tube, d, and so as to surround it, the spindle and flier neck, substantially in the manner and for the objects and purposes as specified.

26,637.—Franklin B. Hunt (assignor to R. D. Van Deursen and J. B. Gibbs), of Cincinnati, Ohio, for an Improvement in Straw-cutters:

I claim the described feeding device, consisting essentially of the rolls, Q L, link bearings, M, rest blocks, V, and springs, W, all arranged with reference to each other, and so as to operate conjointly as and for the purpose set forth.

26,638.—James Rowe (assignor to himself and Martin B. Ewing), of Cincinnati, Ohio, for an Improvement in Sewing Machines:

I claim the bar or bracket, h, on the lower end of the needle bar, so that it shall drive, in combination with the looper bar, k k′, and the feeding levers, j o, by positive movement, when it is driven by the crank pin, b′; all operating in the manner and for the purpose set forth.

26,639.—Charles H. Watson (assignor to himself, A. L. Ashmead and E. W. Carr), of Philadelphia, Pa., for an Improved Portable Register:

I claim, first, A portable alarm register constructed and operating substantially as described.

Second, The dogs on the annular plates, in combination with the pins on the inner front plate, as described.

Third, The combination of the dogs with the notches or pins of the annular plates, and the openings in the rims through which the dogs operate, as described.

26,640.—Mary E. Hemans (Administratrix of the Estate of Alva Hemans, deceased), of Henderson, Texas, for an Improved Peach-parer:

I claim the combination of the rotating and elastic or yielding tines or prongs, b b, knife stock, I, and plate or bed, G, arranged for joint operation as and for the purpose set forth.

[This invention consists in the employment or use of a revolving holding fork provided with elastic tines or prongs, in connection with a paring knife attached to or fitted in a stock arranged in a novel way to admit of being manipulated with the greatest facility in order to perform the desired work.]

26,641.—Joseph Gruler and Augustus Rebety, of Norwich, Conn., assignors to the Manhattan Fire-arms Company, for an Improvement in Revolving Fire-arms:

We claim the use of the intermediate recesses, r r, in combination with the stop, d, actuated by the hammer in pistols where the cylinder is revolved in the act of cocking the pistol, as herein described, thereby effecting a self-acting lock of the cylinder, midway or otherwise between any two cones.

EXTENSION.

James Montgomery, of New York City, for an Improvement in Steam Boilers. Patented Dec. 26, 1845:

I claim the employment of vertical or nearly vertical water tubes for steam boilers or generators that open into water chambers at top and bottom, which water chambers are connected together by a surrounding jacket or water space made singly or in sections to admit of the free circulation of the water which, rising in the tubes by the effect of the heat, will descend in the surrounding jacket or external water space or spaces, and thus by this circulation carry off the heat from the tubes and prevent them from overheating, as described, when this is combined with the fire-chamber placed at the side of the boiler and outside of the series of tubes, substantially as described, whereby the tubes are prevented from being overheated and unequally expanded to an injurious extent, and the water kept cooler in the jacket than in the series of tubes, as described.

I also claim as my invention, in combination with vertical or nearly vertical tubes and surrounding water space or spaces, the employment of a fire-chamber outside of the series of tubes and so arranged and located, substantially as described, as to apply the most intense heat at their upper ends and the reduced heat towards their lower ends, substantially as described, whereby a greater circulation and evaporation are obtained, with a given amount of fuel, than by any plan known to me, thereby not only economizing fuel but effectually preventing the incrustation of the tubes by the deposit of mineral and other solid matters, as described.

I also claim as my invention the employment of a diaphragm or partition in the flue space between the series of tubes surrounded by the water space or spaces, and in combination therewith to divide the same into two parts that the products of combustion after passing around the upper end of the tubes may pass around their lower ends, substantially as described, and thus more effectually expose the upper end of the tubes to a more intense heat than their lower, as described.

And I also claim the making of the bottom of the boiler of a conical or dished form, with a mud or blow-off valve in he lowest part of the concavity, in combination with the vertical tubes communicating with the bottom in the manner described, to permit the deposit of the sediment; there being a water space surrounding them to induce circulation of the water up the tubes towards the mud or blow-off valve, as described.

RE-ISSUES.

James Draper, of Hudson City, N. J., assignor to himself and S. H. Doughty, assignors to themselves and James Brown and William King, of New York City, for an Improvement in Skeleton Skirts. Patented Oct. 4, 1859:

I claim the new manufacture of skeleton skirt herein described, in which the hoops, B, are fastened between separately woven parts of the tapes, substantially as described, when the parts are woven together as single tapes between the hoops, and separately as distinct tapes at the points where the hoops are received.

R. Gleason & Sons (assignees of R. Gleason, Jr.), of Dorchester, Mass., for an Improved Table Caster. Patented March 8, 1859:

We claim, first, The combination of the caster and egg-stand.

Second, The combination of the caster and bell.

Third, The combination of the caster, egg-stand and table bell, substantially as described.

[This invention consists in combining an egg-stand, caster and bell, whereby either article may be used separately, or the whole or certain parts, in combination.]

James McCracken, of Bloomfield, N. J., for an Improved Evaporating Apparatus. Patented March 13, 1855:

I claim a pan for containing solutions to be heated in combination with a vessel contained therein, the top and bottom of which are connected by a series of vertical or nearly vertical tubes the interior of such vessels being connected with proper pipes for the supply of steam and the escape of steam or condensed vapor, and the whole being constructed substantially in the manner and for the purpose set forth.

Giles F. Filley, of St. Louis, Mo., for an Improvement in Cooking Stoves. Patented June 14, 1853:

I claim, first, The flaring enlargement of the side flues, C C, and D D, from the space above the oven to the flue space, E, which extends under the entire front end of the oven; and also the flaring enlargement of the central flues of F and of G, from the flue space, E, to the upper end, G, for the purpose of increasing the draft of the stove, substantially as set forth.

I also claim separating the front of the oven from the front plate of the stove and also from the hearth plate and from the back plate of the fire-chamber, by means of the flue space, H, which communicates freely with the flue space, E, and is closed at all other points; the said arrangement enabling the flue space, H, to arrest the great amount of heat that will be radiated from the back plate of the fire-chamber, and conduct the same (by means of the circulation which it will create in said flue space) into the flue space, E, for the purpose of producing the beneficial results herein particularly set forth.

Notes & Queries

D. M., Jr., of N. Y.—The carriage on which the log is placed in a sawmill is generally moved back and forth by means of a rack on the carriage, which gears into a pinion connected with the machinery.

O. H. P. W., of Ark.—We are informed by several practical mechanics that india-rubber belts, when they are run free from friction, are far more durable than leather; but, in case the belt is to rub at the edge, leather alone is suitable.

F. P., of Cal.—The samples of varnished paper, linen and leather, which you have sent us are prepared with oil varnish, which is simply quick-drying linseed oil. You can prepare it by boiling the oil for a few hours cautiously, adding about a pound of sulphate of zinc to the gallon, and an ounce of sulphuric acid. The latter should be added to the oil when cold, and the zinc put in slowly when the oil is heated, as it is liable to foam over. Use the clear oil for varnish, and dry the articles in a warm room. This is a water-proof and very durable varnish—the best which is known for coating balloons to render the cloth air-tight.

I. T. D., of Cal., wants to know what quantity of oil can be distilled from a barrel of rosin.

H. P. B., of Mo.—The gum mucilage used for pasting paper is made by dissolving dextrine in water until it attains to the proper consistency. Dextrine is made from baked starch, and is sometimes called "British gum."

I. C., of Ill.—So far as we know, no treatise on the manufacture of fire brick has ever been published in our country.

M. B., of N. H.—The method which you propose for tanning hides, by forming a vacuum in a vessel in which they are contained, and allowing the tanning liquor to flow through their pores by pressure, is not new. It is called "Knowles' process," and is about 12 or 15 years old. It has been tried in England; but not with much success, we understand.

I. D., of Fla.—At present we cannot give you the number of registered steamboats in the United States.

A. P., of N. B.—We are not cognizant of any improvement, such as that mentioned in your letter, having recently been made in the Catalan forge for smelting iron.

C. C., of Vt.—Burnt oil may be removed from the brass-work of an engine by scouring it first with fine emery and oil, then finishing off with rotten-stone.

I. A. H., of Mo.—You will find as full a description of the manufacture of paper in "Ure's Dictionary of Arts" as any work published known to us; but it does not come up to the practice of the present day.

J. M., of Ill.—Gelatine is pure glue. It is made from the tendons and skins of animals. The clippings of parchment, by long-steeping in water, will dissolve and become what is called "size," which is very pure gelatine, and is employed to stiffen white straw hats, &c.

J. S. L., of Mich.—In Vol. VIII., SCIENTIFIC AMERICAN, you will find the practice of artesian well-sinking illustrated and described. We cannot recommend you to a better source for information.

S. G. L., of Pa.—We believe it is a very objectionable practice to sprinkle the streets with dilute hydro-chloride acid, even if it could be obtained very cheap. Pure water alone should be used for this purpose, and the dirt should be swept up instanter. Do not advocate any measure that will keep dirty streets in the condition of adhesive mortar.

B., of La.—The Messrs. Winans, who are building the cigar-shaped steamer, will certainly succeed in their main purpose, that is, in settling the question whether that form is better for vessels than those heretofore in use: and thus they will make an important contribution to the science of ship-building. Your views on the subject we consider sound, as you will see by our several articles on the subject in Vol. XIV.

F. A. Y., of N. Y.—If you will write to H. Shlarbaum & Co., 309 Broadway, this city, they will be pleased to give you full information in relation to telescopes. The Illinois coal is (much of it) inferior to that of Ohio. There was a typographical error in our definition of perpetual motion; we wrote it a "a mechanical fallacy," and it got altered into "a popular fallacy," which, of course, made nonsense of it.

I. L., of Mass.—India-rubber bags, capable of containing 20 gallons of gas, are of a size generally used for the compound blow-pipe. Platner's is a good work on blow-pipes; but "Morfitt's Chemical Manipulations," published by Lindsay & Blakiston, of Philadelphia, will suit your purpose in a more general way.

F. A. M., of N. Y.—The compression of air into a cylinder, and the absorption of its heat while in that condition, by water, so as to enable it to absorb heat from water afterwards when it is expanded, and thereby freeze it to produce ice, is a well-known process, and not patentable. We do not believe you will be able to manufacture ice profitably by this method.

A. B. S., of Conn.—A good device for enabling a person to walk on ice is a strap with short steel spikes secured to it, and made capable of buckling on the boot, with the spikes sticking outward on the sole. You can easily make such "ice-creepers," as they are called, for your own use. They are old and well-known, and sometimes used by laborers who are engaged in wheeling loaded barrows up inclined planks.

M. A., of N. Y.—Your plan for extracting stumps by chaining a very strong lever to the root, and then blowing up the end of the lever by means of a short cannon or mortar attached to it, we think, is liable to the objection which you suggest; the force would act so suddenly as probably to break either the chain or lever. Your plan, however, is very novel, and you might make some experiments to satisfy yourself of its practicability; and upon the result of these experiments, apply for a patent or not. If you find it useful, a patent can be obtained for the method.

M. N., of Mich.—You ask, "In a revolving body (the spindle of a lathe, for instance), does the center revolve?" Years ago, we used to be fond of these puzzling abstractions; but as we grow in knowledge, we find so many concrete truths, which it takes the utmost power of our faculties to understand, that we endeavor to keep our mind clear from all such sources of confusion. If a spindle were revolving with mathematical accuracy, there would be a mathematical line (if anybody knows what that is), which would would not revolve; but, practically, it is not probable that any mass of matter was ever made to revolve with mathematical precision.

H. L. & Co., of N. Y.—Liquid quartz mixed with the dust of burr stone may answer very well for filling mill stones, but, so far as we know, such an experiment has not yet been tried.

M. L. V., of Pa.—We should be happy to oblige you, but it is an established rule of this office not to suppress the publication of the claims of any patent which is issued at the Patent Office. The list of claims which we publish every week costs us several hundred dollars a year, and they can be implicitly relied upon as being correct and as reporting every patent issued.

J. E. S., of N. J.—We have not a copy of the patent to which you refer, nor the book; therefore we cannot answer your question. A patent would be invalidated if, on trial, it was made to appear that the same device had been printed, published, known or used prior to the invention thereof by the patentee.

R. A., of Conn.—The oil, tallow, resin and beeswax in your composition for hardening steel, all mix together perfectly, and will, no doubt, burn out together. Your grape vine, coming from a seed, is a new variety, as are all seedling fruits, and whether it will be fruitful or not can only be ascertained by experiment. As there is not one chance in ten thousand that the fruit, if produced, would be equal to either of the best two American grapes, the Catawba and the Isabella, it would hardly be worth while to make any extensive efforts to procure the fruit.

R. C., of Texas.—When you consider that the art of observation has been one which the human race has been slowest to learn—that every science has been filled with a multitude of errors, for want of thoroughness or fairness in the investigations—you will not suspect us of discourtesy in distrusting the reliability of the observations which have convinced you that witch hazel will indicate the presence of running water below the surface of the earth. We should believe this readily, if it were proved by sufficient observation.

R. B. M., of Conn.—As you have not given us the entire amount of heating surface in your boiler, we cannot tell you its horse-power. From your general description of its construction, we think it is a very good boiler. If the metal is of the best quality, its thickness being 5-16 of an inch, its diameter 4 feet, it is capable of standing a pressure of 276 lbs. on the square inch, but we would never use over 130 lbs. pressure in the most extreme cases. Allow 9 square feet of direct heating surface for a horse-power in the boiler. We only allow one-half of the tube surface for direct heating, and the whole of the top surface exposed to the fire.

A. F. O., of N. Y.—An immense number of experiments have been made in gunnery in the several civilized countries of the world, especially in France and England, and numerous volumes published on the subject. The size and length of the bore, the size and shape of the shot, and the quality and quantity of the powder, must be proportioned to each other and vary with the size of the gun.

KANSAS, of K. T.—Anthracite coal is not used for making illuminating gas, neither will it make coke.

S. W. R., of Mass.—Your plan of producing motion by inserting one edge of a vertical wheel in a box of quicksilver through a smooth and tightly-packed slit, so as to lift the said edge of the wheel constantly, by the buoyant power of the quicksilver, is a perfect specimen of perpetual motion; that is to say, it will not move at all. A light body, pressed down in a vessel of mercury, is raised to the surface by the falling of a portion of the mercury, as you will perceive on reflection, but if the mercury is so confined that no portion of it can descend, it has no tendency whatever to raise the light body.

L. de F., of Conn.—The best glue is of a bright, deep yellow color. Marine cement is made by dissolving india-rubber in naphtha, and adding to it powdered shellac until it is of the proper thickness. It is always applied hot, and is very adhesive under water. Fine shreds of india-rubber dissolved in warm copal varnish, also make a waterproof cement for wood and leather. Take glue, 12 ounces, and water sufficient to dissolve it; then add 3 ounces of resin and melt them altogether, after which add 4 parts of turpentine. This should be done in a water bath, or in a carpenter's common glue-pot; it makes a waterproof glue.

J. C., of N. J.—We think that your article is too speculative for our columns.

J. W. K., of Miss.—We should like to publish your comunication on account of the good nature and fairness with which you argue, as it shows the very spirit in which we like to carry on discussions; but we think our readers have had enough of the subject of water wheels running faster by night than by day, unless some further experiments should be made, in which case we should be pleased to recive an account of them.

STUDENT, of N. Y.—We advise you to get some clear-headed teacher of astronomy to explain to you what is meant by a siderial year, and by the precession of the equinoxes, before you endeavor to reason from the former that the latter is a "superfluity in science."

J. L., of Md.—You state that your ice-house is sunk 14 feet in the ground, has a solid stone wall, and is [illegible]ded inside to keep the ice from the stones that; you cannot keep ice through the summer, and you wish to know if a layer of charcoal, placed on the bottom of your pit, would answer as a non-conductor to prevent the ice thawing. Our best ice-houses here are built above ground, with durable walls, either of brick or stone; but wood is as good as either. The space between the walls is generally packed with straw or coarse sawdust, as a good non-conductor. In your case, we would prefer to use dry sawdust in the pit of the floor, rather than charcoal dust; but, owing to the character of your ice-house, if it has also a southern exposure, you will always find it difficult to preserve the ice during the entire summer.

Money Received

At the Scientific American Office on account of Patent Office business, for the week ending Saturday, Dec. 31, 1859:—

E. H., of N. Y., $35; N. S., of N. Y., $60; J. G. C., of Ill., $30; H. K., of ——, $15; J. C. R., of Vt., $25; J. D. B., of Vt., $35; A. B. J., of Ind., $25; E. A. G., of Conn., $118; G. W., of N. Y., $55; W. McC., of N. Y., $35; J. B. S., of Pa., $10; H. W. P., of N. Y., $60; W. G. G., of Mass., $30; J. J. P., of Ind., $30; G. P. T., of Maine, $20; G. G., of C. W., $30; B. D. E., of Ohio, $25; G. E. B., of Mich., $30; W. S. K., of Conn., $20; A. F., of N. J., $30; I. Van B., of N. Y., $30; B. & W., of Pa., $25; H. M., of Ohio, $30; H. W. P., of N. Y., $60; A. J. V., of Mo., $30; J. Y., of N. C., $25; R. & G. E. T., of Ohio, $25; T. D., of N. J., $30; I. N., of ——, $50; M. B., of N. Y., $100; A. G., of N. Y., $20; S. R., of N. J., $30; H. W. H., of Miss., $25; E. C. B., of Ala., $30; E. P. & J. N. F., of N. Y., $30; C. & E., of Conn., $30; C. H. E., of Vt., $30; W. I. T., of Cal., $15; E. B., of Conn., $25; J. M. H., of N. Y., $60; B. L. F., of Pa., $25; C. M. P., of N. J., $30; H. V., of Mass., $100; R. & S., of Ohio, $30.

Specifications, drawings and models belonging to parties with the following initials have been forwarded to the Patent Office during the week ending Saturday, Dec. 31, 1859:—

G. M., of Vt.; J. C. R., of Vt.; E. A. G., of Conn, (2 cases); C. H., of La.; E. B., of Conn.; R. & G. E. T., of Ohio; C. B. W., of N. Y.; B. & W., of Pa.; W. S. K., of Conn.; J. K., of N. J.; W. W. McC., of N. Y.; A. B., of N. Y.; D. W., of France; R. M., of France; B. D. E., of Ohio; J. W. L., of N. Y.; R. A. H., of N. Y.; A. G., of N. Y.; J. Y., of N. C.; A. B. J., of Ind.; J. D. B., of Vt.; B. L. F., of Pa.; S. F. Van C., of Cal.

Literary Notice.

THE ATLANTIC MONTHLY. Ticknor & Fields, publishers, 135 Washington-street, Boston.

The fifth volume commences with the January number, and we see no decline in the high character of this magazine. Holmes is as sparkling as ever, and opens with a premise to tell a true story which will make the readers open their eyes.

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INVENTORS SENDING MODELS to our address should always enclose the express receipt, showing that the transit expenses have been prepaid. By observing this rule we are able, in a great majority of cases, to prevent the collection of double charges. Express companies, either through carelessness or design, often neglect to mark their paid packages, and thus, without the receipt to confront them, they mulct their customers at each end of the route. Look out for them!

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

HOARD & WIGGIN'S STEAM TRAP VALVE, for relieving steam pipes of condensed water, and keeping back the steam:—

OFFICE OF THE BERKSHIRE WOOLEN COMPANY,
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Messrs. HOARD & WIGGIN.—Gents: I have been using your steam trap valves during the past winter, under circumstances well adapted to test their utility for the purpose for which they are designed, and find them far superior to any apparatus for the same uses with which I am acquainted. Truly yours,

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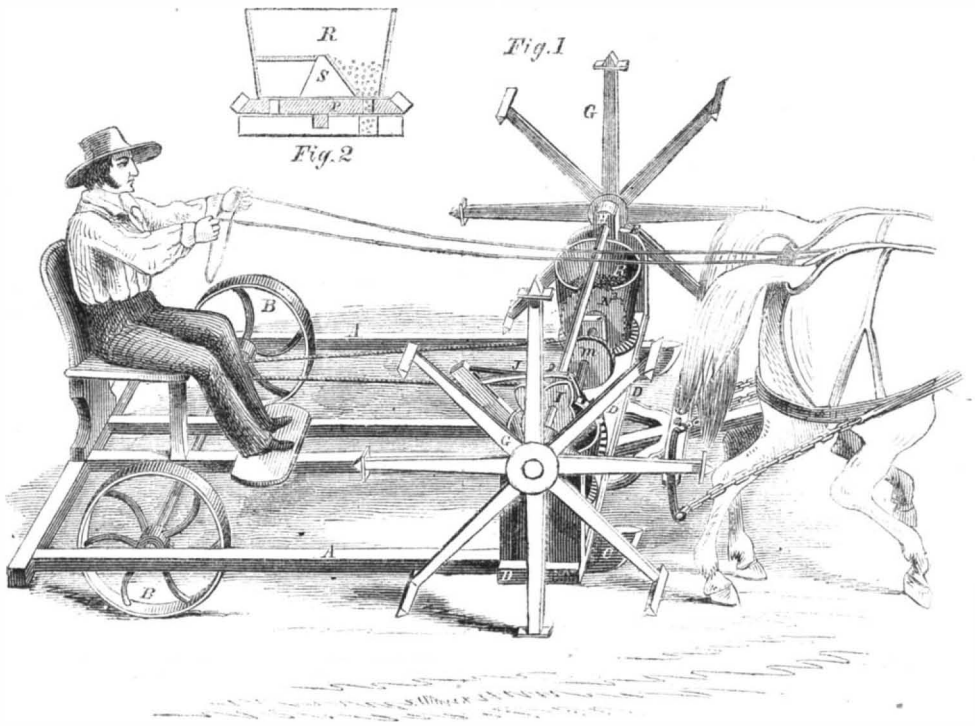
MUNN & CO., Scientific American Office, No. 37 Park-row, New York.

IMPROVED CORN-PLANTER.

We here illustrate a machine for planting corn, either in drills or rows, which is claimed to have advantages over all other planters.

The frame, A A, is supported at its back part by the wheels, B B, and has the runners or plows, C C, at its forward end. These plows are furnished with two diverging wings in the rear for opening the furrow to receive the seed which drops between the wings. These plows are supported by the cross-piece, D, which is hinged to the forward part of the frame, so that it may receive a slight vibration. The uprights, E E, rise from



KIRLIN'S IMPROVED CORN-PLANTER.

the cross-piece, D, near its ends, and between these are standards, F, which are connected with a cross-piece, D', which rests upon cross-piece, D. The wheels or markers G G, are connected with the axle or shaft, H, which they cause to rotate. These wheels are furnished at the ends of their spokes or arms with small shovels which take hold of the ground and prevent all slipping; thus measuring or spacing the distance between the hills with great precision. Fastened upon the shaft, H, is the rose cam, I, which actuates the lever, J, and by means of a hooded pawl, turns a ratchet wheel which is fastened upon the lower shaft, *o*. The shaft, *o*, has beveled gears at its ends which gear into the bevels on the periphery of the rotating bottoms of the hoppers, so that the said bottoms are caused to rotate by the turning of the wheels, G G. The hoppers are constructed, as shown in Fig. 2, with a cone, S, rising in the middle to direct the seed to the side of the bottom, where it passes through holes as they are opened by the rotation of the bottom.

When it is desired to plant corn in drills a more rapid motion is imparted to the shaft, *o*, by connecting the cone of pulleys, *m*, with a similar cone on the shaft of the wheels, B, by means of a belt, as shown; this belt is removed when the machine is used for planting in hills. The broad wheels, B B, follow in the line of drills or rows and press the earth upon the planted seed.

There are three advantages claimed for this planter by the inventor:—1st, The wheels or markers, G G, space the ground so accurately as to obviate the necessity of "laying off" the ground at right angles as usual; 2d, The sudden motion imparted to the hopper bottoms by the cam and ratchet arrangement secures a more certain filling of the holes, and, consequently, a better measuring of the seed than in other machines; 3rd, The runners for opening the furrows are so formed as to leave a broad surface at the bottom of the furrow, and thus allow the seed to spread properly in the hill or drill.

The patent for this invention was issued through the Scientific American Patent Agency, Oct. 18, 1859, and persons desiring further information in relation to it may address the inventor, A. Kirlin, at New Boston, Ill.

HARRIS' CARRIAGE SEAT.

The annexed cuts represent in section a new plan of hanging carriage seats, the object of which is to prevent the persons riding in the carriage from being thrown from the seats in case of a sudden stopping of the carriage, or from receiving an unpleasant jerk in the case of a sudding starting of the vehicle. This is accomplished by hanging the seat in such a manner that it may have an upward motion either forward or backward, and thus accommodate itself to the inertia of the bodies upon it.

Fig. 1 is a longitudinal section, and Fig. 2, a cross section, the full black lines showing the position of the parts in their usual place, and the dotted lines showing the position of the parts when the seat is thrown forward by the sudden stopping of the carriage. B is the seat, supported by the metal plates or bars, *a a*, which are fastened rigidly at their tops to the seat, and are hung at the bottom upon the swinging plates or rods, *c c*, by pivots. The rods, *c c*, are suspended at their upper ends from the firm, upright supports, *e e*, by pivots, *b b*. It

Fig. 1

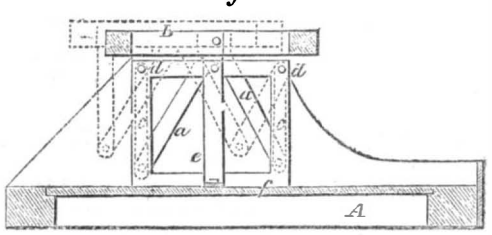
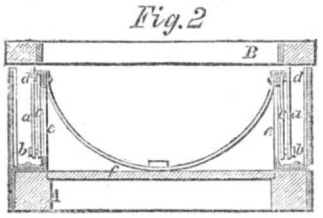


Fig. 2



will thus be seen that the seat may swing forward or backward with a slightly rising motion, so that when the carriage starts or stops suddenly, the seat swings with the persons sitting upon it, who are thus saved from being thrown from it or from receiving the unpleasant jar often experienced when a carriage is very suddenly started.

The patent for this invention was secured through the Scientific American Patent Agency, Nov. 28, 1859, and persons desiring further information in relation to it may address the inventor, E. H. Harris, at Palmetto, Ga.