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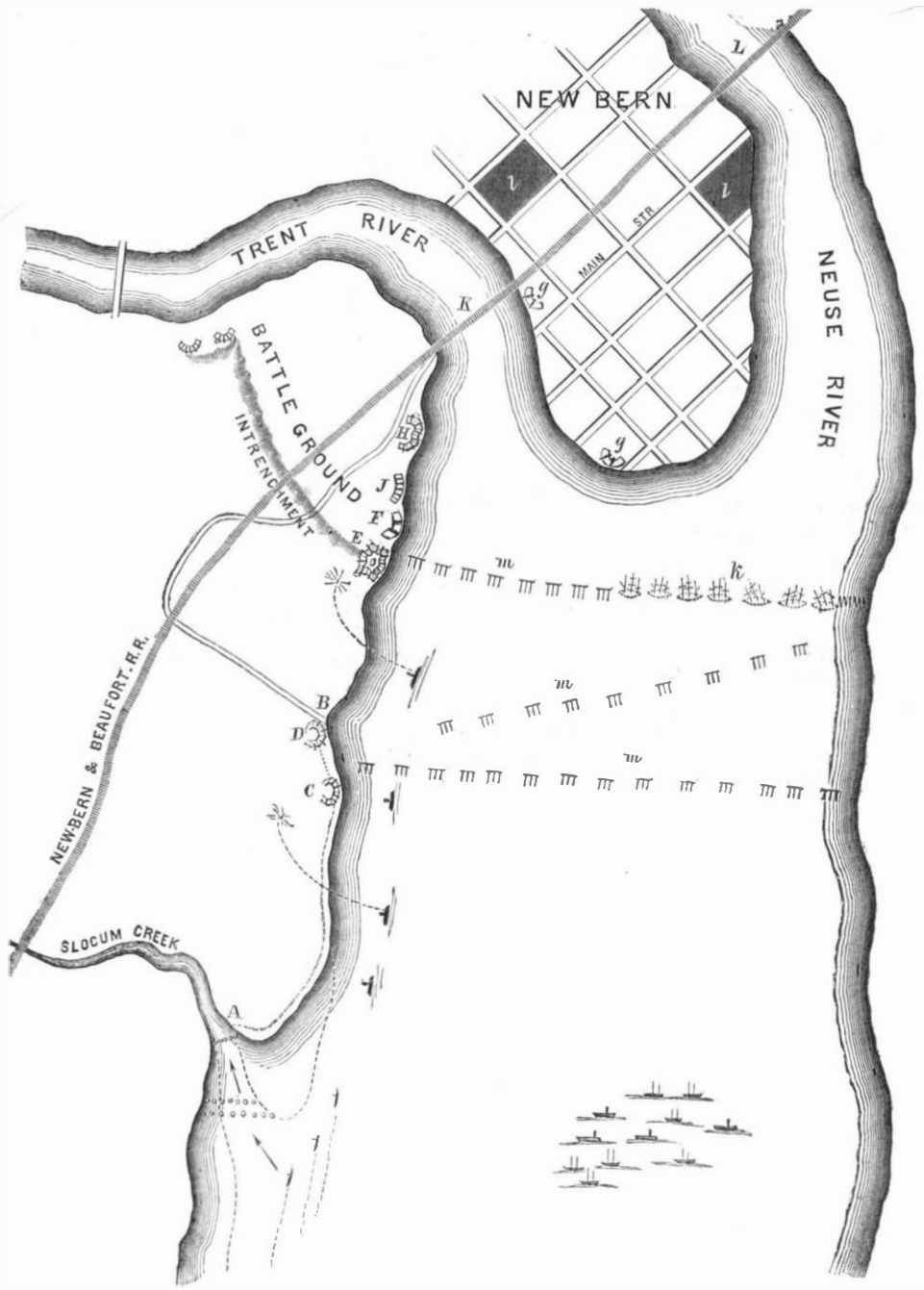
REBEL OBSTRUCTIONS IN THE NEUSE RIVER —PLAN OF THE BATTLE GROUND IN THE VICINITY OF NEWBERN.

One of the most interesting incidents connected with the battle of Newbern was the ease with which our vessels passed through the series of obstructions that had been placed in the river. We have been so fortunate as to receive from a private source sketches of these obstructions and from which we have had engravings made that not only illustrate fully the mode of constructing and placing the obstructions, but that furnish also the best and most reliable map yet published of the battle of Newbern. We gave a minute description of the battle on page 194 of the current volume.

In 1848 Mr. B. Maillefert discovered a process of blasting rocks under water without drilling. A can of powder is sunk to the surface of the rock and connected by an insulated wire with a galvanic battery, by which means it can be exploded. Under the weight of the incompressible water the force of the explosion is exerted downward and laterally and shatters the rock. A patent was secured for the process through the Scientific American Patent Agency several years ago, and the New York Submarine Company, purchased the patent right and employed Mr. Maillefert and Mr. Levi Hayden as their engineers, who are accompanying and operating with Burnside's expedition.

The map represents a section of the Neuse river with the Trent coming in on the left, and the town of Newbern occupying the point formed by the junction of the two rivers. It extends down to the mouth of Slocum's creek, where the troops landed, and indicates correctly the three lines of obstructions formed across the river by planting *cheveaux-de-frise* and sinking vessels. The most important points are indicated by letters.



MAP OF THE BATTLE OF NEWBERN.

A is the mouth of Slocum's creek where the troops landed. The rows of small circles show the positions of the piles which were driven across the shoals at the mouth of the creek.

B is the place of the second landing, where the Fifth Rhode Island Battery landed. A road leads from this point to Newbern.

C and D are batteries which were silenced by our gunboats the day before the principal battle.

E is a fort with 15 guns connected with the intrenchment which was defended by the rebels, and where the battle was fought. At the southwest end of the intrenchment are two batteries.

F is a bomb-proof battery with two enormous rifle cannon. One of these was knocked over by its own recoil.

H is a very strongly defended battery of 20 guns.

J is a battery with 9 guns *en barbette*.

K is the bridge across the Trent which was burned by the flying enemy.

L is the bridge across the Neuse which was also burned.

g g are batteries of 2 guns each.

m m are armed *cheveaux-de-frise* across the Neuse.

K are sunken vessels. There was a narrow secret channel between the sunken vessels and the *cheveaux-de-frise*.

The *cheveaux-de-frise* were constructed as represented in the following cuts. Timbers 25 feet long were bound together in groups of threes by cross timbers as shown in Fig. 1; and were placed in the river below the surface of the water, as shown in Fig. 2. The end up-stream was sunk to the bottom and the end down stream inclined upward at an angle of 30°, in which position it was secured by a box loaded with stones. The timbers were placed eight feet apart, and their down-stream ends were pointed and shod with iron.

Upon the shore were found a number of torpedoes intended to be fixed to the ends of the sunken timbers. An engraving of one of these torpedoes is given in Fig. 3. A is a cast-iron double socket to fit on the end of the timber. B is a cast-iron shell sliding into the end of the socket. C is the end of one of the beams shown in Figs. 1 and 2. *d* is a copper cap filled with fulminating powder to communicate fire to the powder in the shell. *e* is an iron pin upon which the cap strikes, producing an explosion when a vessel comes against the end of the shell.

When the fleet arrived at the mouth of Slocum's creek it took the submarine operators an hour and a half to remove the piling so that the small vessels could enter the creek. When the gunboats ran against the *cheveaux-de-frise* in going up the Neuse, they broke off several of the timbers at the points where the ballast box was fastened; though two of the gunboats were somewhat injured and two of the schooners were sunk. But a passage was soon opened and the whole fleet passed up, silencing the formidable batteries which lined the south bank of the river.

The submarine operators have been employed since the battle in pulling up the timbers of the *cheveaux-de-frise* to render the river safely navigable. A stout hawser is attached to a gunboat and the chain is wound around one set of timbers which is then pulled from its bed by the propelling power of the boat and dragged ashore.

Mr. Maillefert accompanied the expedition up Tar river to remove some obstructions which had been placed in that stream. After the vessels had passed

up the following conversation took place between the captain of one of the vessels and a prominent secessionist :—

"How did you manage to get through those obstructions in the river?"

"What, those little sticks?"

"Little sticks! It took us three months to plant

Fig. 1

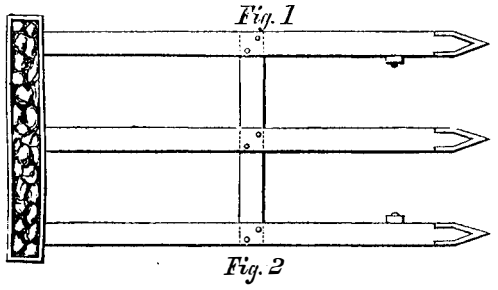


Fig. 2

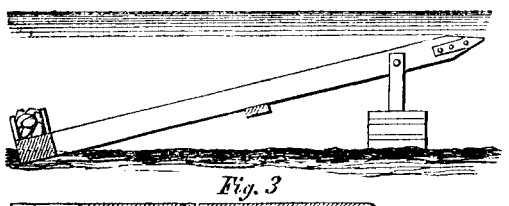
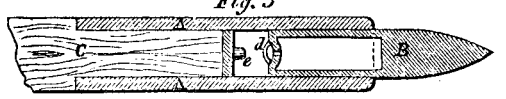


Fig. 3



them. They were as big as barrels and driven 6 and 8 feet into the ground."

"Well, after we found them it took us just 15 minutes to get through.

"Well! Well! What will you Yankees do next?"

NOTES ON MILITARY AND NAVAL AFFAIRS.

CAPTURE OF ISLAND NO. 10.

After the evacuation of Columbus by the rebels, they fell back to Island No. 10, which is situated in the Mississippi River, about 45 miles below Columbus, and just south of the line which divides Kentucky from Tennessee. On the Missouri side of the river a few miles below Island No. 10, is the town of New Madrid. The Mississippi is a very crooked stream, and though New Madrid is below Island No. 10, it is nearly in a northwest direction. General Pope marched down the west side of the river and captured New Madrid on the 13th of March, as we have already related. On the 15th of March Commodore Foote came down the river with a fleet of 8 gunboats and 8 mortar boats, and commenced an attack on the enemy's works. These consisted of 8 batteries mounting 54 guns, and they were aided by a few gunboats and by an immense iron-clad floating battery mounting 16 guns formed of an old floating dock which was constructed at Algiers opposite New Orleans. Commodore Foote commenced a bombardment and cannonade of the rebel batteries which was continued for three weeks, silencing many of the enemy's guns and causing the removal of others. As his gunboats were constructed for fighting with the bow toward the enemy their sterns were not well protected by the iron plates and they were accordingly not well adapted for fighting down stream. The batteries on the island were supported by formidable batteries on the Tennessee shore, and it was soon perceived by Commodore Foote and General Pope that if our army could get in the rear of these batteries and capture them, the place must fall. But the Tennessee shore at this place is a marsh, impassable by an army in the high stage of water which prevailed at that time in the Mississippi, and as the enemy had possession of the river both above and below General Pope, he was unable to procure boats with which to take his army across the river. Our engineers accordingly commenced the survey of the bayous in the vicinity to see if they could find one navigable for steamers of light draft through which boats could be sent to Gen. Pope. These bayous are depressions in the lower valley, or "bottom," as it is called, of the river, and become auxiliary channels or portions of the stream in high water. At the same time Commodore Foote determined upon the desperate enterprise of sending one or more of his gunboats down the stream to run the gauntlet of the enemy's batteries should this measure be necessary. It was found that none of the bayous were navigable, but that one of them, the Chepousi, might be deepened and made navigable by great efforts. This labor was accordingly commenced and the engineers succeeded in getting four steamers and five barges through to New Madrid. In the mean time a violent thunder storm occurred on Sunday evening, April 6, and the gunboat *Carondelet*, Commander Walke, took the opportunity to make a dash through the enemy's batteries. On the perilous passage 47 shots were fired at her, but fortunately they all missed, and she arrived safely at General Pope's position. With these vessels Gen. Pope crossed the river and marched up stream to the southeast to the rear of the enemy's batteries on the Tennessee shore. About daybreak Monday morning the enemy surrendered, as will be seen by the following official dispatches :—

STEAMER "BENTON," OFF ISLAND No. 10, April 7—3:25 A. M.

TO HON. GIDEON WELLES:—Two officers of the rebel navy have this instant boarded us from Island No. 10, stating, by order of their commanding officer, they were ordered to surrender Island No. 10 to the commander of the naval forces. As these officers knew nothing of the batteries on the Tennessee shore, I have sent Captain Phelps to ascertain something definite on the subject. General Pope is now advancing in strong force to attack the rear. I am ready with the gunboats and mortars to attack in front, Gen. Buford is ready to coöperate; but it seems as if the place is to be surrendered without further defence.

A. H. FOOTE, Flag Officer.

ST. LOUIS, MO., April 8, 1862.

TO HON. E. M. STANTON, Secretary of War:—General Pope has captured three generals, six thousand prisoners of war, one hundred siege pieces and several field batteries, with immense quantities of small arms, tents, wagons and horses. Our victory is complete and overwhelming. We have not lost a single man.

H. W. HALLECK, Major-General.

ADVANCE OF THE ARMY OF THE POTOMAC.

About the 1st of April the army of the Potomac under General McClellan, was embarked on board of an immense number of vessels and taken down the river and bay to Fortress Monroe, where they landed. A letter received by the writer of this from the commander of one of the batteries says :—

We put our battery and horses on board at Georgetown, on Friday, March 28th, and left Saturday, A. M. My battery is on board a propeller, and the horses are on three schooners. We were towed down, anchoring at night, and arrived at Hampton Roads Monday, April 1st, at dark. You would be astonished to see the number of gunboats here. The whole of the Roads look like the East river. There cannot be less than 500 vessels here, including all the largest steamers in the country.

The papers have been requested not to give the details of the force under Gen. McClellan, but it is probably somewhere between 100,000 and 150,000 men, with 200 to 300 pieces of artillery. Its appearance and discipline have extorted the admiration of the captious correspondent of the London *Times*, and it is unquestionably the best appointed of any army so large that has ever been seen upon the face of this earth.

At about daylight on Friday morning, April 4th, the great army struck tents and commenced its march up the narrow tongue of land which lies between the York and James rivers. In that latitude, at this season, the fields are green, and the birds were singing gayly as the great host moved forward to its momentous work.

On Saturday, the 5th, at about 10 o'clock, A. M., the army reached some earthworks of the enemy, and a skirmish took place between the artillery on both sides, aided by Berdan's sharp shooters. At last accounts the army was encamped around Yorktown, the scene of the surrender of Cornwallis, the last great event in the Revolutionary War. Here is an army of the rebels, variously estimated at from 25,000 to 75,000 men. The place is strongly fortified, the intrenchments prepared by the British in 1781 being still of service. The first operation undertaken by Gen. McClellan will doubtless be the reduction of Yorktown.

GREAT BATTLE IN TENNESSEE.

The greatest battle of the war, and the greatest ever fought on this continent, took place on Sunday and Monday, April 6th and 7th, at Pittsburg Landing, in Tennessee, on the Tennessee River. It has been known for some time that the enemy were concentrating large forces at Corinth, in Mississippi. This place is very near the north line of the State, and about 100 miles east of Memphis, in Tennessee. Our forces, under Generals Grant and Buell, were advancing to its attack, and General Grant's army, some 40,000 strong, had landed at Pittsburg Landing, about 18 miles northeast of Corinth, when Generals Johnston and Beauregard marched from Corinth and attacked them. The fight raged all through Sunday with doubtful and wavering chances, our side losing many prisoners, among whom was Gen. Prentiss. Toward night Gen. Grant was reënforced by portions of Gen. Buell's army, and on Monday morning the bloody and doubtful struggle was renewed. At about 4 o'clock in the afternoon a brilliant charge of General Grant, at the head of some fresh regiments, decided the fate of the day, which ended in a complete rout of the rebels.

The loss on both sides was very heavy; the reports state that on our side at 18,000 or 20,000 men, and on the rebel side at 35,000 or 40,000. But of course the reporters have no means of knowing the truth in regard to the numbers so soon after the battle, and these statements are mere guesses. It is positively asserted, however, that the able rebel General, A. Sidney Johnston, is among the killed. Gen. Grant, who won this great and important victory, is the same who captured Fort Donelson.

MINOR MATTERS.

We learn that Gen. Burnside is strengthening his position at Newbern, in anticipation of an attack from the rebels. He is also besieging Fort Macon, at Beaufort, which is garrisoned by about 500 of the enemy. The siege of Fort Pulaski, near Savannah, is also being prosecuted. It is reported that Gen. Price has been withdrawn from Arkansas, to strengthen the forces at Corinth, and that Gen. Curtis has before him only small predatory bands. We close our account of this week's important events by the following incident :—

THE OLD FLAG OVER JACKSON'S GRAVE.

A correspondent of the Indianapolis *Journal* writing from Camp Andrew Jackson, Tenn., March 16, says: Yesterday Gen. Nelson made a reconnoissance in force toward Lebanon. He took with him the 2d Cavalry, three batteries of artillery, and five regiments of infantry. Our regiment led the advance, Company F being the advance guard. We were obliged to leave two batteries about four miles from camp, in consequence of the bridges being too rickety to risk their going over in safety. We went as far as the "Hermitage," the former residence of Andrew Jackson. As we approached the sacred spot the band of the 36th Indiana played a national air. Gen. Nelson halted the column, and the Stars and Stripes were planted over the tomb of Jackson, and Harris's battery fired a salute of sixteen guns. To comment on the ceremonies of the occasion would be useless, as all who know the history of the "Hero of New Orleans" can readily imagine the feelings of the troops while standing before the tomb of Jackson. Gen. Nelson and staff were invited into the mansion, and remained some time.

Indian Method of Fixing Loose Teeth.

Dr. Roberts remarked at a late meeting of the Medico-Chirurgical Society of Edinburgh, that it was well known that the natives of India were in the habit of tying loose teeth to sound ones by means of gold wire, arranged in the form of a figure 8, and he had seen various preparations illustrative of this practice. He had never, however, seen so remarkable a preparation of this kind as the one which he exhibited to the Society. It had been removed from the mouth of a native queen, and sent home by a former pupil, now settled in Madras. The preparation consisted of the whole of the teeth of the lower jaw, which had been removed in one piece, and were attached to one another by gold wire. Complete absorption of the alveolar processes had taken place, and the only points by which the teeth were connected to the jaw were the ends of the roots of the wisdom teeth. The roots of the central and lateral incisors were incrusted with tartar, and all the teeth were of a black color, owing to the practice of chewing beetlenut and other preparations.

Dr. George Smith stated that the practice of attaching the teeth together was very common in Madras, and that he had frequently seen examples of the practice, but never on such a large scale as in the preparation shown by Dr. Roberts. The natives also were in the habit of ornamenting their teeth with gold; they bored little holes in the central incisors, and filled them up with gold.

MAN is now believed to have lived in the age when mammoths roamed through American and European forests. Flint arrow heads have been found mixed with the bones of these quadrupeds.

How the Chinese Make Dwarf Trees.

The following method of making dwarf trees is taken from the *Scottish Farmer*:—

We have all known from childhood how the Chinese cramp their women's feet, and so manage to make them "keepers at home," but how they contrive to grow miniature pines and oaks in flower pots for half a century has always been much of a secret. It is the product chiefly of skillful, long-continued root pruning. They begin at the beginning. Taking a young plant (say a seedling or cutting of a cedar), when only two or three inches high, they cut off its tap as soon as it has other rootlets enough to live upon, and replant it in a shallow earthen pot or pan. The end of the tap root is generally made to rest on the bottom of the pan, or on a flat stone within it. Alluvial clay is then put into the pot, much of it in bits the size of beans, and just enough in kind and quantity to furnish a scanty nourishment to the plant. Water enough is given to keep it in growth, but not enough is given to excite a vigorous habit. So, likewise, in the application of light and heat. As the Chinese pride themselve also on the shape of their miniature trees, they use strings, wires and pegs, and various other mechanical contrivances, to promote symmetry of habit, or to fashion their pets into odd fancy figures. Then, by the use of very shallow pots, the growth of the tap roots is out of the question; by the use of poor soil, and little of it, and little water, strong growth is prevented. Then, too, the top and roots, being within easy reach of the gardner, are shortened by his pruning knife, or seared with his hot iron. So the little tree, finding itself headed on every side, gives up the idea of a strong growth, asking only for life, and just growth enough to live and look well. Accordingly, each new set of leaves become more and more stunted, the buds and rootlets are diminished in proportion, and at length a balance is established between every part of the tree, making it a dwarf in all respects. In some kinds of trees this end is reached in three or four years; in others ten or fifteen years are necessary. Such is fancy horticulture among the Celestials.

Manufacture of Files by Machinery.

The *Commercial Bulletin* states that the manufacture of files by Whipple's patent machines is successfully carried on at Ballard Vale, about twenty miles from Boston. The factory is a stone building 276 feet long, 45 feet wide and three stories high. The machinery is driven by two powerful steam engines. The steel for the files is cut off the right length by shears. The best quality of cast steel is used, which, after being cut, goes to the forging shop, where, under nicely gaged trip hammers, the file blanks are forged. From here they go to the annealing furnace, where they are partially decarbonized. After this they are straightened and carried to the grinding room, where they are ground perfectly level, and are then ready to be placed in the cutting machines. Eight files are placed in each machine, where by the use of revolving cutters the burrs are cut. After cutting, and before hardening, each file is stamped by machinery with the name of the company. They then go to the hardening department and are overlaid with a paste of salt and flour which protects the teeth when heated. The skillful hardener, who is devoted exclusively to this, dips the file into the "lead bath," which heats it to allow red heat, when it is immersed in salt water, and before it is cold it is straightened, if sprung in the process. The paste is then brushed out and the files are put into lime water, remaining twenty-four hours, then taken out, dried and brushed; they are then oiled, which preserves them from rust. Every file is tested by an expert by ringing it upon an anvil, and his accustomed ear detects any flaw. The least irregularity in the cutting is rejected. The most perfect system is observed throughout these works, where about 120 men and boys are employed.

A well sunk at any point along Saginaw river, Mich., to the depth of 700 feet, will bring to the surface the strongest and purest salt brine found anywhere in the United States. It is now but two years since its discovery, and already over $200,000 have been invested in this branch of business, and new companies are forming almost daily to sink new wells and manufacture salt. The result, as proved, is, that salt can be made at 60 cents ber barrel, and sold at the works at $1 30 to $2 per barrel.

Trial of the English Iron-plated Steamer "Defence."

The London *Engineer* of March 21st, says:—The *Defence* was again tried on Thursday week. The weather was favorable for trial, but at times very thick. The wind was light, at west north-west. The ship's draught of water was nearly the same as on her former trial—being 25 feet 5 inches aft, and 24 feet 3 inches forward. She was complete in her stores, and had 440 tuns of coal on board. After completing the first mile to the westward the weather became thick, and the ship was taken off the trial ground for a short time; but the weather again cleared up, and the runs at full power showed a mean speed of 11.612 knots an hour. This completed the trials at the measured mile, thick weather again setting in and preventing the half-boiler trials being carried out. The ship was then taken off into deep water, and tested in going round the circle, which she completed in 8 minutes and 10 seconds. In testing the engines they were stopped, from the time of moving the telegraph on the bridge, in 14 seconds, started ahead in 15 seconds, and astern in 11 seconds. The temperatures on deck and below were as follows:—On deck, from 45° to 49°; in the middle of the engine room, frow 90° to 100°; in the stokeholes, from 88° to 96°. The speed made on the first trial was 11.357, and that made on the present occasion, 11.612—a quarter knot less than had been anticipated. The steering qualities of the ship were found to be as uncertain as on the former trial.

Sorghum Sirup.

The cultivation of the Chinese sugar cane for the manufacture of sirup is a subject that is now engaging the earnest attention of our western farmers. A convention of "sugar growers" was held at Columbus, Ohio, on the 7th of January last, for the purpose of exhibiting products obtained from sorghum, awarding prizes, and hearing reports respecting the cultivation of the plant and the treatment of its juice to obtain sugar and sirup. It is still doubtful whether the sorghum can be cultivated profitably for its sugar, but not with regard to its sirup. It yields a large quantity of the sirup, and it appears to be equal to the best obtained from common sugar cane. A small sample of the 1,000 gallons made on the patent clarifier and evaporator of C. Jacobs, of Columbus, and which obtained the premium at the Columbus Convention, has been sent to us to examine. In color it resembles maple molasses, and although the latter is the favorite nectar of connoisseurs in sweets and pancakes, still it is nearly equal to it. The beauty and flavor of this sirup is no doubt due, in a great measure, to the treatment which the juice received in the evaporating and clarifying operations.

Human Strength.

An active man, working to the best advantage, can raise 10 lbs. ten feet in a second, for 10 hours in the day, or 100 lbs. one foot in a second. Absolute force of pressure with the hands was found by the dynanometer of Regnier to be on an average equal to 110 lbs. Absolute force of a man lifting with both hands, 286 lbs. Greatest average load which a man can support on his shoulders, for some seconds, is estimated at 330 lbs.; and it is supposed that he can exert the same force in drawing vertically downward. The mean absolute force, in drawing or pulling horizontally, is found by the dynanometer to be 110 lbs.; the force of the pull in the strongest man was found to be only 20 lbs. more than the average. The greatest effect of a man's strength in raising a weight will be when the weight of the man is to that of his load as $1:-1+\sqrt{3}$, or nearly as 4:3.

George Peabody, Esq., the eminent American banker in London, has donated £150,000 (about $750,000) toward ameliorating the condition of the poor of London. Our Minister, Mr. Adams, Lord Stanley, Sir J. E. Tennent, C. M. Sampson and J. S. Morgan are constituted trustees for its faithful application.

For the first time within nine months past we are in receipt of a Treasury Note from Nashville, Tenn., with inquiries about obtaining patents. In Virginia, also, where our army has been, some of our old patrons begin to inquire about doing business with us again. These facts augur well for the loyalty of inventors wherever they are.

Petroleum in Granite.

At a late meeting of the Manchester (England) Geological Society, Mr. Binney exhibited a specimen of granite containing petroleum, sent to him by Mr. James Yates, F. R. S., of London. He stated that he had communicated to the Society an account of petroleum from peat bogs, so as to show that such substances were now in the process of formation, but he had never before heard of petroleum having been found in granite. Mr. Yates states in his letter to Mr. Binney "that he could find no specimens similar to his either in the museums at the Geological Society or in Jermyn street." Mr. Robert Hunt, F. R. S., was well acquainted with the specimens, and thinks that they are now extremely rare. He has sent Mr. Yates the only record he could find about this substance, stating that about 30 years ago there was discovered in the great copper lode at Carharrack, at the depth of 70 or 80 fathoms, a quantity of bitumen, dispersed throughout the substance of the lode and the contiguous ground. Mr. Yates obtained his specimen in 1818, and it is mentioned in "Aiken's Mineralogy," 1815, p. 60, so that its discovery is of older date than 30 years ago. Copper and tin ores accompany the bitumen. There is no coal in Cornwall, on which account Mr. Hunt thought this bitumen could not be of vegetable origin, but formed by the chemical carbonates of mineral or gaseous matter. All the accounts state that it was found in mineral veins pas sing through the granite. Mr. Binney said that all bitumens or petroleums, so far as yet known, were formed from organic substances, and no instance was known of any having been formed from inorganic matter, whether mineral or gaseous. Although the lode in which the bitumen or petroleum was found did occur in granite, it was not necessarily of great antiquity, as the lode might have been formed at a comparatively modern period, and the bitumen introduced at that time.

Illinois Sorghum Molasses.

About 32,000 gallons of Chinese sugar cane molosses were made last year by Messrs. Mears & Gimble, of Galesburgh, Ill. In sending a sample of it to the Agricultural Bureau of the Patent Office they wrote as follows:—"The manufacture of molasses from the Chinese and African cane is no longer an experiment in the West, but an established fact (a majority of farmers making a sufficient quantity for home consumption), and will before many years enter largely into our agricultural products, and when science, with experiment, develop the proper process, we shall make as good sugar as can be made from Southern cane. We have not as yet succeeded in making sugar except at too great an expense for profit, but our experiments have satisfied us it can and will be done. The sample sent is made in the following manner:—The raw juice is heated to boiling point in order to coagulate it, we then use about one peck of pure native clay, which we mix well with the hot juice (about 100 gallons), agitating it well; let it remain about half an hour and all the pulp will settle to the bottom of the vessel, leaving the juice almost as clear as water; it is then drawn off and evaporated until it is the proper thickness for good molasses."

Preventative of Incrustation in Boilers.

In using hard water for steam boilers, great trouble is experienced from scale forming on the plates inside. A variety of compositions and substances have been used to obviate the formation of such incrustations. The latest substance brought to our notice for this purpose is Baird's patent preparation of the extract of tobacco, the advertisement of which is on another column. It is mixed with the feed water and fed occasionally into the boiler. Its office is to hold the salts that form scale in suspension and prevent them adhering to the metal. Its nature is not kept a secret, and its use is offered upon candid terms. A quantity will be furnished for a fair trial to any responsible party; if it answers the purpose for which it is recommended, and its use is continued, it is to be paid for; if it does not answer, no claim for payment is set up.

Maple Sugar.—*Hunt's Merchants' Magazine* estimates the crop of maple sugar at 28,000 tuns yearly, or 62,700,000 lbs. But a very much larger amount can be produced, and doubtless will be, thus relieving the country from foreign indebtedness.

The Iron-Plated Steamer "Galena."

Our readers are aware that Congress, at the last session, appropriated $1,500,000 for the construction of iron-plated vessels for the navy, and that under the act contracts were made for three vessels, one to be built in New York, one at Mystic, on the river of the same name in Connecticut, and one in Philadelphia. Of the New York vessel, Capt. Ericsson's battery, the *Monitor*, we gave an engraving on page 177 of the current volume, and we now present full illustrations of all the peculiarities in the steamer constructed at Mystic—our engravings showing the upper portion of her midship section, the mode of forming and securing her iron plates, and of constructing and closing her portholes.

Fig. 1 is a representation of a portion of the midship cross section, extending from the upper deck to a point below the gun deck, and showing the angle at which the side is inclined. The side of the vessel is formed of solid oak, 18 inches in thickness, and it is covered with plates or bars of wrought iron to a thickness of 3¼ inches.

The form of the plates and the mode of securing them are represented in Fig. 1, and on a larger scale in Figs. 2, 3 and 4. The plan is a modification of that designed by John F. Winslow, of the Albany Iron Works, and illustrated on pages 276 and 336 of our last volume. The plate, Fig. 2, is rolled from a good quality of wrought iron 6¾ inches in width and 24 feet in length, and fits upon chairs of half the length represented in Fig. 3, in the position shown in Fig. 4. Bolts, ¾ of an inch in diameter and 14 inches apart, pass through the thin flanges of the plate and of the chair and through the side of the ship as shown in Fig. 1, the holes for the bolts being elongated to allow for the expansion and contraction of the plates. The heads of the bolts are not fully countersunk into the plate, but they are covered by the thick part of the plate next above; a groove, *a*, Fig. 2, being formed for this purpose. This thick portion is 2⅛ inches in thickness and 4 inches in width, while the flange is ⅜ of an inch thick and 2¾ wide. The chair is 5 inches wide, the lower flange being 2 inches wide and ⅜ of an inch thick; the central rib ⅜ of an inch wide and 1⅛ inches thick, and the upper flange 2¼ inches wide and ⅜ of an inch thick. These dimensions may be varied to any extent desired. When the plates are secured not a bolt head is seen, and the vessel appears to be planked with iron, as shown in Fig. 5.

Fig. 5 shows the mode of closing the portholes, the ports and port lids being represented in section in Fig. 1. The port lids are constructed of plates and chairs precisely the same as the armor of the sides, and the porthole is lined with angle iron so as to form a rabbeted casing for the reception of the lids. The lids are formed in two sections so as to open up and down as shown in Fig. 1, and each section is secured to the side by massive wrought-iron hinges as shown.

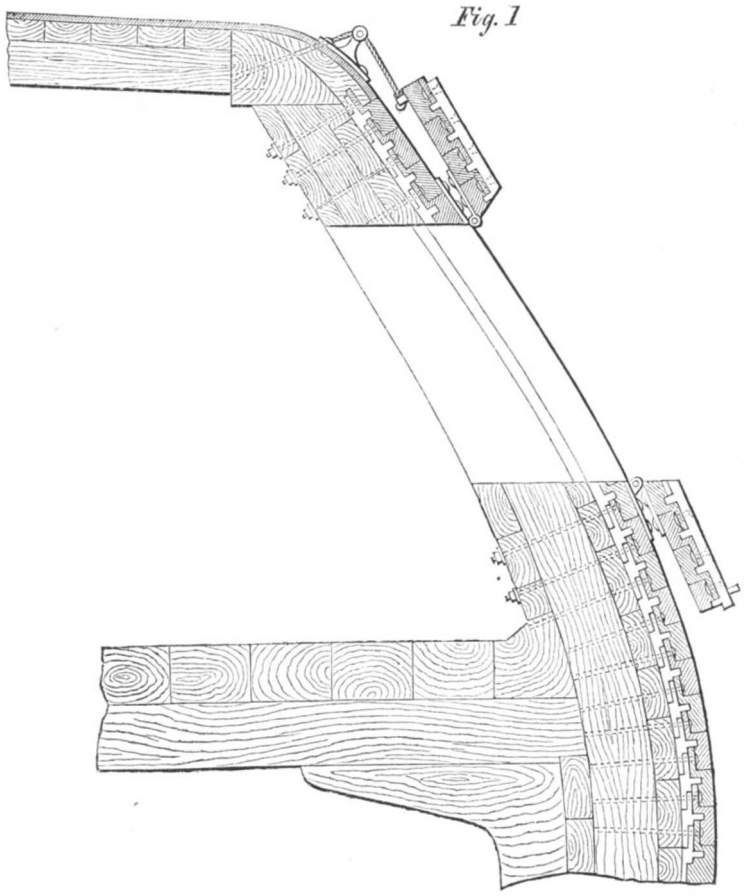
The upper deck is covered by an iron plate half an inch thick, the design being to make the vessel bomb-proof.

This mode of forming armor plates in long bars of moderate width combines cheapness, strength and efficiency. The manufacture of plates weighing 2½ tuns each, like those on the English and French ships, is enormously expensive; it is extremely difficult to fasten such heavy plates to the sides of a ship, and they tend to weaken rather than to strengthen the vessel. On the other hand, the rolling of these long bars is an operation involving very little expense, there is no difficulty in fastening them with perfect security to the ship's side, and from their being of such great length, and being secured in a horizontal position, they add very materially to the strength of the vessel.

The plates on this steamer are not supposed to be of sufficient thickness to resist a heavy solid shot striking them perpendicularly at short range. But the passage of a solid shot through the side of a vessel above the water does not generally inflict any considerable injury, and a vessel will receive a great many such wounds before her powers of resistance are destroyed. It for defense against the terribly destructive effects of explosive shells that iron armor is most serviceable, and experience has demonstrated that for this purpose a thickness of 3¼ inches is more than sufficient.

This steamer has been named the *Galena*. She was built at Mystic, Conn., by Maxon, Fish & Co., and was launched on the 14th of February. Her dimensions are: Length 182 feet, breath of beam 38 feet, draft 11 feet, measurement 1,100 tuns. She is rigged as a brigantine, with her standing rigging of wire ropes. She is propelled by a screw driven by engines of Ericsson's pattern; the "cylinders" being semi-cylindrical, and all of her machinery is below the water line. The armor plating was all made in Troy, N. Y., the chairs at the Albany Iron Works of Corning, Winslow & Co., and the plates at the Rensselaer Iron Works.

Fig. 1



CORNING, WINSLOW & CO.'S IRON PLATING.

Fig. 2

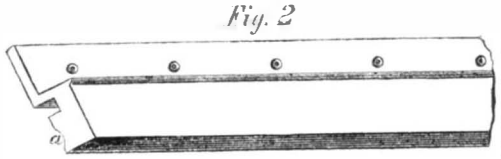


Fig. 3

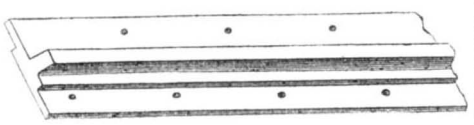


Fig. 4

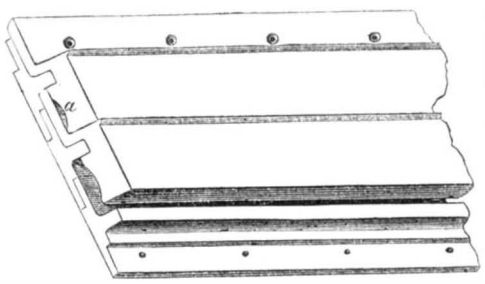
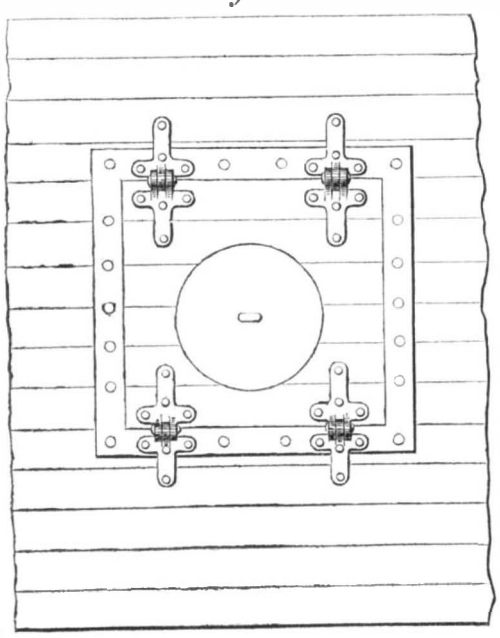


Fig. 5



Friction Matches Without Sulphur.

A new description of friction match has just made its appearance. It is known as the Patent Solar Match, and is intended to supply the public with an article devoid of any unpleasant smell, and which will ignite easily. It is free from sulphur, or the smell of such when burning, and can be supplied as cheap as the common sulphur matches. The substitute used instead of sulphur is paraffine—thus showing another use to which this great natural product of our country is turned. Its application, in connection with the manufacture of friction matches, and rendering them free from damp, has been secured by Letters Patent, bearing date March 11, 1862. A company is now formed for the purpose of manufacturing these matches, and for selling licenses to other manufacturers to make them under the patent. Office Nos. 101 and 103 Beekman street, New York City.

To Copy Letters.

A very neat, cheap and convenient contrivance for printing a copy of written letters is made, under Van Anden's Patent, by Hannah & Co., 29 Cliff st., New York. The device consists of a small roller with a series of attached leaves, which form the copying book. After the letter is written, it is only necessary, in order to take a copy, to dampen one of the book leaves, insert the letter and roll the whole together. In five seconds, we are told, a good copy of the letter is thus produced. This little improvement may be sent by mail. It dispenses with the great weight and expense of the screw press, so commonly employed.

How to Apply Solder.—To make soldering fluid that will cause solder to run over or through iron or any metal, take six pennyweights zinc, clean and cut in small strips from the sheet, put it in an earthen cup, then put on one and a half pennyweights subnitrate of bismuth, then pour on one ounce of muriatic acid. It will boil furiously. Let it stand a day or two, stirring it occasionally, then let it settle, and pour off the clear liquid for use. The edges of the pieces to be soldered are first filed, then wet with the metallic solution, the edges brought together, a piece of solder laid on, and the hot soldering tools then applied in the usual manner.

Since the 1st of January last 623,081 gallons of petroleum have been exported from Philadelphia to England.

SURFACE CONDENSERS FOR STEAM ENGINES.

A few weeks since, we concluded the publication of the illustrated essay of Mr. Louth on the above subject. It has attracted a great deal of attention, and since then quite a number of experienced engineers have called upon us and added their quantum of personal knowledge on condensers to the general stock. The marine engineers of Europe and America have their minds intently fixed upon this subject at present. They admit that surface condensation, whereby fresh instead of salt water may be used in steam boilers at sea, is so desirable that all wish it success. But it has been found, in some cases, that the use of surface condensers has involved practical and unexpected evils of greater magnitude than those connected with inside condensers. Remedies for these evils are earnestly desired, and no doubt they will be discovered. To these we wish to direct special attention, and in doing so present the following view of Sewell's American Condenser, which has been adopted by the Cunard Company, having been put into their splendid new S. S. steamer *China* by Mr. Davidson in Glasgow.

A is the fresh-water passage to air pump; E is the exhaust steam passage into condenser outside of tubes. One great difference between the most successful new and old condensers is the exhaustion of the steam among the whole tubes outside instead of inside. This mode of exhaust maintains a more uniform temperature throughout the condenser. I is the inlet of water from the circulating pump; O is the outlet pipe communicating with the interior of tubes. These condensers have been put into all the new gunboats that were built last year for our navy. The shell is of cast iron; the tubes are brass of $\frac{5}{8}$-inch external diameter, their length 4 feet. In each condenser for the two engines of each gunboat there are 2,832 tubes. These are secured tight in their plates under hydrostatic pressure, and their ends are fitted with vulcanized india-rubber gromets. Such is a general description of these condensers. They have been already applied to more steam vessels, we understand, than all other surface condensers put together.

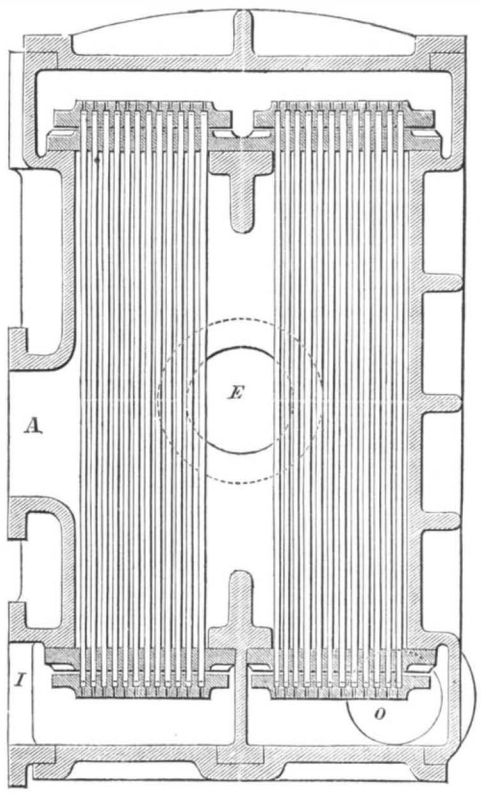
The benefits of surface condensation in sea steamers may be more clearly set forth by stating that with the common inside condensers salt water is used in the boilers, and no less than one half of that received as feed must be blown out hot into the sea, thus involving a great waste of fuel. A scale also forms in the boilers in which salt water is used, which obstructs the passage of heat from the fire to the water, thus involving another waste of fuel. With inside condensers, the condensed exhaust steam is used over and over again in the boiler, and no blowing off is necessary.

Steam of much higher pressure may also be used with surface condensers, thus admitting of greater expansive working, and a considerable saving of fuel also. There is also more safety in using surface condensers; for if the blow-off cock in a boiler is left full open, by neglect, all the water may be run off. It has been stated that the steamer *Pulaski* was lost several years since from this cause. No blowing off is required with the surface condenser. It is also stated that a better vacuum is obtained by the surface condenser. Every two inches increase of vacuum is equal to the pressure of one pound of steam on the square inch of piston during the whole stroke.

Such are some of the advantages claimed for surface condensers over common inside condensers. Two important papers on this subject have lately been read before the Institution of Engineers in Scotland, by Mr. J. Davidson, the agent of the above-named American condenser in Glasgow, and Mr. J. F. Spencer, patentee of another condenser. The latter claims five specific advantages for surface condensers. First, freedom from incrustation in boilers; second, the use of stronger boilers, whereby stays may be used to carry steam of a higher pressure (stays cannot well be used in boilers in which scale forms); third, foul water may be used for condensing the steam without injury to the boilers; fourth, greater regularity in the feed of boilers, and, fifth, greater uniformity of load upon the air pump, thus rendering it unnecessary for the engineer to reduce the condensing water in stormy weather.

The disadvantages of surface condensers are pointed out candidly by Mr. Spencer as follows:—First, the necessity for an additional pump for circulating the condensing water; second, additional space required for the surface condenser; third, alleged tendency of *corrosion in the boilers* when working with fresh water supplied from a surface condenser; fourth, complication of parts in the number of tubes and joints in condensers, and, fifth, increased liability to leakage, arising from the number of joints in the tubes.

All the evils stated respecting surface condensers are held to be very unimportant compared with rapid corrosion of the boiler. This is the principal evil which has been brought to our notice by several of our old and most skillful engineers, and the same evil has been noticed by European engineers. One of the steam vessels in the American navy, furnished with a surface condenser, had her boiler completely honeycombed in a very short period, and this result has been attributed to the use of the fresh water supplied by the condenser. Mr. Spencer has stated that several cases had occurred in Europe where boilers have corroded more rapidly from using fresh than salt water. This is the intricate subject to which we wish particularly to direct the attention of engineers, so as to discover the cause of this rapid corrosion of the boilers, and provide a remedy. Why should fresh water corrode boilers more rapidly than salt water?



An engineer of much experience has stated to us that the rapid corrosion in the iron plates of some boilers is due to electrical action. Electricity, he believes, is generated in the condenser, the brass tubes are decomposed, and the copper is carried off in fine particles into the boiler to form a galvanic couple with the iron. One correspondent of the London *Engineer* states that he has seen particles of copper in a corroded boiler which had a surface condenser; and another corroborates this statement, and asserts that brass steam tubes are always decomposed when connected with iron pipes. The remedy, he states, is the adoption of iron instead of brass tubes. As brass pipes are the best conductors, of course they are most suitable for surface condensation, and their decomposition by the steam may be prevented by tinning them. It is difficult to account for the rapid corrosion of some boilers connected with surface condensers, because there are cases in which such condensers have been used without any more injury to boilers than is usually the case with inside condensers. Thus the steamer *Maule*, built by Delamater, of this city, for a firm in Valparasio, has a surface condenser with brass tubes and malleable cast-iron elbows, and she has been running for three years without any more injury to her boilers than would occur with old condensers. There can be no question of the fact that several steamers which have used surface condensers, have had their boilers corroded like sieves in a very short period of time. How to account for this is the question. We are confident that fresh water is not the cause, for the tug steamer *New York* has boilers that are 20 years old, and her engineer, Mr. C. Russ, who has been with her 24 years, states that they are nearly as good as new, and have never been repaired in all this time. The boilers are tubular and fresh water is used for feed. The rapid corrosion of boilers in some cases may be due to galvanic action caused by steam and feed pipes made of copper. The subject is a fruitful one for investigation. We are positive the rapid corrosion of the boilers is not due to the principle of surface condensation, and the use of fresh water. The grease carried over by the exhaust steam from the cylinder into the surface condenser may corrode the the brass tubes and form verdigris; or the zinc which forms part of the brass, and is united with it as a mere mechanical mixture, may be decomposed—as it is a volatile metal—by the rushing hot exhaust steam. In this case the copper would be carried off in fine particles with the feed water into the boiler, and a galvanic action would be developed, whereby the iron would corrode rapidly. The subject is of vast importance to all marine engineers and owners of steamships. We trust that all who are interested in the improvement of the condensing engine will contribute their experience on the subject of surface condensers.

POLYTECHNIC ASSOCIATION OF THE AMERICAN INSTITUTE.

The regular weekly meeting of the Association was held at their rooms at the Cooper Institute on Wednesday evening April 2d, the President, Prof. Joy, in the chair. After some preliminary business the President announced that the regular subject for the evening was

SALTING THE STREETS.

This subject had been continued from the meeting a fortnight previous. It is curious that while at the first discussion those in favor of using salt to remove snow from the streets had the matter all their own way, at the second meeting every speaker except one took ground in opposition to the practice. At the first meeting the city railroads were ably represented and statistics were presented to show that snow could be removed by means of salt much more cheaply than by any other means, and that the practice was not injurious either to the feet of horses or to the health of the community. At the second meeting facts and arguments were presented upon the opposite side of the question. The early part of the evening was occupied by the habitual speakers at the Polytechnic, and while their speeches were well enough for a small society, they seem to us to contain no facts or points of sufficient importance to justify their dissemination through our paper. We accordingly commence the publication of our report with the remarks of

Mr. SMITH—I was not here, Mr. President, at the first discussion of this subject, and if I attempt to make any remarks I may occupy ground that has already been gone over. I happen to be one of those persons who, as the gentleman says, "enjoy poor health"; and I find very little enjoyment in it. Many years since I contracted a disease of the lungs, and I am very sensitive to changes in the atmosphere. You may take me blindfold through the city, and I can tell every street that is salted as soon as I enter it, from the chilliness in the air, and its effects upon my system. Melting snow by mixing salt with it does sensibly and considerably reduce the temperature of the lowest stratum of the air. As in the case of all other substances, snow cannot be reduced from the solid to the liquid state without absorbing heat, and when it is melted by means of salt the heat is absorbed from the atmosphere. The air is not only made colder, but it is rendered more moist. Warm air will contain more water than cold air, and when the temperature of the air is reduced the invisible vapor which it contained is condensed, and is perceived in the form of moisture. Thus we have a cold damp air—the very worst air for the health. I never walk through or even across a salted street without having my cough increased, and I have no doubt that every such exposure must tend to shorten my days.

Dr. GARDINER—The first question to be decided in relation to this matter is whether it is desirable to have the snow removed from our streets. In Paris and other cities in France, when snow falls to the depth of a few inches, a large number of workmen are employed with carts, and in a short time the

snow is all carted away. There is so little snow in that country that it is not used for sleighing, and when it does fall it is simply a nuisance to be got rid of as soon as possible. But the case is different with us. The country around New York is frequently so covered with snow that the roads are impassable with wheeled vehicles, and if people visit the city at all they must use sleighs or sleds. If the snow is all removed from the streets they cannot be traversed with runners, and the country people find it impossible to get about with their sleds. Now, it is a question worthy of consideration whether the streets of the city should not be adapted to the same vehicles as the roads in the vicinity. Cut off the city from the country and the city perishes. (The speaker continued at considerable length in regard to the effects of salting the streets on the health of the inhabitants, indorsing the remarks of Mr. Smith. He remarked that it was not necessary to be in delicate health to perceive the chilliness in the atmosphere where salt was used. "It is apparent to the rudest sensibility.")

The PRESIDENT—I invited Dr. Sayre to be present at this discussion and to give us his views. He is the city physician, and in his official capacity caused the practice to be discontinued. He has devoted a great deal of attention to the subject, and can doubtless give us some pertinent facts in relation to it.

Dr. SAYRE—Mr. President, I thank you for the invitation to be present at this discussion. Dr. Gardiner, Mr. Smith and Mr. Dibben have so fully stated the chemistry and science of the matter that it is not necessary to go into that branch of the subject. Every old woman knows that if she mixes snow and salt together and sets her vessel of prepared milk and eggs into the mixture, the milk will be frozen into ice cream. Snow and salt form a freezing mixture, which extracts caloric from any substances with which it comes in contact. I will state the circumstances which first called my attention to the effects of salting the streets. Sometime after my appointment as City Physician, by Mayor Wood, as I was walking one day up Broadway, I saw near Canal street a team of four fine horses belonging to Mr. Herring. The wheel horse was standing on the snow bank near the curbstone, and was resting comfortably on his four feet; but the other three horses were standing in the water which filled the middle of the street, and I was surprised to see that each of them was standing on only two of his feet. Stopping to observe them, I soon saw them change their position, putting down the feet which they had been holding up, and raising the others out of the water. Seeing that the horses were fancy animals, I asked the driver if this was some trick that he had been teaching them. He replied that it was not, and remarked that he supposed the horses raised their feet to get them out of the cold water. I then put my finger into the water and discovered that it was extremely cold. This led me to investigate the subject and I soon became satisfied of the very deleterious effects of the practice of salting the streets. Never in the history of the world was such an event known as the freezing of a horses' hoof. Every blacksmith knows, and every person who has ever seen a horse shod knows, that you may burn the hoof with a red hot iron, or you may stick nails into it without producing any sensation. It is an inert mass. So long as a horse stands upon the surface of the snow, he would not have his foot frozen if he should stand there forever. But when he puts his foot into a freezing mixture that is in a liquid state, so that the liquid comes in contact with the corona of the foot above the hoof, where the parts are alive and sensitive, full of blood vessels, then the foot may be injured. I have at my office specimens of horses' hoofs that have sloughed off in consequence of injuries received to the feet by the animals standing in the salt slush in the streets. As Dr. Gardiner has well remarked this question is simply a matter of dollars and cents to the railroad companies. When a manager shows the stockholders that he has cleared a track with $60 worth of salt, when it would have cost $460 to clear it with shovels, they conclude that he is an excellent manager. They do not think of the horses which will be dying a fortnight hence, or perhaps next summer. On the Tenth-avenue railroad the contractor for drawing the cars owns the horses, and he has discovered that the loss in horses more than counterbalances the economy resulting from the use of salt; and after thorough trial he has adopted the plan of clearing the track by having the snow shoveled off at his own expense. (The speaker then read an affidavit of this man's, stating that when he used salt on the road he lost quite a number of horses and had others become lame, and that since he abandoned the practice none of the horses' feet were injured by the cold.) If the salt slush is thus injurious to the feet of horses, why should it not be to your or my more sensitive feet? It is. I had one case in my own practice that is worth all the theories in the world. A man whose name is known to a large portion of the inhabitants of this city, Mr. Reed, of the privateer *Armstrong*, an old gentleman, in stepping from one car to another wet both of his feet in the salt slush above his ankles. He rode some distance up town to his house, and when he got there both of his feet were frozen. He died from the effects.

On motion of Prof. Seely, the same subject was continued for discussion a fortnight hence.

Correspondence

A Substitute for Lead Pipe.

MESSRS. EDITORS:—In the last number of the SCIENTIFIC AMERICAN I notice, under your list of "Subjects for Inventions," the following:—

A material for water pipes, not metallic but pliable, durable and capable of being bent in any direction, &c.

I would call attention to my patented "Substitute for Lead Pipe," advertised in your columns. It possesses every property requisite as a conduit of water in any and every place or position; unobjectionable in every way; is entirely free from any deleterious substance in its composition, and only needs to be known to be universally used. It is, in fact, a real substitute for lead pipe. It may be used underground, or exposed in any way, and has been thoroughly tested in every position. It is not a hastily-got-up thing, nor was it produced at a mere thought. I experimented nearly five years, at various times, before a promising sample was produced. I then tested it for three years before offering it for sale. "Apothecaries seldom take their own compounds," and "A prophet is not without honor, &c," but I have used my own pipe to conduct water for the use of my family and myself for over five years, and I have the certificates of immediate friends and neighbors who have used it for one, two and some three years, and they would not now willingly give it up. I have also two lines of 3-inch pipe, containing 700 feet each, buried underground, which have been in use seven years, conducting water from a brook to a cistern to supply steam boilers, which still continues good. It costs but very little more than lead pipe per running foot, and can be united by various simple methods, without solder or the aid of a plumber. CHAS. MCBURNEY.

Roxbury, Mass., March 27, 1862.

Another "Answer to Questions for Millers."

MESSRS. EDITORS:—I notice in No. 12, of the present volume of the SCIENTIFIC AMERICAN an article headed "Questions for Millers." Belonging to that craft I proceed to answer the questions propounded by the Young Miller:—A millstone, 3 feet 10 inches in diameter, making 135 revolutions per minute should have 12 quarters, with 3 furrows to the quarter. The furrows should be $1\frac{1}{2}$ inches wide and $\frac{3}{16}$ of an inch deep at the skirt of the stone, and $\frac{1}{4}$ of an inch deep at the eye. The back of the furrow should be cut down square and run out regularly and evenly to a nice feather edge, and have 4 inches draft; have your burrs a mere shade lower for 6 inches around the eye. A bolt of the dimensions you speak of will bolt from 6 to 8 bushels per hour, owing to the kind and condition of the grain. I do not think the circular as good as the straight dress; the burrs are more liable to heat, and will not make the flour as evenly as the straight dress. I would suggest that your burrs do not run near fast enough. With the proper speed a burr 4 feet 10 inches in diameter will grind 20 bushels of wheat per hour, and do its work well if kept in good order. A WESTERN MILLER.

Chanton, Iowa, March 23, 1862.

Practical Mode of Soldering Lead Pipe.

MESSRS. EDITORS:—I have read the article that you condensed from the *Ironmonger* and published in the SCIENTIFIC AMERICAN of March 29th. It interested me. My way of joining lead pipe is easier, in my opinion, than any now in common use. Perhaps it would interest your readers. This is it: If the pipe to be soldered is not a vertical one, make it so by bending the end of one piece up and the other down. Square the end of the line with a knife or other implement, chamfer the upper piece so that the slant length of the chamfer will be three or four times the thickness of the metal in the pipe, and scrape it bright one-quarter of an inch farther up. Next, enlarge the lower piece with a blunt-pointed conical pin, so that it will admit the upper piece half an inch, and scrape the inside bright five-eighths of an inch deep. Put the ends together, and make them fit, by hammering the edge of the lower piece nearly up to the inside one; make a pair of sugar tongs of light hoop iron, and spring them on to the joints, so that the ends will project half an inch above the end of the outside piece. Between these projections and the pipe drop two pieces of solder, each as large as, or larger, than a pea. The solder is made by melting two and a-half ounces of tin with one of bismuth. Moisten the solder and joint with some solution of chloride of zinc, and apply heat with a spirit lamp and blow pipe. As soon as the solder flows stop the heat. There is no danger of melting the pipe if care be taken not to turn a fine sharp blaze on it. If the pipe cannot be held still readily, place a strip of board so as to rest it. In the absence of a spirit lamp and blow pipe, take two clay tobacco pipes and fill one with cotton, and wet it with alcohol. The other may be used as a blow pipe. An elder, with the pith punched out and fitted into a short pipe makes a tolerable blow pipe. HOBAN HOLDEN.

East Genoa, N. Y., March 29, 1862.

Questions for Tinmen and Saltmakers.

MESSRS. EDITORS:—If you will give me the address of some eastern firm who manufacture small tin boxes, such as pill boxes and blacking boxes, in a rapid wholesale manner, I will receive it as a personal favor?

The salt made by violent boiling contains *aqua calcies*, or alkali of lime, which is thrown into the brine to neutralize the color of the protoxide of iron contained therein; and now I wish to neutralize the *aqua calcies* or its effect upon the commodities packed and preserved with that kind of salt, cheaper than sugar will do it. I would like to know this fact. Although I do not use lime in my process of manufacturing salt; I only use fire, air and motion.

NATHAN CHAPIN.

East Saginaw, Mich., March 25, 1862.

[The lime which you wish to neutralize is the excess over the amount required to precipitate the iron, and the best plan for you to adopt is to introduce no more than is sufficient for the purpose, and thus avoid any excess. In case of excess it may be neutralized by a very little sulphuric acid. We give your question to tinmen the benefit of our circulation.—EDS.

Working Gunpowder Expansively.

MESSRS. EDITORS:—After all the discussion on firearms for twelve months past, in the SCIENTIFIC AMERICAN, I cannot see as we have settled any thing. The questions, no doubt, are difficult, and experiments do not seem to confirm what, in the present state of knowledge, we regard as conclusions.

For instance, reason teaches us that as long as the pressure of gas upon a projectile is more than sufficient to overcome the friction, it should cause an accelerated motion. It can be easily seen by consulting experiments that the pressure is not canceled by friction, within the length of any ordinary rifle barrel, and yet experiments seem to show that 21 inches is the proper length to attain the greatest velocity.

Experiments prove that the greatest velocity we have succeeded in giving to a projectile is 2,000 feet per second, but the strength of machines and power of motor may be increased indefinitely. Then why not attain any velocity required? S. W.

St. Francisville, Mo., April, 1862.

THE saw, the chisel, the ax and drill were used in the days of Moses, by the Egyptians, who were also acquainted with the art of dovetailing boards.

Manufacturers of Brass.

In the Scriptures the word *brass* is employed to denote copper, as it is said in Deuteronomy "out of whose hills thou shalt dig brass," evidently meaning copper, as brass is an artificial product, and never found in a natural state. It is composed of copper and zinc. The direct method of making brass is by mixing copper and zinc together in a fused condition, but before zinc was used as a metal, brass was made by mixing the ore (calamine) of zinc with charcoal and copper, and melting them in fire clay pots.—When brass was invented is unknown.

Mr. Frank Storer, a most industrious and able young chemist of Massachusetts, has made a great many experiments with alloys of metals, and has thrown much light upon the subject. It was at one time believed that copper and zinc in definite proportions formed a chemical compound. This notion has been exploded by Mr. Storer. All the alloys of copper and zinc are isomorphous mixtures.

In the process of alloying two metals of such different fusibilities as copper and zinc, a considerable waste of the latter metal, by combustion, might be expected; but, in reality, the loss is in a great measure prevented by the speedy absorption of the zinc. The affinity of one metal for the other is so great, that copper plates and rods are often brassed externally by exposure, at a high temperature, to the fumes of zinc, and are afterward laminated or drawn.

The first step in making brass by the direct process, is to plunge slips of copper into melted zinc, till an alloy of somewhat difficult fusion is formed, then raise the heat, and add the remaining portion of the copper.

The brass of the first fusion is broken to pieces and melted with a fresh quantity of zinc. Each melting takes from eight to nine hours. The alloy, when perfect, is cast into plates about 40 inches long by 26 broad, and from one-third to half an inch thick. The molds are slabs of granite mounted in an iron frame.

The cast plates are usually rolled into sheets. For this purpose they are cut into ribands of various breadths. The ribands are first passed through the cylinders of the rolling press cold, but they soon become too hard to laminate; they are then annealed in a furnace, and, after cooling, are again passed through the press. After paring off the chipped edges, the sheets are laminated two at a time; and if they are to be made very thin, from four to eight are passed through the press together. The process of annealing has to be repeated seven or eight times before the sheet becomes sufficiently thin.

The specific gravity of brass is greater than that deducible from the specific gravities of the metals which constitute it, as is shown by the following statement:—

Brass, containing copper 70 and zinc 30, would give a calculated specific gravity of 8·390; but, by experiment, it is found to be 8·443. On comparing the composition and density of different kinds of brass, it appears that the density increases with the proportion of copper.

In Holtzapffel's work on mechanical manipulation, the following information respecting English brass is affored:—

The red color of copper slides into that of yellow brass at about four or five ounces of zinc to the pound of copper, and remains little altered with about eight or ten ounces; after this it becomes whiter, and when thirty-two ounces of zinc are added to sixteen of copper; the mixture has the brilliant silvery color of speculum metal, but with the bluish tint. The alloys, from about eight to sixteen ounces to the pound of copper, are extensively used for dipping, a process adopted for giving a fine color to an enormous variety of furniture work. In the following list, the quantity of zine employed to one pound of copper is given:—

1 to 1½ oz.—gilding metal for common jewelry. 3 to 4 oz.—bath metal, pinchbeck, resembling inferior jewelers' gold. 10 2-5 oz.—Muntz's metal, or 40 zinc and 60 copper. "Any proportions," says the patentee, "between the extremes, 50 zinc and 50 copper, and 37 zinc and 63 copper, will roll and work well at a red heat." 16 oz.—Soft spelter solder, suitable for ordinary brass work. 16½ oz.—Mosaic gold.

A brass composed of 60 per cent copper is very homogeneous, fine in the grain, and may be rolled either hot or cold, also hammered. This is the celebrated Muntz metal, which is so extensively used for sheathing ships, and is known as malleable brass.

In the preparation of Muntz's sheathing, or yellow metal, it is the custom to reserve a portion of the zinc which has been weighed out for a charge, until the alloy in their pots or furnace has become sufficiently hot; the last portions of zinc are then added in small pieces, a sample of the alloy being tested after each such addition. This is done by dipping out a small portion of the melted mass and pouring it into a mold; a little ingot, five or six inches long by an inch or less in thickness, is thus obtained, which after cooling, is broken on an anvil, and its fracture observed. If this does not exhibit a smooth and homogeneous surface, more zinc is added to the alloy. The accuracy with which an experienced workman can thus obtain the alloy is astonishing.

It is stated that the alloy of 60 per cent of copper and 40 per cent of zinc will present almost precisely the same homogeneity of fracture, whether the test ingot prepared from it be cooled slowly, by exposure to the air, or rapidly, by plunging it into cold water; while alloys containing either more or less than 60 per cent of copper are liable to assume different structures, according as they are cooled with greater or less rapidity.

Iron has been added to some kinds of brass. Thus, Aich's alloy is composed of

Copper	60·00
Zinc	38·20
Iron	1·80
Total	100·00

The color of this alloy is rather darker than ordinary brass; its fracture is paler. It bends at a red heat, is of fine grain, and takes a high polish. It is extremely ductile, though not so flexible as brass. Experiments made in the Austrian marine arsenals show that this metal possesses a high degree of tenacity; it maintains its properties at a dull red heat; it can be worked like iron; and when cold it can be considerably bent without cracking or breaking.

Waterbury, Connecticut, is the great seat of American brass manufactures. It has been computed that each soldier in our great army has about one pound weight of Waterbury brass upon his person in the form of buttons and other ornaments. This will amount to no less than 375 tuns of brass for the army. The following are statistics respecting some of the companies engaged in this brass business in Waterbury:—

Benedict & Burnham Manufacturing Co., with a capital of $400,000, manufacture rolled and sheet brass and German silver, wire, tubing, brass and copper rivets and bars, brass and German silver castings, &c. Holmes, Booth & Hayden's, capital $330,000, employ 300 hands, make nearly the same goods, with the addition to daguerreotype plates, matting, &c. Brown and Brother, 230 men, capital employed $200,000, make the same goods generally, also steam boiler tubes. Scovill Manufacturing Co., capital $300,000, make same articles nearly, also metal buttons and daguerreotype goods. Waterbury Hook and Eye Co., capital $55,000, make a variety of army goods, employ 60 hands, Waterbury Buckle Co., make all sorts buckles, also military and navy buttons, and besides these there are two pin manufactories. These are by no means all the companies in Waterbury that are engaged in brass manufactures. In Providence, Rhode Island, and Attleborough, Massachusetts, a great variety of brass articles are also manufactured.

THE smallest blood globule is that of the Java musk deer, its average size being $\frac{1}{12325}$th of an inch in diameter; the largest is that of the Proteus, an animal of Batrachian family, its size being $\frac{1}{837}$th of an inch. The average dimensions of the blood globules of a sheep is $\frac{1}{7000}$th; of a dog, $\frac{1}{3542}$d; of a mouse, $\frac{1}{3814}$th, and of a man, $\frac{1}{3200}$th of an inch. In some the blood is globular, in others oval or elliptical, &c.; and from the characters of the hairs and of the blood the microscope enables us to determine from what animals they are derived.

THE thirtieth anniversary of the Eagle Iron Works (Miles Greenwood), Cincinnati, was lately celebrated by a banquet, at which there were 1,100 employees. During 1861, 40,000 smooth-bore muskets were rifled at these works, and 100 bronze guns cast.

How to Set a Hen and How to Preserve Eggs.

Ireland, like China and France, is a great country for hatching chickens, consequently good practical information on this subject should be expected from such a source. The following is from *The Irish Country Gentleman*, by A. Henderson:—When a hen of any description is to be set with eggs, the place ought to be well cleaned out, and a nest made of short clean straw. Some give eleven eggs, others thirteen, and even more, according to the size of the hen, yet in most cases she will manage eleven eggs best; but let the lot consist of an odd number, and be all about the middle size. Carefully examine every egg, by holding it up betwixt you and the sun or candle, so that the tread, so-called, if present, may be seen, if not visible, the egg must be rejected; reject also those that have a circular flaw, which is indicative of a double yolk. Should a given number of cockerels only be wanted, the male and female are known by examining the egg in the same way; such as have a "tread" or vacuum directly on the top of the egg will be a cockerel, and those on the side of the top, pullets. The hen should be provided with oats and water when hatching, with liberty to leave the eggs a little, if inclined. If she becomes affected with lice, &c., a little flour of brimstone may be shaken upon both her and the nest. As a hen brings forth the young of her own species in three weeks, or twenty-one days, she must be watched regularly to see if all goes on right, as sometimes the young require a little assistance to get out of the shell; this, however, is seldom necessary, and in nine cases out of ten it is better to let nature take its course; but the shell that the young have left ought to be instantly removed, as also any visible rotten eggs, which will make a watery jumble when shaken. A great deal of such trouble may be saved by being particular at the time of setting, when the eggs must be as equal in age as possible, and the newer laid the better, as such are more certain.

The difference in price of eggs at one period is so great as to make it advisable to keep them as fresh as possible; immediately when laid, rub them all over with fresh butter, then pack them into a cask in regular layers, with the round ends uppermost, and fill up all the vacancies with wood ashes, covering the layers about two inches deep with the ashes—they will come out as fresh six months after as when newly laid; or the crevices may be filled up with lime water; but must in this case be used immediately when taken from the cask. The crevices are sometimes filled up with the following mixture viz.: To five quarts of cold water add one pound of salt and one ounce of saltpeter; boil together for about twenty-five minutes, and when nearly cold, add four table spoonsful of pounded quicklime; let it stand three days, stirring it twice a day. When a hen is fond of hatching, if not wanted for that purpose, I found a change of residence the best cure. Moulting, with its effects, generally lasts about two months, sometimes more, and if a hen is young, less. When chickens come first out, I feed for ten days with soaked oatmeal and hard boiled eggs, afterwards groats hulled oats; all kinds of soft meat should be avoided at this age; but plenty of clean water, which should constantly stand before them, placed in such a manner that the chickens cannot get in to it. Fountains are now to be had anywhere, suitable for that purpose, or a bowl may be turned over in the middle of a pan of water. When rearing chickens never let them out too soon in the morning; avoid wet grass and rainy days, which generally bring on all diseases that gallinaceous poultry are subject to. It will be found that feeding poultry with the very best of oats is quite preferable. I have, on several occasions, had two birds from double-yolked Spanish eggs; some arrived at maturity and laid well, but the birds so produced are generally weak, and ill to rear; it is a system which ought not to be attempted, at least with a view of profit.

A GREAT hail storm visited Honolulu in the last week of January. Such storms are not unfrequent in many other parts of the world, but the oldest inhabitants of the Hawaiian Islands had never seen a hailstone before.

A CONTRIBUTOR to the London *Mechanics' Magazine* states that experiment has proved that a plain smooth surface of iron is best calculated to repel projectiles.

Improved Road Scraper.

The accompanying engraving represents a dirt scraper which may be adjusted at different angles with the tongue, both vertically and horizontally, to adapt it to various operations; such as scraping stones, or earth to either side, moving earth along a short distance, or compressing and smoothing the surface. The horizontal semicircular board, A, is rigidly secured to the upper edge of the vertical board, B, while to the lower edge of the board, B, the scraper, C, is attached by means of hinges; so that its upper edge may be inclined forward at any angle desired. It is secured in the desired position by the bar, D, which is pivoted at its forward end to the standard, E, while the notches upon its lower side catch on the pin in the standard, F; the standard, E, being secured rigidly to the upper edge of the scraper, and the standard, F, to the upper edge of the vertical board, B.

The tongue is attached to the board, A, by a pivot at, G; allowing it to sweep around horizontally at any angle with the face of the scraper; it being fastened at the desired angle by a pin passing through a hole in its rear end and through one of the holes in the curved edge of the board A.

Two ordinary crowbars are used for handles, which implements are always needed in road making, and provision is made for varying their inclination to the scraper as that is varied, so as to keep the workman always directly behind the scraper. To effect this the ends of the bars are passed through holes in the board, A, and inserted into mortises in the vertical board, B; several of these mortises being made for the end of each bar, and the bar being inserted into the mortise, which is in the proper place, to give the required inclination.

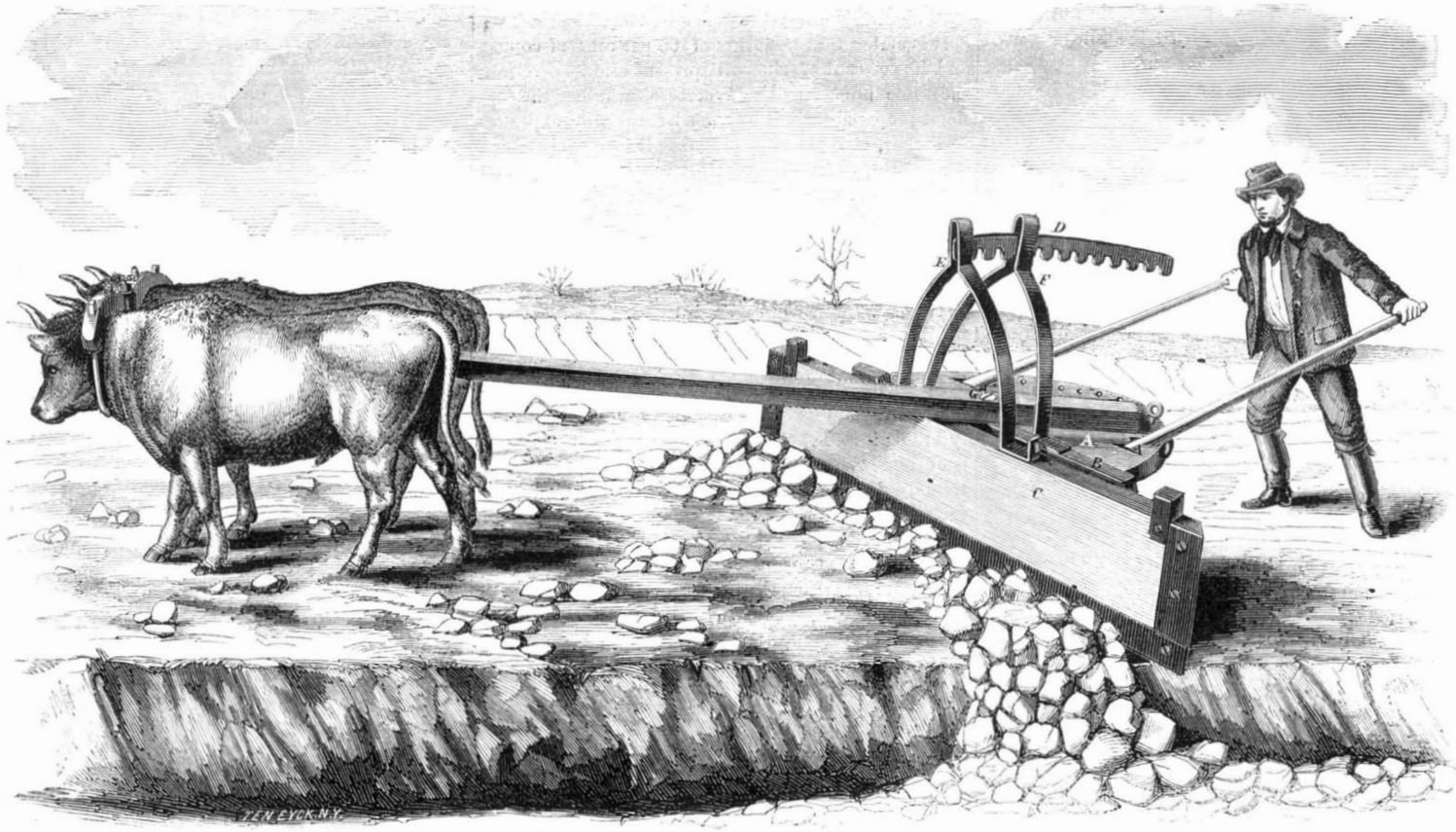
The top of the board, B, is inclined a little back from a vertical position, and the scraper may be thus inclined when it is to be used for moving earth directly forward a short distance. In this position it is adapted for digging cellars or for any other work usually performed by an ordinary scraper.

For smoothing ground in roads or other places, the upper edge of the scraper is inclined very much forward, and the workman rides upon the implement to give it additional weight.

For scraping stones or earth to the side of the road or to the middle, the scraper is inclined to the tongue as represented in the cut. The crowbar handles, being capable of being removed may be used for digging stones whenever there is occasion.

While this scraper is believed to be as convenient and serviceable as any for digging cellars and canals and for other similar work, it is especially designed for road making. It will be seen that it moves the earth to the middle of the road with far greater ease and with less interruption of the work than the scrapers usually employed.

The patent for this invention was procured through the Scientific American Patent Agency, January 21, 1862, and further information in relation to it may be obtained by addressing the inventor, James F. Brooks, at Stafford Springs, Connecticut.



BROOKS'S ROAD SCRAPER.

Lubricating Substances.

A very great expense is annually incurred for the lubricating substances that are employed for the engines and machinery on railroads, steamboats, factories and workshops. Inquiries are frequently made of us respecting the best and most economical lubricating agents. This is a subject of much importance, and is not quite so simple as many persons suppose. A variety of substances are used for lubricating machinery, and while one is the most suitable for one class of machinery, another is superior for a different purpose. It is only by experiment that such knowledge can be acquired. It is very generally conceded that pure sperm oil is the best lubricating agent for light machinery, and its anti-friction qualities are not equaled by any other lubricant. At the same time it is not so good as tallow for heavy shafting and the pistons of steam engines. As sperm oil, however, is very high in price, a cheaper substitute for it is desirable. The following is a recipe which has been given to us by a manufacturer who has used the composition for the past six months with satisfaction and decided economy on the journals of his steam engine and other machinery. Take equal weights of unpressed lard and refined petroleum (the heavy oil is best), melt the lard in a tin dish over a fire, then add the petroleum, and stir the mixture well. This forms a homogeneous liquid lubricator, which keeps the machinery in good order, and is nearly as good as sperm oil, while it does not cost over half as much. In some cases a mixture of water and oil answers a very good purpose, especially where a considerable quantity of heat has to be carried off, and where, in such a case, a great cost would be involved in using sperm, lard, or other oil. As water will not naturally mix with oil, a chemical agent is required to effect their union. To accomplish this, dissolve two ounces of pearlash in a gallon of milk-warm water, add one quart of oil, then stir them together, and a milky saponaceous liquid will be formed. This method of mixing oil and water has been sometimes sold as a recipe for a large sum. Oil will also mix with lime water, aqua ammonia and any alkaline solution, but for lubricating purposes the alkali and oil should not be so intimately combined as in soap. Rosin oil mixed with caustic lime in powder, makes a good cheap grease for heavy shafting and the axles of carts. Two pounds of tallow, one of lard and a quart of petroleum, mixed together under moderate heat, with about an ounce of fine plumbago stirred in, make an excellent anti-friction grease for carriages, wagons and carts.

The Inventor of Revolving Iron Turrets for Naval and Land Batteries.

Mr. A. G. Johnson, of Troy, N. Y., states that Mr. George Vanderheyden, of that city, invented and reduced to writing a well-matured plan for a revolving turret and battery, composed of iron, in 1847, and offered it to the United States Government in a letter written to Governor Marcy. The original drawings and specifications are still in existence, and copies of them were sent to Mr. Seward, May, 1861, and filed in the War Department at Washington. Mr. Marcy refused to accept the plan, and the present administration were not more enterprising. According to Mr. Johnson, if the government had accepted Mr. Vanderheyden's offer in 1847, this country might have had a fleet of these vessels afloat ten years ago. It is fortunate that the invention was not made public, for the traitors who controlled the administrations of Pierce and Buchanan would have used it for the destruction of the nation. In his letter to Mr. Marcy Mr Vanderheyden says:—"Sir, my plan, as you will see, will revolutionize the whole system of river, harbor and coast defence, and save millions to the country." In a letter to Major R. L. Baker, dated February 18, 1847, Mr. Vanderheyden also made the same claim to its efficiency:—"Revolutionizing coast and harbor defence on an entirely new plan, and saving millions of expense to the country." Mr. Vanderheyden's plan contemplated the construction of revolving batteries on land, saving all the enormous expense of casemated forts. Four of these revolving turrets on Governor's Island, at an expense of $100,000 would be more efficient in defence than all the costly works of the central fort. Indeed, the adoption of the plan would dispense with the whole complicated and expensive system of stone, brick and earth fortifications, as useless for protection or defence.

The harder steel is made the more difficult it is to magnetize it.

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NEW YORK, SATURDAY, APRIL 19, 1862.

WHAT CAN BE DONE FOR INVENTORS.—ADVICE GRATIS AND ADVICE FOR PAY.

For the information of our new subscribers, we would state that it is the custom, at the office of this paper, to examine models or drawings and descriptions of alleged new inventions, and to give written or verbal advice as to their patentability, without charge. Persons having made what they consider improvements in any branch of machinery, and contemplate securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a model or drawing and a description of the invention should accompany the remittance.

The publishers of this paper have been engaged in procuring patents for the past sixteen years, during which time they have acted as Attorneys for more than FIFTEEN THOUSAND patentees. Nearly all the patents taken by American citizens in FOREIGN countries are procured through the agency of this office.

Pamphlets of instructions as to the best mode of obtaining patents in this and all foreign countries are furnished free on application.

For further particulars as to what can be done for inventors at this office, see advertisement on another page, or address MUNN & Co.,

No. 37 Park-row, New York.

FLAX AND COTTON MACHINERY.

Owing to the scarcity and high price of cotton, many of our cotton manufacturers are deeply concerned respecting a supply of some other material as a substitute. The manufacturers of Rhode Island, whose enterprise has always been conspicuous, offered, in May last year, through their society for the encouragement of domestic industry, a premium of thirty dollars for a bale of not less than fifty pounds of the best-prepared flax cotton, with a statement of its culture, preparation and cost of the operations; also a premium of twenty dollars for the second best bale of flax, upon the same conditions. The premium was afterward raised to five hundred dollars in July, with the additional proviso that the flax should be an economical substitute for cotton.

A committee of eight competent judges were appointed to take charge of this question, and in the month of November they made their report, which has recently been published. It is stated in it that there was a large display of flax at the Society Exhibition in Providence, on the 11th of September, but none of the premiums were awarded because none of the contributors were entitled to the prizes offered. The samples presented for competition were not "fit for use on cotton machinery." But, although not fit for use on cotton machinery, the flax cotton prepared by the process of Stephen Randall, of Warwick, R. I., in the judgment of the committee, was considered superior to cotton for mixing with wool in the manufacture of several fabrics. This is no doubt a correct judgment, for the old-fashioned linsey-woolseys and druggets, composed of nearly equal parts flax and wool, were really very durable and comfortable fabrics. The manufacture of mixed cotton and woolen goods should be greatly extended, but this cannot be done unless flax is cultivated on a more extensive scale for its fiber than it hitherto has been. There appears now to be a favorable opening for the cultivation of flax, because it is so well adapted for mixing with wool, and not only so, but further experiments may show that it is capable of being used on cotton machinery. The committee of Rhode Island cotton manufacturers entertain such hopes, as they conclude their report as follows:—"Feeling a warm interest in the substitution of flax for cotton we have investigated the subject more thoroughly than was required simply to discharge the duties for which we were selected, and are led to believe that the encouragements for ultimate success are too strong to allow the investigation to rest here. Therefore we hope the Society will devise some plan whereby this investigation will be continued until the question whether or not flax can be used as an economical substitute for cotton on cotton machinery is *practically settled.*"

Some fortunate inventor may so prepare flax yet as to render it fit for spinning on cotton machinery, or the machinery may be modified at a small cost to accomplish the desired result. Most attention, we think, should be devoted to the improvement of the machinery, as it is well known that flax is spun in the best manner by the *wet process.* It is possible that steam jets may be introduced into cotton spinning frames to moisten flax and render it fit for spinning on such machinery. This subject is of great importance, and deserves wide-spread attention.

PROFESSOR RANKINE ON STEAM EXPANSION AND THE AMERICAN EXPERIMENTS.

A paper was lately read before the Institution of Engineers, in Scotland, by Prof. W. J. Macquorn Rankine, containing his views on the condensation of steam in the cylinders of steam engines. His remarks originated from the report of Messrs. Isherwood, Stimers and Long, Chief Engineers U. S. N., on the well-known experiments conducted by them at Erie, Pa. The opinions and investigations of Prof. Rankine derive importance from the fact that he is a distinguished mathematician and teacher of mechanical engineering in Glasgow College, the place where James Watt invented his great improvements in the steam engine. No criticism was offered on the mode of conducting the experiments, and the report of our engineers was treated with marked respect.

The experiments at Erie to test the relative economy of working steam at about full stroke, and with different measures of expansion, proved conclusively that when saturated steam expands in an unjacketed cylinder, the latter is cooled down to a temperature below that at which the steam enters, viz., the boiling point of the water in the boiler. The consequence of this is that at the next stroke a portion of the inlet steam is condensed, and it afterward passes into the condenser without doing any work. This process of cooling goes on in all cases where steam is worked expansively. If the amount of steam thus condensed equals the gain which theory attributes to working steam expansively, of course it is absurd to use a cut-off. This is the great scientific question to be decided in such a discussion. In the Erie experiments there was so much steam condensed in the cylinder that it neutralized all the benefits of expansion. Professor Rankine's calculations, however, go to prove that there was no necessity for such an amount of condensation, and he relates how it may be avoided, and the benefits of expansion realized in practice. Such information is, therefore, of great scientific value to steam engineers.

Professor Rankine computed theoretically the proportionate and absolute weights of steam which would have been liquefied per stroke during expansion had the cylinder of the steamboat at Erie consisted of non-conducting material. The diameter of the cylinder was 39 inches, stroke 8 feet. The following is a table showing the small quantities of steam which should have been condensed when working expansively, according to the theory of expansion.

Number of Experiments.....	I.	II.	III.	IV.	V.
Cut-off of stroke.....	.95	.67	.4	.354	.25
Lbs. of steam expanded per stroke.....	4.42	3.15	1.84	1.62	1.17
Fraction of whole which would have condensed in a non-conducting cylinder.....	.004	.026	.056	.061	.081
Lbs. of steam that would have condensed in a non-conducting cylinder.....	.018	.082	.103	.099	.095
Actual amount in lbs. which was condensed in the Erie cylinder, according to Report	.78	1.25	1.56	2.01	1.85

Here we have an explanation of the great loss of steam in unjacketed cylinders, working expansively, and of which the indicator takes no record. Instead of the condensation having amounted to but .103 of a lb. weight of steam, when cutting off at .4 of the stroke at Erie, it was no less than 1.56 lbs. A very small quantity of heat really requires to be supplied to a cylinder at each stroke, in order to obtain great benefit from expansion. It is essential, as laid down by Professor Rankine, that the temperature of the cylinder should be maintained at the boiling point of the water in the boiler which supplies the steam. This can be accomplished by a steam jacket, or by superheating the steam Several experienced practical engineers, who were present at the reading of the paper, stated that in the ordinary engine, with unjacketed cylinders and unsuperheated steam, they never found any advantage in expanding to more than a double volume. In locomotives running without jacketed cylinders, and with saturated, expanded steam, D. K. Clark proved experimentally that a considerable amount of steam was condensed on entering the cylinder, then it reëvaporated near the end of the stroke when exhausting, but did no useful work. It is, therefore, inferred, from such data, that a great benefit can be derived from working steam expansively, in a manner embracing no very complicated arrangements, and causing no extra labor to engineers.

INGENIOUS PLAN FOR CORRESPONDING IN CIPHER.

The *Evening Post* of this city publishes a dispatch which was sent in cipher, by Beauregard to a confederate in Washington, about a year ago, and which we copy from the interest to our readers of the ingenious mode in which the cipher is constructed. Each correspondent is provided beforehand with a page printed from the same form, which may be any connected article in a book or paper, or merely the several letters of the alphabet arranged in parallel lines with the more common letters repeated a proper number of times. Then the correspondent who writes to his friend lays his sheet over a sheet of white paper and punches out the letters to spell his words, driving the punch through the sheet below. The white sheet is then forwarded to the correspondent who lays it over his printed sheet, and spells out the words which are formed by the letters seen through the holes, and which of course correspond with those punched out of the other sheet. Should the dispatch be found on its way it is of course nothing more than a sheet of white paper punched with holes, conveying no intelligence without the printed sheet.

The following is the dispatch, and the *Post* says that it was found under circumstances which verify it as authentic:—

I shall cross the river above Little Falls on Sunday at two A. M. Signal red and white rockets from Turner's Hill. For God's sake don't fail us. Fire the city at all points agreed on at once. Dispatch Lincoln and Scott as you suggest, and let the execution of our plot be perfect.

BEAUREGARD.

HAWAIIAN RICE.—We learn from our Honolulu exchanges, that the first rice harvest on a large scale in the Hawaiian Island commenced at Moanalua about the beginning of February last. The fields were planted by Dr. Ford (an American) for the Prince Kamehameha. The yield of the crop is good and the quality of rice excellent. It is said to be equal to the best Carolina.

STEAM ENGINES ON COMMON ROADS AND FOR PLOWING.

Steam engines for drawing loaded wagons on common roads are called in England Traction Engines, and are receiving a great deal of attention. Some time since a man by the name of Bray took out a patent for certain improvements in this class of engine, and a company was formed to manufacture the engines under his patent. On the 14th of March a meeting of Bray's Traction Engine Company was held in London, and at this meeting some interesting statements were made.

Mr. Louttit, the Secretary, read a report, from which it appeared that the experience gained by the directors during the past year, with regard to the working of the engines and the conduct of the business of the company, had been so entirely satisfactory, that they had now the fullest confidence in the ultimate success of the system of steam traction. A new engine No. 16, built at the company's factory, was finished a few months since. In its construction every desirable adaptation was tried, and as some of these were necessarily experimental, its completion was considerably delayed by the modifications and alterations suggested as the construction proceeded. The results obtained, however, when the engine was brought out, left no doubt that it was the best traction engine ever built. Several eligible contracts at a distance were at once offered for the employment of this improved engine, but having no other to supply its place, the directors were obliged, in the interests of the company, to decline those offers, and confine its services to special work in the neighborhood of London. It had removed for Messrs. John Penn & Son—for whom it was now working—some immense loads of machinery for the large engines they manufacture, with far more ease, and occupied much less time than two of the old engines under similar circumstances. Engineers, and other persons whose opinion is valuable in connection with traction engines, expressed their approval of its superior arrangement and construction, and at its satisfactory working.

They had obtained as their consulting engineer Mr. D. K. Clark, C. E., a gentleman well known from his great experience and works in locomotive engines, as well as from his connection with the International Exhibition. Mr. Clark was accordingly now engaged in arranging for the introduction, in a new engine, of all the improvements not fully attained in No. 16, and at the same time so modifying and simplifying the details as to reduce the construction of traction engines to a principle.

The amount of the present capital, which, with all debts and liabilities, was less than £30,000, had been subscribed from time to time, as it became necessary, by a few individuals interested in the development of the question. For this sum the directors had purchased the original and supplementary patents, with all the plant, fixtures and rolling stock, and had been enabled to carry on business since the company's formation until the present time, during which period they had gained much valuable experience.

The chairman, in moving the adoption of the report, observed that the directors had at length attained a point for which they had been laboring for years.

With reference to the question of investment, he would direct attention to the report of Mr. Clark, the engineer, who stated that "he was confident in the merits of this system of steam traction as a sound investment, capable of being indefinitely extended." There was no doubt that, in arriving at this conclusion, Mr. Clark had been guided by great practical experience, and by a perfect knowledge of the subject under his notice; and on the general question, the obvious result of the use of these engines was that, whereas the cost of conveying goods according to the ordinary means of transport was 8d. per tun per mile over an average road, the present company were in a position to carry the same goods at the rate of 4d. per tun per mile, and with considerable advantage to those who were interested in the undertaking. Moreover, there were many things that could not be removed by any other means than the use of the traction engine, for it was well known that when a large number of horses were employed to draw an unusually heavy burden it was extremely difficult to get them to pull together. In proof of the fact that the project was to be regarded as a good and profitable investment, he might state that, supposing they had twenty engines working at the most moderate rate, they would yield an income to the company of something like £10,000 a year. The demand for the engines was increasing daily, both at home and abroad, and there was a large amount of property in mineral districts that was not worked at all for the want of such means of transport as Mr. Bray's invention afforded.

A gentleman present stated that he contemplated using the engines extensively abroad in connection with a rail system of agriculture which he explained to the meeting. The directors had kindly placed No. 16 engine at his disposal, for the purpose of making experiments by means of a spiral spring dynamometer to register up to 8 tuns—the accuracy of which he had tested by means of hydraulics—to ascertain the draught power it exerted. It had three wagons attached loaded with 9,000 bricks, the weight being with wagons about 30 tuns, with which it went to Clapham-common. On the hard road the draught indicated was about 1,800 lbs., increasing in some cases where it was very muddy, there having been about 48 hours' previous rain, to as much as 2,200 lbs. The engine went on the grass, which was very soft and slippery from the rain, and drew the load along without difficulty, the draught being about 3,000 lbs. The wheels of the engine left an impression in the ground about the depth of half an inch, while the wagon wheels made tracks as deep as two inches. For the purpose ef experiment the train went to a very boggy piece of turf; after moving over it for a short time the wagon wheels sunk to the depth of six inches, in a bad place, while those of the engine were scarcely two inches deep. The draught power exerted increased to 4,500 lbs., when the wheels of the engine slipped round without moving the train. The driver, having gone so far on the plain surface of the wheel, then brought the auxiliary power to bear, and threw out the spades a short distance, which exactly doubled the power of the engine, since the dynamometer registered 9,000 lbs., and the engine drew on the load without further difficulty. These figures were quite independent of the power exerted by the engine to move herself. This result was considered entirely satisfactory, since no traction engine had hitherto been found capable of exerting a greater draught power than 4,500 lbs. It was, therefore, calculated that on increasing the width of the tire of the wheel and putting on slow gearing, by the use of his rail system, to guide the implements, one of these engines could draw at least 30 plows after it, plowing 5 inches deep, at a speed of about 1½ miles per hour, or plow 60 acres per day; and as he could employ it for every purpose of cultivation in large tracts of land in foreign countries, after reckoning cost of outlay and maintenance at a high rate, he would be able to raise wheat, &c., at the cost of 1s. per bushel.

[It must be remembered that the roads in England are generally macadamized, and are much better adapted to locomotives than the roads in this country.—Eds.

THE NEW CUNARD STEAMER CHINA—AMERICAN CONDENSERS.

The North American Royal Mail Company (Cunard) has inaugurated a new class of mail and passenger steamers in the *China* which left this port for Liverpool on the 9th inst., on her first return voyage. Hitherto the mail vessels of this company have all been paddle-wheel steamers with wooden hulls (except the *Persia*, iron,) and side-lever engines. The *China* has an iron hull, oscillating engines and a geared screw. She was built by Robert Napier & Sons, Glasgow. Her length of keel is 320 feet—extreme length 340 feet, breadth 40 feet, depth 29 feet, registered capacity, 2,600 tuns; engines nominally 500-horse power each. Her two oscillating cylinders are vertical and run lengthwise in line amidships. They are 80 inches in diameter and 5 feet 6 inches stroke each. On the crank shaft is a huge wooden-toothed driving cog wheel 11 feet in diameter, 6 feet 2 inches broad; gearing into a pinion 4 feet 11 inches diameter on the propeller shaft. The pitch of her screw is 23 feet; she has 4 tubular boilers and 24 furnaces. Two of Sewell's American surface condensers (illustrated on another column) are used and they gave entire satisfaction, as we learned by inquiry, on her voyage. Her run from Queenstown, Ireland, to New York was made in 9 days, and 21 hours, and 10 days and 15 hours from Liverpool. Her whole running time is said to have been less than ten days. Although the two engines are rated at 1000-horse power they actually worked up to 2,000-horse power on the trial trip. They are splendid specimens of mechanical engineering. In all likelihood side-wheel steamers and complex huge side-lever, and beam engines will become obsolete in a few years. Oscillating engines are so simple and compact, and the hull of a screw vessel is so beautiful in outline, that in viewing such a steamer as the *China*, the paddle boxes of other steamers appear like huge excrescences. Such screw steamers deserve the attention of our marine engineers. They can be built and run much cheaper than paddle-wheel steamers having side-lever and beam engines.

The New Croton Reservoir.

The reservoir, in the Central Park will be ready for the reception of water about the middle of May. It is a great artificial basin, covering a space of one hundred and seven acres, and will contain when filled, a depth of thirty-eight feet of water—enough to accommodate and float the entire navy of the United States, even if thrice its present size, and sufficient to supply the entire wants of the city with water for thirty or forty days.

The construction of this basin is very solid. The earthworks have been excavated in some instances to a depth of forty feet, leaving the bottom nearly level. Around this the embankments are constructed, with a central one, which divides the reservoir into two sections; but this being a little lower than the sides, the reservoir will, when filled, present to the eye an unbroken surface of water over the entire space. The inner sides of the reservoir are faced with heavy blocks of stone, laid in a cement of some eight inches in thickness. These sides shape from the bottom, at an angle, of about 43°, and are fitted in behind with a deep or wide belt of clay or concrete puddle, which soon almost becomes as hard as granite itself, and literally binds the whole as with a band of rock. This belt of rock-clay is formed by excavating the earth to the depth of ten to forty feet, according to the irregularities of the surface, and sixteen feet in width, and the excavation is filled with the clayey puddling, while in nearly a fluid state. The reservoir in its present condition is well worth visiting.

Horse Power.

It is well known among engineers that a horse is capable of raising a weight of about 150 lbs. 220 feet high in a minute, and to continue exertions enabling him to do that for 8 hours a day. Multiplying the number of pounds by the hight to which they are raised in a minute, 150×120 gives 33,000 lbs., and the power of a horse is generally expressed by a sum varying from 30,000 lbs. to 36,000 lbs., raised 1 foot high in a minute. Watt expresses it by 33,000 lbs. In trains of machinery from one-fourth to one-third is allowed for friction.

HORSE POWER AT DIFFERENT RATES OF SPEED.

Let us suppose 15 to represent the greatest unloaded speed, and the square of 15, or 225, to represent the greatest load which can be sustained without moving. The following table gives for each degree of speed, from 1 to 15, the corresponding load and useful effect:—

Speed....	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Load....	225	196	169	144	121	100	81	64	49	36	25	16	9	4	1	0
Effect....	0	196	338	432	484	500	486	448	392	324	250	176	108	52	14	0

Thus, if the greatest unloaded speed of a horse be 15 miles an hour, and the greatest weight he is capable of sustaining without moving, be divided into 225 equal parts, his labor will be most advantageously employed if he be loaded with 100 of those parts, and travel at the rate of 5 miles an hour. If he be thus employed it will be found that he will carry a greater weight through a distance, in a given time, than under any other circumstances. A horse, upon a well-constructed railroad, can draw 10 tuns at the rate of 2 miles per hour, or 5 tuns 4 miles per hour.

Indigenous cotton was found by the Spaniard Alarcon, in 1542, on the Colorado, of which the Indians made garments. This native cotton is still grown on the Gila, in Chihuahua, Sonora, on the Texas Rio Grande bottoms, and in many warm river bottoms of the uplands of the northern States of Mexico.

PROGRESS OF AMERICAN INVENTIONS ABROAD.

When the inhabitants of a country are engaged in civil war, it is very natural for the inhabitants of other countries to suppose that the war must absorb the whole, or at least the principal portion of the time and efforts of the people in the country in which the war is being waged. All the news that they hear from that country relates to battles and armies, and it is not strange that they should not think of the ploughing and planting, the sowing and reaping, the spinning and weaving, the buying and selling, and all the industrial pursuits which occupy the time of the great mass of the people. It may therefore create some little surprise among the less thoughtful portion of the inhabitants of Europe to witness the steady development of our industry, in the midst of the great war which is being waged amongst us. One of the most striking proofs of this progress to the minds of foreigners, must be the large number of new inventions which are constantly being originated in this country, and introduced among foreign nations. Since our last allusion to the subject we have received accounts of the following American inventions being patented in England, all through the Scientific American Patent Agency.

Improvements in Floating Structures:—Patentees Thomas and Robert Schofield, of Grass Valley, California. This invention consists in the employment of hollow globes or cylinders as foundations for the support of bridges, lighthouses, piers, landing stages and other structures in places where the nature of the bottom or the depth of the water does not allow the construction of the foundations usually employed. The globes or cylinders are anchored securely in place, and are provided with valves and pumps for removing any water that may leak into them.

Improvements in Machinery for Preparing Hemp and other Fibrous Materials:—Patentees Joseph C. Todd, and Philip Rafferty of Paterson, N. J. This patent covers two improvements one in the scutcher and the other in the lapper. The improvement in the scutcher consists in the adaptation of an adjustable apron in close proximity to the points of the teeth, to keep the fibres of the hemp in the teeth. The improvement in the lapper consists in the employment of an endless toothed apron provided with feeding teeth which are attached to bars so arranged that they are drawn in on approaching the main cylinder and are moved out ready to take in a fresh supply of hemp or other material on passing the feed rollers.

Improved Construction of Hook for Hook and Eye Fastenings:—Patentees, Alvin C. Mason, Henry H. Mason, and David McAlister Smith, of Springfield, Vermont. The object of this invention is to prevent the hook from becoming accidentally disengaged from the eye. A tongue, made in one piece with the hook is bent over so as to catch under the end of the hook; this tongue springing down as the eye is slipped in, and then returning to its place by its own elasticity. The end of the tongue is bent down at right angles and passes through an opening in the eye prepared for the purpose.

Improvements in Machinery for Making Bullets:—Patentees, Richard Gornall, and William J. Hooper, of Baltimore, Maryland. The cylindrical blank is compressed cold into an undivided matrix and then turned by mechanism which could be made intelligible only by means of illustrations.

Improvements in Machinery for Drawing and Spinning Wool and other Fibrous Substances:—Patentee, John H. Bloodgood, of New York city. This is an excellent invention, but to make it plain would require engravings, for which we hope very soon to find a place in these columns.

Improvements in Breech loading Fire Arms:—Patentee, Christopher M. Spencer, of Hartford, Conn. This ingenious breech loader was illustrated on page 49, of the current volume of the Scientific American.

Improvements in Pressure Gages:—Patentee, John Leavens, of the city of New York. This pressure guage is so arranged that it acts to raise the safety valve when a certain pressure is reached. The device can be understood only by means of engravings.

Improvements in the Construction of Liquid Meters:—Patentee, Gottfried Kober, of the city of New York. In meters which measure water by the turning of a helix placed in the flowing current, it is found that he screw turns more rapidly in proportion to the flow of the water when the latter has a high velocity than when it has a low velocity, and this invention is designed to obviate this difficulty by the mode of constructing the screw and securing it in the current.

Improvements in Desiccating and Torrefying Farinaceous and other Substances:—Patentee, Francis Huckings, of Roxbury, Mass. The grain to be dried is placed in a semicylindrical pan which is placed within another pan of similar form but somewhat larger; the space between the two being filled with animal oil to secure a uniform heat. Upon a shaft occupying the axis of the pan are arranged vibrating arms with V-shaped ends to stir the grain. The whole is placed over a suitable furnace.

Improved Lubricating Compound:—Patentee, John B. McMunn, of Port Jervis, N. Y. This compond is prepared by a chemical process, and is claimed to possess peculiar virtues. It has been patented in this country and we believe has become quite a popular lubricator.

Improvements in Knitting Machinery:—Patentee, James G. Wilson, of the city of New York. This exceedingly ingenious machine could be rendered intelligible only by elaborate engravings. We shall illustrate one of his machines in these columns before long.

Improvements in Gun Stocks:—Patentees, Charles R. Alsop, of Middleton, Conn., and Joseph W. Alsop and Henry Chauncey, Jr., both of the city of New York. A pistol stock is secured to the gun, and to this stock a gun stock is attached by means of a metallic bow, through which the thumb can be passed so as to grasp the pistol stock with the hand; thus enabling a firmer hold to be obtained than upon stocks of the ordinary construction. The gun stock portion or shoulder piece may be made so as to be removed, thus leaving the piece mounted simply as a pistol.

Improvements in Chemical Formulæ.

The Abbé Laborde offers to the attention of chemists his proposed new chemical notation, the aim of which is to place the reactions they represent more clearly before the eye. He is fully aware of the great reserve that must be employed in attempting to modify a system now so generally adopted, but the changes he suggests are so trifling in appearance that they cannot disturb the operations of chemists, while they possess the advantage of imparting greater clearness to a great number of formulæ.

The alteration consists in writing the oxy-salts with both terms, not one after the other, but one over the other—the base below, the acid above. The following examples will show how many advantages this simple change offers.

1st. Suppose it be desired to express the mutual decomposition of two salts—sulphate of potassa and nitrate of barytes; according to the old method it will stand thus :—

$$KO, SO^3 + BaO, NO^5 = BaO, SO^3 + KO, NO^5.$$

In the new method it would stand as follows :—

$$\frac{SO^3}{KO} + \frac{NO^5}{BaO} = \frac{SO^3}{BaO} + \frac{NO^5}{KO}.$$

a much more condensed formula, in which the eye, in following a diagonal, encounters more readily the acids and the bases which must unite together. It can also be guided by an arrow placed in the first member of the equation, and always directed from the acid to ths base which will form the insoluble body, thus :—

$$\begin{matrix} SO^3 & NO^5 \\ KO & \diagdown\ BaO \end{matrix}$$

From this example it will be seen that it is scarcely necessary to add the second member of the equation.

2d. This way of representing the salts will render them easily recognizable in a formula at the first glance, and, moreover, will often permit of our adopting an arrangement which will place the nature of the binary compounds clearly before the eyes. Suppose it is desired to represent, first, the action of sulphuric acid upon carbonate of potassa; in putting the acid in the line of acids we shall have :—

$$\frac{SO^3}{KO} + CO^2 = \frac{SO^3}{KO} + CO^2.$$

Second, the action of baryta upon sulphate of soda, by putting the baryta in the line of bases, we shall have :—

$$\frac{SO^3}{BaO} + NaO = \frac{SO^3}{BaO} + NaO.$$

The acids and the bases will occupy this place only in proportion as they are in presence of a salt and in the same member of the equation; besides, we put them on the mean line like all the compounds expressed by the ordinary notation; for example, sulphate of lead and sulphite of lead, heated together :—

$$\frac{SO^3}{PbO} + PbS = QSO^2 + QPb.$$

Chemists are not agreed as to the manner of grouping the atoms in haloid salts; they will, therefore, be retained in the ordinary notation. As to the saline oxides, they will be represented like the oxy-salts :—

$$\begin{matrix} NIn^2\ O^3 & Fe^2\ O^3 \\ NIn & Fe\ O \end{matrix} \&c.$$

Between the written expression FeO, SO^3, where we place the electro-negative body second, and the spoken expression, sulphate of iron, there is really a sort of contradiction, which disappears upon placing the two terms one above the other, for then there is neither first nor second.

The part water plays is not clearly indicated in the formulæ adopted, KO+HO, SO^3+HO, to express hydrate of potassa, or hydrated sulphuric acid. As it is now recognized that water plays the part of an acid with potassa, and that of a base with sulphuric acid, the new formulæ,

$$\begin{matrix} HO, & SO^3, \\ KO & HO \end{matrix}$$

will express it clearly.

3d. A last example will exhibit many other advantages. Purposely selecting a very complex formulæ, that representing the action of bibasic phosphate of soda upon nitrate of silver :—

$$(NaO+HO)PhO^5 + 2\,(AgO, NO^5) =$$
$$= 2AgO, PhO^5 + NaO, NO^5 + HO, NO^5$$

By the new formula we have :—

$$\frac{PhO^5}{NaO, HO} + \frac{NO^5}{AgO} = \frac{PhO^5}{2AgO} + \frac{NO^5}{NaO} + \frac{NO^5}{HO}.$$

The parentheses and the sign + are suppressed for the bibasic phosphate of soda, the formula of which is, nevertheless, much clear and easier to read. The parentheses are also suppressed for the nitrate of silver, because the position of the figure 2 on the mean line allows it to be clearly seen that it multiplies both acid and base.

As to the phosphate of silver which comes afterward, the 2 placed before AgO addresses itself evidently to the base, and without other artifice we perceive that it is not at the same time the co-efficient of the acid PhO^5.

These examples will suffice to show that many real advantages would be gained by adopting the change proposed, without at the same time incurring any inconvenience.

Benefits of Patent Laws.

The farmers now are doing everything in fact by machinery, and patents are to be found by the hundred for machines for every operation of man or horse in farm work. Steam plows to turn up the ground, patent harrows and drills to break clods and sow the seed, mowing machines and reapers, thrashing machines and fans, all are to be had in abundance and variety, through the agency of the patent system, far better in quality than those of England and far cheaper. All that used to cost man toil is accomplished by horse power, and it is confidently asserted, and we believe that it will prove true, that steam will be made so flexible as more cheaply and easily to accomplish all the work of the traveler now performed by horses, whether it be plowing or hauling, reaping or thrashing, traveling on the ordinary high road, or on the ice as well as on the water, going straight forward at any pace, from one to thirty miles an hour, or turning a corner with perfect ease and manageableness, throwing water like a deluge on the roofs of houses and barns to extinguish fires, or carrying a body of flying artillery, or a regiment of what used to be cavalry, into action at twice the speed and with twenty times the precision and effect of horses. In fact, the iron horse will soon become an antiquated term, and the steam elephant become all the rage. Such are some of the problems which are now being wrought out as the result of our patent laws.—*Philadelphia Ledger*.

There is a petroleum well on Buchanan's farm, Oil Creek, Pa., which, since August 13, 1861, up to March 20, 1862, has yielded 48,000 barrels of oil, not including several hundred barrels which have been wasted. It is 533 feet deep, and is called the "Brawley well."

RECENT AMERICAN INVENTIONS.

Car Brake.—This invention, patented by A. J. Ambler, of Milwaukie, Wis., relates to an improved brake for Railroad cars, and of that class which are operated by the movement of the cars from the running gear thereof. The object of the invention is to obtain a brake which will admit of being applied by a single person to all of a series or train of cars, the brakes of the several cars being simultaneously applied, and with a uniform pressure, and the pressure graduated as may be required, with the greatest facility, far more so than the brake of a single car, arranged in the ordinary way. The invention consists in the employment or use of what is termed a tumbling rod, placed underneath each car, just above its axles, the tumbling rods of the several cars comprising a train being connected together and so arranged that they, with their draw bars, may be rotated, and also raised and lowered, by means of suitable gearing, connected with a slide and belt shipper. The above parts are used in connection with two cones, a belt and two cylinders, one cone and two cylinders being placed on an axle of each car, and the other cone and cylinder on a lever, which is connected to a chain attached to the brake bars, all being arranged to effect the desired end.

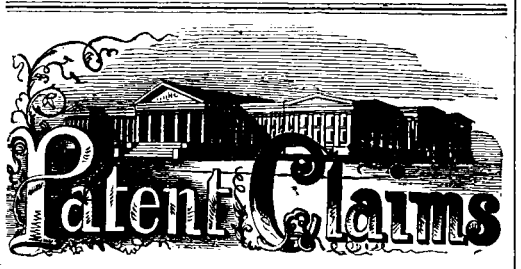
Sugar Kettles.—The principal object of this invention, patented by Abel Brear, of Saugatuck, Conn., is to transfer the juice from one kettle to another of the train, or otherwise to empty the kettles used in the manufacture of sugar without manual labor. This operation is commonly done by ladling, which is a very laborious, as well as a tedious process. The invention consists in the employment, for the purpose mentioned, of a movable cover, fitting to the rim of the kettle with a suitable packing, in such manner as to be capable of making a steam-tight joint therewith, and furnished with a pipe, of goose-neck, or other suitable form, having a suitable length below the cover to reach nearly to the bottom of the kettle. When the kettle is to be discharged the cover is to be placed upon it, and the steam generated from the juice pressing on the surface thereof, discharges it through the pipe, which is placed in such direction as to deliver the juice into the next kettle of the train, or into any suitable receptacle. The same device is applicable to the discharge of the contents of vessels used in other boiling operations.

Apparatus for Raising Water.—This apparatus, patented by Abel Brear, of Saugatuck, Conn., consists principally of a steam pipe, the mouth of which enters and is surrounded by a socket, in which is an opening for the admission of water or other liquid to be raised, from the well reservoir or other source of supply, and from which a delivery pipe leads to the point where it is to be delivered, the direction of the steam pipe being the same as that of the contiguous portion of the delivery pipe. The issuing steam expels the water from the delivery pipe, and the place of the water so expelled is supplied by water forced into the socket from the well reservoir or other source, by the pressure of the atmosphere. We are informed by the inventor that with steam at a pressure of 80 lbs., through a 2-inch pipe, he has raised 1,600 gallons of water per minute.

Telegraph Cables.—This invention, patented by John Morgan, A. T. Jay, Edmund Edwards and Joseph Tilston, of London, England, consists in the arrangement of a spiral coil of wire or other metal, within a covering, composed of vegetable fiber, metallic wires or metallic ribbons, in such a manner that the stretch of the rope longitudinally is prevented by the resistance of the internally-coiled wire to a transverse strain.

Air-Heating Furnace.—The object of this invention, patented by R. L. Bate, of Adrian, Mich., is to obtain a much greater area of heating surface than any air-heating furnace now in use, with but little increase in the cost of the apparatus and of the fuel required to supply the same, and it consists in the manner of arranging two furnaces, one on top of the other, both having flues on each side, extending horizontally of the same, in combination with the distributing pipes, for injecting cold air into the space surrounding the furnace. When coming in contact with the heated furnace of the same it becomes rapidly heated, and is thrown out through registers into the rooms.

Tanning Apparatus.—This invention, patented by J. S. Wheat, of Berkeley Springs, Virginia, consists in the arrangement of induction, exit, communicating and exhaust pipes, each being provided with suitable cocks and branch pipes, in combination with a series of air-tight tanning vats, in such a manner that a current of tanning liquid can be forced through all or a portion of said vats, and that the hides contained in the same, by coming in contact with the liquor, are impregnated and tanned in a comparatively short time. It consists further in the arrangement of a series of valves, loaded with adjustable weights, one on each of the tanning vats, in combination with said induction, exit, communicating and exhaust pipes, and with the cocks attached to the same, in such a manner that by shifting the weights of the valves, and a corresponding opening and closing of the cocks, the current of the liquid passing through the several vats, may be changed at pleasure, causing it to enter at the first, and from this into the second and out at the third, or to enter at the second, and from this into the third and out at the first vat, and so forth, and that by this arrangement the hides, when ready tanned, can be taken out of either one of the vats and replaced by green hides, which, by coming in contact, first, with weak liquor, that has passed through all the remaining vats, and afterward, with stronger and stronger liquor are gradually impregnated with the tanning substance, thereby producing, in a very short time, a sound and perfectly-tanned leather, with a comparatively small quantity of tanning bark or other tanning material.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING APRIL 1, 1862.

Reported Officially for the Scientific American.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 2, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

34,807.—J. W. Bartlett, of New York City for Improvement in Needle Gage and Adjuster for Sewing Machines :

I claim a needle gage and adjuster combined, substantially as set forth.

34,808.—Henry Behn, of New York City, for Improvement in Machines for Splitting Kindling Wood :

I claim the arrangement of an eccentric chopping knife, D, in combination with a moveable support, E, for the purpose of splitting kindling wood, when the whole is constructed and operating in the manner substantially as described.

34,809.—David Bennet, of Stratford, Conn., for Improved Ice Shoe or Calk :

I claim, as an improved article of manufacture, an ice shoe or foot calk composed of a central longitudinal connecting bar, a, and two-pointed rectangular cross bars, b c, united together and otherwise constructed and operating as shown and described.

[This creeper or ice shoe is so constructed that both the heel and the sole of the wearer's foot will be protected against slipping upon the ice when walking. Many parts of the country were unusually glazed over with ice during the past winter, and hundreds of persons have suffered from dislocations and limb fractures occasioned by falls upon the slippery streets. This ingenious device would entirely prevent all such accidents. It is adapted for the use of women and children as well as the "rest of mankind," is cheap and simple in construction and worthy of a place in every household.]

34,810.—Abel Brear, of Saugatuck, Conn., for Improved Device for Raising Water by Steam :

I claim the combination of the steam or air pipe, A, the open socket, c, and the delivery pipe, D, with the check valve, F, and the chamber, G, the whole operating substantially as and for the purpose specified.

34,811.—Abel Brear, of Saugatuck, Conn., for Improved Mode of Discharging the Contents of Sugar Kettles and other Vessels :

I claim the employment for the discharge of open kettles or vessels, used in boiling or evaporating processes, of a movable cover, B, and pipe, C, the cover being so fitted to the rim of the kettle or vessel that by placing it thereon temporarily the contents of the vessel may be expelled through the pipe, by the steam generated within the kettle or vessel itself, substantially as specified.

34,812.—H. P. Briggs, of Brookfield, Conn., for Improved Washing Machine :

I claim the arrangement of a tub with the ledges, d, upon a ferm or bench, a, in combination with the disk, e, and ledges, d', spring, m, hinge levers, i i, yoke, g, and arms, k, substantially in the manner as and for the purpose described.

34,813.—T. H. Burgess, of Boston, Mass., for Improvement in Portable Sewing-Work Cases :

I claim the improved traveler's work case, or construction or arrangement of the rotary spool or spools, and their arbors, or its equivalent, the metallic case and the flexible flap provided with a scissors' sheath and needle leaves or other devices for sustaining articles useful for mending or making clothing.

34,814.—T. M. Bush, of Hartland Township, Ohio, for Improvement in Sawing Machines :

I claim the arrangement of the gripe binder, A, dog, B, the connected levers, C and D, the hinged swing guide, F, all operating together and in combination with the main frame and the log-feeding and saw-guiding and operating mechanism, in the manner and for the purpose substantially as described.

34,815.—William Bush, of Wilmington, Del., for Improvement in Tanning for Morocco and other Grain-Finished Leather :

I claim the application of the principle of tanning without sewing and pressure to the manufacture of goat, sheep, calf and other small skins into morocco and other grain-finished leather, by suspending the skins by the neck, forward shanks or otherwise perpendicularly, to a frame, which frame has a constant oscillating motion in a vat of tanning liquor, as described.

34,816.—S. G. Clarke, of Cleveland, Ohio, for Improvement in Stills for Coal Oils :

I claim, first, The described combination of the steam retort, B, with the fire-heat retort, G, arranged and operating as and for the purpose specified.

Second, I claim the described devices for the continuous discharge of the residuum, and the burning of the same, as and for the purpose set forth.

34,817.—Charles Coale, of New Brighton, Pa., for Improved Japan Varnish :

I claim the described composition for Japan varnish, made of the ingredients specified, and mixed together in about the proportion as set forth.

34,818.—G. J. Colby, of Waterbury, Vt., for Improvement in Fastening India-Rubber Rolls to Metallic Shafts :

I claim the application of a greater degree of heat to the shaft than was used in vulcanizing the rubber and sufficient to slightly melt the rubber as the shaft is forced into it, thus forming a lubricator until the shaft is in place, and then by immediately cooling, the melted rubber becomes a cement that unites the shaft and rubber firmly together.

34,819.—G. H. Dodge, of Camden, N. J., for Improvement in Pumps :

First, I claim the upper and lower barrels with the communicating passage, c, the branches, w and m, and foot valve, n, in combination with the hollow plunger, D, and its valve, h, and the hollow plunger, D', and its valve, i, the whole being constructed, arranged and operating as and for the purpose set forth.

Second, The hollow plungers, D and D', with their respective valves, and the packing pieces, f f, when the latter are confined between the two portions of the barrels, as set forth for the purpose specified.

Third, The grooved screw, E, its metal disk or washer, t, and packing washer, s, in combination with the foot valve, n, and the projection, p; the whole being arranged for joint action, substantially as and for the purpose specified.

34,820.—Adam Domis, of New York City, for Improvement in Cartridge Box :

I claim the arrangement of the revolving case, A, with chambers, B, and spring stop, a, in combination with the outer cylinder, E, having a notched rim, and an outlet opening, g, substantially as and for the purpose shown and described.

[This invention consists in the arrangement of a cylindrical revolving case provided with a series of chambers to receive the cartridges, and furnished with a spring stop, in combination with an outlet opening and with a series of recesses in its rim, to receive the point of the spring stop and to arrest the revolving case at the desired intervals, in such a manner that by revolving the inner case one cartridge chamber after another can be brought before the outlet opening in the outer cylinder to receive or discharge its cartridge, or that all the chambers can be brought in such a position that the same are closed by the rim of the outer cylinder, and that the outer cartridges in the same are fully protected, and can conveniently be carried in the pocket.]

34,821.—Lewis Eikenberry, of Philadelphia, Pa., for Improvement in Variable Cut-Off Valves :

I claim, first, The shifter, C, constructed substantially as described, in combination with a cam, eccentric or movable piece, D', which has a fixed position longitudinally, whereby a greater or less circular movement in the cam, eccentric or movable piece is produced, and at the same time the said cam, eccentric or movable piece is held by the shifter at any desired point of adjustment on its shaft, as set forth.

Second, The moveable piece, D', substantially as and for the purpose set forth.

Third, The combination with an engine governor of a movable piece, D', which has a fixed position longitudinally, as described, and also of the movable piece, D', and shifter, c, combined, substantially as and for the purpose described.

34,822.—Lewis Eikenberry, of Philadelphia, Pa., for Improved Device for Operating Valves of Steam Engines :

I claim the devices, substantially as specified, for producing the results set forth.

34,823.—J. P. Evans, of Hazleton, Pa., for Improvement in Steam Boilers :

I claim having the fire grate made with an alternate arrangement of large elliptical tubes and small cylindrical tubes or bars, in the manner and for the purpose shown and described.

The arrangement of the elliptical pipes, D, and connecting pipes, E, with each other and with the boiler, A, as shown and described.

[This invention consists in the combination, for the grate of a boiler furnace, of a series of tubular bars of elliptical, or substantially similar form, in their transverse section, and a series of alternately interposed tubular or solid bars of round form, the elliptical bars being so much deeper than the round ones, as to expose a great portion of their surface to lateral contact with the incandescent fuel upon the grate and cause the rapid generation of steam from the water, which circulates through them, between the water spaces at opposite ends of the fire box. It also consists in the arrangement within and at the sides and ends of the fire box, of bent pipes, having an elliptical or flattened transverse section, connected each at one end with the upper part of the water space surrounding the fire box and at the other end with a lower portion of said water space, such pipes being exposed to the intense radiant heat of the fire and to the contact of the heated and inflamed gases of combustion, and having induced through them a natural circulation of water, which is rapidly converted into steam. It further consists in the connection of the above-mentioned pipes with each other and with the water space outside of the fire box by transverse pipes, arranged parallel or nearly so with the sides of the fire box.]

34,824.—Jacob Felsing, of Granville, Wis., for Improvement in Grain Separators :

I claim the arrangement of the pitman as connected with the sieve frame at the points L or K, and the wheels, E B, for the purpose of imparting a more or less rapid movement to the sieves, constructed and operating substantially as set forth.

34,825.—J. McAulay Gallacher, of Roxbury, Mass., for Improved Fertilizing Composition :

I claim the described fertilizing composition made of animal charcoal, sulphuric acid and liquid animal matter, substantially as set forth.

[This invention consists of a composition made by mixing liquid animal matter with animal charcoal and sulphuric acid or oil of vitriol. Patents have been secured in foreign countries.]

34,826.—William Gee, of New York City, for Improved Soda-water Apparatus :

I claim the application and use of a pump, for the purpose described, when used in combination with a cylinder having connected therewith the described pipes and valves, substantially as described and arranged, so that when the whole combination, on being operated I am enabled thereby to supply and gage the quantity and gas required within the cylinder, for the purpose set forth and described.

34,827.—William Gibb and R. J. Bell, of Carlisle, Pa., for Improved Clothes Wringer :

We claim attaching together the frames of a clothes wringer by an adjustable box strap-hinge joint, whereby they may be adjusted to fit tubs or other suitable supports of different thicknesses, and to clamp the same with a degree of pressure regulated by and corresponding with that of the rollers on the clothes, substantially as described.

[This clothes wringer may be readily applied to the side of a tub of

any form or thickness, and the parts are so constructed and arranged that an increase of pressure between the rollers is always accompanied by a tightening of the clamp, thus avoiding the danger of forcing the machine from its hold upon the tub in heavy work.]

34,828.—John Gross, of Manilla, Ind., for Improvement in Cultivators:

I claim the lever frame, B, with levers, C, and adjustable points, D, when operated in connection with the frame, A, with the guide bar, F, and rollers, I I, by means of the standards, E, the whole being arranged and operated as set forth.

34,829.—H. C. Glasgow, of Chicago, Ill., for Improvement in Brakesman's Cab.

I claim the brakesman's cab when constructed substantially in the manner and for the purposes set forth.

34,830.—M. T. Glimsdal, of Madison, Wis., for Improvement in Seeding Machines:

I claim, first, The combination of the plates, a, and blocks, b, fitted in the seed box, H, as shown in connection with the rotating shaft, M, provided with loose transverse rods, p*, and placed within the seed box, H, and the adjustable rotating seed-distributing shaft, J, provided with a series of circumferential rows of holes, 1 2 3, all arranged for joint operation, as set forth.

Second, Attaching the roller, E′, to the frame, A, by means of the draught rod, B′, pin, o′, and drawhead, C′, as shown, for the purpose of allowing the roller an adjusting movement independent of the frame, A, as specified.

[The object of this invention is to obtain a machine which will sow or plant various kinds of seeds either in drill or in hill in check rows, as may be required, and the machine at the same time simple in construction and capable of being readily manipulated by the driver or attendant.]

34,831.—A. J. Gibson, of Worcester, Mass., for Improvement in Burners for Coal-Oil Lamps:

I claim the removable cone, C, provided with the hooks, c c, and arm, D, in combination with the elastic adjustable plates, E F, attached to the arm and arranged in relation with each other, and respectively with the chimney, and burner, A, substantially as and for the purpose set forth.

[This invention relates to a new and improved mode of securing the chimney to the cone, and of securing the cone to the burner, whereby the chimney is allowed to expand as it heats, and thereby prevented from breaking or fracturing, a result which would occur if a rigid or unyielding chimney were employed, the invention at the same time admitting of the cone being firmly secured to the burner to allow of the chimney and cone being removed from the burner while hot, so that the wick tube may be exposed, and the wick trimmed with facility at any time.]

34,832.—Joel Haag and J. C. Smith, of Bernville, Pa., for Improved Water Wheel:

We claim, first, the employment of the spiral water way contracting in two directions as it approaches the wheel, as and for the purpose set forth,

Second, The use of the buckets being of a concave spiral form gradually diminishing in width from their lower to their upper ends, and having semicircular-formed bottoms and flat tops, so formed that the water is easily and quickly discharged, as and for the purpose specified.

34,833.—John Holmes, of Boston, Mass., for Improved Ball Furniture Caster:

I claim the improved ball caster, as made with the two cases, A C, arranged with the ball and the bearing rollers and the axles of the latter, substantially as described.

34,834.—P. H. Jackson, of New York City, for Improved Vertical Windlass:

I claim the employment of the elongated hub, 2, of the wheel, b, to receive the capstan head, g, in combination with the chain barrel, f, fitted to rotate on the said hub between the capstan and wheel, and connected to or disconnected from said capstan, substantially as specified.

34,835.—Phineas Jones, of Newark, N. J., for Improvement in Doweling:

I claim, first, A dowel, B, formed of a metal tube fitted in annular recesses, b b, in the parts to be connected, substantially as set forth.

Second, Having the interior of the metal dowel, B, of variable diameter or of double taper or conical form, in combination with the wedge, C, for the purpose of locking the cores, c c, in the dowel, as described.

[This invention relates to dowel pins, such as are used by joiners, cabinetmakers, wheelwrights, &c., for connecting together pieces of wood which abut against each other. The object is to obtain a device which will firmly connect the parts together without the liability of the latter splitting by any transverse or lateral strain to which they may be subjected, and at the same time obviate the necessity of using pins or bolts to hold the dowel in proper place and prevent either of the connected parts being withdrawn from the dowel.]

34,836.—T. B. Jones, of Paterson, N. J., for Improvement in Tenoning Machines:

I claim the peculiar arrangement of knives and chisels, as shown and described, when operated in the manner and for the purpose specified.

34,837.—Morton Judd, of New Briton, Conn., for Improved Serew Support for Hanging Pictures:

I claim the conical base, d, in combination with the cord-retaining button, e, and screw, c, forming a stud for hanging pictures and other articles, as set forth.

34,838.—J. P. Kettell, of Worcester, Mass., for Improvement in Hat-shell Irons:

I claim a hat-shell iron constructed substantially as eescribed.

34,839.—J. J. Kimball, of Napierville, Ill., for Improved Water Wheel:

I claim the wheel, D, provided with two sets of buckets, a b, one set, b, being below the bottom of the penstock, A, and the top of the wheel fitted in the bottom of a box, E, in the penstock, in combination with the annular gate, F, placed in the lower part of the wheel encompassing the buckets, b, and connected with the adjusting lever, K, by the rods, f H h, and lever, G, all arranged substantially as and for the purpose set forth.

[This invention relates to an improvement in that class of water wheels in which the water acts upon the wheel both by impact and reaction.]

34,840.—Nathaniel Lloyd and J. G. Dale, of Church, near Accrington, England, for Improvement in Dyeing and Printing with Aniline Colors:

We claim the use of tannin and tartarized or other soluble salt of antimony capable of dilution with water or a soluble salt of lead, mercury or chromium, substantially as described, for the purpose of fixing colors derived from aniline or analogous substances upon textile materials or fabrics.

[The claim in this case explains the nature of the invention, which we belived to be a very valuable one.]

34,841.—William Morehouse, of Buffalo, N. Y., for Improvement in Lamps for Burning Coal Oil:

I claim the arrangement and combination of the heater plates, c c, attached to and near the base of the cone, A, with the tube, K, cone, A, burner, B, and globe, i, in the manner and for the purpose set forth.

34,842.—William Morehouse, of Buffalo, N. Y., for Improved Mode of Attaching Chimneys to Lamps:

I claim a lamp chimney or globe, having a part of its base or flanch so reduced in diameter as to permit the chimney or globe to be set upon and secured to or removed from the lamp cap, without causing or requiring a lateral displacement of any of the parts which hold the chimney or the globe to the said cap, substantially as described.

34,843.—Valentine Mott, of Roslyn, N. Y., for Improved Washing Machine:

I claim the conical fluted roller, k, fitted as specified, in combination with the revolving tub, b, containing the conical surface formed by the inclined tapering rollers, the parts being fitted and acting substantially as and for the purposes specified.

34,844.—Peter Naylor, of New York City, for Improvement in Machines for Compressing Musket Balls:

I claim, first, The delivery punches, 6 and 7, adjusted by means of the levers, 8 and 9, and set screws, 11 and 12, in combination with the dies, r and s, arranged substantially as set forth.

Second, In combination with the said dies, r and s, provided with the delivery punches, levers and adjusting screws aforesaid, I claim the holding jaw, q, and cutter, o, arranged as and for the purposes set forth.

Third, I claim the solid die, s′, and sliding face pieces, r2 r3, constructed and acting as and for the purposes specified.

Fourth, I claim the cylinder, u, as constructed, having a partially revolving movement around the die, r, in combination with the spiral spring, u′, as set forth.

Fifth, I claim the arrangement of the dies, s′ r′ r2 r3, and wedge bars, t t, acting in the manner and for the purposes set forth.

34,845.—A. D. Reeves, of Portland, Maine, for Improved Female Supporter:

I claim the sack made in the shape and form, and with the buckles and straps described.

34,846.—C. Robbins and R. P. Burlingame, of Chicago, Ill., for Improvement in Corn Shellers:

We claim, first, the use of the endless belt, C, constructed and operating in the manner and for the purpose specified.

Second, The use of the yielding plates, I I, in combination with the endless belt, as and for the purpose specified.

34,847.—Sheridan Roberts, of Cleveland, Ohio, for Improvement in Barrel-making Machines:

I claim, first, The adjustable sock, A, so arranged that the axis or pivot of said stock, shall be in the rear of the knife and gage, in combination with the screw, R, and nut, S, so that in adjusting the knife and gage to the log, the knife edge can be inclined and depressed at the same etime, as the knife sash, e, moves in a right line toward the log, in the manner specified.

Second, I claim the gage bar, F, with its adjusting screws, sliding stock, c, the adjustable yoke, U, and screw, R, in combination with the sash, C, as set forth.

Third, I claim the adjustable stock, A, pivoted to the sliding sash, C, in the rear of the knife, D, and gage, J, when operating conjointly in the manner and for the purpose specified.

Fourth, I claim the curved knife, D, knife gage, J, with its curved face and gage guide, N, in combination with the adjusting stock, as described.

Fifth, I claim the arrangement of the sliding box, a, levers, e′ d′, in combination with the springs, l m, and sleeve, j, when arranged as and for the purpose specified.

34,848.—Dyer Robinson, of Reading Center, N. Y., for Improvement in Hay Rakes:

I claim the arrangement of the lever, M, pulley, d, cord, g, and bar, I, with the rake bars, G, posts, D D, and thills, C C, in the manner and for the purpose shown and described.

[This invention relates to that class of horse hay rakes wherein the raking teeth are attached to a series of pivoted bars which will yield separately when their teeth meet with obstructions, and allow the teeth to pass over the obstructions without being injured.]

34,849.—J. P. Royce, of Cuylerville, N. Y., for Improvement in Harvesters:

I claim, first, The side-draft frame, A, provided with the journals, a bed, and bearing box, e, or their equivalents, constructed and applied substantially as and for the purposes set forth.

Second, The arrangement of the friction wheel, c, within the driving wheel and in the relation to the pinion, h, substantially as and for the purpose set forth.

Third, The lever standard, F, with driver's seat attached, connected to and arranged in line or nearly so, with the cutting apparatus, and in rear of the draft frame, substantially as and for the purposes set forth.

Fourth, The arrangement of the hinged brace, I, in connection with the socket bearing, D′, of the intermediate grain wheel, C, substantially as and for the purposes described.

Fifth, The socket bearing, D′, and guard, D2, arranged in combination with the intermediate grain wheel, C, substantially as and for the purpose set forth.

Sixth, The arrangement with the platform angular brace, K, and shoe or divider, N, of the angular hinged braces, v w, substantially as and for the purposes described.

Seventh, The construction of the finger guards of U-form and with pivot holes and tenons in combination with the mortised fingers, substantially as and for the purpose set forth.

Eighth, The shoe or divider, consisting of the parts, N N′ N2 N3 N4 N5 N6, made in one piece, substantially as and for the purposes described.

Ninth, Providing the shoe, N, with the perforations, N5, for the purpose of adjusting the hinged platform, in the manner described.

Tenth, Attaching the arms of the reel to the faces of a pulley and disk which revolve on a still shaft, in the manner and for the purpose described.

34,850.—E. M Scott, of Auburn, N. Y., for Device for Canceling Notes, Checks, &c.:

I claim a mechanism for canceling notes, checks and documents, constructed substantially as shown and described.

[The object of this invention is to obtain a simple and efficient device for canceling notes, checks, &c., one that may be operated with the greatest facility, and used for canceling a greater or less number of notes or checks at a time, as may be required.]

34,851.—Robert Shepard, of Shaker Village, N. H., for Improved Land Leveler:

I claim a land leveler for agricultural purposes composed of a platform and series of ribs, and operating in the manner and for the purpose set forth.

34,852.—S. T. Thomas, of Laconia, N. H., for Improvement in Knitting Machines:

I claim the rocker bar, having an adjustable weight by means of which any required strain or tension may be applied to the web, in combination with the weighted tri-armed lever, or its equivalent, acting directly upon a friction cone driver, which turns the feeding rollers at the proper velocity, substantially in the manner described.

34,853.—J. S. Wheat, of Berkeley Springs, Va., for Improved Apparatus for Tanning:

I claim, first, The arrangement of the induction pipes, E, exit pipes, a2 b2 c2, communicating pipe, F, and exhaust pipes, k l m, with suitable branch pipes and cocks, as described, in combination with a series of vats, A B C, constructed and operating substantially in the manner and for the purpose set forth.

Second, The arrangement of valves, g h i, with adjustable weights, g′ h′ i′, one on each vat, in combination with induction pipe, E, exit pipes, a2 b2 c2, communicating pipe, F, and exhaust pipes, k l m, and suitable branch pipes and cocks, all constructed, arranged and operating as and for the purpose specified.

34,854.—S. W. Wood, of Cornwall, N. Y., for Improvement in Breech-loading Firearms:

I claim counter sinking the front face of the gate, so as to admit and inclose the rear-projecting end of the barrel and cartridge, for the purpose specified.

Second, I also claim the safety bolt, h, arranged substantially as described, for the purpose of preventing the descent of the hammer while the gate is open; and in combination therewith the aperture, i, or its equivalent, to allow the hammer to descend when the gate is entirely closed, substantially as specified.

Third, I also claim the combined arrangement of the hammer and safety bolt, or bolts, in such a manner as to prevent the closing of the gate, as long as the hammer is less than at half cock.

Fourth, I also claim a wedge, M, for the purpose of starting the case of the exploded cartridge from the barrel or chamber, arranged substantially as described.

34,855.—A. J. Ambler (assignor to himself, R. N. Ambler and Warrick Martin), of Milwaukie, Wis., for Improved Brake for Railroad Cars:

I claim, first, The tumbling rod, V, in connection with the belt-shipper, A′, and slide, Z, for the purpose of operating the belt, D′, on the cones, P R, cylinder, S, and cylinder or cone, Q, all arranged substantially as and for the purpose set forth.

Second, The employment or use, in connection with the belt, D′, of the two cones, P R, one, P, being placed loosely on the lever, L, and the other, R, permanently attached to its axle, C, for the purpose of actuating the lever, L, and operating upon the chain, I′, as and for the purpose specified.

Third, The cylinder, S, placed loosely on its axle, C, and the cylinder or cone, Q, placed loosely on the lever, L, when used in connection with the cones, P R, belt, D′, and belt shipper, A′, and all arranged as and for the purpose set forth.

Fourth, Constructing the belt shipper, A′, with slides, i i, having rollers, k′ k′ n′ n′, attached and acted upon by the springs, d′ f′, and arranged substantially as shown, for the purpose of loosening or relaxing the belt, D′, on its return or inward movement on the cones, P R, as set forth.

Fifth, The tumbling rod, V, slide, Z, provided with the double rack formed of the slot, u, and teeth, v, and fitted on the double-grooved bars, N N, as shown, in combination with the belt shipper, A′, cones, P R, cylinder, S, cylinder or cone, Q, and lever, L, connected with the chain, I′, by means of the pulleys, a a, and the chain, I′, connected with the brake bars, E E E′ E′, by means of the rods, H H K, chain, I, and pulleys, J J, all arranged for joint operation, substantially as and for the purpose specified.

Sixth, Suspending the tumbling rod, V, underneath the bed, A, of the car in adjustable bearings, i, for the purpose of disengaging when desired, the tumbling rod from the hand wheel, o.

34,856.—R. L. Bate (assgnor to himself and W. S. Wilcox), of Adrian, Mich., for Improvement in Air-Heating Furnaces:

I claim the fire boxes, E F, flues, b b c c, cold air reservoir, D, distributing pipes, a a, radiating surface, l and pipes, C, when combined, arranged and operating in the manner substantially as described.

34,857.—G. F. Blake, of Medford, Mass., assignor to himself and Peter Hubbell, of Charlestown, Mass., for Improvement in Water Meters:

I claim, first, Operating the registering mechanism of a water meter by means of a ratchet wheel, driven directly by the slide valve, substantially as described.

Second, The tappets, i j k l, in combination with the slides, J K slots, L, and plungers, O O′, arranged and operating substantially in the manner set forth.

34,858.—J. O. Farrell, of Boston, Mass., assignor to himself and William Veazey, of Cambridgeport, Mass., for Improvement in Wagon Springs:

I claim the construction of side spring wagons, with the rear ends of the springs, D D, jointed to curved arms, F, which are also jointed to the hind axle, all as shown and described.

[This invention relates to that class of springs which are used for light pleasure wagons, and are generally known as side springs, the same extending longitudinally beneath the body, and at each side, and parallel with each other. These springs have hitherto been rigidly attached to their axles, and have consequently caused the latter to be subjected to a great strain, a contingency which the described invention is designed to avoid. For this purpose the springs at one end are rigidly attached to an axle, while those at the other end are connected to the other axle by means of shackles.]

34,859.—C. B. Holden (assignor to himself and S. H. Bowker), of Worcester, Mass., for Improvement in Breech-loading Firearms:

I claim, first, The sliding breech pin, D, and slidinghammer, E, constructed and arranged in combination with each other, and applied to work either together or separately, in an open-sided cavity, a a, in the frame, A, substantially as specified.

Second, The stop, F, applied and arranged in connection with the trigger-guard lever, and in combination with the sliding breech pin, D, substantially as and for the purose specified.

Third, The trigger, H, applied in combination with the trigger guard lever, G, and the stop, F, substantially as and for the purpose set forth.

Fourth, The sere, F′, and elbow lever, I, applied in combination with each other, and with the hammer and trigger, substantially as specified.

This invention consists in a novel arrangement and combination of a breech pin and hammer; also, in a novel mode of locking the breech pin; also in a novel mode of applying the trigger, in connection with the device which locks the breech, for the prevention of accidental explosion of the charge; also, in a novel arrangement of the sere and mode of combining the same with the trigger and hammer.]

34,860.—C. E. L. Holmes (assignor to himself and E. D. Griggs), of Waterbury, Conn., for Improved Shade for Lamps:

I claim a paper or cloth shade, A, provided with a reflecting surface, produced by a lining, a, of metallic foil or metal-covered paper or cloth, as and for the purpose specified.

[This invention consists in the combination, with a paper or cloth shade, of a lining made of thin metallic foil or metal-covered paper, thereby producing a shade of superior reflecting power, and all sufficiently light to allow of its application to the glass chimneys of coal oil or other lamps in the ordinary manner.]

34,861.—R. Knowlton (assignor to himself and Jeremiah Laws, Jr.), of Eureka, Ill., for Improved Washing-Machine:

I claim, first, The combination of the cylinder, B, with the concave, G, the latter being provided with rollers, when said concave is arranged with rockers j, as shown, to admit of the rocking or oscillating of the concave, under the action of cylinder, B, as and for the purpose set forth.

Second, Having the cylinders, B, and the rollers, d e, of the concave, covered respectively with zinc and copper, or other suitable metals, and arranged substantially as shown, to produce a galvanic action during the operation of the machine, for the purpose specified.

[This invention relates to a new and improved clothes-washing machine, of that class in which a reciprocating rotary cylinder, having a corrugated periphery, is used in connection with a concave beneath its formed of a series of small rollers. It consists, first, in arranging the concave in such a way that an oscillating motion will be given it as the cylinder is rotated, and the clothes acted upon between the cylinder and concave, whereby the clothes are subjected to a more efficient rubbing process than hitherto, and also made to pass back and forth between the cylinder and rollers with greater facility. It consists, second, in having the periphery of the cylinder covered with zinc, and the rollers of the concave covered with zinc and copper; the zinc and copper rollers being placed alternately in the concave, and connected in pairs, substantially as shown and described, whereby a galvanic action is developed during the operation of the machine, and the clothes more readily cleaned than by the simple rubbing process alone.]

34,862.—John Morgan, A. T. Jay, Edmund Edwards and Joseph Tilston, of London, England, for Improvement in Telegraphic Cables:

We claim the arrangement of a spiral coil of wire or metal ribbon, A, with a covering of rope, B, substantially as and for the purpose specified.

34,863.—R. B. Perkins (assignor to Parker and Perkins), of Meriden, Conn., for Improvement in the Manufacture of Spoons:

I claim forming the recess in the bowl of the spoon, for the reception of the handle by swaging the same by means of dies, as set forth.

34,864.—John Petrie, Jr., of Rochdale, England, assignor to John Cooke, of Bradford, England, for Improvement in Machines for Drying Wool, &c.:

I claim the construction and arrangement of the case, air chamber

fan, and inclined perforated or woven wire flaps, to receive the wool to be dried, said flaps being so arranged as to expose the wool on an extended surface to the immediately-surrounding air, to facilitate its placement, drying and removal, the whole being constructed, arranged and combined in the manner and for the purpose set forth.

34,865.—M. D. Whipple, of Cambridge, Mass., assignor to the Whipple File Manufacturing Company, of Ballardvale, Mass., for Improvement in Machines for Cutting Files:

I claim the described machine for cutting the edges of file blanks, consisting essentially of the arm, K, with its guide bar, r, the vibrating arm, n, with its cutter, the feed rolls, G, and suitable gearing and mechanism for operating the parts, substantially in the manner specified.

34,866.—M. D. Whipple, of Cambridge, Mass., assignor to the Whipple File-Manufacturing Company, of Ballardvale, Mass., for Improvement in Files:

I claim, as a new article of manufacture, a round or curved surface file, the teeth of which are cut in rows, winding spirally, substantially as specified.

34,867.—A. B. Cooley, of Philadelphia, Pa., for Improved Floating Battery:

I claim, first, The vessel, with its central opening, in combination with the tube, F, and anchoring bars, K, for rendering the said tube stationary, while the vessel is revolved.

Second, The tube, E, forming a part of the vessel, in combination with the tube, F, and its flange, a, the said flange resting on the pinions, H, or their equivalents, of the tube, E, as specified.

Third, The platform, T, secured to the tube, F, and arranged substantially as and for the purpose set forth.

RE-ISSUES.

1,297.—The Liquid Quartz Company, of New York City, assignees of G. E. Van Derburgh, of Mamaroneck, N. Y., for Improvement in Preparation of Soluble Silicates. Patented May 29, 1860.

I claim reducing any silicious and alkaline composition or substance to a liquid state, by bringing it into direct contact with super-heated steam, while inclosed within a suitable vessel, substantially as set forth.

DESIGNS.

1,558.—John Rogers, of New York City, for Design for a Statuette Group—the Picket Guard.

1,559.—John Rogers, of New York City, for Design for a Statuette Group—Camp Life.

1,560.—J. B. Sargent, of New Britain, Conn., for Design for a Coat and Hat Hook.

1,561.—W. W. Stanard (assignor to Jewett and Root), of Buffalo, N. Y., for Design for Stove Plates:

Notes and Queries

D. B. D., of Ky.—We advise you to blow out a portion of the water in your boilers frequently. This will diminish the amount of scale which forms from the hard water. There seems to be no established rule with engineers for the size of air vessels upon the suction pipes of pumps. An air chamber of 70 cubic inches capacity we know has been sufficient for a water pipe of 1¼ inches diameter. Clack valves in the plunger of your lifting pump, we think, are best where the water contains sand and gravel, Vulcanized india rubber is used to a large extent for valves, especially those which are subject to rapid motion. It is economy to use feed water for a steam boiler as hot as you can get it safely pumped in. To prevent the exhaust of your small engine slamming the valve of your large cylinder, carry off the exhaust to a greater distance from the cylinder.

W. H., of Ohio.—Minié balls are manufactured in this city for the army by punching them from solid lead. Molds for casting are first made in two pieces, then the chamber is bored out and the core for the hollow part turned separately. It may then be soldered to one half of the mold. We have swedged hollow conical bullets from solid lead. This method makes the most perfect bullets. Your snake story will do for marines, but not for old salts.

W. A. R., of Mich.—No work on Buhl-inlaying has been published in America, so far as we know.

R. J., of Pa.—We cannot tell you how far 12 and 64-pound shot have penetrated into pine at range of half a mile. All such data is derived solely by experiment, and we cannot answer your question.

H. S., of Iowa.—We are unable to give you the complete ranges of different rifles with bullets fired at an angle of 45°. The best rifle for war purposes is that which has the greatest range and the most flat trajectory. Firing at an angle of 45° would be mere amusement to soldiers.

R. H. A., of Md.—The sulphate of aniline can be prepared for you by any good chemist in Baltimore.

W. B., of N. Y.—If you put some fresh slacked lime into your well, and allow it to stand for about two hours it will exterminate all the blood suckers in it. The water should then be pumped out and in all likelihood the vermin will not trouble you again.

E. L. G., of Conn.—The best solder for iron known to us is composed of copper 2 lbs. zinc 3 lbs. tin 2 ozs. A good solder for iron, of the same color as the iron, would be a valuable acquisition to the arts.

A. W., of N. Y.—The English drive their 4-feet millstones at the rate of 130 revolutions per minute, and they usually employ a hollow shaft through which a current of air is directed to cool the stones. The French millers first introduced the use of silk cloth for bolting fine flour. Belting and not gearing is chiefly employed now for driving the millstones. Some millers employ the "dressing mill" instead of bolts. The wire cloth used for dressing is about 34 gage and has 2916 meshes to the square inch. Some have used wire as fine as 38 gage which is 84 wires to the square inch or 7056 meshes.

P. C., of Pa.—Hoop iron is not covered with copper prior to being coated with zinc in order to "galvanize" it. It is thoroughly cleansed with muriatic acid, tinned and then coated with zinc. The hoops are drawn through a long trough containing the molten zinc. W. H. Haight, No. 341 Third street, this city, galvanizes all kinds of iron work.

M. B., of Springfield, Mass.—In all likelihood you may be able to obtain some of the colors made from coal tar at some of the drug stores in your city, if not H. Forstrict, No. 26 Broad street, New York, is agent for the French manufacturers and can furnish them.

J. W., of Mass.—You will find a table of the power, velocity and size of belts for driving machinery on page 150, Vol. II. (new series) SCIENTIFIC AMERICAN. To find out the power of a belt, multiply the width in inches by the velocity in feet per minute and divide by 1070. The result is the horse power.

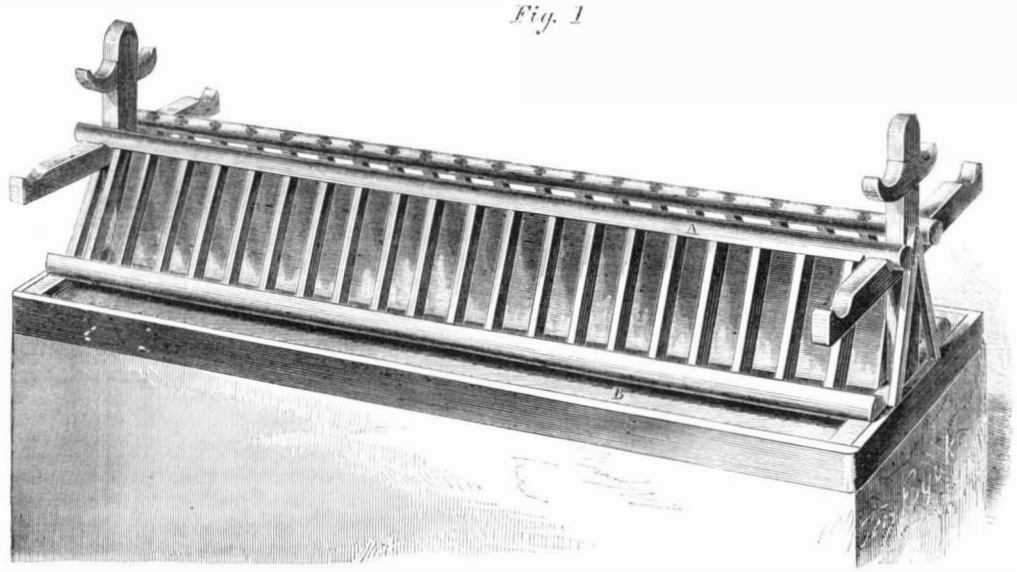
B. B., of Penn.—If your device for expelling air from lead pipes is novel as well as useful it would of course be patentable.

Improved Hay Rack.

It is well known that when sheep or other animals eat hay from racks constructed in the ordinary manner, with the upper portion inclining over the animal's head and back, a large part of the seed and finer leaves, which are the most nutritive portions of the fodder, fall upon the animal or upon the ground and are trodden under foot and wasted. In the case of sheep there is another evil in addition to the waste —the dust falls into the wool and increases the difficulty of cleaning it. To obviate these evils the rack here illustrated has been invented.

Fig. 1 is a perspective view of the rack, and Fig. 2 an end elevation. The rack, A, rests in the frame, as

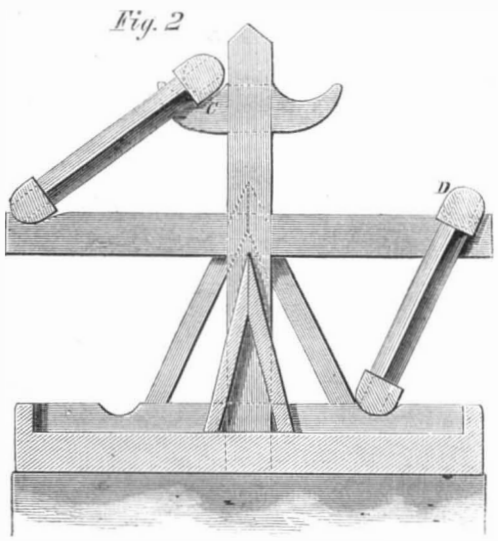
Fig. 1



STRUVE'S HAY RACK.

shown in Fig. 1, while the animals are eating the hay; the seed and fine leaves falling into the trough, B. When the long hay is consumed the rack is lifted up and suspended on the hook, C, as shown in Fig. 2; thus giving the animals free access to the trough, to eat the seed and fine hay. When the rack is to be filled its upper part is turned forward, as shown at D, Fig. 2, and after the supply of hay has been introduced the rack is tipped back into the position shown in Fig. 1.

Fig. 2



The engravings represent a double rack, but it is manifest that a single one may be constructed on the same principle. The dimensions suggested for the trough are, width 44 inches, with a width outside of the rack of 5 inches. The thickness of the partition should be about 8 inches.

The principal advantages claimed for this rack are, convenience of filling, great economy of fodder and cleanliness of the animals.

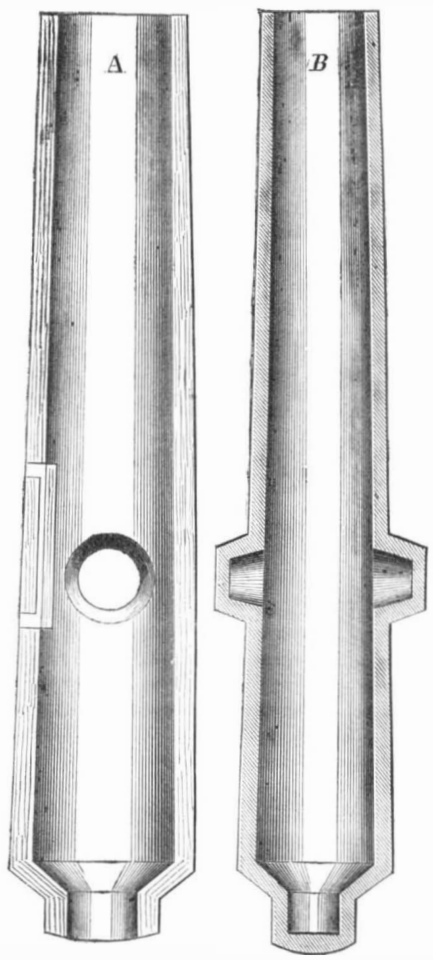
The patent for this invention was granted through the Scientific American Patent Agency, March 25, 1862, and further information in relation to it may be obtained by addressing the inventor, F. G. L. Struve, at Jefferson, Wisconsin.

Cocoa-nut oil is now manufactured at Honolulu. It is extracted from the scraped pulp of the cocoa nut. The pulp is fermented before the oil is developed.

IMPROVEMENT IN CASTING BRONZE ORDNANCE OR OTHER ARTICLES.

It is a fact well known to manufacturers of bronze articles, that owing to the repulsion or want of affinity between copper and iron, or for some other cause, it has hitherto been impossible to make a good sound casting of bronze in an iron mold, especially if the casting was large, and consequently all heavy bronzed articles are cast in baked clay or dry sand molds. This method is not only expensive, but it is a very slow and tedious one. The accompanying engravings, illustrate a plan for preparing iron molds for bronze castings which is said to overcome all difficulties, and to be practically successful. Two longitudinal sectional views are given of a cannon mold, one, B, through the trunnions, and the other, A, at right angles to this.

The mold after being formed of the required shape is to be thoroughly annealed, so that its inside surface shall have the appearance of burnt iron, such



inner surface is next to be washed, with an aqueous solution of pulverized clay, and wood ashes, until the pores of the iron are completely filled, and such a coating formed upon it, as to entirely prevent any contact of the metallic surface with the melted bronze, during the process of casting. Over such coating and while the mold is in a warm state, a coating of lamp black dissolved in spirits of turpentine or alcohol, is next to be applied or instead thereof a liquid resinous substance, such as tar may be used. In casting a piece of ordnance, or other article, the molten bronze is poured into a long tunnel extending down some distance into the mold so that the liquid mass shall fall directly into or upon the center of the bottom of the mold, the pouring being continued until the mold is completely filled; care being taken that none of the molten bronze shall come in contact with the resinous coating on the unfilled portion of the mold.

By this improvement the cost of casting a cannon or other articles of bronze, is claimed to be very much lessened in comparison with the ordinary method; as all the expense attending the making of the clay molds, the molding, the flasks, the baking of the molds, and the ovens for baking them is avoided. Another important advantage is the rapid and almost instantaneous cooling of the molten bronze, whereby a separation of the tin from the copper is prevented (an evil familiar to all manufacturers of bronze articles by the old method).

While the fluid metal is in the mold, the resinous wash or second coating will gradually liquefy and burn, and thus will prevent the metal from setting or hardening against the surface of the mold until the mold may have received its proper quantity of metal. By this means the metal is enabled to become properly and evenly compacted, preparatory to, and while passing from, a fluid to a solid state.

A patent for this invention was granted February 25, 1862, to John Revere, of Boston, Mass.

FROM THE STEAM PRESS OF JOHN A. GRAY.