Correspondence

Ship-building---Iron and Wood combined.

MESSRS. EDITORS :—Sometime ago you were kind enough to publish an account of the steamer *Niphon*, built with an iron frame, and planked with oak. That vessel has been sold to the Government, and has gone to sea under the command of Capt. J. B. Breck, I had the pleasure of making a passage in her to Fortress Monroe, and found her stiff, easy, and free from the excessive rolling of our gunboats, which I attribute partly to her model and partly to her bilge keels, or "outside kelsons," which steady her and do not impair her steering or sailing qualities. The system of building by a combination of wood and iron, is making considerable progress in England, as you will see by the inclosed.

R. B. FORBES.

Boston, May 7, 1863.

[The article to which our correspondent alludes is a letter addressed to the *Shipping and Mercantile Gazette* (London) by Thomas Evans, of Bristol, who states that about ten years ago two ships—the *Tubal Cain* and *Mayard Macintyre*—were built with wood planking upon iron frames, by Messrs. Jordan & Jetty, of Liverpool; and now in London, Glasgow, Sunderland, Aberdeen, and other places ships are being built in which iron, for framing and beams, is introduced in combination with wood planking. Mr. Evans states that he had lately visited Sunderland, when he found three ships of this character under construction, and he gives the following description of one of them:—"The keel, of wood, is laid in the usual manner, and stem and sternpost, also of wood, are fitted and fastened to the keel precisely as in the case of a wooden-built ship. The ship is then set in frame, which is of iron, and in space or size, the same as in a regular iron-built ship. These frames are all riveted into an iron plate on the keel, which plate extends to a sufficient width to take in the garboard strakes, which are bolted through the keel, and also through this plate and the frame; the frame is then diagonally trussed on the outside with flat iron bars, extending from the keel plate to the sheer strake, five or six feet apart, and riveted to each frame. The beams, which are also of iron, both in the upper and lower decks, are then fitted in and well secured to the frames by stringer plates, and angle iron; so that the ship becomes a strong rigid structure in frame, before any planking is fastened on the sides. The plank, which is from ½-inch to $\frac{5}{8}$ths thicker than Lloyd's requirements for a wooden ship, is then fitted to the framing, being scored on over the diagonal trussing, and secured to the frames by bolts of yellow metal, driven from the inside, and clenched upon rings of the same metal on the outside plank. To prevent galvanic action, by the contact of the iron and yellow metal, Messrs. Moore, the builders, have patented an ingenious contrivance, which consists in a collar of lead and some other metallic substance combined, which is fitted tightly into the hole in the frame through which the metal bolt is to pass; the bolt is then driven and clenched as before named; a capsule, of the same material as that through which the bolt is driven, is then fitted over the head of the bolt, and soldered to the collar beneath, so that no external action can affect the bolt thus hermetically sealed. It appears to me, therefore, that, taking into account the great rigidity of the framework of a ship so built, the increased lateral strength given by the thick plank being well fitted on over the diagonal trussing, and the more perfect connection between the stringer plates, beams, and framework, than can be obtained in an ordinary wooden-built ship, there is nothing to be apprehended in regard to the strength of a ship so built." The advantages of this system of ship-building are apparent to practical men, and we think it should commend itself to our ship-builders in New York and other places. At all times it is difficult to procure first-class crooked-frame timber, and at present it cannot be obtained in sufficient quantities to meet the demand. Iron framing will relieve them of this difficulty, and measures should be taken for the erection of works and machinery to roll such iron for ship-framing. It is difficult to obtain the sharp angular floors of the fore and after body of a timber-framed vessel; but there is no curve so sudden, or angle so acute, but can be easily formed in the iron frame. Beams, too, especially in large high-class ships, are often difficult to obtain, and are expensive, whereas in the use of iron, all is simple and easy. With such framing an internal capacity for carrying a cargo equal to that of an entire iron vessel is secured, and such ships can also be sheathed with yellow metal, and thus remove all difficulty as to fouling, so common a complaint in regard to iron-built ships.—EDS.

A Churn Power Wanted.

MESSRS. EDITORS :—On page 278, current volume of the SCIENTIFIC AMERICAN, I noticed a communication from J. B. Schooley, of Wyoming, Pa., inquiring for a real practical and useful invention for saving the labor of churning, which, at the same time, will avoid the unpleasantness and inconveniences of the various machines moved by animal "powers" now in use. Your readers will remember that an engraving and description of such a "power" was published on page 64, current volume of the SCIENTIFIC AMERICAN. I saw that notice and became much interested; I have since seen the "power" itself tested, and am fully convinced that it is all that Mr. Schooley could desire. Your remarks (following Mr. Schooley's inquiry) call upon inventors to go to work and "reap the praise and pence of the over-taxed farmer's wives" by producing a "power" adapted to the work. Now allow me to say that your call is already obeyed—the work is done. A. A. Drake's patent churn-power, patented on July 8, 1862, and illustrated and described in the SCIENTIFIC AMERICAN (as above referred to), is just the thing desired by Mr. Schooley. It works like a charm [or *churn?*]. It obviates all the unpleasantness and inconveniences of animal "powers," and operates incomparably better than any of them. The illustration and descriptive details of Drake's churn, published in that number of your valuable journal dated January 24 (page 64), so attracted my attention that, like some scores of others in this section, I embraced the earliest opportunity to examine the "power" itself. [Here is a hint to inventors.—EDS.] Mr. E. D. Cramer, of Hackettstown, N. J., who is now selling rights in this State, has recently visited this village, and exhibited one of Drake's "powers." I examined it carefully, saw it thoroughly tested, and my anticipations of it were more than realized. Once winding the machine (which requires from two to three minutes and is easily done by a child) will give from fifteen hundred to two thousand strokes, and it can be so regulated as to make the strokes of any depth, from eight to twenty inches, and will work a churn of any size, from one quarter of a barrel to two barrels. This is just exactly the thing inquired for, and will save all the hard work of churning.

JOHN SMITH.

Easton, Pa., May 5, 1863.

An Inventor who is More than Satisfied.

MESSRS. EDITORS :—My patent for an improved coffee-roaster came to hand yesterday, and after carefully reading it I find that you have succeeded beyond my hopes based upon what I was led to expect from the first official letter informing me of a rejection. I find that I have got all I ever wanted; the patent being a good one. I shall in future recommend the Scientific American Patent Agency to parties having business with the Patent Office. You will accept my thanks for your successful efforts in my case.

C. H. MILLS.

Hazel Green, Wis., May 5, 1863.

REMEDY FOR SEA-SICKNESS.—Neptune is in a fair way to be deprived of a portion of his honors, if we may credit the following prescription said to be sovereign against sea-sickness :—The surgeon of the steamship *Great Britain* has found the most successful remedy to be the nitro-hydro-chloric acid, with sulphate of magnesia. He offers this formula: dilute hydro-chloric acid, two drachms; dilute nitric acid, one drachm; hydro-cyanic acid, sixteen drops; water, eight ounces—mix. Two tablespoonfuls to be taken every three or four hours.—*Medical and Surgical Reporter.*

Do not put Dirty Wool inside of a Fleece.

The *Wool-grower* states that an important wool suit was recently decided at Bath, Steuben county, N. Y., in which O. A. Willard & Co., of Boston, were plaintiffs, and Enos Merritt, wool-grower, of Yates county, N. Y., was defendant. The plaintiffs alleged fraud, and set forth in their declaration that in July 1860, their agent, J. W. Davis, of Hammondsport, N. Y., bargained with defendant for 142 fleeces of wool at 47½c. per lb., a full market price at the time, for good fine wool, to be delivered in good condition.

Davis testified that he agreed for the wool on the sheep's back, soon after it had been washed, and the defendant agreed to put his wool up in good condition. The wool was brought and delivered to Davis, apparently in good fair condition, externally, and he received it and paid the stipulated price. But soon after he discovered by opening some fleeces that some one-half pound of unwashed tags, and much dirt and filth were in each fleece. This was proved by several witnesses, who assisted in opening the fleeces.

The defendant proved that he washed his sheep clean and put up his wool in good condition, but acknowleged that he put unwashed tags in each fleece, and claimed that it was the common custom of wool-growers in his vicinity. He introduced several who swore that such was their method, and supposed it to be the general usage.

Plaintiffs proved by several respectable farmers, that they never put their unwashed tags in their fleeces, and they were not aware that it was customary to do so. It was argued by counsel for defense that the common usage should protect his client in putting in his tags; inasmuch as Davis received, accepted, and paid for the wool and made no objection at the time, plaintiffs should not recover. Also, he claimed that it was Davis's duty to open the fleeces at the time, to ascertain their condition.

Counsel for plaintiffs argued that inasmuch as the wool appeared outwardly in good order, the agent had good reason to believe that the inside of the fleeces must be in corresponding condition, according to the usual appearance of the inside and outside of fleeces. The court so ruled, and remarked that the purchaser was not obliged to open the fleeces when he purchased wool, to ascertain the condition, and the seller had no right to conceal anything in the fleece, like unwashed tags or anything unmerchantable. The jury found 16 cents per pound damage for plaintiffs on 748 lbs. of wool, with interest from the time of purchase. The defendant also had to pay the costs of the suit.

How to treat Dwarf Pear Trees.

The following is from a correspondent of the *American Agriculturist:*—

"I have dwarf pear trees fifteen years old in my garden—thrifty, hardy, productive, and bidding as fair to live the next fifty years as any standard tree upon my grounds. The complaints against these pets of the garden, I am fully persuaded, are owing more to neglect and mismanagement, than to any inherent difficulty. Some varieties will not flourish on the quince stock; the fruit books will point them out; do not plant such. They will not be productive on grass land, or in hard inflexible soil; do not plant them there. They want a deep, rich, mellow border, at least eighteen inches in depth; if you cannot afford to prepare a border, do not purchase dwarf pear trees. In addition to being properly planted, they must have care every season. Now they should be shortened in, about two-thirds of the last season's growth. This keeps them "stocky," and prepares them to sustain a great burden of fruit. They also want a barrow-full of stable manure put around them every fall. The quince roots cannot go far in search of food. They should have all they can take up within six or eight feet of the tree. With manure and good management dwarf pears will be a success."

THE POPULARITY OF STEAM FIRE ENGINES.—No less than seventy steam fire-engines have been made up to this time by the Amoskeag Company, of Manchester, N. H., including some for almost every large city in the Union, two for Halifax and one for the Russian city of Amoor. Thus do American inventions penetrate to every portion of the earth.

Bombarding a Balloon.

The "professor" aroused me at three o'clock, when I found the canvas straining its bonds and emitting a hollow sound, as of escaping gas. The basket was made fast directly, the telescopes tossed into place; the professor climbed to the side, holding by the network, and I coiled up in a rope at the bottom.

"Stand by your cables!" he said, and the bags of ballast were at once cut away. Twelve men took each a rope in hand and payed out slowly, letting us glide gently upward. The earth seemed to be falling away and we poised motionless in the blue ether. The tree-tops sank downward, the hills dropped noiselessly through space, and directly the Chickahominy was visible beyond us, winding like a ribbon of silver through the ridgy landscape.

Far and wide stretched the Federal camps. We saw faces turned upwards gazing at our ascent, and heard clearly, as in a vacuum, the voices of soldiers. At every second, the prospect widened, the belt of horizon enlarged, remote farmhouses came in view; the earth was like a perfectly flat surface, painted with blue woods, and streaked with pictures of roads, fields, fences and streams. As we climbed higher, the river seemed directly beneath us, the farms on the opposite bank were plainly discernible, and Richmond lay only a little way off, enthroned on its many hills, with the James stretching white and sinuous from its feet to the horizon. We could see the streets, the suburbs, the bridges, the outlaying roads, nay, the moving masses of people. The capitol sat white and colossal on Shockoe Hill, the dingy buildings of the Tredegar works blackened the riverside above, the hovels of Rockets clustered at the hither limits, and one by one we made out familiar hotels, public edifices and vicinities. The fortifications were revealed in part only, for they took the hue of the soil and blended with it; but many camps were plainly discernible, and by means of the glasses we separated tent from tent and hut from hut. The Confederates were seen running to the cover of woods that we might not discover their numbers, but we knew the location of their camp-fires by the smoke that curled towards us.

"Guess I got 'em now, jest where I want 'em" said Professor Lowe, with a laugh; "jest keep still as you mind to, and squint your eye through my glass, while I make a sketch of the roads and the country. Hold hard there and anchor fast!" he screamed to the people below. Then he fell imperturbly to work, sweeping the country with his hawk eye, and escaping nothing that could contribute to the completeness of his jotting.

We had been but a few minutes thus poised, when close below, from the edge of a timber stretch, puffed a volume of white smoke. A second afterward the air quivered with the peal of a cannon. A third, and we heard the splitting shriek of a shell that passed a little to our left, but in exact range and burst beyond us in the ploughed field, heaving up the clay as it exploded.

"Ha!" said Lowe, "they have got us foul. Haul in the cables—quick!" he shouted in a fierce tone.

At the same instant the puff, the report and the shriek were repeated; but this time the shell burst to our right in mid-air and scattered fragments around and below us.

"Another shot will do our business," said Lowe between his teeth; "it isn't a mile and they have got the range."

Again the puff and the whizzing shock. I closed my eyes and held my breath hard. The explosion was so close, that the pieces of shell seemed driven across my face, and my ears quivered with the sound. I looked at Lowe to see if he was struck. He had sprung to his feet and clutched the cordage frantically.

"Are you pulling in there, ye men?" he bellowed, with a loud imprecation.

Puff! bang! whiz-z z-z! splutter! broke a third shell, and my heart was wedged in my throat.

I saw at a glimpse the whole bright landscape again. I heard the voices of soldiers below, and saw them running across fields, fences and ditches, to reach our anchorage. I saw the waving of signal flags, the commotion through the camps—officers galloping their horses, teamsters whipping their mules, regiments turning out, drums beaten and batteries limbered up. I remarked, last of all, the sight of the battery that alarmed us, and by a strange sharpness of sight and sense, believed that I saw the gunners swabbing, ramming and aiming the pieces.

Puff! bang! whiz z-z z! splutter! crash!

Puff! bang! whiz-z z-z! splutter! crash!

"My God!" said Lowe, hissing the words slowly and terribly, "they have opened upon us from another battery!"

The scene seemed to dissolve. A cold dew broke from my forehead. I grew blind and deaf. I had fainted.

* * * * * * * *

"Pitch some water in his face," said somebody. "He ain't used to it. Helloe! there, he's come to."

I staggered to my feet. There must have been a thousand men about us. They were looking curiously at the aëronaut and me. The balloon lay fuming and struggling on the clods.

"Three cheers for the Union bal-loon!" called a little fellow at my side.

"Hip, hip—hoorooar! hoorooar! hoorooar!"

"Tiger-r-r—yah! whoop!"

* * * * * * * *

The balloons were prominent features of the two terrible months ensuing, and during the battles of Hanover, Seven Pines, and the bloody sixty days' struggle before Richmond, they were invariably afloat. Lowe seldom made ascensions on windy days, but in the dead June calm of that almost tropical climate he had opportunities for safe and frequent reconnoissances. Mr. Phox, of the *Popgun*, one day transcended his powers by published a minute description of the Federal position as seen from this exalted point, and the commanding general forbade the balloon to correspondents thereafter. So we were obliged to receive the news from the lips of the "professor," and Phox, having no more imagination than old Joe Willett, fell sadly short in his reports. Some of us were not so dismayed, and the correspondent of the *Howitzer*, having a fertile fancy, professed to have looked into the Gulf of Mexico, and solved the mystery of the whereabouts of Beauregard.—*St. James's Magazine.*

A New Iron Furnace.

The furnace of Messrs. Graff, Bennett & Co., of Pittsburgh, Pa., is truly a novelty in the furnace line. Like the city in which it is, it may appropriately be called an iron furnace. It is 45 feet high and 12 feet bosh. It is only 16 feet over all, the outer wall being boiler-plates, firmly riveted together, with an inner wall of 2 feet—the whole standing upon 9-feet iron columns above the hearth. It produces an average of 18 tuns of pig per day, and has now been in blast the greater portion of the time for about three years. We believe it uses our ores entirely. This, we think, is the first iron furnace ever erected. Thus far, not a rivet has loosened in its entire surface, while its success has been so highly gratifying that the same firm are now erecting two more at Manchester, on the Pennsylvania Central Railroad, near its junction with the Cleveland and Pittsburgh Road, some few miles out of the city, and where our ore and the coal will both reach the furnace without any transhipment. These are to be 13 feet bosh, with walls 2 feet 6 inches inside of the iron hull. It is expected that they will produce at least 20 tuns each per day. Each will have a separate engine of sufficient power to drive both, which is a precautionary measure in case of accident to either. We have no question but that these will be as fine, indeed, we might say the finest furnaces in America, as no money, experience and skill will be spared to make them such. It is intended to have them ready for blast by August 1st.

Messrs. Jones & Laughlins are also erecting a furnace at Pittsburgh to smelt our ores, which will be completed at an early day. The size and character of this we did not learn, as we did not have time to visit them. These three new furnaces will smelt annually some 35,000 to 40,000 gross tuns of our ore—about doubling the amount of last year. Thus the good work goes steadily forward.—*Lake Superior News.*

ADJECTIVES are to nouns what pepper, salt, mustard, vinegar, sugar, molasses, butter, and other condiments are to the food we eat—very good in moderation, and when appropriately applied.

Enlarged Photographic Pictures for Ornamentation on Glass.

The following are a few remarks made by Dr. Taylor at a late meeting of the Glasgow Photographic Association, and published in the London *Photographic News*:—

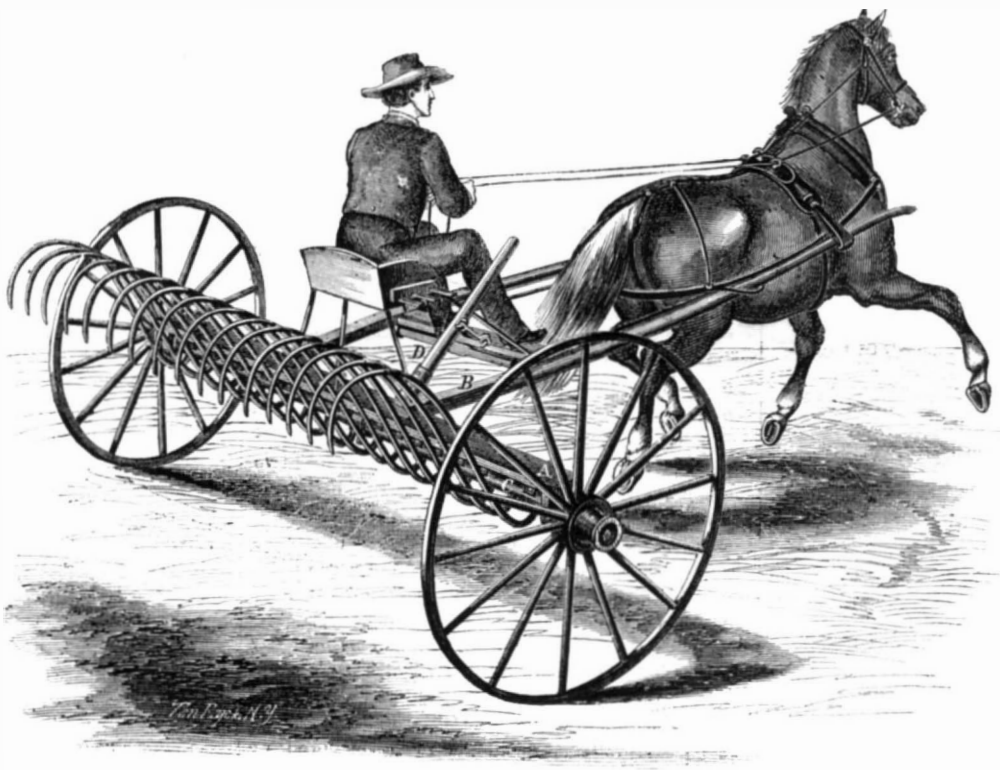
"The house-painter at present exercises his faculties in decorations, and so long as he confines his efforts to ornamental scrolls or geometrical patterns, he succeeds moderately well; but when the human figure or other object, requiring accurate and subtle drawings, is attempted, the results are too often anything but beautiful or instructive. Drawing is an art in which few obtain perfection, but photography promises to bring a higher kind of decorative art within easy reach. If glass doors and panels could be ornamented with large-sized photographs of appropriate subjects, they would soon supplant the daubs that at present too frequently appear in such situations. Then, again, as regards our stained-glass windows, photography will yet have an important part to play. The kind of art at present in use is excessively costly. I would not wish publicly to say anything by way of depreciating works which are so highly paid for, and on which so much labor has been bestowed, but to a society of photographers the case is different, and to them such works, compared with photographs, are, in most instances, merely barbarisms. In past ages, no doubt, such work served its purpose, and as a relic of the past it deserves our regard; but appropriate photographic transparencies of well-chosen subjects, delicately tinted by colored glass placed behind them, would be far more effective and beautiful than the incongruous and improbable-looking pictures at present too often seen occupying prominent situations. Let us have such pictures to take the place of the frequently ill-drawn and glaringly-colored figures which have long been the representations on stained glass. Colors are much alike in all ages, and though the scenes represented are long past, this ought to form no reason that modern art should still be tied down to imitate the colors and designs of a past age. The fact seems to be that glass painting is an art which, as we had borrowed it from our ancestors, we were afraid to improve through dread of innovation. As to future advancement, I am very sanguine in the progress of the photographic art as regards the size and boldness of effect of the pictures. It is only in large gallery paintings or in great dramatic pictures, as seen in churches and other public buildings, that the art gained power to make its deepest impressions on the mind. The painted ceilings become a part of the architecture, and produce an effect on the spectator which could never be obtained by small work. Photography has been hitherto confined to small work, such only as could be seen by close inspection and dependent for its effect upon minutiæ of detail, and it is only very recently that it has attempted to reach a grander development and to produce results which large size and breadth of effect alone can give. It would now seem that small pictures, such as those exquisite little cards or stereoscopic views now so well known, can be enlarged to almost any extent. No one can doubt but that this is a great step in advance, and that photography will thus be enabled to take up a more extended and perhaps a higher position."

The "Roanoke's" Engines.

The recent statement, to the effect that this ironclad's engines are failures, is very broad and covers altogether too much ground. The facts are simply these, Mr. Alban C. Stimers introduced a drag crank on the main shaft in the place of the usual solid forged crank; this feature, old in design but new in its adoption in the present engines, has been found impractical and will have to be removed and replaced by a shaft of the usual construction. This will detain the ship several weeks, if not months, from active service, as the construction of a crank shaft of the dimensions required by the *Roanoke's* engines involves much time. Several eminent engineers, we are informed, protested against the modification referred to, but Mr. Stimer's influence prevailed, and hence the results set forth. It is a matter of regret that the occurrence should have taken place, as the battery has already cost the country a large sum and her services are needed at once.

Improved Patent Horse Rake.

This engraving represents an improved horse rake, and was designed for the purpose of obviating many of the objections hitherto attaching to those machines. It is light, portable and easily moved from place to place. The dashing manner in which our artist has depicted the farmer proceeding to the theater of operations aptly illustrates the peculiar features of the machine above alluded to.



HOMAN'S PATENT HORSE RAKE.

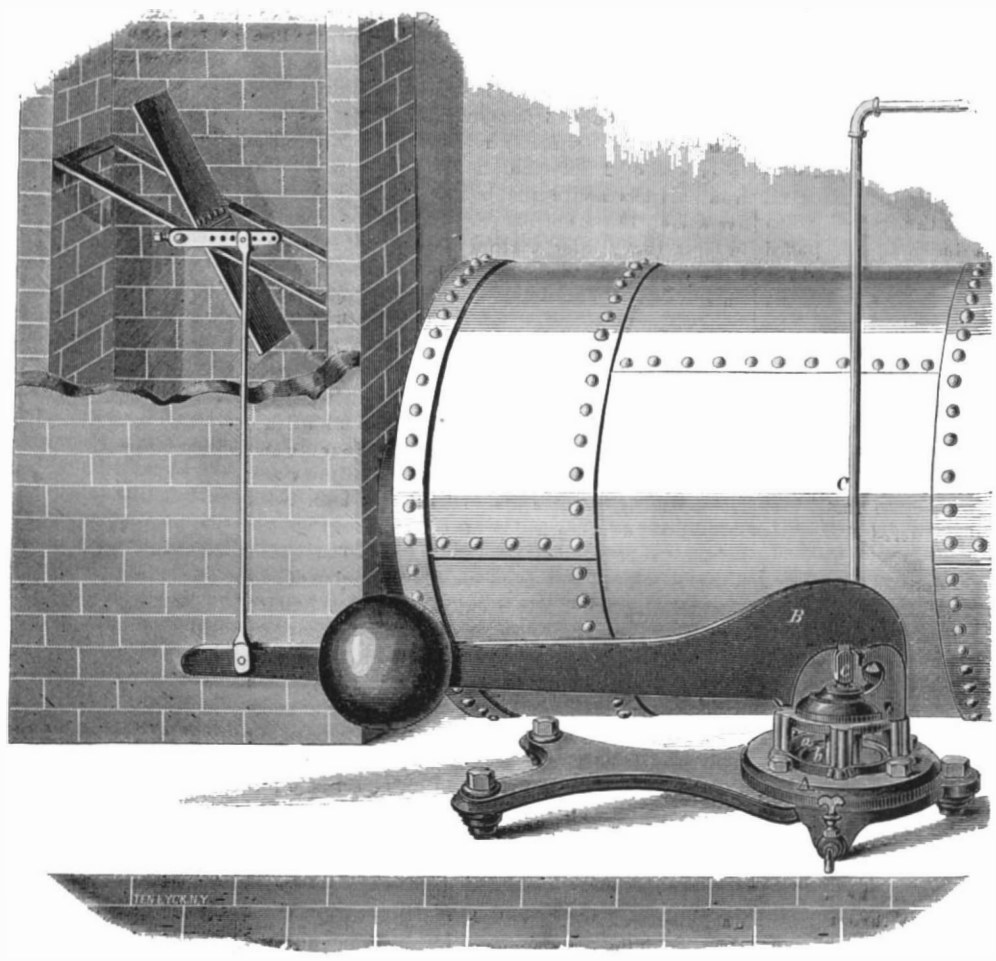
The two large wheels have a cylindrical portion projecting from the inside of each hub, and the two ends, A, of the thills, B, have metal eyes which bear on the cylindrical parts above mentioned. The wheels run on the axle-tree, C, which is capable of being vibrated in the wheels by the lever, D, attached to it by a metallic joint, and connected with the pins on the side of the seat when it is desired to raise or lower the rake teeth. The teeth themselves are bent to a suitable form and secured to the axle, C, by nuts and collars on either side; they pass through the axle and are secured in the manner described. The rake is governed from the driver's seat, by the lever, and the distance at which the teeth work from the ground can be altered at will. It will be seen that the driver's seat is supported on the wheels, and instead of forcing the rake teeth into the ground, will allow it to be freely moved, so as to regulate it as required. In the engraving the rake is shown hooked up out of the way, so as to be transported from place to place. These machines are said to be very efficient, and they are certainly simple enough in construction to entitle them to much consideration on this score alone.

A patent for this invention was procured through the Scientific American Patent Agency, by S. J. Homan, of Dowagiac, Mich., on May 7, 1862; further information can be had by addressing C. B. Holmes, at that place.

Steam and Fire Regulator.

The importance of regulating the draught, and through it the fires, in steam-boiler furnaces cannot be over-estimated as a matter of economy. Too often coal is consumed that might have been saved had proper attention been given to this subject.

Herewith we illustrate an apparatus which exercises complete control over the draught and regulates the same to suit the occasion. It consists of a cast-iron chamber, A, in which is fitted a rubber diaphragm, *a*. This diaphragm has a cast-iron head, *b*, resting on it, which is provided with the spindle, *c*, and through it connects with the lever, B. On the opposite side of the chamber is an orifice for the entrance of the steam-pipe, C, nearly on a line with that occupied by the pet-cock seen in the foreground. The extreme end of the lever is connected with the chimney (part of which is broken away to show the damper), and the apparatus otherwise explains itself. The operation of it is as follows:—When steam enters the chamber it expands the elastic diaphragm and raises the lever, which in turn closes the damper. Should the pressure in the boiler fluctuate, the result is immediately apparent in the action of the lever; and whether the steam increases or decreases in force, the motion of the diaphragm corresponds to it and regulates the draught accordingly. The desired pressure of steam in the boiler can be obtained by moving the weight in the lever to or from the center. These regulators have been in use for a long time and give universal satisfaction. All the bearings are knife edges, as in the best platform scales made, and the apparatus is comparatively frictionless. There are no less than two thousand of them now in use, and the proprietors of the patent refer to the owners of them for testimonials regarding their efficiency. Patented on Jan. 3, 1854, by Patrick Clark, of Rahway, N. J., and further information may be obtained by addressing Clark's Patent Steam and Fire Regulator Co., at No. 5 Park Place, New York. [See their advertisement on another page.]



CLARK'S PATENT STEAM AND FIRE REGULATOR.

Gold Quartz.

A new method of depriving gold ores of sulphur has been introduced at the mines of Pike's Peak. It consists in reducing the ores to fine dust, then forcing the dust by a draft through a flame of pine wood. The furnace used is a square brick structure, with a grate about three feet wide by four in length, and three feet high, in which a fire of common pine wood is built. The flame from this fire-place escapes into a chimney built in the shape of a muffle and, instead of rising upward, runs down toward the lower floors at an angle of forty-five degrees. The tube containing the ground quartz enters this muffle-shaped chimney at its upper end, just were the blaze from the furnace enters, and the strong current carries the flame through its whole length. There are several round holes, an inch or two in diameter, at intervals of three or four feet along both sides of the chimney. Through these, when the apparatus is in operation, a further supply of air than that furnished by the blower is sucked in and assists in decomposing the sulphur contained in the ore. In passing down the flue or chimney the pulverized ore is blown through a jet of flame, as dust, for a distance of about twenty feet—the length of the flue—and each particle being separate, is surrounded by air and a strong flame, and it becomes red hot, giving off its sulphur, arsenic and other volatile constituents. After passing down the flue, it falls into a receptacle of brick-work, whence it is raked out upon an earthern floor to cool. The ore now presents about the same appearance as that burned in a reverberatory furnace—a brick red. The amalgamating machinery is simply an arrastra about eight feet in diameter, with a stone bottom and drag-stones. This is a very novel process, and three times more gold, it is stated, are obtained by it than by any of the old processes.

Sulphur, arsenic and iron in quartz prevent, in a great measure, the mercury from amalgamating with the gold.