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Improvement in Sewing Machines.

Incredible as it may seem after all the thought that has been directed to the subject by the most fertile intellects in the world, some important improvements have just been made in the shuttle-stitch sewing machine. They are the invention of Louis Bollman, an ingenious young German, who has long been in the employ of the Grover & Baker Sewing Machine Company, the well-known manufacturers. The invention was perfected in the shop of this enterprising firm, and has been assigned to them. It introduces material modifications in the construction of the shuttle machines, dispensing with parts that have heretofore been considered essential, and displays an ingenuity which will render its examination interesting to every mechanician. We doubted at first the possibility of explaining this invention clearly by an engraving, but the illustrative skill of our artists has made it perfectly plain, as will be seen by an examination of the illustration.

Fig. 1 is a perspective view of the principal parts of the machine on the lower side; the machine being turned on its edge for the purpose of displaying these parts. The hook, *a*, is attached to the shuttle carrier, *d*, and moves back and forth with it. As the shuttle, *e*, moves forward, this hook passes close by the side of the needle, and catches into the loop upon the upper thread, drawing down and enlarging the loop over the wide part of the hook as the latter is carried forward; the loop, at the same time, being held by the stationary hook, *b*.—Then, as the shuttle returns, the loop is caught and held by the stationary hook, *c*, and the shuttle, scraping along the side of the hook, *a*, passes through the loop, carrying the lower thread with it. Just as the shuttle completes its transit, the thread slips from the hook, *c*, and the loop is drawn past the end of the shuttle.

Fig. 1

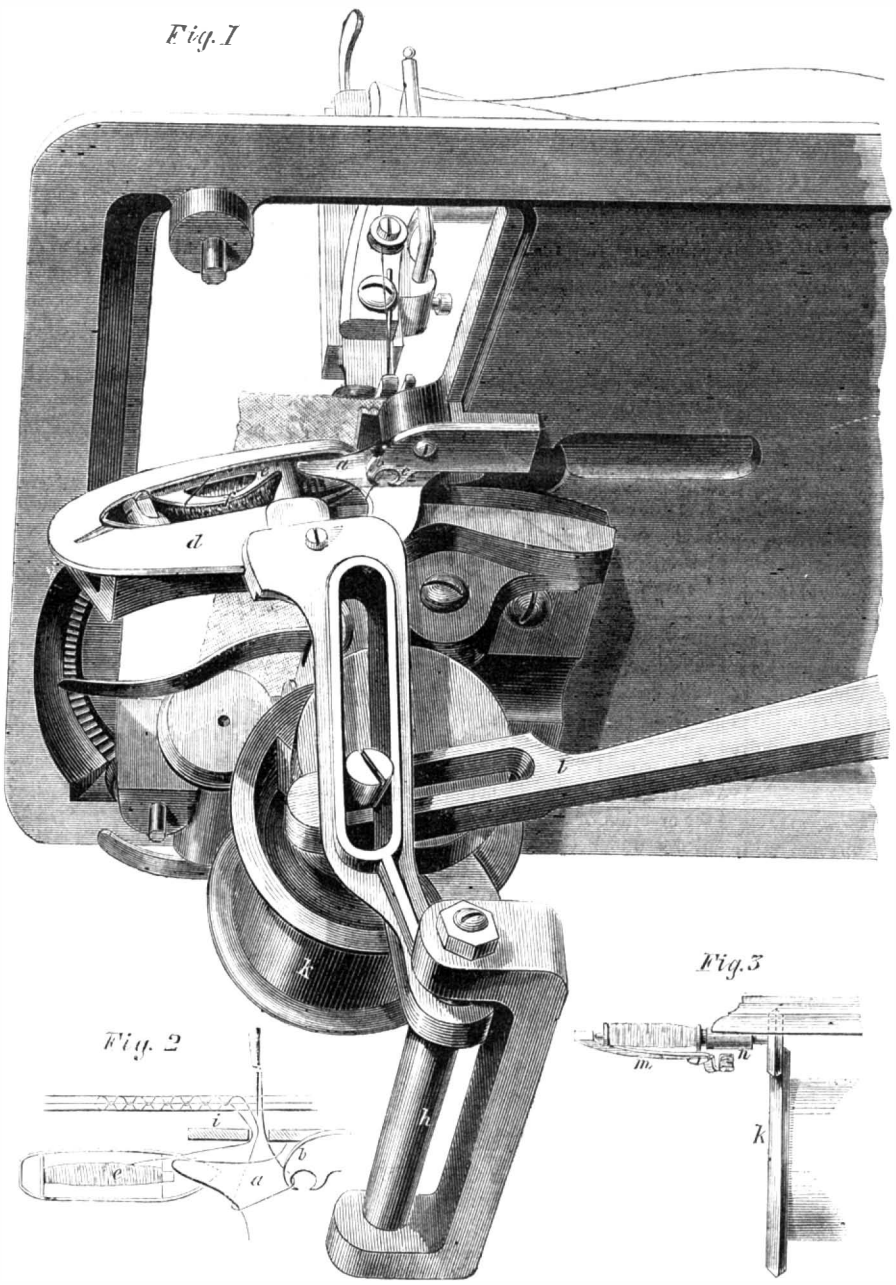


Fig. 2

Fig. 3

A NOVEL SEWING MACHINE.

Fig. 2 is a sketch with the seam turned at right angles, and the other parts somewhat out of position to show the manner of tightening the thread. As the hook, *a*, and shuttle, *e*, are moving to the left, while the hook, *b*, and plate, *i* (through a hole in which the threads pass), are stationary, it will be seen that both threads are being drawn tight, and the arch of the upper thread has both of its sides pulled downward at the same time; thus forming a peculiar rounded seam, without any tendency to gather or disarrange the fibers of the cloth.

The shuttle carrier has its fulcrum on the rockshaft, *h*, and is driven by the pin, *j*, on the pulley, *k*. This same pin also actuates the lever, *l*, which has its fulcrum on the rear end of the machine, and is bent forward to carry the needle.

It has been found that when the thread is drawn from the shuttle spool in the ordinary way, the tension will vary, in consequence of the thread unwinding more readily when running from one part of the spool than from another; it being drawn at one time at right angles to the spool, and at another nearly lengthwise with it. This difficulty is overcome in the most simple manner by an invention of Mr. Bollman. The thread, as it comes from the spool, is passed over the curved bar, *f*, in the upper plate of the shuttle, and, as the thread unwinds, it slips along this bar, thus always being drawn at right angles to the portion of the spool from which it is unwinding. This is more clearly shown in the cut which represents the shuttle open.

A third improvement, by the same inventor, is the spooling apparatus illustrated in Fig. 3. The spool is placed lengthwise between the lever, *m*, and the spindle, *n*, turning on a point in the lever, and being rotated by the spindle. The spindle has a broad disk upon its inner end which is pressed against the pulley, *k*, when the spool is in position, and is thus turned upon its axis. This is an application of those friction gears which have been extensively introduced in England, and are coming more and more into use in this country. It will be seen that the mere act of placing the spool in position presses the spindle into gear, while the act of removing the spool relieves the spindle head from its pressure against the pulley, and thus stops its rotations.

The following are the advantages claimed for this invention:

1. That the loop is not taken from the needle by the shuttle point, but by a distinct narrow hook, so shaped as not to pull or drag on it while the needle is in the cloth, but merely to keep it down until the needle is out.

The needle and thread have, therefore, less strain, and both can be much finer than in other shuttle machines.

2. The application of this hook does away with the stop motion of the needle during the passage of the shuttle through the loop; we thus obtain a smooth crank motion for both the shuttle and needle, and can use a higher speed.

3. The shuttle passing through the loop *after* the needle has risen out of the cloth, and it not requiring to drag the thread for the formation of the loop through, the needle eye may be a great deal larger than in other machines sewing as fine thread, and a much larger bobbin may be used.

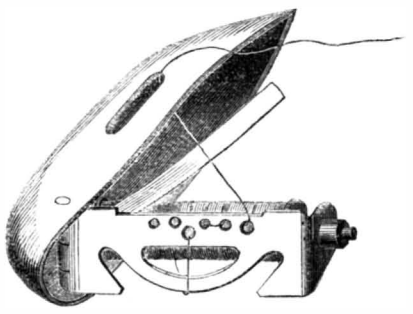
4. The stitches are tightened from below, and by the same motion of the shuttle driver pulling both the upper and under threads at the same instant.

This method gives a full and round appearance to the upper side of the stitch, admits a very high tension to both threads without drawing or gathering up the goods, and, altogether, produces a superior seam.

5. No take-up is required to drag the entire loop

during every stitch back and forth through the needle eye. This further admits the use of a finer needle for the same thread, which, in shuttle sewing, is of the utmost importance, because a large hole with a fine thread will not cover the joints of the thread, and very much weakens the strength of the seam in all unelastic goods.

It is well known that, in machines having a take-up, the exceedingly rapid back and forth motion of the thread through the needle eye will, in many kinds of work, heat the thread and needle so as to



burn the thread; therefore, but very slow speed can be used, and a very large needle must be employed to avoid this effect.

6. There is almost no friction on the shuttle, it bearing on its front against the driver; while, in other shuttle machines, this front bears against the race, and the friction is therefore very great.

7. The stop motion and the take-up being dispensed with, the machine is thus much simplified.

Application has been made for a patent for this invention, and further information in relation to it may be obtained by addressing the Grover & Baker Sewing Machine Company, at No. 495 Broadway, New York.

THE WAR.

The great importance of the following proclamation induces us to give it in full:—

HEADQUARTERS OF THE WESTERN DEPARTMENT,
St. Louis, August 31.

Circumstances, in my judgment of sufficient urgency, render it necessary that the Commanding-General of this department should assume the administrative powers of the State. Its disorganized condition, the helplessness of the civil authority, the total insecurity of life, and the devastation of property by bands of murderers and marauders, who infest nearly every county in the State, and avail themselves of the public misfortunes and the vicinity of a hostile force to gratify private and neighborhood vengeance, and who find an enemy wherever they find plunder, finally demand the severest measures to repress the daily increasing crimes and outrages which are driving off the inhabitants and ruining the State. In this condition the public safety and the success of our arms require unity of purpose, without let or hindrance to the prompt administration of affairs.

In order, therefore, to suppress disorders, to maintain as far as now practicable the public peace, and to give security and protection to the persons and property of loyal citizens, I do hereby extend, and declare established, martial law throughout the State of Missouri. The lines of the army of occupation in this State are for the present declared to extend from Leavenworth by way of the posts of Jefferson city, Rolla and Ironton, to Cape Girardeau, on the Mississippi river. All persons who shall be taken with arms in their hands within these lines shall be tried by court martial, and, if found guilty, will be shot. The property, real and personal, of all persons in the State of Missouri, who shall take up arms against the United States, or who shall be directly proven to have taken active part with their enemies in the field, is declared to be confiscated to the public use; and their slaves, if any they have, are hereby declared free men.

All persons who shall be proven to have destroyed, after the publication of this order, railroad tracks, bridges or telegraphs, shall suffer the extreme penalty of the law.

All persons engaged in treasonable correspondence, in giving or procuring aid to the enemies of the United States, in disturbing the public tranquillity by creating and circulating false reports or incendiary documents, are in their own interest warned that they are exposing themselves.

All persons who have been led away from their allegiance are required to return to their homes forthwith; any such absence, without sufficient cause, will be held to be presumptive evidence against them.

The object of this declaration is to place in the hands of the military authorities the power to give instantaneous effect to existing laws, and to supply such deficiencies as the conditions of war demand.

But it is not intended to suspend the ordinary tribunals of the country, where the law will be administered by the civil officers in the usual manner and with their customary authority, while the same can be peaceably exercised.

The Commanding General will labor vigilantly for the public welfare, and in his efforts for their safety hopes to obtain not only the acquiescence but the active support of the people of the country.

(Signed) J. C. FREMONT,
Major-General Commanding.

THE NAVAL EXPEDITION.

The Atlantic coast of the United States, from the middle of Long Island to the southern point of Florida, is of very peculiar formation. Throughout almost the whole of this 1,200 miles there are narrow ridges of sand at a short distance from the main land, leaving long shallow sounds inside, with narrow inlets communicating with the ocean, through which all the shipping must pass. The sounds thus shut in on the North Carolina coast are Albemarle and Pamlico, both broad, navigable sheets of water, which, in times of peace, have been whitened with the sails of numerous sloops and schooners, bearing away the products of the great pine forests of that State—rosin, tar, turpentine, plank, timber, and pine wood. These sounds communicate with each other and are both separated from the ocean by a low sand ridge 200 miles in length. At about the middle, a point of this ridge runs out easterly into the Atlantic, and is called Cape Hatteras, a point much dreaded by mariners from the storms which prevail in its vicinity. With the single exception of Wilmington, a place of 7,000 inhabitants in the south part of the State, all the harbors of North Carolina lie behind this ridge of sand, and consequently, almost the entire commerce of the State must pass through its navigable breaks or inlets, of which there are but two—Hatteras Inlet, 15 miles south-west of Cape Hatteras, and Ocracoke Inlet, 12 miles still further to the south-west. There is a third opening through the sand ridge far to the north of Cape Hatteras, called New Inlet, but as it has only five feet depth of water, it is not navigable for vessels of any considerable size. The two principal inlets, besides serving as gates for the North Carolina commerce, furnish a water communication from the ocean, by the way of the Dismal Swamp Canal, with Norfolk and the ports on James River, in Virginia.

The great and manifest importance of these two inlets caused the secessionists to make early and very vigorous efforts to secure the control of them, and the erection of fortifications was commenced at both places under the direction of William Beverhout Thompson, Chief Engineer of the North Carolina Coast Defence. The United States Navy Department also appreciated the importance of these two inlets, and before the late session of Congress a plan was formed for capturing the fortifications at both places, but various delays occurred in carrying out the plan, and the expedition did not get away from Fortress Monroe till the 26th of August. This was the secret naval expedition, the sailing of which was mentioned in our last number.

The fleet, consisting of seven war vessels and two transports, all steamers except one, under the command of Commodore Stringham, U.S.N., with about 800 land troops in the transports under the command of Major General Butler, sailed from Hampton Roads on Monday, August 26, and arrived off Hatteras Inlet about four o'clock in the afternoon of the next day. On Wednesday morning, the 28th, the transports with the troops were sent in close to the shore, about two miles north of the inlet, under the protection of three of the smaller naval vessels, and the landing of the men was commenced. But the surf ran so high that the boats were all soon swamped or stove, and only about three hundred of the men were got ashore.

In the meantime the large ships of war took up positions at long range and opened a bombardment on the only fort that could be seen from the outside. At 10 o'clock the *Wabash* fired the first gun, the 11-inch shell striking near the battery with tremendous force. The battery, which was of sand, covered with turf and mounting five long thirty-twos, instantly returned the fire, the shot falling short. The *Minnesota* and *Cumberland* immediately opened fire and rained nine and eleven-inch shell into and about it. The fire was terrific, and soon the battery's responses were few and far between, save when the frigates suspended fire for a while to get a new position, when the enemy's fire was most spirited.

No damage was sustained by our ships, and when they again took their position the cannonading was intensely hot, the shells dropping in the enemy's works or falling on the ramparts, exploding in death-dealing fragments, and carrying death and destruction with them. The small wooden structures about the fort were torn and perforated with flying shells.

At eleven o'clock the immense flag-staff was shot away and the rebel flag came down, but the fire was still continued by them.

At twelve o'clock the *Susquehanna* steamed in, and, dropping her boats astern, opened an effective fire. The cannonading on our part was incessant, and the air was alive with the hum and explosion of flying shell; but the enemy did not return the fire with any regularity, the battery being too hot for them, from the explosion of shells that dropped in at the rate of about half a dozen a minute.

The enemy ceased firing a little before two, and after a few more shells had been thrown in, the Commodore signalled to cease firing.

In the meantime the land forces advanced, and, discovering that the battery was abandoned, entered it and raised the United States flag in order to prevent the fleet from wasting ammunition upon it. The rebel garrison fell back upon another fort in the rear which was out of sight of our ships, and as the *Monticello* entered the inlet to protect our land forces, this second fort opened fire upon her at short range. At the same instant she got aground, and stuck fast, the enemy pouring in a fire, hot and heavy, which the *Monticello* replied to with shell sharply. For fifty minutes she held her own, and finally getting off the ground she came out, having been shot through and through by seven 8-inch shell, one going below the water line. She fired fifty-five shell in fifty minutes, and partially silenced the battery. She withdrew at dusk for repairs, with one or two men slightly bruised, but none killed or wounded. This ended the operations for the first day. The next morning the vessels proceeded more closely in shore and renewed the attack. They fired nearly half an hour before the battery responded, when it answered briskly. Our fire was more correct than on the previous day. The range had been obtained, and nearly every shot went into the battery, throwing up clouds of sand and exploding with terrific effect. The fire was so hot that all of the enemy that could do so got into a bomb-proof in the middle of the battery. Finally, at five minutes past eleven A. M., an 11-inch shell, having pierced the bomb-proof through a ventilator and exploded inside near the magazine, the enemy gave up the fight and raised over the ramparts a white flag. We immediately ceased fire. Gen. Butler went into the Inlet and landed at the fort and demanded an unconditional surrender, which, after some parleying, was consented to, by the commander of the forts, who proved to be Commander Barron, formerly of the United States Navy, and at the time of his capture Assistant Secretary of the Confederate Navy. By the surrender we came in possession of one thousand stand of arms, thirty-five heavy guns, ammunition for the same, a large amount of hospital and other stores, two schooners—one loaded with tobacco, and the other with provisions; one brig loaded with cotton, two lightboats, two surf boats, &c. The prisoners surrendered numbered 45 officers and 665 non-commissioned officers and privates. They were placed on board the *Minnesota* and sent to New York, where they arrived on Monday, Sept. 2d, just a week after the sailing of the expedition from Fortress Monroe.

If this operation is followed up by the capture of the forts at Ocracoke Inlet, all but one of the ports of North Carolina, as well as those of Virginia, will be hermetically sealed; and by stationing sufficient forces at the two inlets, all this stretch of coast may be effectually blockaded without the employment o any vessels.

PRIVATEERS IN HATTERAS INLET.

Among the papers taken at the capture of Fort Hatteras were copies of letters by Major Andrews, at one time in command of the place. The following is so instructive that we give it in full :—

HEADQUARTERS CAMP HATTERAS,
August 2, 1861.

His Excellency Henry F. Clark :—

GOVERNOR—Since my last the privateer steamer *Mariner* has brought into this port as a prize the schooner *Pricilla*, of Baltimore, from Curacoa, with six hundred bushels of salt. I had some doubt as to the legality of the prize, but having seen that Baltimore vessels, laden with coffee, had been seized in the mouth of the Chesapeake and sent to New York as prizes, I ordered her up to Newbern to-day. The *Winslow* has a large brig at the bar laden with sugar and molasses, and the *Gordon* has two schooners coming over the bar now. The *Mariner* has taken a schooner into Ocracock, and is now in pursuit of another. These will all be fully reported as soon as the captains report to me. I am doing all I can to prevent the news of captures spreading, but so long as the crews are sent up to Newbern immediately, it cannot be prevented. Your despatch through the Adjutant-General's office of the 27th instant, is received.

The directions of Captain Barron, with regard to Hatteras Light-House, will be followed. You did not direct me what to do in regard to the coffee. I am trying to save the copper on the bark *Linwood*, and will await your order how to dispose of it. I suppose it is needed to make percussion caps. Yours, very respectfully,

W. S. G. ANDREWS,
Major Commanding Fort Hatteras and Dependencies.

A SKIRMISH IN WESTERN VIRGINIA.

Our account left General Cox pursuing General Wise up the valley of the Kanawha, which runs northwardly through the western part of Virginia. On the 26th of August, General Cox had reached Gauley Bridge, some 40 miles above Charleston, and had sent one regiment, the Ohio Seventh, to Summersville, a few miles up the Gauley River, a stream that enters the Kanawha from the east.

As Col. Tyler's men were taking their breakfast on the morning of the 26th, they were suddenly surrounded by three regiments of Secessionists, who hoped to take them prisoners. But they fought their way through the enemy's lines, and most of them reached the main body at Gauley Bridge in safety.

WRECK OF THE PRIVATEER "JEFFERSON DAVIS."

The privateer *Jefferson Davis* was wrecked at 6½ o'clock on Sunday morning, August 12th, while trying to enter the harbor of St. Augustine, Fla. The vessel struck on the bar, and became a total wreck. The crew were all saved.

OBSEQUIES OF GENERAL LYON.

On Saturday, August 31st, the remains of General Lyon reached this city on their way to their last resting place in his native town, Eastford, Conn. In all the principal cities on the route—St. Louis, Cincinnati, Pittsburgh, Philadelphia and New York—the citizens testified their respect for the departed hero by celebrating the passage of his remains with imposing funeral ceremonies. Along the route it was remarked that there was a peculiar depth and earnestness in the grief of the people for the death of this brave soldier. In all the numerous histories that will be written of this war, his name will stand out with remarbable prominence, for his career was remarkably heroic. He never shrunk from battle, whatever the odds, and as long as he lived he was never defeated. Contending against greatly superior numbers, he finally sacrificed his life in a desperate attempt to save the city of St. Louis from the clutches of the secessionists, and with it, the State of Missouri from the crushing military despotism that reigns in the seceded States. There is great satisfaction in reflecting that the effort was successful. The people have appreciated his sublime devotion, and the hushed breaths and bended heads which accompanied the passage of his coffin mark the beginning of a fame that will grow brighter with the lapse of time.

Parr's American Camp Chest.

This excellent article, which was illustrated in No. 5, present volume of the SCIENTIFIC AMERICAN, is on exhibition at Messrs. Ball, Black & Co.'s, on Broadway, and is attracting unusual attention from army officers and others interested in the comforts of camp life. The demand for these chests has exceeded the ability of the inventor to supply, and we learn that Messrs. Gray & Potter, of 202 Broadway, who are making "army supplies" a specialty, have become the proprietors of the patent, and will very soon be able to fill any and all orders. Messrs. Ball, Black & Co. will, we learn, continue to have the agency for this city. We understand that this useful invention is meeting with the success it deserves.

Correspondence

From a Washington Correspondent of the "Scientific American."

WASHINGTON, D. C., August 29, 1861.

MESSRS. EDITORS:—Since my last communication to your highly-prized journal, there has been great activity in the military department under Gen. McClellan, and all fear of danger from a surprise has vanished and given place to a feeling of perfect security. It is not a little amusing to see the great anxiety expressed sometimes by persons living at a distance for the safety of this city, when we who live here, and who would probably be the greatest sufferers in case the city should fall into the hands of the enemy, feel perfectly at ease, and have full confidence in the preparations and ability of Gen. McClellan. The reason of this fear, however, is but natural, when we consider the fact that all knowledge of military movements on our side is suppressed, while we read accounts daily of the activity and the near approach of the enemy to our lines; thus leading many to suppose that our preparations for offence and defence are not as certain as those of the enemy, which is very far from being the case.

The business of the Patent Office has fallen off some since our troubles commenced; and, in consequence thereof, some changes have been made in this department, only, however, as regards the force employed and the compensation of those who are retained. I notice that a great many improvements have been made in military accouterments, the better to provide for the comfort and convenience of our soldiers during the present struggle. Inventors will find a broad field open for them here to display their ingenuity, as there are hundreds of little wants which could be readily supplied by the inventor, and those who, through disabilities, cannot enter our regiments, might contribute their share in this way.

We have a Provost Guard in this city, whose especial duty it is to arrest drunken and disorderly soldiers, and to arrest and fine persons for selling or giving liquors to soldiers. All soldiers are required to have a pass from one of the officers of their respective regiment, with which pass they can attend to their private business about the city; without a pass, the soldier is liable to be arrested. We therefore have very little disturbance in our streets, night or day.

Army wagons and horses continue to arrive every day in large numbers; and I notice that many of the wagons are dragged through our streets with the *wheels locked!* This is an injury both to the horses and wagons, and attention should be called to it immediately.

The Washington Navy Yard has become quite a lively place, and many hundred workmen are employed day and night in and about the various shops, turning out cannon, making shot and shell, gun carriages, &c., &c. This yard is now a very convenient place for keeping in good repair the gunboats used on the Potomac, some of which visit the yard every day or two.

Steamers run between this city and Alexandria, Va., every hour, but all persons leaving the wharf for the latter place are required to show a pass. These passes are only obtained upon the representation of some well-known Union citizen, and much inconvenience has been felt by certain person whose opinions are somewhat tainted with secession because of this pass system. This channel to Virginia has been blockaded effectually, and as every floating craft on the river, from a "dug-out" to a long boat, has been taken possession of by our river guard, those whose character deprives them of the privileges of a pass must be content to live among us until they show, by their good works, that they are indeed Union-loving citizens.

The system of oath-taking at first adopted by our government has ceased to exist, and those who prove disloyal and treacherous to the confidence reposed in them are sent where they will neither be harmed themselves nor harm others. Thus has the Mayor of our city been arrested and imprisoned "for cause;" many ladies of this city having taken advantage of the privileges accorded to their sex to aid the enemy, have been arrested and held, so far, only, as to prevent the recurrence of such things.

Rumors say that we are to have a battle on the other side of the river soon; the circumstances on which they are based amount to little more than the gradual advance of the scouting outposts of Beauregard's army to points almost within range of the guns of our fortifications. These scouting parties, however, remain only a sufficient time to make reconnoissances, shoot down our pickets, and then retire; but Gen. McClellan will soon put a stop to these movements of the enemy, and if persisted in, we may expect to hear at any moment of a considerable affair between the outposts of the two armies at some place not more than three ar four miles from this city.

Finally, I will add that, as all of our military affairs have been confided to men of military knowledge and experience, everything goes on smoothly and harmoniously, leading us to believe with great confidence that all will end well, and to the glory and honor of our Republic. R. T. C.

MESSRS. EDITORS :— Will you have the kindness to inform me, through your popular scientific journal, the title, price and where I can purchase the best scientific work on mechanical engineering published in this country, and much oblige an attentive reader? Yours, truly,

JAMES DEVINE.

Frankford, Pa., August 27, 1861.

Similar letters of inquiry to the above come daily to this office, and it would relieve us of answering a great many letters of no profit to us, if dealers in scientific and mechanical books would advertise their works in our columns. At the same time, they would find it a profitable business transaction.

MESSRS. EDITORS :—At the request of one of your patrons who receives your paper at the news depot here, I write for advice upon the subject of steam engineering, he desiring to purchase one of about twenty horse-power; he wishes "all the modern improvements." Whose engine do you consider the best? Your reply will be conferring a great favor. Respectfully yours,

A. D. MCDONALD.

Hamilton, C. W., August 26, 1861.

The same editorial advice as rendered to booksellers in the above is applicable to manufacturers of steam engines and all kinds of machinery, inquiries about which are being constantly made at this office.

The secret of success in all kinds of business is advertising; and the duller the times, the more should manufacturers or others having anything to sell avail themselves by advertising in papers of large circulation, and especially in such papers as are circulated among the class of persons likely to patronize their wares.

The New Postage Stamps.

The new postage stamps have made their appearance. There are eight classes—one, three, five, ten, twelve, twenty-four, thirty, and ninety-cent stamps, embracing line-engraving heads of Washington, Franklin, and Jefferson, from portraits painted by Stuart, Trumbull, and Houden.

The one cent stamp is green with a profile bust of Franklin. The three cent is a delicate carmine with a portrait of Washington. The five cent is brown with a likeness of Jefferson. The ten cent is green with a head of Washington. The twelve cent is black also with a head of Washington. The twenty-four cent is purple—same likeness. The thirty cent has a bust of Franklin and is printed in orange. The ninety cent is dark ultra-marine, and concludes the list with a portrait of the father of his country.

PROGRESS OF THE WORK ON THE FORTRESS AT SANDY HOOK.—The fortifications at Sandy Hook are progressing very rapidly under the superintendence of Capt. J. G. Foster, U. S. Engineer corps.

Twenty-seven casemates are completed, and the guns will be mounted in a few days. This part of the work will command the entrance of the main and Swash channels. Thirty-seven guns have been ordered down immediately. A large portion of them will be rifled, and of a new and improved pattern; 8-inch columbiads will make up the complement to be used at present.

A magazine is nearly completed, and as soon as entirely finished a large quantity of shot and shell will be sent down.

AT a recent exhibition in England, a couple of bullets were shown which were picked up on the field of Inkerman. A French and a Russian bullet had met in mid air and were flattened against each other. So says the London *Mechanics' Magazine*.

Bessemer's Paper on his Process of Making Steel.

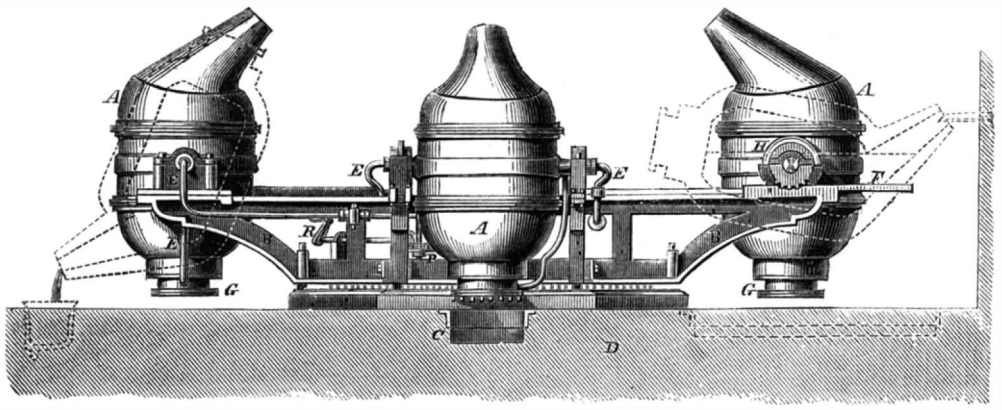
We published last week some extracts from this valuable paper, and now, in view of the great importance of the subject and the wide interest that it has excited, we give the remainder. In order to make it more intelligible, we accompany it with an illustration of Bessemer's apparatus which is reproduced from page 373, Vol. III (new series). It will be understood that the vessels A A, are the pots in which the refining is effected; these vessels being supported in a frame which revolves so as to bring them to the furnace of melted iron on one side and carry them to the mold on the other. They are hung on trunnions so as to be turned down to receive the iron, keeping the airholes in their bottoms above the liquid metal until the charge is received.

THE ORDINARY MODE OF MAKING CAST STEEL.

The mode of manufacturing cast steel, which now forms so important a branch of the Sheffield trade, was discovered in the year 1740 by Mr. Benj. Huntsman, of Handsworth, near Sheffield. This gentleman subsequently established steel works at Attercliffe, where his most valuable invention has ever since been successfully carried on. In the early stages of this invention many difficulties had, doubtless, to be overcome, materials for the lining of furnaces, and for the making of crucibles, had to be sought for and tested, the peculiar marks of iron most suitable for melting had to be determined on by numerous experimental trials, and such was the difficulty at that time of making crucibles that would stand the excessive heat of molten steel, and only very highly carbonized or "double converted" steel, could, for a long period, be successfully melted.

The first products of a new manufacture, even while the invention still remains in a partially developed state, but too frequently stamp its subsequent character; thus Huntsman's cast steel, although it was acknowledged to be a pure, homogeneous metal of great value for certain purposes, was still looked upon as a hard and brittle material of very limited use, not bearing a high temperature without tumbling to pieces, and quite incapable of being welded. Even within our own time this has been the popular idea of cast steel. Improvements in its manufacture have, however, from time to time been introduced, and steel of a milder and less brittle character has long been made capable of welding with facility, and working at a high temperature without falling to pieces. Its uses have, in consequence, been greatly extended, and the employment of cast steel for the best cutlery and edge tools has now become universal; indeed, the excellent quality of the cast steel at present made in Sheffield for these purposes is scarcely to be surpassed. Of late years several of our most enterprising manufacturers have sought to introduce cast steel for a variety of purposes other than those for which it was originally employed, hence we now find it used in some form or other, in almost every first-class machine. Its employment as a material for founding bells and various other articles in clay molds has been successfully carried out by Messrs. Naylor, Vickers & Co., while the introduction of a most valuable material by Messrs Howel & Shorbridge, under the name of homogeneous iron, are prominent examples of the successful adaptation of cast steel to engineering purposes. The manufacture of cast steel by Huntsman's process is so extensively practiced, and is so well known, that it will not be necessary here to go into any lengthened detail, but it may be as well to remind those who have not paid special attention to the subject, that crude pig iron has first to go through all the stages of melting, refining, puddling, hammering and rolling, in order to produce a bar of malleable iron as nearly pure as the most careful manipulation in charcoal fires can make it.

Bar iron, on which so much labor, fuel, and engine power has been expended, thus becomes the raw material of this most expensive manufacture. In order to convert these iron bars into blister steel they are packed with powdered charcoal in large chests, and are exposed to a white heat for several days; the time required for heating and cooling them extending over a period of twenty days. The iron bars, when thus converted into blister steel, are broken into small pieces, and are sorted for quality, which sometimes differs even in the same bar. For melting this material powerful air furnaces are employed containing two crucibles, into each of which are put about 40 lbs. of the broken blistered steel; in about three hours the pots are removed from the furnace, and the molten steel is poured into iron molds, and is thus formed into ingots of cast steel, from three and a half to four tuns of hard coke being consumed for each tun of metal so melted. When large masses of steel are required a great many crucibles must be all got ready at the same moment, and a continuous stream of the molten metal from the various crucibles must be kept up until the ingot is completed, as any cessation of the pouring would entirely spoil it. Hence, in proportion to the size of the ingot, so is the cost and risk of its production increased.



BESSEMER'S PROCESS OF MAKING STEEL.

DISADVANTAGES OF THIS PROCESS.

From the foregoing remarks it will be obvious that the cast-steel manufacturer is working at an immense disadvantage. If he desires to supersede the use of wrought iron for engineering purposes, he must cease to employ wrought iron as a raw material for his otherwise most expensive mode of manufacture. The extremely high temperature requisite to maintain malleable iron in a state of fusion has, from the earliest period of the history of iron up to almost the present day, rendered its purification in a fluid state practically and commercially impossible; hence arise all those imperfections to which bar iron is subject, every small piece of this material consisting of numerous granules partially separated from each other by scoria, and every large mass of it resulting only from the piling together of small bars, with the inevitable result of increasing the former imperfections; for no two pieces of iron can be brought to a welding heat without becoming perfectly coated with oxyd, and when this coating is rendered fluid by welding sand, a fluid silicate of the oxyd of iron is formed covering the entire surface to be united; the heavy blows of the hammer, or the pressure of the rolls, may and does extrude the greater portion of this fluid, extraneous matter, but it is never wholly removed from between the welded surfaces, and hence a portion of the cohesive force of the metal is lost at every such junction. When a bar of iron is nicked on one side and bent, the rending open of the pile clearly shows this want of perfect cohesion, nor is this the only difficulty to be encountered, for, in the production of large masses of wrought iron, it is necessary to raise the temperature nearly to the fusing point of the metal, in order to render each additional piece sufficiently soft and plastic to become united to the bloom. This softening of the iron induces a molecular change in the structure of the metal; its natural tendency to crystallize is so powerfully assisted by the long continuance of this high temperature that its whole structure undergoes a change. Large and well-defined crystals are formed, almost independent of each other and cohering so feebly to the planes of other contiguous crystals, as, in some cases, to separate with as little force as would overcome the cohesion of ordinary cast iron.

ADVANTAGES OF CAST STEEL.

In the substitution of cast steel for malleable iron we escape both these sources of difficulty, for the mass, whether it be of 1 ton or of 20 tons in weight, may be formed in a fluid state into a single block wholly free from an admixture with scoria, while it is perfectly and equally coherent at every part. The forging into form of such a solid block of metal is only the work of a few hours, and, as there is no welding of separate pieces, it may be worked under the hammer at a temperature at which no molecular disturbance will take place, the metal being far below its fusing point, and much too solid to undergo that destructive crystallization so common in large masses of iron. Thus it will be perceived that the difficulties and uncertainty which attend the production of all large masses of wrought iron are wholly avoided in the production of equally large masses of cast steel. But, however desirable in the abstract it may be to employ cast steel as a substitute for malleable iron for engineering purposes, it must not be forgotten that there are several important conditions indispensable to its general use. Firstly, the steel must be able to bear a good white heat without falling to pieces under the hammer, or otherwise the shaping of it will not only be expensive, but the partly finished forging may be spoiled at any moment by being overheated. Secondly, the steel should be of that tough character as to admit of being twisted or bent almost into any form in its cold state before fracture takes place, whether the force be applied as a gradual strain or by sudden impact. Thirdly, it should have a tensile strength of, at least, 50 per cent over the marks of English iron. Fourthly, and especially, it must be soft enough to turn well in the lathe, to bore easily, and yield readily to the file and the chisel, so as not to enhance its original cost by the difficulty of working it into the requisite forms. This is both commercially and practically an important question, and one which will in future greatly determine the extent of its use. Steel to the engineer, has hitherto stood in much the same relation as granite to the builder. All acknowledge the superior hardness, beauty of polish, and durability of that material, as compared with other building stone. Nature has given it to us in great profusion; we have only to lift it from the earth and use it. But the practical man has found that to drill a hole in granite for blasting takes days of labor to accomplish, blunts all his chisels, defies the saw, and is only faced at a great cost; hence the builder goes on using his inferior soft stone, over which his tools have perfect command.

BESSEMER'S PROCESS.

The problem we have before us is, how to produce cast steel that will take any form in the mold, or under the hammer; that will yield quickly and readily to all our present cutting and shaping machines; will retain all the toughness of the best iron with a much greater tensile strength; and all the clearness of surface, beauty of finish, and the durability, that so eminently distinguish the harder and more refractory qualities of the steel in common use. It is believed by the author that these desirable objects are fully accomplished by his process of converting rude molten iron into cast steel at a single operation, which process has now been in daily operation in this town for the last two years. For this purpose the hematite pig iron, smelted with coke and hot-blast, has chiefly been used. The metal is melted in a reverberatory furnace, and is then run into a founder's ladle, and from thence it is transferred to the vessel in which its conversion into steel is to be effected. It is made of stout plate iron, and lined with a powdered argillaceous stone found in this neighborhood below the coal, and known as ganister. Its value in the powdered state is about 11s. per ton. The rapid destruction of the lining of the converting vessel was one of the great difficulties met with in the early stages of the invention; the excessive temperature generated in the vessel, together with the solvent action of the fluid slags, were found to dissolve the best

fire-brick so rapidly that sometimes as much as 2 inches in thickness would be lost from the lining of the vessel during the thirty minutes required to convert a single charge of iron into steel. The material used at present is not only much cheaper than fire-bricks, but is also very durable. A portion of the old lining of the vessel is also shown. It has stood ninety-six consecutive conversions before its removal. The converting vessel is mounted on axes, which rest on stout iron standards, and by means of a wheel and handle it may be turned into any required position. There is an opening at the top for the inlet and pouring out of the metal, and at the lowest part are inserted seven fire-clay tuyeres, each having five openings in them; these openings communicate at one end with the interior of the vessel, and at the other end with a box called the tuyere box, into which a current of air, from a suitable blast engine, is conveyed under a pressure of about 14 lbs. to a square inch, a pressure more than sufficient to prevent the fluid metal from entering the tuyeres.

Before commencing the first operation, the interior of the vessel is heated by coke, a blast through the tuyeres being used to urge the fire. When sufficiently heated, the vessel is turned upside down, and all the unburned coke is shaken out. The molten pig iron is then run in from the ladle before referred to; the vessel, during the pouring in of the iron, is kept in such a position that the orifices of the tuyeres are at a higher level than the surface of the metal. When all the iron has run in the blast is turned on, and the vessel quickly moved round. The air then rushes upward into fluid metal from each of the thirty-five small orifices of the tuyeres, producing a most violent agitation of the whole mass. The silicum, always present in greater or less quantities in pig iron, is first attacked. It unites readily with the oxygen of the air producing silicic acid, at the same time a small portion of the iron undergoes oxydation, hence a fluid silicate of the oxyd of iron is formed, a little carbon being simultaneously eliminated. The heat is thus gradually increased until nearly the whole of the silicum is oxydized; this generally takes place in about twelve minutes from the commencement of the process. The carbon now begins to unite more freely with the oxygen of the air, producing at first a small flame, which rapidly increases, and in about three more minutes from its first appearance we have a most intense combustion going on; the metal rises higher and higher in the vessel, sometimes occupying more than double its former space. The frothy fluid now presents an enormous surface to the action of the oxygen of the air, which unites rapidly with the carbon contained in the crude iron, and produces a most intense combustion, the whole, in fact, being a perfect mixture of metal and fire. The carbon is now eliminated so rapidly as to produce a series of harmless explosions, throwing out the fluid slags in great quantities, while the union of the gases is so perfect that a voluminous white flame rushes from the mouth of the vessel, illuminating the whole building, and indicating to the practiced eye the precise condition of the metal inside. The workman may thus leave off whenever the number of minutes he has been blowing and the appearance of the flame indicate the required quality of the metal. This is the mode preferred in working the process in Sweden. But here we prefer to blow the metal until the flame suddenly drops, which it does just on the approach of the metal to the condition of malleable iron; a small quantity of charcoal pig iron, containing a known quantity of carbon, is then added, and steel is produced of any desired degree of carburation, the process having occupied about twenty-eight minutes from the commencement. The vessel is then turned, and the fluid steel is run into the casting ladle, which is provided with a plug rod covered with loam; the rod passes over the top of the ladle, and works in guides on the outside of it, so that, by means of a lever handle, the workman may move it up and down as desired. The lower part of the plug, which occupies the interior of the ladle, has fitted to its lower end a fire-clay cone, which rests in a seating of the same material let into the bottom of the ladle, thus forming a cone valve, by means of which the fluid steel is run into different sized molds, as may be required, the stream of fluid steel being prevented by the valve plug from flowing during the movement of the casting ladle from one mold to another. By tapping the metal from below no scoria or other extraneous floating matters are allowed to pass into the mold.

By this process from one to ten tons of crude iron may be converted into cast steel in thirty minutes without employing any fuel except that required for melting the pig iron, and for the preliminary heating of the vessel, the process being effected entirely without manipulation. The loss in the weight of crude iron being from 14 to 18 per cent on English iron worked in small quantities. The result of working on a purer iron in Sweden has been carefully noted for two consecutive weeks, when the loss on the weight of fluid iron tapped from the blast furnace was ascertained to be 8¾ per cent. The largest sized apparatus at present erected is that in use at the Atlas Steel works, the vessel being capable of operating on four tuns at a time, which it converts into cast steel in twenty-five minutes. In consequence of the increased size of the vessel no metal is thrown out during the converting process, and the loss of weight has fallen as low as 10 per cent, including the loss in melting the pig iron in the reverberatory furnace.

SAMPLES OF THE STEEL.

We have on the table before us some examples of this manufacture, as carried on by Messrs. Henry Bessemer & Co., of Carlisle street. The first sample is a piece of the pig iron employed, viz: hot-blast coke made hematite No. 1. Secondly, a portion of an ingot of very mild cast steel, broken under the hammer, to show the purity and soundness of the metal in its cast unhammered state. Perfectly sound ingots of such mild steel are extremely rare, if ever, produced by the old process.

The third example is an ingot partly forged to show how little work with the hammer will produce a forging from these solid blooms of steel.

There are also two pieces of steel of the quality employed for making piston rods. These samples were bent cold under a heavy steam hammer. To show the toughness of the metal it requires very much more force to bend it than would be required to bend wrought iron, but notwithstanding this additional rigidity, it gives to any extent without snapping. The tensile strength of this soft and easily wrought metal is from 41 to 43 tons per square inch, or from 15 to 18 tons greater than Lowmoor or Bowling iron. In turning, planing, boring and tapping this metal, it will be found that the uniformity of its quality will be less trying to the cutting tools than the hardness and sunk cracks found in the common qualities of malleable iron.

It must, however, be borne in mind that the tensile strength of the piston rod steel just quoted is by no means the maximum, but, on the contrary, it is nearly the minimum strength of such converted metal; but, at the same time, it possesses nearly a maximum degree of toughness, every additional ton in tensile strength given to it, by the addition of carbon, hardens it for working, renders it more difficult to forge and brings it nearer to that undesirable state when a sudden blow snaps it like a piece of cast iron.

The extreme limits of tensile strength of the converted metal are exhibited in a tabular form on the wall above. They are the result of many trials made at different times at the Royal Arsenal, at Woolwich, under the superintendence of Colonel Eardley Wilmot, and are copied from his reports. The highly carbonated samples exhibit a mean tensile strength of 152,000 lbs., and are, from their hardness and unyielding nature, totally unfit for many purposes, while the entirely decarbonized metal is so soft and copper-like in its texture as to yield to a mean strain of 72,000 lbs., a point unnecessarily low, except in such cases where a metal approaching copper in softness is required. The author, therefore, is strongly impressed with the belief that the soft, easy-working, tough metal, of the quality used for piston rods, is the most appropriate material for general purposes, and that the hard steels, that range up to a tensile strain of 50 or 60 tons per square inch, should be avoided as altogether too expensive to work, and too dangerous to be employed in any case where sudden strains may be brought upon them.

A kettle for boiling tallow, weighing 9,114 lbs., and capable of containing 1,316 gallons, was lately cast at Donohue's foundry, in San Francisco. California papers assert that it is the largest cast iron kettle ever made in America.

Revolution in Photography.

The Paris correspondent of the London *Photographic News* says:—"Another revolution in photography! The honor of achieving this result is due to Sig. Joseph Eugéne Balsamo, Professor of Natural Philosophy at Lucca, in Italy, who has found a substitute for nitrate of silver in positive printing, which is hydrochloric acid saturated with phosphorus, and diluted with acetate of copper. Paper imbued with this compound is exposed to the action of light under a negative, and when it has acquired a gray color, it is removed from the pressure-frame and exposed for five minutes to the vapors of sulphureted hydrogen, which acts upon those parts of the paper which have become altered by the action of light. The picture is afterward toned and fixed in a solution of nitrate of bismuth. A decomposition of the salt of copper takes place, and the image, which is permanent is formed of oxyd of bismuth. The professor, with that true liberality which characterizes men of science, has given his discovery to the world. His researches in heliography have opened a new path to the photographer, and he promises another communication on this subject ere long.

Fire-Proof Buildings.

An article in the London *Review* maintains that the late gigantic fire at London bridge tested and found wanting the present system of fire-proofing warehouses. The conflagration made its meal of no mere piles of wooden houses, but of piles of buildings in which science had exhausted her resources in attempting to fortify them against fire. Party walls of immense thickness, stone staircases, iron beams and pillars were of no avail against the spontaneous combustion of a little heap of hemp. Poor Braidwood, who lost his life at this great fire, always protested against the use of cast iron for warehouses; pillars made of it become red hot, the water contracts and snaps them, and away go the floors at once. Then there is another danger outside—the girders supporting the flooring expand, no walls can resist their lateral thrust, and down they fall, to the destruction of those near at hand. Braidwood's death was caused by such an effect. It was proved at the inquest held upon his body that the iron girders heated to a white heat, as they were elongated nearly half a foot, pressing before them the solid wall which proved his tomb.

Industrial and Agricultural Fairs.

The following is a list of Fairs to be held this year in various States and in Canada:—

California.....Sacramento, Sept. 16, 21.
Canada, Upper.....London, C. W. Sept. 24, 27.
Connecticut.....No exhibition.
Ilinois.....Chicago, Sept. 9, 14.
Indiana.....Indianapolis.
Iowa.....Iowa City, Sept. 24, 27.
Kentucky.....Louisville, Sept. 17, 21.
Maine.....Portland.
Michigan.....Detroit, Sept. 24, 27
Minnesota.....St. Anthony, Sept. 27.
New Brunswick.....Sussex, Oct. 1, 4.
New Hampshire.....Manchester.
New Jersey.
New York.....Watertown, Sept. 17, 20.
Ohio.....Dayton, Sept. 10, 13.
Oregon.....Oregon City, Oct. 1, 5.
Pennsylvania.
St. Louis.....Ag. and Mechanical Association St. Louis.
Vermont.....Rutland, Sept. 10, 13.
Wisconsin.....Madison, Sept. 23, 27.
Wisconsin, Ag. and Mech.....Milwaukee, Sept. 2, 6.
Rhode Island Industrial, Providence, Sept. 11. Show of Flax Cotton.

To Clean Printed Paper and Picture Prints.—Fasten the paper to a board with button drawing pins, then wash it with water, in which is dissolved an ounce of carbonate of ammonia to every pint of water. This do with care, employing a camel's hair brush for the purpose. Then rinse the paper well with plenty of fresh water. When dry, repeat the same process for the reverse side of the paper. Now wet the paper with water made sour with white vinegar. Finally, wet the paper with water containing a little bleaching powder, and again rinse with clean water; then dry it by exposure to air and sunshine. It will become white, excepting where printed. To stiffen the print give it a coat of parchment size. Most valuable prints have been thus "restored."—*Septimus Piesse.*

The Harrisburgh (Pa.) *Telegraph* states the potato crop in that vicinity is good, and unaffected by the rot.

Discovery of New Basaltic Columns—A New Giant's Causeway.

The Tuolumne (California) *Courier* thus describes a natural curiosity, lately discovered in its neighborhood :—

A very great excitement among our miners has been caused by a singular discovery made by Messrs. Cochrane, Russell and Lambert, on their claim at Dry Arroya, about a quarter of a mile from Sonora. The gentlemen while "hydraulicing" a stream bank about seventy feet in hight, were suddenly surprised by the caving down of an immense amount of gravel, limestone, boulders and lava, which revealed beyond, in the heart of a high hill, some hundreds of basaltic columns of a dull brown color, pentagonal in shape, and standing perpendicular, from 10 to 21 feet high. The open space between these pillars no where exceeds four or five inches, and rows of them run into the hill from 40 to 50 feet, closely packed together.

In some places, at certain angles, it is possible to see beyond this singular colonnade into an opening formed apparently of quartz rock, which is certainly exceedingly rich in gold; for, even at this distance from the observer, in a kind of dim twilight, strong indications of the metal are distinctly visible. Rays of light seem to penetrate into this opening through fissures in the roof, sides or from the rear, although the most diligent search of hundreds has not as yet led to the discovery of any of them, or of any other avenue through which the light could enter.

The hill is thickly covered with chapparel, which makes the search difficult and unsatisfactory. The well-known geologist of Columbia has been to the spot and examined the place with great attention. He reports that the columns are exceedingly hard, unusually regular in shape, and closely packed together ; that their igneous origin is very apparent, and that on examination he found augite, feldspar, titanic iron and olivin in their composition. He is certain that this is the only instance that so pertect a basaltic development of rock has been found in California—although he has seen as good a development in the West Indies—and he considers it, among all the geological discoveries in this country, as by far the greatest and most worthy of scientific observation. These wonderful natural pillars, interspersed here and there with immense stalactites, indicate a calcareous formation.

THE NEW SPANISH RIFLED ARTILLERY.

[From the London Mechanics' Magazine.]

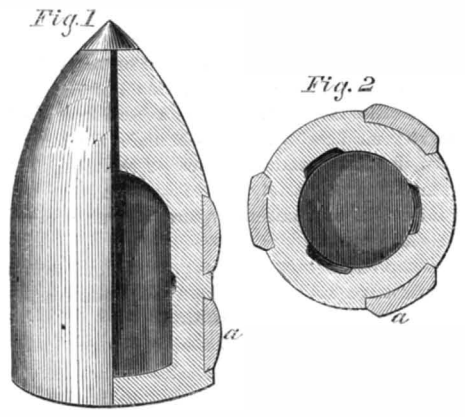
The Spanish government has set an example well worthy of imitation, by publishing the report of the experiments made by the Artillery Committee before deciding on the new system of ordnance, and the reasons given by it for its decision. From these documents it appears that after trying various kinds of breech-loading guns with lead-covered shot like those now in use in England (the Armstong system), a muzzle-loading projectile on very nearly the same plan as the French was found to give better results. A range of 6,600 yards was obtained at 17° of elevation with a 56-pound hollow shell constructed on this system, the extreme simplicity of which the accompanying drawings will render apparent.

The shell is entirely of cast iron, except six buttons of zinc *a a*, which enter the grooves of the gun and give rotation to the shell. As may be supposed, the exact angle for the grooves, the exact length of the shot and position of the buttons best adapted for service, were not ascertained without many trials. At last, however, great certainty of aim seems to have been attained, to judge by the published tables of firing. As to range with practicable angles of elevation, nothing comes up to the reported 6,600 yards with 17°. The nearest approach is by Lancaster, whose 100-pound shell ranged within 1,000 yards as far. Whitworth and Blakely and Armstrong may be able to do more, but we are not aware of their having done it yet.

Captain Blakely, indeed, may claim a great part of the credit of the success of the Spanish artillery, for though the projectile is not his, no guns could be found to fire it with safety but such as are built on his system. The committee reports the trial of many service cast-iron guns rifled, but although the Spanish cast iron is celebrated for its excellence, none stood the great strain produced by firing elongated shot. On the danger of rifling the present stock of cast-iron guns, the committee insists formally in more than one report.

On the 2d January, 1860, it writes:—"Cast iron by itself, as is clearly proved to us by the bursting of the guns we have tried, is not strong enough to resolve the question of rifled cannon of large caliber, unless the charge of gunpowder be much reduced, and even then the gunners would not feel confidence in their guns."

Large iron guns forged in one mass the committee condemns also, and judging by the bursting of the 6-inch forged gun at St. Petersburg a few months ago, and of the 7-inch forged gun at Shoeburyness more recently, we feel inclined to agree in this decision. We hope, however, that wrought iron will not be found as the committee reports it, "without the hardness and other qualities *necessary* to the bore of a gun." If it be really true that guns built up on Captain Blakely's plan, over a central tube of cast iron, are not only cheaper but really better than if the whole mass is of wrought iron, what a mistake England has committed !



The Spanish Artillery Committee asserts that the cast iron center is best, and gives detailed reports of the resistance of several cannon so constucted. We have space for but a few extracts. On the 9th of March, 1859, a comparative trial of a cast iron 32-pounder and a Blakely 32-pounder is thus reported :—

"The results of the proof are the following:—

	No. of rounds with 3 ks. powder.	3½ ks.	4 ks.	Total.
Hooped gun ...	600	200	400	1,200
Gun without hoops --		153	—	152

"The hooped gun is not at all injured. The firing was in the same place, and equal in all circumstances. Seeing this, and taking into consideration the premature bursting of the unhooped guns at Gijon, the committee connot do less than acknowledge the great increase of strength which the hoops supply, and declare themselves convinced that from guns cast of iron, in a single piece, the advantages of the system of rifling cannot be obtained." On the 13th of November, 1859 a Blakely gun, of 16 centimetres bore (6⅜ inches), is reported to have "been fired 900 rounds without suffering even the slightest alteration." On the 4th of September, 1860, another of the same bore, and weighing only 2,835 kilogrammes (about 57 cwt.), is reported as bearing no less than 1,366 rounds, with $28\frac{2}{10}$ kils. (about 60 pound) shells, and charges of 3 and 3½ kils. of powder. "During the first days of proof 100 rounds were fired, with intervals of only from 1 to 1½ minutes. On the following days 50 rounds were fired with the same rapidity every morning, and 50 more every evening. The gun could not be touched with the hand on account of the heat." No wonder the committee thinks that this proof "renders apparent the excellence of the gun, and consequently that of the hooping system."

The final decision of the committee, which has been acted on by the government to the extent of ordering 600 sixty-pounder cannon, we cannot give better than in its own words;—

The path we must follow is clearly indicated : cast-iron cylinders hooped, a most simple manufacture, which, once established, only requires great care in securing the proper diameter to the bore of the hoops. The difference between the diameters of the hoops and of the cast-iron part must be determined by experiment, aided by calculation."

Besides the sixteen-centimeter gun, the Spaniards have rifled guns 4 8-10ths. inches diameter, for siege purposes, and reserve batteries throwing shells of about twenty-four pounds weight. The rifling is very similar to that of their larger guns, with six grooves, however, instead of three. The shells are of cast iron—strong enough to breach masonry—and have each six zinc buttons to take the rifling. The loading is by the muzzle. The reports from which we derive our information contain detailed accounts of experiments with breech-loading cannon, but of none which gave satisfaction to the artillery committee. The lead-coated shot they declare to be uncertain in aim, in consequence of the difficulty of always securing exactly the same difference between its diameter and that of the bore of the gun. Hence, the friction varying ; so does the range.

For field artillery the Spaniards have adopted a caliber of 3 4-10ths. inches, and a shell of about nine pounds. This enables them to use their stock of 4-pounder brass guns. These weigh about 6½ cwt. For mountain service they use the same shells and guns, weighing only 2 cwt.

An exceedingly interesting experiment is reported to test the powers of the new rifled field and siege guns. The fortress of Molina de Aragon was breached in three places by an old smooth-bored 24-pounder, by a 4 8-10ths. inch rifled gun, and by a 3 4-10ths. inch rifled gun. The former opened a breach eleven yards wide, in the ten feet thick wall, in 107 rounds, requiring ten hours. The second made a similar breach in 222 rounds, in fifteen hours ; and the third in 800 rounds, in forty hours.

Taking into consideration the much greater facility of moving the lighter rifled guns than the heavy smooth-bore 24-pounder, the commission unanimously recommend the use of the medium rifled gun for siege purposes. One observation made during this experiment we were not prepared for ; this was the less liability to rupture of the elongated shells than of the round solid shot but of 107 of the latter fired all but five were broken. Out of forty-one unloaded shells only three broke ! Does not this bear on the question of iron-plated ships ?

The Spaniards are now making further experiments, with a view of replacing brass for siege guns, with iron, built upon Captain Blakely's plan. This they are desirous of doing, on account of the destruction of brass when heated by rapid firing. They are also trying steel. We strongly recommend to our readers interested in gunnery to study for themselves the reports we have only had space thus briefly to notice.

English Patents.

The London *Times* gives the following statement concerning the condition and transaction of the English Patent Office :—

In the year 1860 there were 3,196 applications for provisional protection of inventions, and the number of patents actually passed was 2,061 ; in the other 1,135 cases the applicants did not proceed for their patents within the six months. The number of patents that prove useless is very great. The first 4,000 under the new system were granted in 1852-54, all for fourteen years, but liable to become void unless a stamp duty of £50 were paid at the end of three years, and another of £100 at the end of seven years, and of the whole 4,000 only 1,186 paid the £50 duty at the end of the third year, and only 390 the £100 duty at the end of the seventh year; so that nearly 90 per cent were allowed to become void by the end of the seventh year. Still, the stamp duties received last year amounted to £108,000. The fees paid to the Attorney and Solicitor-General and their clerks amounted to no less than $9,621. Abstracts or abridgements of specifications of patents continue to be published, and sold at the cost of printing and paper ; the subjects now in the press are, shipbuilding, preparation of fuel and apparatus for its combustion, steam-engines, weaving, photography, bricks and tiles, and spinning. The Patent Office labors under the prevalent complaint—it has no room, it has books for which there are no shelves, and models which it has no opportunity to exhibit. But the fees have annually produced a surplus, which has now accumulated to the extent of £92,000, so that there is a building fund to begin with.

BRIGHT LIGHTS.—The Drummond light consists of a stream of oxyhydrogen gas burned upon a piece of chalk (carbonate of lime). It has also been called the "oxyhydrogen" and the "calcium light ;" but it is most generally known by the first name, because Lieut. Drummond first applied it practically and publicly in 1826, while conducting the ordnance survey of Scotland and Ireland. The light is very white, and it has been seen at a distance of 90 miles on a dark night. It has oftentimes been proposed for lighthouses, but the electric light is more promising for this purpose. because more simple.

Socialism in Inventions.

[From the London Engineer.]

We should feel pain in believing that the views expressed by Sir W. Armstrong, at Sheffield, respecting inventions and patents, were shared to any extent either by the mechanical engineers or any other class in this country. In so many words he denied the natural right of the inventor to property in his own invention. "Primary ideas," Sir William took occasion to say, "ought to be the common property of all inventors," which amounts, of course, to saying that they ought to be the common property of everybody. "Protection," he went on to remark, "if we are to have it at all, should be sparingly awarded to those persons alone, who, by their labor and intellect, give available reality to ideas." Thus not only is the inventor, or the "mere schemer," as the president of the Institution of Mechanical Engineers chooses to designate him, to be shut out from any exclusive right to his own ideas, but he is, indeed, to be shut out from even a common participation in the benefits resulting from them, since, with all his leaning for communism in such matters, Sir William prefers to grant patents at least to those who have worked out what may be other peoples' ideas into profitable shape. "The merit of an invention seldom lies in the fundamental conception," quoth the same oracle. Does Sir William Armstrong really attach no value to inventions, or does he, like Mr. Denison, Q.C., believe that inventors can no more help inventing than hens can help laying eggs, deeming it as well, therefore, to rob the nests wherever he can find them? We presume the argument relied upon is, that anybody can invent, and that, therefore, monopoly on the part of an individual is a common injustice to all. If this be true it does seem a little strange that it was not until the world had been inhabited for nearly 6,000 years that the steam engine, the spinning frame, the power loom, the locomotive, the steamship and the electric telegraph were thought of. And now, that we think of it, Sir William Armstrong, with whom invention must be easy, has given the world a few proofs of his capacity in that line. He has made an adaptation of a water pressure engine invented and used half a century or more ago, and he has compiled and patented a gun which, whatever its range, is inevitably destined to be abandoned as too complicated and costly for general use; guns of the simplest construction and made of soft steel being absolutely more effective. But it is probably only the intention of the patentee of the "Armstrong" gun, and who has sold his patent to the government for £20,000 down, and "contingencies," to argue that he *could have produced* any one or more of the many inventions for which protection has been granted by the Commissioners of Patents. Possibly it is easy enough to see how we might have made the egg stand upon its end after some Columbus has kindly shown us how. "We see," or, rather, Sir William sees, "numerous cases of disproportionate wealth realized by persons whose only merit has been promptitude in seizing upon and monopolizing some expedient which lay upon the very surface of things, and required no forcing atmosphere of protection for its discovery." Surely Sir William is not here alluding to himself, although we are much tempted to suppose so. If, as is clearly to be inferred from the remark, patents in general are the results of a prehensile faculty by which "expedients lying upon the very surface of things" are exclusively appropriated, why will not Sir William Armstrong be so good as to anticipate all the important inventions of the next half century, and thus (even if taking care to obtain his own patents) cut off all chance of annoyance from other patentees, who might otherwise lay claim to what, even if they were the first to discover it, appears, after all, to be common property? Surely one who is able to speak with such authority as to the facility of invention might render the world this service—so trifling to himself, so vital in its consequences to mankind! Under the inspiration of Sir William's logic, what a trumpery idea does that of Watt appear as to the separate condenser, that of Cort as to the rolls and puddling furnace, that of Arkwright as to the spinning throstle, that of Millar and Symington as to steam navigation, that of Winsor as to gas purification, that of Howard as to boiling saccharine fluids in *vacuo*, Neilson's crochet of the hot blast, Roberts's contrivance of the mule, Stephenson's locomotive, Wheatstone's pins for arresting the needle, which Oersted had shown, nearly twenty years before, *must* be deflected, and finally, the idea of Armstrong's unskillful and complicated gun! These were fundamental ideas, all of them, and for which, erroneously it would now appear, mankind have been content to applaud those who conceived them.

Mr. Brunel always held that a gift of two guineas was ample remuneration for a workman who had schemed a good thing. What munificence, then, had it been on the part of Lord Derby to have handed a five pound note to the plain Mr. William Armstrong, of Elswick, in 1858, as full reward for the scheme of the gun of which each costs, it is understood, £2,000 to make! We say this with no desire to detract from the merits, whatever they may be, of that contrivance. An inventor and patentee, who holds all other inventions so lightly, may, however, confess to the shallowness of his own. For if it be true that Sir William is really an inventor, his beloved country has much reason for praying that he will invent no more.

Sir William can only explain away the inconsistency that, while he is decrying patents, he is himself a patentee, by urging that manufacturers are compelled to patent their own ideas in order to be enabled to work them, as they would else be seized upon and patented by others. Whether from inadvertance, or otherwise, this excuse is based upon a falsehood. No man need patent an idea, or a machine embodying an idea, for the mere purpose of preventing its being patented by others. Had Sir William, instead of patenting his modification of the old water-pressure engine, at a cost to himself of some hundreds of pounds, published to the world the same specification as a book, and at one-tenth the outlay, he would have effectually shut out all chance of his plans being exclusively appropriated by any one. Watt, Arkwright, Bramah, Cort, Hargreaves, Winsor, Howard, Sir Samuel Bentham, Brunel, Neilson, Roberts, the Stephensons, Wheatstone—indeed nearly all inventors of note—have elected, however, to patent their ideas, notwithstanding that they could have made them the common property of all by simply publishing them in full to the world. Had there been no patent laws these inventors would not have had the same motive for invention, unless upon Mr. Denison's idea, invention is the involuntary exercise of a natural function. Why are not the Swiss inventors? Their ingenuity (which is not invention in itself) is everywhere admitted. Switzerland has no patent laws, but an ingenious Swiss, Mr. Bodmar, when he came to this country, made a multitude of inventions and took out a great number of patents. Without patent laws the "prestige," as Sir William chooses to call it, of "successful invention," would be a mockery, and, upon the assumption implied in his remarks, that there is no merit in mere invention, there would, indeed, be no chance of "prestige," whatever that may be. But we have not argued, nor shall we seriously do so, the question of the merit of invention with one whose perceptions in that respect appear so oblique as do those of Sir William Armstrong. Whether known as an invention or discovery, the enunciation of an original idea, capable of embodiment in mechanism for the advantage of mankind, has long been, and, we hope, long will be, esteemed as meritorious and deserving of reward in proportion to the value it may be made to yield. The merit being admitted, it is but justice to reward it, either by a grant of money, or by that of a limited monopoly of the invention itself. It is incumbent upon no man to invent for another, unless he be paid for his pains, and yet Sir William would confiscate the invention, holding that "primary ideas" should be common property, just as a furious mob might say the same of Elswick factory. When the time shall have arrived for withholding all reward from inventors, whose thought is of the highest order of merit, the occupation for brains will indeed be gone. Is there no fear that, were that time to come, the thinkers would begin to ask by what right property was held at all, and why it was not divided in common? The communism desired by Sir William might then take a different and unexpected shape.

The first inventor is, clearly enough, the one to whom reward for the invention is due. And fourteen years, in any case, is the longest term for which the inventor, rewarded by a patent, can set up his claims in the way of any one. Many patents lapse at the end of six months, a much larger number at the end of three years, and a considerable share on the expiration of seven years from the date of issue. It is idle to say that the progress of inprovement is being obstructed by the existence of patents of no practical value. These very patents, most likely, which Sir William would thus characterize serve to provoke fresh inventions of a class to supersede them. And, besides, it is natural that one who denies the right of property in invention should complain of the abstructiveness of all patentees. The Armstrong gun and its projectile have been compiled from the inventions of a number of ingenious men. Mr. Rothwell Jackson, as long ago as 1834, patented the coil arrangement of wrought-iron rings for hydraulic press cylinders, Captain Blakeley, too, patented it for guns before the then Mr. Armstrong. A Mr. Benson claims the important feature in the construction of the shell, and Mr. Whitworth has had occasion to point out, before the Institution of Civil Engineers, one or two instances, furnished by the Armstrong gun, of infringement upon his own plans. Is it, therefore, manly and fair for one, who, with the results of so much eclecticism in his favor, has had the public purse almost at his own disposal, now to raise an outcry against those to whose efforts he owes so much? Not content with appropriating the ideas of others, right and left, he would have the larceny legalized by the world. We think that we can congratulate inventors that, under all the circumstances of this attempt to strip them of their property, it will not have the slightest chance of success. It is not less for the interest of the public at large than for that of inventors themselves, that their rights should be sacredly respected. They give infinitely more than they receive; and even if all considerations of justice were set aside, it would, we apprehend, prove to be the worst policy to withhold from them the only encouragement which they now have to exertion. From the unjust and ungenerous detraction of Sir William Armstrong, from whom inventors had every right to expect appreciation and sympathy, they have little to fear.

New Flax Company.

At a public meeting in Lockport, on the 19th ult., the establishment, in that village, of the American Flax Company was announced. Hon. Samuel B. Ruggles made some remarks at the meeting, in which he represented the importance of Lymans invention for cheaply extracting from flax a fiber capable of being substituted for cotton, at least to a considerable extent. We quote from the Lockport *Journal*:—

Mr. Ruggles dwelt earnestly on the importance of developing this new branch of industry, not only in increasing the trade and revenue of our canals and opening new sources of agricultural wealth, but its far higher influence in securing to the Northern States, and to Europe, comparative independence from "cotton domination," with which the world has been threatened.

Among the many interesting statistical views which he presented was the dominant fact that the price of the flax fiber, thus produced and ready for use, would fall far short of the present price of cotton, probably not exceeding eight, and certainly within ten cents per pound.

In the assumption that an acre of land will produce 1½ tuns of flax, (on which point, however, he asked the meeting to procure more accurate information,) that each tun will produce 300 pounds of fiber, every acre of land thus employed would yield a bale of 450 pounds of fiber. He expatiated on the immense agricultural capacity of our neighboring States North of the Ohio, and the high political importance of this homogeneous culture, as riveting still more strongly the union, at least, of the Northern States.

Ex-Governor Hunt also made a speech on the occasion, setting forth the objects of the company, and we learn that a factory will either soon be engaged or a new one built. The fiber obtained by this process is mostly short, but good, and is capable of being used with great advantage in the manufacture of mixed woolen goods. We have always been the constant advocates for the cultivation and manufacture of flax and flax fabrics in America.

Our people should not expect to obtain flax as cheap as cotton. We are confident that flax of as long fine fiber as cotton would be cheap at almost double the price of cotton, because it makes such superior cloth.

WHITE lead and litharge mixed together in nearly equal proportions with boiled linseed oil so as to make it of the consistency of putty, forms a good cement for joints of steam pipes. This is also a good cement for water cisterns, when mixed with about 10 per cent of dry white sand.

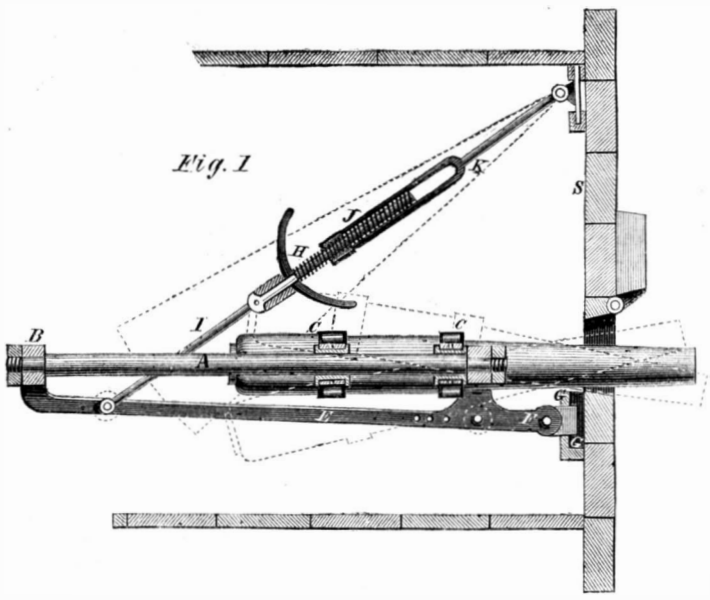
Slinging and Working Guns.

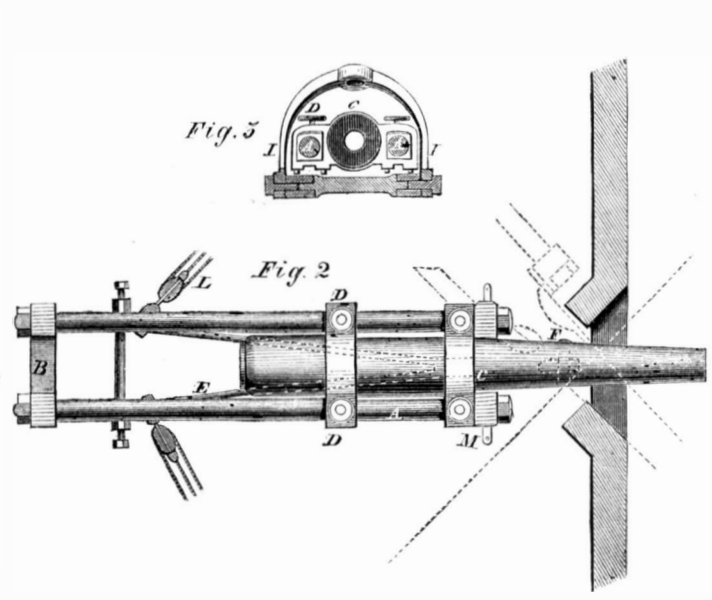
The accompanying engravings represent an important mode of slinging and working guns, invented by Scott Russell, of London. Its object is to reduce the size of the portholes and embrasures. The guns are between decks with the portholes open, and they are mounted on and between guide bars on which they are capable of sliding, there being india rubber springs used to receive the recoil consequent on the discharge. A nipping apparatus is also employed for increasing the friction so as to resist the backward motion of the gun. This is most conveniently accomplished by an inclined surface which is caused to bear tightly upon one or both of the bars. The hinder ends of the two bars upon which the gun slides are connected by a crosshead, which may be supported from above, or it may be supported upon a sledge, or upon wheels resting upon the deck. The breech end of the gun with the bars upon which it slides are elevated and lowered as may be required.

Fig. 1 shows a vertical section, and Fig. 2 a plan, partly in section of the arrangement preferred when a gun is mounted between two bars; and Fig. 3 shows a tranverse section taken near the ends of the two bars.

A A, are two bars which are connected at the ends by a crosshead, B, and at the other end the bars are connected by a crosshead or bar, which is hollow for the under side of the gun to rest on; the gun is also supported in and connected with the two rods or bars by two slides, C C, which at their ends embrace the two bars, and there are friction surfaces which are acted on by the screws, D, so as to offer any desired friction according as the screws, D, are more or less screwed up.

These bars are arranged to move freely up and down and to and fro horizontally, and it is by such movement of the bars that the pointing of the gun is obtained. E is an under framing to the bars, which at one end is connected to the crosshead, B, and at the other end to the crosshead under the gun. The end of the frame, E, together with the bars, A, pivot on the horizontal axis, F, and the vertical axis, G, as shown; but in place thereof the bars might be connected to a ring carried by vertical and horizontal axes or gimbals, so as to obtain similar motions of the bars, A, together with the gun. In the arrangement shown, a screw, H, connected to a forked connecting rod, I, is used to raise and lower the breech end of the gun; such screw working in a screw nut, J, carried by a suspending or radius rod, K; but tackle may be used above the gun, as tackle is used on either side of the gun at L L. In addition to the friction surfaces acted on by the screw, D, spring buffers may be used behind the gun and between it and the crosshead, B. Tackle is also applied at M M, to run out the gun. In thus supporting a gun on bars it is not essential that the bars should be so arranged as to admit of the gun being placed between them, as a gun may be carried by and slide on a bar or bars otherwise placed, so long as such bars are arranged to pivot with the gun, as described.





SLINGING AND WORKING GUNS.

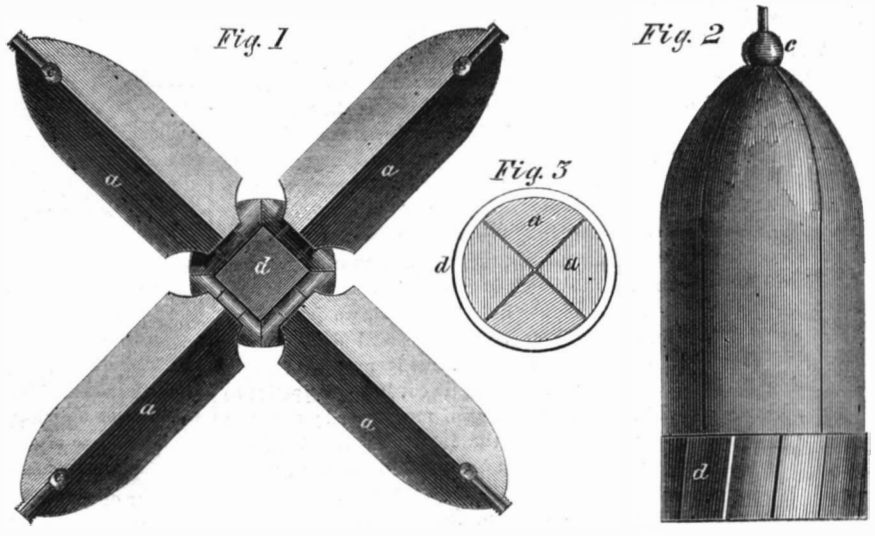
Improved Expanding Projectile.

New ideas in regard to weapons of war continue to come forth from the fertile brains of our thinking people in vast numbers. The novel invention here illustrated is but one of the many which have been developed by the war. A shot is made in four sections, hinged at the breech, and carrying a fuse with a charge of powder so arranged that at the proper time in the flight they will be thrown apart in the form represented in Fig. 1; thus increasing the breadth of their destructive track.

The four sections, *a a a a*, Fig. 1, are made of cast iron, and are connected by simple hinges to the breech-piece, *b*, also of cast iron. When brought together they form the acorn-shaped shot represented in Fig. 2; the button, *c*, being screwed around the projections on their ends to hold them together. They are also further confined by the soft metal cup, *d*, around the base, this cup serving to fill the rifling, thus closing the windage and giving the spiral motion to the shot. A cavity, *e e e e*, is formed in the shot near its apex to receive a charge of powder, which is connected with a fuse leading outward, to be fired at the discharge; and when the fuse has burned in to the cavity, *e*, it fires the powder in the cavity and throws open the shot in its expanded form.

Each of the sections, *a a a a*, is made hollow, and is filled with powder to act as a shell. A fuse leads from this central charge of powder to the cavity, *e*, so that when the powder in the latter is burned it kindles the fuse and this conveys the fire to the central charge, exploding the shell. Fig. 3 is a cross section of the projectile, showing the shape of the sections. The shell may be made in 2, 3, 4, or more sections; and the lengths of the fuses must be adjusted to the times of flight.

It will be seen that this shot cleaves the air with the ease of the ordinary elongated projectile; at the desired point in its flight throws out its wings, cutting a wide path of destruction; and finally explodes into a multitude of fragments, scattering death in every direction. A shot 4 inches in diameter measures 20 inches when expanded.



GAULT'S EXPANDING PROJECTILE.

The patent for this invention was granted to the inventor, John Gault, of Boston, Mass., through the Scientific American Patent Agency, July 2, 1861, and further information in relation to it may be obtained by addressing George R. Jackson & Co. (to whom an interest in the invention has been assigned) at their iron works, 201 Center street, New York. This firm is prepared to manufacture the projectiles in any quantity.

Machine Barber.

A patent has lately been applied for in England by Tom Bromwich, of Bridgenorth, Salop, for a machine for cutting the hair of the human head—a capillary abridger by which Monsieur Tonson's "occupation is gone." Its object is stated to consist in combing and cutting the human hair at one operation. A comb, consisting of a flexible steel blade is made to pass under the hair and hold it to the action of a pair of scissors which follow the bend and motion of the comb. To all barbers who desire to engage in hair cutting upon a scale extensive as their loftiest ambition, we recommend Jenkins's American Sheep Shearing Machine, illustrated on page 129, Volume XIII., Scientific American (old series). It will beat that of Tom Bromwich or any kindred machine in old England "all hollow."

Massachusetts claims to have constructed the first railroad and the first canal in America. The Middlesex Canal, uniting the Merrimac river with Boston, was finished in 1808. It formed the model of the New York and Erie Canal. The Quincy Railroad, having train rails and operated by horses, was the first railroad. It was opened in 1827. The railroad between Albany and Schenectady, N. Y., is the first upon which passenger steam locomotives were used.

No less than eighty million forty-two thousand six hundred and ninety-eight tuns of coals were raised from the mines in Great Britain in 1860.

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NEW YORK, SATURDAY, SEPTEMBER 14, 1861.

INFORMATION AS TO THE PATENTABLE NOVELTY OF INVENTIONS.

The list of claims published from week to week in these columns, indicate truthfully the extent of business being transacted at the Patent Office.

It will be observed that inventors are far from being dormant, if they are not as numerous and active, as they were a year ago. Since the first of July we have received a great accession to our subscription list of subscribers, and for the information of each, 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 who contemplate to secure 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. 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 drawing and description or a model of the invention should accompany the remittance. Address—

MUNN & Co., No. 37 Park-row, New York.

TELEGRAPHING BY OCCULTATION OF LIGHTS—SEVERAL CLAIMANTS FOR THE DISCOVERY.

On page 22 of our present volume, the method of telegraphing by lights, according to experiments performed by Professor Tuttle, of Cambridge, Mass., was fully described. The nature of his invention consists in making the time of the disappearance of any fixed light correspond to dots and lines of the Morse telegraph alphabet, and also "by making the time of the appearance of the light correspond to the same thing."

The London *Mechanics' Magazine* published our description of the system, giving Professor Tuttle the credit of the invention, but it now claims it for Prof. Babbage, of London, who is also known in scientific circles to be a most ingenious mechanician. In the last number of the *Magazine* received by us, it is stated that in 1851 the United States government appointed a Lighthouse Board, to inquire into the condition of our lighthouses, and in the report presented by its members, there is a paper by Prof. Babbage for distinguishing lights by occultations, by a system similar in its nature to that of Prof. Tuttle.

We are not informed when Prof. Babbage invented his system, but Mr. H. J. Rogers, of this city, on page 39 present volume of the SCIENTIFIC AMERICAN, claims to have invented it in 1844—seven years before the paper printed by the Lighthouse Board.

As applied to lighthouses and vessels at sea, Prof. Babbage has worked out his system in a more complete manner than any of our American inventors, and if not the first inventor, he deserves credit for having made the system most perfect. By his system it is impossible to mistake any casual light on shore or at sea for a lighthouse, or one lighthouse for another. Every lighthouse on a coast is to have its special number, and it is made to repeat its number continually during the time it is lighted. This is accomplished by inclosing the upper part of the glass cylinder of an argand burner by a thin tube of brass, which is allowed to descend slowly by mechanism before the flame, then suddenly start back, thus causing an occultation and reappearance of the light. Thus, if the number of the lighthouse is 24, there is first two occultations and a short pause; then four occultations and a longer pause, and so on all night.

Prof. Babbage describes the following method for telegraphing by occultations between lighthouses and ships in distress:—

1st. The ship fires a gun and hoists a light.

2d. The lighthouse ceases repeating its number and becomes a steady light, informing the ship that its signal has been observed.

3d. The ship having a prepared message in numbers, expresses it by occultations of its own lamp.

4th. The lighthouse occults its answer.

This is a most simple system of telegraphing at night by lights. With common coal-oil lamps and an understood system of messages represented by numbers, it is very easy for persons to hold converse several miles distant at night. Neighboring farmers in the country may devise their own alphabets and communicate in this manner with one another. And with a secret alphabet, military night signals may thus be transmitted in the absence of rockets.

REVIVAL OF BUSINESS.

Our merchants are experiencing a glad surprise in the rapid revival of business. The city is filling with dealers from all parts of the North and West, who are here for the purpose of buying goods. There is an almost complete destruction, however, of the credit system, our jobbers generally refusing to sell on longer time than from ten to thirty days.

What a blessed thing it would be for the country if this foolish system should never be revived. It has been the cause of more social misery to the favored classes of our people than all other causes combined. Carefully collected and reliable statistics reveal the astounding fact that out of every hundred men who engage in mercantile pursuits in this country, ninety-seven become bankrupt at some period of their lives. What a wretched life do these people lead! A brief period of wild extravagance, followed by long years of bitter humiliation. And this is the lot of almost all of our whole mercantile class. How much wiser and happier is the life of that three in the hundred who do not fail! These people commence by close economy, and, not being impelled by enormous expenses to make great nominal profits, they do a snug business within their means. As their capital increases they enlarge their business and their style of living; always keeping both, however, within moderate bounds; and thus their life is one of steadily advancing prosperity. This happy life would fall to the lot of all of our merchants if trade was universally done on a cash system.

If this great reform cannot be universally pursued, we hope to see a large number of our dealers adhere to it. All the burden of the change has now been borne, and it is only necessary to continue the cash system that is now in practical operation. If the war should sweep away forever our credit system, this one blessing would more than balance all its evils.

ALUMINUM BRONZE—BRASS.

A great number of experiments have recently been made by B. L. Proctor, of Newcastle-upon-Tyne, England, to test the qualities of aluminum bronze (copper and aluminum) and common brass (copper and zinc) for withstanding corrosion, when exposed to acids and various gases and the moist atmosphere. No less than thirty-one different experiments are recorded in the *Chemical News*, and from these Mr. Proctor draws the following conclusions:—

It appears that the bronze has a little advantage over ordinary brass in its power of withstanding corrosion, and that its surface, when tarnished, is more readily cleaned. This should give it a general preference where cost of material is not an important consideration, especially if strength, lightness or durability is at the same time desirable.

In comparison with brass, it is but little acted upon by ammonical salts and coal gas, and it thus offers advantages for the construction of gas meters, stop-cocks, and joints in all gas fittings. It is also well adapted for door plates and bell handles, as it is not easily acted upon by the weather; and even when it becomes dull, it can be easily rubbed bright again with a piece of soft leather. Brass is very liable to corrode at the edges, when used for hinges and almost every other purpose; aluminum bronze is free from this defect. For culinary vessels, aluminum bronze is superior to tinned brass and most of the materials now used; and for drawing instruments, telescope tubes, and all kinds of philosophical and mathematical instruments, it is altogether superior to brass. Aluminum bronzes cannot be made of a good quality except with perfectly pure copper.

THE NEW SPANISH RIFLED CANNON.

On another page will be found a description of the artillery recently adopted, after thorough experiments, by the Spanish government. They have decided on using muzzle-loading rifled cannon, made with a core of cast iron, hooped with wrought iron, essentially on Capt. Blakely's plan. These guns are advertised in the English papers, with either steel or iron cores, at very low rates—12-pounders for $150 and 200-pounders for $2,000. It was a Blakely gun that did the most execution at the attack on Fort Sumter. The ablest engineers in England seem to be following the conclusions of our own ordnance officers, that there is no better material for artillery than cast iron. Whether Blakely's plan of hooping the central core with wrought iron is better than Rodman's plan of making the gun wholly of cast iron and increasing its strength by cooling it from the inside, remains to be determined by experiment. It is quite possible that Blakely's may be better for light field pieces and Rodman's for heavy fortification ordnance.

We have thought for some time that the Blakely gun was the best yet produced in England, and this indorsement by the able commission of the Spanish government of course tends to confirm this opinion.

GREAT TRIAL OF STEAM PLOWS.

An extensive trial of steam plows, lasting 12 days, has recently been made at Leeds, England, and the *Mark-Lane Express* gives an elaborate report of the experiments. Most of the work was done by engines stationed at the side of the field and drawing the plows across by long ropes; though it seems there were at last two engines that traveled over the ground. The *Express* concludes that the latter system is impracticable, but concludes that plowing on the long-rope plan may be introduced on very heavy clay soils as a partial substitute for horses.

The engines cost from 2,500 to 4,000 dollars apiece, and the cost of the plowing ranged from $1.38 to $2.10 per acre. The fastest work was at the rate of about three-fourths of an acre per hour, and the shortest at the rate of an acre in two hours and a half.

The *Express* comes to the conclusion that steam cannot be used profitably in plowing any land that can be plowed by two horses at the rate of 1½ acres per day.

BESSEMER'S PROCESS OF MAKING STEEL.

In our last week's issue we published some extracts from a paper read by Mr. Henry Bessemer, of Sheffield, before the Institution of Mechanical Engineers, on his mode of refining iron and making steel. Our extracts related merely to the quality of the metal and the uses for which it is adapted. On examining his paper the second time we are so impressed with its readable and instructive character that we are induced to publish the remainder of it, and it will be found on another page. Besides the remarkably clear and vivid account of his own brilliant process, Mr. Bessemer gives the plainest and best description that we have seen of the ordinary mode of making cast steel.

INFORMATION ABOUT HYDROPHOBIA.

No person who has seen a case of hydrophobia can ever forget the painful scene. Of all the maladies to which human beings are exposed, this is perhaps the most mysterious, and it is surrounded with a dreadful interest. As there is a great deal of popular fallacy afloat respecting it, every item of reliable information and every gleam of light which can be thrown upon the subject deserve to be collected and placed before the public.

In the last number of *Blackwood*, there is a very profound essay on rabies, in which current ideas on this malady are shown to be not only inaccurate, but dangerously wrong. For example: it is commonly believed that rabies in dogs is peculiar to the warm months—the "dog days"—and in July and August great precautions are taken, which no person thinks of in November and December. "But," says the writer, "the dog days have no more to do with rabies than the moon with lunacy." In the veterinary schools of France, the records kept respecting the cause of hydrophobia show that a majority of cases have occurred not in the hottest, but *wettest* months. In April, November and December, double the number of cases occurred as compared with July and August. M. du Chaillu, the late African traveler, states that most of the West African villages are crowded with dogs, but hydrophobia is unknown to the natives. In Cyprus and Egypt, which are also very hot and dry countries, the disease is unknown, thus showing that it is not at all produced by heat or dryness of atmosphere.

It is also supposed that all mad dogs foam at the mouth, and that they run about snapping at man and beast, manifesting great ferocity. There is only one stage of rabies in dogs in which they foam at the mouth, while healthy dogs foam frequently. Gentle dogs, when affected with rabies, are generally gentle to their masters, but they will then snap at other dogs; it is only the ferocious dog that shows very great fierceness when rabid. It is also a popular belief that dogs attacked with rabies are afraid of water; hence, the name *hydrophobia* (horror of water) has been given to the malady. This is a misnomer, and the popular notion respecting it is a dangerous error. A burning thirst is one of the characteristic symptoms of rabies in its earlier stages, and when a dog laps water or plunges into it, it is no sign, as some suppose, that he has not the disease. In man, during the latter stages of the disease, there is an undeniable dread of water, and hydrophobia is not inappropriate when applied to him; but in dogs, a dread of water does not show itself in one out of fifty cases. An acquaintance of ours once pursued a mad dog which had bitten some of his hogs in the barnyard, when it plunged into a river of considerable breadth; it was then followed in a boat, and shot a short distance from the further shore. This was in the early part of December, and there was snow upon the ground at the time. The weather, as it regards heat, had nothing to do with this case, and no fears of water were shown by the animal, thus disproving two popular notions respecting the disease.

The writer in *Blackwood* states that it is as yet undecided whether rabies *now* occurs spontaneously, or is only the result of direct inoculation by biting, and it is not certain that every man and animal bitten by a mad dog will take the disease; but when it is once completely developed in a man, "the physician that cures is *Death*." Man or beast, once infected with the poison, is doomed to a certain and horrible death.

Mr. Youatt, the greatest authority on rabies in dogs, thinks that it does not now occur spontaneously, and he believes it may be extirpated everywhere if a thorough quarantine could be established on dogs. It appears to us that at least eighty out of every hundred dogs in every community are of no use, and that it would be well to destroy just about this proportion of them.

The essayist says:—

All who are in charge of a dog may, by a little attention, discover the early symptoms of rabies, and prevent any mischief by sequestrating the animal in time. Is he fidgetty and sullen? Does he, when first ill, manifest importunate affection? Is he affected with hallucination? Does he exhibit ardent thirst? Does he scratch his ear violently? and does he paw the corners of his mouth without keeping the mouth permanently open? Does he refuse his natural food, and exhibit a depraved appetite? Is he insensible to pain, and his voice strangely altered? Any one of these symptoms should awaken suspicion, and a close observation will soon discover the true state of the case. We advise all our readers to commit this information respecting the symptoms to memory, as it may be of paramount importance at some future period.

The poison of rabies is not communicated by contagion, but inocculation with the saliva. One mysterious feature connected with this poison, is that after being bitten it may remain in the system for nearly a year before it develops itself. How it thus remains inert is unknown. When a person is bitten by a dog supposed to be mad, the only safe course to pursue is to cauterize the wound at once. It is a consoling fact that only one out of every three persons bitten by mad dogs have become affected with hydrophobia; still, the malady is so terrible and treacherous that every precaution should be used at all seasons of the year to prevent it.

OXYGEN DECOMPOSED.

When repeated charges of electricity are passed through a jar filled with atmospheric air or with pure oxygen gas, the oxygen acquires new properties. It emits a peculiar odor, it possesses extraordinary bleaching powers, and has its affinities, or power of combining with other substances, very largely increased. Schönbein, who first discovered this fact, supposed that he had found a new substance, and he gave it the name of ozone, from the Greek, *ozo*, odor; its most striking peculiarity being the odor which it emitted. It has since been ascertained that ozone may be produced by passing oxygen through moist phosphorus, and in other ways, and the various phenomena connected with it have led chemists generally to the opinion that ozone is oxygen electrified, or in some allotropic condition.

Natural electric discharges produce ozone in the atmosphere, and as oxygen in this condition is more energetic in its action on the blood, as well as in all its other actions, this may account for the peculiarly exhilarating properties of the air after a thunder storm. On the other hand, sulphuretted hydrogen and other gasses arising from cesspools absorb ozone, and this may be the cause of the bad effect on health produced by the vicinity of these pools. It may also be the true nature of malaria.

We find in *La Repertoire de Chimie* an account of some recent investigations which have revived the first idea of Schönbein, that ozone is not oxygen, but a separate element. Messrs. Andrews and Tait, after a long series of observations, regard the conclusion as probable that oxygen is a compound substance, and ozone is one of its elements.

COCOA LEAVES—THEIR PECULIAR PROPERTIES

The German chemist, Dr. Niemann, has recently been making experiments with cocoa leaves, and has obtained from them—by the following process—an alkaloid which he purposes to call *cocaina*. The leaves are first steeped in alcohol of 85 per cent strength, mixed with about two per cent of sulphuric acid. After the whole of their strength is extracted by this alcohol mixture, a little lime water is added. This neutralizes the acid, and a sirupy precipitate of a resinous character falls to the bottom of the vessel. The sulphate of lime is then removed by washing with water, and the resinous liquid is precipitated with carbonate of soda. The residue is the crude alkaloid *cocaina*, which consists of colorless crystals, mixed with a yellow substance of a disagreeable odor which has to be removed by washing with cold alcohol, or filtration through animal charcoal. Pure *cocaina* is colorless, the crystals are large prisms, inodorous, and soluble in water. It has an alkaline reaction, a bitter taste, and when placed upon the tongue it promotes the flow of saliva and induces a sensation of cold. In its chemical and physical properties it resembles atropia. It is composed of C66.8, H7.1, N5.4, O20.7=100

Besides the alkaloid *cocaina*, a vegetable wax was also obtained by Dr. Niemann from cocoa.

The leaves of the cocoa are employed in Peru as we employ tea, in order to prepare a soothing beverage. Several German chemists and physicians have recommended their introduction as a substitute for coffee in European armies, on account of the well known qualities of cocoa, to preserve life and strength for a considerable period of time without common food.

On the first of August, an ærolite weighing 83½ lbs. fell at Chorley rectory, near Lancaster, England.

COATING THE BOTTOMS OF IRON SHIPS.

A great evil connected with iron steamers is the liability of sea-weed and minute shells to adhere to the metal, by which they become foul like the bottoms of uncoppered wooden ships. As this impairs their sailing qualities by offering great resistance to their passage through the water, various compounds in the form of paints have been tried, which it was expected would answer a similar purpose to copper sheathing on timber vessels. We believe that a perfect coating for iron ships has not yet been obtained, therefore many persons are engaged in making experiments, hoping to make the important discovery and thereby acquire a fortune without a doubt. A new composition or paint for this purpose was lately patented by Mr. Geo. Hallett, of Lambeth, England, which consists of native oxyd antimony reduced to powder, dried, then ground up with boiled linseed oil similar to the mode by which thick white lead is originally mixed for painting purposes. Compositions of arsenic, copper and lead have been used for coating the bottoms of iron ships, but the oxyd of antimony may be a great improvement upon these.

American Trade with England.

The civil war in our country has had a most injurious effect upon the export trade of Great Britain with America. During the first six months of the present year British exports to the United States had fallen off about 40 per cent.

The statistics of the British export trade with this country present some very striking features. In 1845 it amounted in value to little more than $31,500,000; in 1853 it reached $110,000,000; in 1855 it fell to $80,000,000; in 1856 it rose to $105,000,000; in 1858 it fell to $65,000,000, and in 1859 it rose to nearly $110,000,000. It is expected that the exports will fall to $60,000,000 for the current year.

The imports of Great Britain, on the other hand, have increased in an astonishing degree, and these are assumed to be signs of the growing prosperity of that country.

In the first six months of the present year 3,664,529 quarters of wheat, and 3,677,461 cwts. of flour were imported whereas in the first six months of 1860 the quantity purchased was only 1,394,432 quarters of wheat and 1,429,536 cwts. of flour. From New York there was exported, in the year ending June 30, domestic produce to the value of $118,190,000, against produce of the value of $70,215,000 exported in the year ending 30th June, 1860. The bulk of this increase went to England. In five months the computed value of all the principal articles imported into England has risen from $225,000,000 in 1859, and $285,000,000 in 1860, to 330,000,000 in the present year, or nearly 14 per cent as compared with 1860, and more than 30 per cent. as compared with 1859. The consequence of this increase of imports is continued cheapness in all the necessaries of life. Prices generally are low, and especially as regards articles consumed principally by the multitude. Notwithstanding the disturbance of trade arising from the events taking place here, the revenue of the British government has been better sustained in the first half of 1861 than was expected. This is fortunate for the laboring classes in England, among whom there is a vast amont of suffering, owing to strikes in the building and other trades, and short hours in the cotton factories. As regards the supply of cotton, it has as yet been but slightly affected, 5,874,435 cwts. having been received during the last six months from the United States. This quantity is less than that received during the same period in 1860, which amounted to 7,194,835 cwts; but is more than that received in 1859, which was 4,725,153 cwts.

A supply of water being needed for Fort McHenry, Baltimore, without depending upon any outside source, an artesian well was commenced, which went on very successfully until it reached a depth of 115 feet, when the auger was stopped by a bed of oyster shells. The fort has now to depend upon making a connection with one of the city mains, a rather precarious source of supply under the circumstances.

The New Orleans *Crescent* states that an iron floating battery—a steamboat clad with thick iron plates—has been prepared and is nearly ready for attacking and destroying the blockading squadron at the mouth of the Mississippi.

TAKING OF THE POPULAR LOAN.

In order to relieve the banks and to make this, what it essentially is, a popular loan, the government instructed the Sub-Treasurer to receive individual subscriptions, to be placed to the credit of the banks. That is to say, the banks guaranteed to take the stock, under any circumstances, but all of it bought up by the general public before the time for the banks' payment expires, goes to their credit, so that they only have to pay the amount representing the difference between fifty millions and the total individual subscriptions. The notes are issued in denominations of $50, $100, $500, $1,000 and $5,000; bear interest at seven and three-tenths per cent, payable semi-annually, and are redeemable at the expiration of three years from the date of issue—August 19, 1861. Before, or at maturity, they may be exchanged, if for over $500, for United States six per cent bonds, having twenty years to run.

A reporter for the *Herald* attended for a while at the office of Mr. Cisco, the Sub-Treasurer in this city, to observe the people subscribing for the loan, and gives the following sparkling account of the scene :—

THE POPULAR SUBSCRIBERS.

But the room is filling up with depositors, and we must turn away from these documents to allow Mr. Cisco to attend to these visitors, and to study the character and positions of the depositors for ourselves. Now it is not necessary for the depositors to see Mr. Cisco at all, for they pay down their money at the cashier's desk in the outer room, and the certificates are signed by Mr. Cisco and taken out to them by a clerk. But the great majority of them come into the private office, nevertheless. Some from that idiosyncracy which leads many people to believe that things cannot go rightly unless they see every thing which is done, and which makes folks inspect their luggage at every station when traveling. Others, with pleasant old Captain Cuttle's notion, that they had better be on hand in case they are wanted, and that their presence will make things easier. Others, with the consciousness that they are doing a good action, and a laudable desire to show themselves to Mr. Cisco as really the identical persons who were subscribing amounts which seem to them almost fabulous. Others, for curiosity's sake, or actuated by that unaccountable feeling of nervousness and discomfort which always seizes the uninitiated when engaged in pecuniary transactions. Others, because they are friends of Mr. Cisco and like to shake hands with him and say good cheer. Others, because they feel that by showing themselves personally to the Sub-Treasurer they are, in some sort, giving aid and comfort to the government of which he appears to them the representative. Whether for these or other reasons, they almost all come, and sitting quietly in a corner we have a chance to photograph some of them.

There were about one hundred visitors to-day, and their subscriptions ranged from $50 upward. That short, stout, broad-faced gentleman, dressed richly in black, and with a gold-headed cane, gold spectacles, and a general banking air about him, comes bustling into the room from his easy carriage down stairs, and is evidently a millionaire. He says, "$20,000" quite coolly, and rolls off to the cashier's desk hurriedly, but with the dignity of well-lined pockets. Next comes an old woman, poorly dressed, bent down by age, and looking like the keeper of an apple stand or a corner grocery of peanuts and dirty candies. What can she want there? Down go those withered hands into her bosom; tremblingly they emerge again, grasping an old stocking, from which she pours upon the table—$1,000. She has not yet spoken a word, and while you look at her, wondering where she can have procured that amount of gold, the clerk has counted up her savings, and she makes room for a dapper little "cash," who carries a small bag of gold in his hand, and tries to look unconscious that he thinks himself a shrewd business man, and imagines he cannot be humbugged. Next comes a veritable Bridget, with her $50. How in the world could she know of the loan and of its advantages? Seeing her in the intelligence office, or answering her advertisement in the *Herald*, you would never think of employing such a creature; but she has her wits, you see. Mark the shrewdness with which she watches the making out of her certificates, ready to burst out into a vehement harangue at the slightest blunder. Next comes a former comptroller of this city, now totally blind, and led in by his daughter. A few words, and this sad couple retire. Here is a negro, a colored man, an African, or whatever he prefers to be called, and instead of the $50 you expect him to subscribe, he puts down over $700, and does it with that affected carelessness and careful affectation which poor Jerry Bryant used to mimic so inimitably. Following him is a lady sweeping her long trail past you, and displaying rich diamond rings as she ungloves to write her draft. Then comes a clerk who subscribes thousands of dollars for his employers, and then, after a moment's hesitation, $100 for himself. In walks an elderly gentleman, evidently from the country, and not in very good health. He tells Mr. Cisco that he has not left his native town in New Jersey for five years before, but has taken this long and fatiguing journey because he thinks his country needs his savings. There go, past the office door, a long procession of men and boys carrying canvas bags and paper bundles of gold. This is the $3,500,000 from the banks. Next you see a chambermaid with her $50; then another merchant with his $5,000; then a laborer or a mechanic with his $100 or $200; then another capitalist, with his $10,000 or $15,000; and so the loan comes in by person after person. Here is a man who has $150 to subscribe—the extra $50 for a friend. It may all be put in one note, and his friend's $50 endorsed on the back, but he will not hear of this. The notes must be made out separately, in spite of the long troubles and complications of the double entry, for his friend wishes his name to appear also, as one of those who "stand by the Union." Next is a lady who comes from the back country, and brings a letter of introduction to Mr. Cisco. She wants to know how she is to invest her money to aid the country. Then comes the inevitable Irishman and German, who say exactly what they do not mean, but whose business the quick clerks dispatch before the inexplicit, episodical and curiously intertangled story of the depositors is half finished. Here is a clergyman from the Sixth avenue, who says ten words about his business and fifty about his determination to sustain the government. Then comes Bridget, the mechanic, the apple woman, the lady, the clerk, the chambermaid, Patrick, the capitalist, the Long Island farmer, the Jerseyman, the colored man, the German, the widow, the clergyman, and people of all classes and conditions, over and over again, and so the loan is paid in.

Chicago the Greatest Grain Port.

In the year 1840, it was stated in one of the reports presented to the city of Chicago that the exports of grain amounted to the "enormous total of 200,000 bushels in a year." During the single week ending August 24, 1861, the exports were: Flour, 26,180 barrels; wheat, 856,230 bushels; corn, 891,363 do.; oats, 65,121 do. At the same time, there was in store: Flour, 8,326 barrels; wheat, 352,131 bushels; corn, 1,931,656 do.; oats, 303,471 do. Receipts of grain for the week, flour being reduced to wheat, 2,320,180 bushels; since Jan. 1, 1861, 28,108,156 bushels—being an excess of over 9,000,000 bushels as compared with 1860. One day's receipts amounted to 425,495 bushels—double the amount that was shipped in 1840. Chicago is undoubtedly the greatest grain port in the world; and it has grown to be such from a mere hamlet of a few houses in a quarter of a century. And let it not be forgotten that this is not due to a change of trade from one port to another, but is the outgrowth, as it were, of a new creation. The grain which comes into Chicago is mostly the product of fields which, until within twenty years, had never been turned with the plowshare. Such are some of the developments of the "Great West."

ALL who take an interest in mechanism will be pleased with an examination of the improvements in the sewing machine, illustrated on the first page. The ingenuity displayed in this invention is considered more than ordinary.

A TINY STEAMBOAT.—The steam ferry-boat plying between Governor's Island and the Battery, in our harbor, is only 45 feet long, 11 feet 8 inches wide and 5 feet deep. The engine has a cylinder 8 inches in diameter, with 12 inches stroke. The propeller shaft is three inches in diameter.

Stock of Cotton in Liverpool.

There has been a decided decrease in the stock of cotton in Liverpool. On the 22d of July, 1860, there were 1,227,990 bales; on the same day of 1861, there were 1,102,600; and within ten days thereafter, it had fallen to 1,052,000 bales. Of this amount, there were 798,660 bales of American, 187,740 Surat (a poor quality of cotton), 45,750 Egypt, and the rest from a variety of sources. The total imports of cotton this year into England, up to July 20th, were 2,135,836 bales, against 2,509,039 for the same period last year. Surat cotton has greatly increased, but it would not be used if American cotton could be obtained in greater quantities and at less cost. The London *Times* states that the manufacturers are not suffering for the want of cotton, and probably will not for a year to come.

Prosperity of the Shipping Interest.

While our manufacturing interest is greatly depressed, excepting that portion of it engaged on war supplies, and the importing trade is languishing, and, in many branches, totally suspended, the mercantile marine of the country is enjoying a season of great prosperity. This is principally owing to the shipments of provisions to Europe, which are beyond all former precedent. The extra shipments of wheat alone since Jan. 1, 1861, over the same period of 1860, were nearly 10,000,000 bushels, furnishing cargoes for 318 average-sized ships; the extra shipments of corn exceed 4,000,000 bushels, furnishing cargoes for 106 ships; and those of flour were about 822,000 barrels, furnishing cargoes for 103 ships. But these are only three items of exports. The gain in cut meats, butter, cheese, lard and tallow is very strongly marked. For instance, there were 40,545,609 lbs. of cut meats shipped, against 13,772,702 for the same period last year; and 15,852,120 lbs. of cheese, against 10,675,205 last year. While the export trade is thus active, the charter and purchase of several hundred vessels for government service have aided in sustaining the rates of freight.

THE CUNARD STEAM FLEET.—The Cunard Company are at present engaged in reorganizing their steam fleet by the sale of their steamers and the construction of more powerful ones furnished with all the modern improvements. A short time since the *Etna* was sold to the Inman Company, and we have now to record the sale of the *Jura* to the Montreal Ocean Steamship Company for the Canadian mail service. The *Jura* is a fine screw steamer of about 2,200 tuns and 400-horse power, and did good service as a transport during the Crimean war. In the course of two or three months the Cunard Company will have two new steamers completed from the workshops of Messrs. Robert Napier & Son. One is the *Scotia*, a paddle steamer of 700 tuns larger than the *Persia*, and the other the *China* (s s). Both are intended for the mail service between Liverpool and New York.

THE people in Montreal are about to get up a street horse railway. It is expected that the work will be commenced upon it in a few days, and that it will be double—not two tracks in one street, but the up-track running in one street, and the down track running in an adjacent parallel street.

THE French iron-plated frigate *La Gloire* has recently made the passage between Toulon and Algiers in 16 hours; beating the quickest steamers on the station 10 hours.

POWDER MILLS BLOWN UP.—The extensive powder mills, four in number, at New Durham, N. H., were blown up at 2½ o'clock in the afternoon of Tuesday Aug. 27, killing five men. The explosion was terrific, and shook the country for miles around. The mills had a large contract to fill for the government. The cause of the explosion is unknown.

THE *London Engineer* says, that Mr. William H. Muntz, of Millbrook Lodge, near Southampton, has lately patented the American Railway Signal Cord, so long in use in the United States for giving notice to the engineer to stop the train.

THE statement which we copied from the English papers that the Russian government had ordered the construction of a large iron-plated steamship in England is authoritatively contradicted.

Patent Claims

SSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING AUGUST 27, 1861.

Reported Officially for the Scientific American.

PATENTEES, READ THIS.

The new Patent Laws which went into force on the 2d of March last, authorized the Commissioner of Patents to have all the specifications which form part of the Letters Patent printed.

This is a wise provision, and it renders the documents much handsomer than the old system of engrossing them on parchment; besides, in passing before the printer and proof-reader, the clerical errors, which were often made by the copyist, are mostly obviated, thus rendering the patent more likely to be correct.

But, to enable the printer and proof-reader an opportunity to do their work properly, the Patent Office is obliged to withhold the Letters Patent after granting them, for about *three weeks* after the claims are published in the Scientific American.

This explanation is intended to answer scores of letters received from patentees at this office every week, inquiring why they do not get their documents. We trust it will also save the Patent Office the trouble of writing to every patentee to explain the cause of their not receiving their patents the moment they see their claims published in these columns.

Munn & Co.

2,123.—Wm. F. Beecher, of Chicago, Ill,, for an Improvement in Stoves:

I claim the arrangement of the curved conical air-chamber, F, with the stove body, A, and fire-chamber, B, in the manner shown and described.

[This invention relates to an improvement in that class of stoves in which an air-heating and radiating stove are combined; or, in other words, those stoves which are provided with an air-heating chamber passage in close contact with the fire chamber, and so arranged as to take cold from the lower part of the room and discharge heated air from its upper part.]

2,124.—F. Boissard and S. Conrath, of New York City, for an Improved Bedstead and Trunk Combined:

We claim the trunk, A, formed of three parts, a b c, and the flap, d, connected together by joints, the parts, a b, being provided with lids, g h, and the part, c, provided with a drawer, f, all arranged as shown and used, in connection with a mattress, D, and with or without cover or curtain supports, B, to form a new and improved combination of a trunk and bedstead, as set forth.

2,125.—Henry Bowers, of New Hudson, Michigan, for an Improvement in Cultivators:

I claim the bolster, D, king bolt, E, axle, A, neap, C, beams, F F′ M, pieces, G G′, hinges, H H′, standards or arms, K, braces, N, plows or hoes, L L′, and handles, P, the whole being constructed, combined, arranged and operating as and for the purposes described.

2,126.—Thomas Boyd, of Boston, Mass., for an Improvement in Tents:

I claim, first, the combination of the center-pole with its traveling collar or ring of hooks, ridge poles, f f, &c., and end sustaining devices substantially as described.

Second, The arrangement of devices for sustaining the tent, the same consisting of the hinged legs having spindles, k k, that engage with suitable sockets formed in the ends of the ridge-poles.

2,127.—W. H. H. Burnham and Samuel B. Pierce, of Homer, N. Y., for an Improvement in Sub-Soil Plows:

We claim the arrangement of the adjustable bar, e, secured as set forth, with the shank, a, blade, c, bar, d, set screws, i i, and plow, A, the several parts being constructed and used in the manner and for the purpose specified.

2,128.—John Cavender, of Milton, Ohio, for a Blacksmith's Hearth:

I claim the heart-plate, A, having conical or taper perforations, B, in combinations with the box, C, provided with the pipe, f, slide, D, and chute, b, the latter having the door, c, at its end, all arranged as and for the purpose set forth.

I further claim, in combination with the chute, b, of box, C, and perforated hearth-plate, A, the plug, d, for the purpose of regulating the blast as set forth.

[The object of this invention is to obtain a hearth for blacksmiths, one which will be durable, admit of being very readily cleansed, and by which the fire may be kept clear and free from cinders and ashes, and regulated in size or area as circumstances may require.]

2,129.—William Clissold, of Dudbridge, England, for an Improvement in Driving Belts. Patented in England May 2, 1861.

I claim constructing wedge-shaped driving-belts, suitable for working in conjunction with V-grooved pulleys of links, substantially in the manner and for the purpose set forth.

2,130.—Suspended.

2,131.—E. de Bassano and A. Brudenn, of Brussels, Belgium, for an Improvement in the Manufacture of Stearic Acid. Patented in England May 2, 1861:

We claim the use of carbonaceous or charred matters or substances, with additional oline or such equivalent substance, in the manufacture of stearine, as stated, and substantially as described, as constituting improvements in the manufacture of stearine.

2,132.—Adam Exton, of Trenton, N. J., for an Improved Biscuit Machine:

I claim the molding plates, J K L M, with the flutes or grooves cut thereon, substantially in the shape of a truncated cone, in combination with the cranks or the endless belt, substantially as described and for the purpose set forth.

2,133.—Matthew Fletcher, of Louisville, Ky., for an Improvement in Feed Cutters:

I claim, first, Forming the knife of a straw cutter of a series of cutting edges set at different angles, and coming into operation successively, the whole arranged to operate substantially as described, for the purpose set forth.

Second, I claim a series of cutting edges or knives, so arranged as to come successively into operation, as described, in combination with a rotating carrying flywheel, the whole constructed and operating as specified, for the purpose set forth.

2,134.—John C. Gibbs, of Middleborough, Mass., for an Improved Ship Scraper:

I claim, A ship scraper provided with edges, d e f g, corners, h h′ and i i′, and attached to a tang, B, and handle, C, all as shown and described.

[The object of this invention is to obtain an implement that will facilitate the scraping of the coverings, and other parts of a vessel, that require to be scraped without injuring or defacing the wood work during the operation.]

2,135.—A. Giraudot, of New York City, for Improved Motive Power:

I claim the arrangement in combination with an ordinary wind wheel of a bucket wheel, A, inclined channels, B, and elevator, C, constructed and operating in the manner and for the purpose specified.

[The object of this invention is to store up the surplus power of a wind wheel when a high wind prevails, so as to be able to produce a uniform and continuous rotary method. It consists in the combination with a wind wheel of a bucket wheel to be operated by a series of balls of stone or other heavy material, which are conducted through long inclined channels, and which after having descended are elevated by the action of the wind wheel, whereon the wind has sufficient power to produce a motion of the same end of the elevator, which serves to raise the balls.]

2,136.—John S. Gwynn, of Plainfield, N. J., for an Improvement in Stamps:

I claim the suspended pawl or click fastening in combination with any form of glass chimney or any other burner substantially and for the purpose set forth.

2,137.—Gardiner Hall, Jun., of West Willington, Conn., for an Improvement in Thread Dressing Machines:

I claim the combination of the following devices in the construction of brush cylinders of thread dressing machines, to wit: the hollow cylinder, the brushes, d d, upon its periphery, the openings, b b, between the rows of brushes, the end passages, f f, and the hot-air trunk, F, communicating with the interior of the cylinder by means of the passages, f, the several parts being constructed and arranged substantially as described.

2,138.—S. H. Hamilton, of Macomb, Ill., for an Improvement in Corn Harvesters:

I claim, first, The combination of inclined ribbed cylinders, G G, and bars, F F, with the cart-body, having inclined sides, B B, and otherwise constructed substantially as and for the purpose set forth.

Second, The combination of ribbed cylinders, G G, inclined sides, B B, bars, F F, spur gearing, c c d d′, husking and shelling cylinder, I, concave, J, and the endless corn carrier, K2, all arranged and operating as a whole, substantially as set forth.

[The object of this invention is to obtain a machine which, on being passed through a corn field and between the standing corn, will strip the ears of corn from the stalks and gather them into the body of the machine. The invention also has for its object, combining with the body of a corn harvester, a husking apparatus, so arranged that after the ears of corn are severed from the stalks, the ears will be carried to the husking apparatus and divested of their husks.]

2,139.—A. H. Hammond, of Worcester, Mass., for an Improvement in Metallic Reeds for Musical Instruments:

I claim the construction of the stock, A, and reed proper or tongue, a, of one piece of metal, in the manner described.

2,140.—Henry W. Harper, of Berlinsville, Pa., for an Improvement in Slate Frames:

I claim a slate frame composed of papier maché or pulp composed of any fibrous material mixed with size, reduced to a plastic state, and while in that state applied to and formed on the edges of the slate under pressure between dies, as set forth.

2,141.—W. D. Harrah, B. S. Baldwin, and H. P. Jones, of Davenport, Iowa, for an Improvement in Seed Drills:

We claim the arrangement with the box, D, slide, E, adjustable perforated plates, g g, tubes, v v v, and adjustable tubes, w w w, of the pitman, n, crank, p, adjustable pendulous lever, s, gear wheels, m r, and Shaft, C, all as shown and described for the purpose set forth.

[This invention relates to certain wood improvements in that class of seed sowing machines, wherein a long horizontal hopper is used, divided into several compartments for different varieties of seeds, such as wheat, corn, and other seeds, which are planted in rows or drills, and wherein seed tubes stationary and movable, are used, to properly distribute in drills the seeds falling from the hopper.]

2,142.—M. S. Harshaw, of Sycamore, Ill., for an Improved Washing Machine:

I claim the reciprocating spring, D, operating in the manner described and for the purpose specified. And I also claim the brackets, H, and I, secured to the tub and its cover for the purpose of producing the necessary currents.

2,143.—Horace R. Hawkins, of Akron, Ohio, for an Improved Straw Cutter:

I claim, first, The right angled shaft, E, for supporting the front end of the knife lever and knife.

Second, Sustaining that end of the knife lever to which the knife is attached, by a racking support arranged over or nearly over the centre of the throat or mouth of the feed box, substantially as described.

Third, The crooked knife lever, in combination with its operating crank and shaft, arranged below the bottom of the mouth of the feed box.

Fourth, The adjusting bolts or screws, or their equivalents, in combination with a vertically adjusting feed box, whereby the box can be quickly raised, to compensate for the wear of the knife.

2,144.—Benjamin Hoyle, Jr., and A. Ralston, of Martin's Ferry, Ohio, for an Improvement in Thrashing Machines:

We claim, in combination with an endless belt straw carrier of a thrashing machine, one or more rockshafts with radial tines or fingers arranged above the straw carrier, and operated as described, to agitate the straw on the carrier and shake out the grain.

2,145.—S. F. Jones, of St. Paul, Ind., for an Improvement in Mole Plows:

I claim, first, The method of connecting the mole, E, to the cutter, B, by means of the slot, e, and clevis, c, when constructed and operated substantially as shown and described, for the purpose set forth.

Second, I claim, in combination with the slot, e, and clevis, c, the mole, E, screw rod, J, and armed nut, m, when combined and arranged to act conjointly, and used as shown and described, for the purpose set forth.

[This invention consists in the combination of an adjustable gage roller with a cutter and mole, whereby the drain is formed with the earth well compacted at its sides and top, and the colter-cut closed so as to prevent the drain being injured by surface water.]

2,146.—Lawrence Kearney, of New York City, for an Improved Washing Machine:

I claim the combination of the washboard, A, supports, B B, and swinging frame, C, provided with the roller, D, arranged as shown, to form a portable and new and useful article, for the purpose specified.

[The object of this invention is to obtain a simple and portable device to aid in the manual operation of washing clothes, the device to be used in connection with an ordinary wash tub, and so arranged that it may be compactly folded when not required for use, and stored away in a small compass.]

2,147.—Charles Keniston, of West Cambridge, Mass., for an Improvement in Shoe-pegging Machines:

I claim the movable center, n, as combined with the plunger, and so arranged as alternately to engage with the leather to effect the feed and disengage itself therefrom, substantially as described.

2,148.—Henry Knight, of Jersey City, N. J., for an Improvement in Combination Cement and Metal Pipes:

I claim a molded combination cement and metal pipe, with or without a metal coupling band on one of its ends, substantially as described, which is molded complete in a single mold at one and the same operation with its metal portion, A, intermediate between its inner and outer molded cement surfaces.

2,149.—P. H. Lawler, of Spencerport, N. Y., and John B. Dougherty, of Rochester, N. Y., for an Improvement in Machines for Forming Barrel Heads:

We claim, first, The arrangement of the vertical rods or shafts, r r, carrying the arms or rests, a a, and connected with the lever, H, which moves the saw, the whole operating in the manner and for the purpose substantially as described.

Second, We claim the combination of the ratchet wheel and pawl, b and c, with the treadle, t, and cam, M, so that whenever the screw, S, is thrown into gear with the wheel, W, the pressure of the face plate, A, against the barrel head may be maintained while said face plate is revolving, and this without the continued supervision of the operator.

Third, We claim the arrangement of the pin, p, catch, d, and handle, h, with the cam, M, whereby the screw, S, is thrown out of gear with the wheel, W, as soon as the latter has completed one revolution.

Fourth, We claim the combination of the pin, q, and lever catch, l, with the handle, H, of the saw, whereby the saw is maintained in proper position by means of the spring, V, while the barrel head is being cut, and is removed by means of the same spring as soon as the face plate, B, has completed one revolution.

2,150.—T. R. Markillie, of Winchester, Ill., for an Improvement in Churns:

I claim the cream vessel, constructed round at the bottom as high up as the hight of the dashers, with the rest of the body of the vessel square, and this in combination with the revolving dasher, operating as set forth and for the purposes described.

2,151.—T. H. Miller, of Lancaster, Pa., for an Improved Machine for Rolling Carriage Axles:

I claim the tongs described, provided with the swivel clutches, K K, shoulders, k k, space, l, and check, i, for the purpose of holding, turning and gaging the iron in the process of rolling without removing it from the tongs, when the same is used in connection with the gage rod, I, and grooved rollers, C D, of the machine, substantially as specified.

2,152.—Andrew Morse, of Portland, Maine, for an Improvement in Machinery for Ringing Fog Bells:

I claim, first, Combining with the barrel, B′, buoy, B, cord, a′, cord, e, wheel and axle, E E, and weight, E2, the double ratchet wheel, d d′, pawls, c d3, inside gear, d2, pinions, g g2, drum, G, and weight, J, all arranged and operating substantially as described, for maintaining a constant motion of the bell movement.

Second, I claim the secondary weight, R, in combination with weight, J, operating as and for the purposes described.

[The object of this invention is to keep up a continued ringing of one or more bells by certain mechanism which is operated by the conjoint action of a buoy or float that rises and falls with the motion of the waves, and certain weights which are wound up by this operation of the buoy, and which are used as a reserve power to ring the bells when the sea is calm and the buoy ceases to act.]

2,153.—D. P. Nickerson, of Cleveland, Ohio, for an Improvement in Cheese Presses and Hoops:

I claim the special arrangement of the hinged hoop, M, and bale, O, crane, R, and adjustable table, L, in combination with the described cheese press, when operating conjointly in the manner and for the purpose set forth.

2,154.—J. M. Orput, of Malta, Ill., for an Improvement in Harvesting Machines:

I claim the arrangement of the vibrating frame carrying the cutting apparaus, reel, endless apron and gearing, upon the axle, a, and adjusting the same by means of the lever, n, substantially in the manner described and for the purpose specified.

2,155.—A. B. Paul, of Nevada, Cal., for an Improved Amalgamator:

I claim the reciprocating box, A, provided with a double inclined bottom, c c, and chamber, d, having amalgamated surfaces, in connection with a traverse piece, C, having a curved back or side and pendants, f, with amalgamated surfaces, the latter being arranged in quincunx form, substantially as and for the purpose set forth.

I also claim in combination with the reciprocating box, A, and traverse piece, C, the screen, E, extending the whole length of the box or over a portion thereof, for the purpose specified.

[This invention consists in the employment or use of a reciprocating box, provided with a double inclined bottom having an amalgamated surface and a chamber at the inner ends of the two inclines, which also has an amalgamated surface, and using in connection with the above a series of amalgamate plates, or plates having amalgamated surfaces, which are screwed to an amalgamated surface, and project down over the chamber at the inner ends of the inclines which form the bottom of the table or box, all being arranged used with a sieve or screen.]

2,156.—J. W. Pearson, of Winchester, Mass., for an Elastic Pen Holder:

I claim the elastic band, C, for holding pens when they are not in use, operating substantially as specified.

2,157.—Charles M. Peirce, Jr., of New Bedford, Mass., for an Improvement in Molds for Earthen or Cement Pipes:

I claim, first, The sheet-metal or elastic core, E, provided or arranged with a key or wedge, F, or its equivalent, to operate as and for the purpose set forth.

Second, The tool, H, formed with a cutting or scraping edge, f, and smoothing surface, g, when applied to or used in connection with the case, A, and core, E, for the purpose specified.

[The object of this invention is to facilitate the removal or withdrawal of the core after the pipe is formed, and also to obtain a core which will admit of being varied in diameter, so that pipes of different internal diameters may be molded with one and the same core.]

2,158.—H. H. Reynolds, of Buffalo, N. Y., for an Improved Spermatorrhoea Instrument:

I claim, first, The roughened plate, H, in combination with a spermatorrhoea instrument for the purposes set forth.

Second, I claim the spring bars, F and G, in combination with the pressure plates, D and E, and cone cap, A B C, for the purposes and substantially as described.

Third, I claim placing the spiral spring, c, between the two sections of the cane cap for the purposes and substantially as set forth.

2,159.—Frederick Richter, of Orange, Ohio, for an Improvement in Portable Fences:

I claim the adjustable or hinged post, B, and base, A, when the panels are arranged and constructed in the manner and for the purpose as described.

2,160.—D. W. Seeley, of Albany, N. Y., for an Improvement in Churns :

I claim, first, The use of two screw and parallel dashers constructed and operating substantially as described.

Second, I claim the sliding or movable pinions, F G and P, together with the stationary driving wheel, H, for the purpose of working the disks or dashers separately or together as set forth.

Third, I claim the double face plate, N, provided with teeth or diamond-shaped pins, n n n n, revolving between the shell disks, L and M, when said double-faced plate, N, is provided with buckets and openings at its center, substantially and for the purpose specified.

Fourth, I claim the two screw dashers, B C, in combination with the double-faced plate, N, when constructed and operating as set forth.

2,161.—J. J. Sherman, of Albany, N. Y., for an Improvement in Balloons :

I claim the combination with a balloon of a pulley, or system of pulleys, applied to operate substantially as and for the purpose specified.

2,162.—Milo D. Wilder, of La Porte, Ind., Improvement in Water Elevators :

I claim the endless plaform of slats, A, in combination with a pump, R, and a ball governor, provided with a brake formed of the levers, N N O O, operating on a wheel, F, all arranged for joint operation as and for the purpose set forth.

[This invention relates to an improved water-elevating device which is chiefly esigned to be operated by stock so that the latter may raise their own water. The invention, however, is capable of being operated by horse power, so as to be used as a force pump when required.]

2,163.—Walter Youmans, of Waterford, N.Y., for Improvement in Railroad Car Trucks :

I claim the application to a car truck, provided with adjustable axles, of sockets and guides, when said sockets and guides are formed of portions of ciroles, cx, the center of which is in a line, bx, that bisects the axles centrally when parallel with each other and at right angles to said line, and which line is tangential with the inner line or rail, ax, of the curve, the arcs, cx, intersecting the ends of the outer axles, when the latter are in a radial position, substantially as and for the purpose set forth.

And I also claim the combination of the loose wheels, C or M, non-rotating axle, B or K″, bolster, E or L, and eccentric socket and guide, I H or Q R, arranged and operating substantially as and for the purposes shown and explained.

[The object of this invention is to obtain a car truck which will admit of the axles, as the trucks pass over curves of the road, assuming positions corresponding to the radii of the curves, thereby avoiding much friction hitherto attending the passing of car trucks over curves, and the consequent wear and tear attending the same.]

2,164.—Suspended.

2,165.—James McNamee (assignor to James B. Wilson), of Easton, Pa., for Improvement in Sewing Pins :

I claim as an improved article of manufacture, a sewing pin composed of a plate or stock, A, and hooks, a a b, as shown and described.

[This invention consists in a plate or stock with three hooks, two at one end turned in one direction and one at the other end, turned in the opposite direction, the two to be hooked into the garments at a lady's knee and the other to hook into and hold the work, such device being much more convenient to use than either a common pin for pinning the work to the knee or a sewing-bird, and much less expensive than the sewing-bird.]

2,166.—A. H. Merrill (assignor to A. H., R. S. and J. S. Merrill), of Boston, Mass., for Improvement in Implements for Handling Lamp Chimneys :

I claim as a new article of manufacture a lamp chimney handling device formed of or forming a griping frame and handle combined for application and use, substantially as described.

2,167.—J. J. Muller, of New York City, assignor to W. H. McVickar and H. E. Roeder, of New York City, and P. Weiler, of Bolleville, N. J., for an Improved Ore Separator :

First, I claim isolating the particles of pulverized ore or minerals while being mechanically agitated from the main body of water or liquid fluid through which there are subsequently allowed to fall, substantially as shown and described.

Second, I claim providing the fluid containing vessel with trap doors or their equivalent, constructed substantially as described and capable of being closed and opened for retaining the ore or for allowing the same to subside into the fluid at pleasure, in combination with the piston or other suitable suction device for mechanically agitating the particles of ore or minerals, by air and otherwise, whereby the agitation of the said ore may be effected previous to its being allowed to fall through the mass of fluid, essentially as set forth.

2,168.—J. W. Osborne, of Melbourne, Australia, assignor to S. T. Hooper, of Boston, Mass., for Improvement in Photolithographic Transfers :

I claim the method described of inking with a greasy ink the whole surface of the sensitive transfer paper after exposure of the same to light under a negative, before wetting or moistening it, and subsequently removing the superfluous portions of the ink, in the manner detailed in Letters Patent of the United States, issued to Samuel T. Hooper, assignee of John Walter Osborne, on the 25th day of June, 1861, for improvements in photolithography.

2,169.—I. S. Schuyler (assignor to J. J. Eckel), of New York City), for an Improved Oil Press :

I claim the arrangement in combination of the hollow follower rod, cross head, E, follower, F, arms, a, pawls, b, and side rods, D, with the double rack bar, G, pawls, R, levers, L, and connected gearing, N O Q, as shown and described.

The construction of the perforated tube, X, with an attached perforated base plate, l, as shown and described.

The combination of the movable self-adjusting base plate, l, and tube, X, with the bottom, W, as shown and described.

The combination of the fluted column, m, with the perforated tube, X, and base plate, l, as shown and described.

2,170.—I. W. Valance, of Lansingburg, N. Y., and Hiram Littlejohn, of Troy, N. Y., assignor to I. W. Valance, of Lansingburg, N. Y., and G. W. Valance, of Troy, N. Y., for an Improved Machine for Riveting Hinges :

We claim, first, The described arrangement of a riveting pene or hammer shaped, revolved and reciprocated a uniformly limited distance, substantially as described, with a hinge holder constructed substantially as set forth, and having a certain limited movement toward and from the riveting pene, whereby the operator can freely and accurately present the hinges to the riveting pene while the latter is revolving and reciprocating at its full working speed, as specified.

Second, The combination of a reciprocating riveting hammer and a hinge clamp, so constructed and operated together, substantially as described, as to automatically admit, gripe, and hold a hinge, and strike a series of blows in a circle in different places upon the end of the pivot wire of the hinge, and finally release the riveted hinge, as set forth, the combination, as a whole, being substantially as specified.

Third, The movable pivot-wire support, C, Fig. 3, when arranged and operated in combination with the jaws, B B′, of the hinge-holder, substantially as and for the purpose described.

2,171.—C. C. P. Waterman, of Sandwich, Mass., assignor to J. W. Jarvis & Co., of Boston, Mass., for Improvement in Machines for Grinding Glass Shades :

I claim a machine for grinding or roughing glass shades or other articles, composed of one or more upright rotating spindles, provided with suitable means of carrying such articles, working within one or more stationary cups containing the sand or other grinding material, substantially as described.

And I also claim fitting each of such spindles with a collar, c, fitted to an opening in the bottom of its respective cup, substantially as and for the purpose specified.

[The character of this invention is well described by the claims.]

2,172.—W. H. Haworth, of Towanda, Ill., for Improvement in Cultivators :

I claim, first, The connecting rod, E, and crank shafts, D d, employed in the manner explained, to turn the wheels, C, on a vertical axis by the deflection of the tongue, as and for the purpose set forth.

Second, The combination of the beams, K K, levers, L M and n, rods, N m′, and O, and suspending claims, l, arranged and operating substantially as and for the purposes explained, in connection with a four-wheeled cultivator.

RE-ISSUE.

120.—Rufus Dutton, of Dayton, Ohio, for Improvement in Harvesters. Patented April 27, 1858 :

I claim the concentric rack, H, in combination with the pinion, I, when the same are respectively secured directly with the platform frame and the axle of the main driving wheel of a harvester, without intermediate parts, and so that by merely raising the platform with one hand, the adjustment is accomplished, while, at the same time, the gear wheel and actuating pinion are perfectly meshed at any position, substantially as set forth.

I also claim the hollow sleeve or bore, L, inclosing the axle, K, and forming the bearing of the hub of the driving wheel when said sleeve is provided with the face, c, and projection or projections, d, resting in the slot, b, of the plate, substantially as described.

In combination with the sleeve, L, and the axle, K, with its pinion, I, I also claim the jam washer, g, and nut, h, for clamping the pinion with the plate, substantially as specified.

EXTENSION.

5,254.—Timothy Clark, of New Haven, Conn., for an Improvement in Safety Apparatus for Steam Boilers. Patented August 21, 1847 :

I claim the application of an elastic vessel, substantially as described, instead of the piston, whereby the friction of the piston is avoided, and the operation of the damper is rendered much more uniform, the whole being constructed and operating substantially as described.

DESIGN.

I05.—Bernard Smith, of Cincinnati, Ohio, for Design for Burial Case.

RECENT AMERICAN INVENTIONS.

Oil Press.—This invention, by Isaac S. Schuyler, of New York city, relates to an improved press for expressing tallow and lard from meat, and for expressing oil from different substances. The object of the invention is to obtain a powerful and durable press of the kind specified ; one that may be operated with facility, both as regards the pressing operation and the disengaging or removing of the compressed substance from the press. The invention also has for its object the adjusting, with greater facility than heretofore, of the parts which allow the grease or oil to escape freely from the substance under compression.

Dressing Thread.—This invention consists in the introduction into the rotating brush cylinder or circular system of brushes of a thread-dressing machine, of air which has been heated, such air being discharged between the brushes for the purpose of carrying off the moisture from the sizing as the brushing proceeds, by which means the operation of dressing can be more expeditiously and effectually performed than with the use of a heating apparatus within the cylinder. Gardiner Hall, Jr., of West Willington, Conn., is the inventor.

Melodeon Reeds.—This invention consists in the construction of the stock of the reed and the reed proper or "tongue" of a single piece of metal, by which construction some very important advantages are obtained, among which may be mentioned the obviation of all danger of the working loose or rattling of the tongue and its lateral displacement, the simplification of the process of construction, and the saving of metal. The credit of this invention is due to A. H. Hammond, of Worcester, Mass.

Trunk and Bedstead.—Frederick Boissard and Sebastian Cousatte, of New York city, have invented a combination trunk and bedstead, which invention consists in constructing a trunk of three principal parts and a flap connected by joints, and arranged with lids and a drawer, whereby the trunk, when open or distended, will be sufficiently long to serve as a bedstead, and still be capable of being folded or shut up in compact form and of sufficient dimensions to contain a requisite amount of clothing, together with supports and a covering for the bedstead.

Balloon.—The object of this invention is to give to the aeronaut in the car beneath a mechanical control over the volume of the gas contained in the balloon, whereby he can increase or diminish its density at pleasure, and thus be enabled to ascend or descend in the air without the expenditure of gas or ballast. For the above purpose, the balloon is made of a spherical, or nearly spherical form, and has passed vertically through its center a flexible tube, which is airtight with respect to the interior of the balloon, and which is capable of corrugation in such manner as to contract lengthwise, and which is secured to the bottom and top by airtight and gastight connections. Within this tube is arranged a system of pulleys and tackle, one block of which is attached to the top and the other is attached to the bottom of the balloon, or to the ropes or netting surrounding it, and the fall of which passes down to the car, where it is operated by hand or by a windlass, or by any of the modes adopted on shipboard. This invention has been patented by Josiah J. Sherman, of Albany, N. Y.

Basket.—This invention relates to an improvement in the construction of splint baskets, those which are formed with upright splints or staves only. The object of the invention is to obtain a strong and durable basket of the kind specified, and one that will be ornamented and admit of being constructed very economically. The invention consists in a novel way of securing the inner and outer wires or hoops of the basket together ; and also, in a novel arrangement of metal straps or plates applied to the lower parts of the staves or splints, as well as in the employment or use of metal plates applied to the inner side of the bottom of the basket. S. M. Sherman, of Fort Dodge, Iowa, is the patentee.

HONORABLE JOSEPH HOLT IN NEW YORK.

We have attended many public meetings, but we never witnessed a reception that would compare in enthusiasm with that which welcomed Mr. Holt at Irving Hall on the evening of the 2d inst. The hall was crowded with people of all classes, including a considerable number of ladies, and it seemed as if the cheers and waving of handkerchiefs would never cease. Finally when silence was restored, Mr. Holt commenced his speech—a speech that will be published in nearly all the papers of the country, and will be more widely read and with more intense satisfaction, than any other speech that has been made in modern times. It convinces us all that the time of our great men has not wholly gone by.

While Mr. Holt was Commissioner of Patents, we had a good deal of intercourse with him, and were constantly more and more impressed with his ability, integrity, and all noble and worthy elements of character. We were not surprised at his rapid advance first to the place of Postmaster General and then to that of Secretory of War. It will be remembered that he was appointed to the last position during the troubled times that marked the close of Buchanan's administration, when the government seemed to be crumbling to pieces ; and it was owing mainly to his able conduct of affairs that Washington was saved from seizure by the secessionists, and the inauguration of Lincoln was peaceably effected.

Mr. Holt has never been a seeker of office, and the few places that he has held have been urged upon him. He has risen to his present exalted position before the nation simply by the strength of his high qualities. His patrotism is of the kind which in his own eloquent language, he attributes to the capitalists of the country, "not summer patriotism which flourishes amid the pæans of victory, but patriotism which struggles and sacrifices and suffers, and is prepared to put all things to hazard, even in the winter of adversity and in the very hour of national defeat. A patriotism which rises fully to the comprehension of the actual and awful perils in which our institutions are placed, and which is eager to devote every power of body and mind and fortune to their deliverance —a patriotism which, obliterating all party lines—and entombing all party issues, says to the President of the United States, 'Here are our lives and our estates ; use them freely, use them boldly, but use them successfully ; for, looking on the graves of our fathers and on the cradles of our children, we have sworn that though all things else shall perish, this country and government shall live.' "

Arrival of Arms.

The *Northern Light* brought 30,000 stand of arms from California, a portion nf the 50,000 stand sent to that state by Floyd.

The *Northern Light* was overdue a day or two, and some anxiety was felt lest the *Sumter* had fallen in with her, and perhaps captured this vauable prize. The loss of her treasure, large as it was ($760,000), would have been insignificant in comparison with the capture by the rebels, of so large a quantity of arms.

When Floyd sent these arms to California, he doubtless thought that the Golden State would join the secession movement.

DARING EXPLOIT.—E. S. Barrett, of Concord, Mass., last week succeeded in reaching the profile rock known as "the Old Man of the Mountain," on the White Mountains, and safely planted a flag upon the crest of the rock which forms the cap. This feat, a very perilous one, has been successfully achieved but once before.

Notes and Queries

R. S. B., of Ill.—The best chemists regard it as settled that nitrogen forms a part of steel. Nitrogen and carbon combine to form cyanogen, and steel is considered a cyanide of iron.

J. B. F., of Conn.—"Anastatic Printing" is a term which has been used for printing with plates of zinc, prepared by etching and transferred copies of prints. A printed sheet of an engraved picture, or map, is first moistened with dilute nitric acid, which acts upon all the parts but those containing the printer's ink. The sheet is then pressed smoothly upon a flat zinc plate, and is allowed to remain for a short period. The acid in the paper attacks and etches all the zinc surface except those portions covered with the ink of the print, which being protected, are left in relief. The plate of zinc is then washed with a solution of gum in weak phosphoric acid, which wets only the portions that have been etched. A roller containing lithographer's ink is now passed over the plate, when the raised parts containing the transfer print take up the ink from the roller, while the etched portions are not effected. A sheet of paper is now laid upon the zinc plate, which is run into the press and an impression taken. It was anticipated at one period that this system of printing would, in a great measure, supersede that of lithography with prepared stones, but such hopes have not been realized. We have seen several very legible but somewhat coarse maps produced by anastatic printing.

G. W. C., of N. Y.—You will find full information respecting the examination of engineers for the navy, the amount of their salaries, and a great deal of other useful information about the American navy, on page 198, Vol. IV., present series of the SCIENTIFIC AMERICAN. The Board for examining candidates for Navy Engineers commenced a session on the 4th of this month at the navy yard, Philadelphia.

M. C., of Pa.—Soluble glass would not answer, we believe, for coating the inside of petroleum oil barrels, as it would be liable to crack off when the barrels are rolled.

C. L. D. G., of Me.—Three pounds of salt and half a pound of white copperas (sulphate of zinc) are sufficient for mixing with a bushel of lime in making good whitewash for outhouses.

G. Q. J., of Mass.—A knowledge of elementary chemistry would be a great advantage to you in practicing the art of varnish-making. Mussprat's Chemistry is not yet completed: it is a very useful and reliable chemical cyclopedia. Miller's Chemistry would be a good work for you to study. A little essential oil, especially oil of cloves—when mixed with gum-paste—prevents it from becoming moldy.

M. C. L., of C. W.—It is generally estimated that 5-horse power will drive one run of mill-stones; though at the Metropolitan Mills in this city it takes just 10-horse power to each run with the bolting machinery, &c. Thirty-three thousand pounds of water per minute falling one foot gives 1-horse power. Hence if the fall was 7 feet it would take 4,714 lbs., per minute, and with 10 feet 3,300 lbs. As your wheel would waste from 10 to 50 per cent of the power, the proper allowance must be made for this. An ordinary overshot wheel generally yields about 70 per cent of the whole power of the water.

E. S., of N. Y.—Fulton's first war steamer was provided with appliances to discharge steam and hot water into the vessel of an enemy, and thus convert it into a huge stewing-pan.

S. G. & Bros., of Ohio.—We are not acquainted with any other method of tempering the steel mold boards of plows to prevent them warping, than the exercise of care in the common mode of operation. Cover the surface with a paste of flour and salt, heat the mold boards slowly and carefully up to a low red heat, and then dip cautiously into cold water or oil. Some makers of steel plows keep their modes of tempering secret.

MULEY SAWS.—A correspondent desires to obtain information respecting the best length of pitman for muley saws. Different opinions and practices prevail among sawyers respecting the length of pitman to length of stroke. The experience of practical sawyers given to the public, would be of general benefit and lead to the adoption of more uniform and correct proportions in mill gearing.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Sept. 4, 1861:—

D. C. S., of Conn., $53; L. S., of N. Y., $10; R. L., of Mass., $20; A. A., of Ohio, $20; F. L. H., of Vt., $40; G. J., of N. Y., $20; J. M. O., of N. Y., $20; J. B. B., of Cal., $20; L. A. B., of N. Y., $20; W. S. M., of N. Y., $45; H. G. S., of N. Y., $20; G. F., of N. Y., $40; C. Van H., of Mass., $25; C. McW., of Cal., $30; E. T. & J. H., of N. Y., $22; J. J. K., of Ill., $15; W. R. P., of Ohio, $15; S. & P., of Conn., $15; T. W., of Ill., $15; J. M. F., of Ill., $15; W. M., of Mass., $20; J. P. R., of Iowa, $25; L. B. L., of Cal., $30; C. H. B., of Mass., $30; T. J. P., of Pa., $15; A. W., of Pa., $15; C. L. N., of N. Y., $15; S. & R., of N. Y., $30; W. H. A., of Conn., $15; C. B., of N. Y., $15; E. F., of N. Y., $15; J. E., of Conn., $25; J. G. W., of N. Y., $250; J. L. L., of N. Y., $15; W. M., of Ohio, $25; W. P., of N. Y., $25; H. J. P., of N. Y., $25; T. J. W., of England, $70; C. & M., of N. Y., $30; W. O. L., of N. Y., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Aug. 28, to Wednesday, Sept. 4, 1861:—

J. C. C., of Conn.; C. McW., of Cal.; N. B., of Ky.; G. A. R., of Germany (2 cases); C. & M., of N. Y.; J. G. W., of N. Y.; C. A. W., of Mass.; L. B. L., of Cal.; J. P. R., of Iowa; G. F., of N. Y.; C. L., of Ohio; W. M., of Mass.; W. M., of Ohio; E. P. R., of N. Y. (2 cases); J. H. S., of N. J.; C. H. B., of Mass.; L. T., of N. Y.; C. Van H., of Mass.; J. W. H., of N. S.; W. P., of N. Y.; T. J. W., of England (2 cases); W. O. L., of N. Y.; H. C., of England; O. B., of Ohio; H. J. P., of N. Y.

New Books and Periodicals Received.

THE UNION FOREVER.—We have received from the publisher, James D. Torrey, No. 13 Spruce street, this city, the first number of a history of the war, which is published in weekly parts, at ten cents each. It is entitled "The Union Forever, and the War for the Union. A History of the Rise and Progress of the Rebellion, and Consecutive Narrative of Events and Incidents, from the First Stages of the Treason against the Republic, Down to the Close of the Conflict, Together with Important Documents, Extracts from Remarkable Speeches, &c., &c." This is a very good current history of the war, in convenient form for preservation.

INSTRUCTIONS ABOUT EUROPEAN PATENTS, With a Synopsis of the Patent Laws of the Various Countries.

AMERICAN INVENTORS SHOULD BEAR IN MIND that, as a general rule, any invention which is valuable to the patentee in this ountry is worth equally as much in England and some other foreign countries. Four patents—American, English, French and Belgian—will secure an inventor exclusive monopoly to his discovery among 100,000,000 of the most intelligent people in the world. The facilities of business and steam communication are such that patents can be obtained abroad by our citizens almost as easily as at home. The majority of all patents taken out by Americans in foreign countries are obtained through the Scientific American Patent Agency. We have established agencies at all the principal European seats of government, and obtain patents in Great Britain, France, Belgium, Prussia, Austria, Spain, &c., with promptness and dispatch.

It is generally much better to apply for foreign patents simultaneously with the application here; or, if this cannot be conveniently done, as little time as possible should be lost after the patent is issued, as the laws in some foreign countries allow patents to any one who first makes the application, and in this way many inventors are deprived of valid patents for their own inventions.

Many valuable inventions are yearly introduced into Europe from the United State, by parties ever on the alert to pick up whatever they can lay their hands upon which may seem useful.

Models are not required in any European country, but the utmost care and experience is necessary in the preparation of each case.

GREAT BRITAIN.

Patents for inventions under the new law, as amended by the act of Oct. 1, 1852, and now in operation, include the United Kingdom of Great Britain and Ireland in one grant, which confers the exclusive right to make, use, exercise or vend. This is conceded to the inventor, or the introducer, for a period of fourteen years, subject, after the patent is granted, and the first expenses paid, to a government tax twice during its existence—once within three years, and once again within seven. The purchaser of a patent would assume the payment of these taxes.

There is no provision in the English law requiring that a patented invention shall be introduced into public use within any specified limit. Under the Patent Act of October, 1852, the British government relinquished its right to grant patents for any of its colonies, each colony being permitted to regulate its own patent system. If a patent has been previously taken out in a foreign country, the British patent will expire with it.

FRANCE.

Patents in France are granted for a term of fifteen years, unless the invention has been previously secured by patent in some other country; in such case, it must take date with and expire with the previous patent. After the patent is issued, the French government requires the payment of a small tax each year so long as the patent is kept alive, and two years' time is given to put the invention patented into practice.

It should be borne in mind that, although the French law does not require that the applicant should make oath to his papers, yet if a patent should be obtained by any other person than the inventor, upon proof being adduced to this effect before the proper tribunal, the patent would be declared illegal.

BELGIUM.

Patents in Belgium are granted for twenty years, or if previously patented in another country, they expire with the date thereof. The working of the invention must take place within one year from date of patent; but an extension for an additional year may be obtained on application to the proper authorities. Inventors are only legally entitled to take out patents.

THE NETHERLANDS.

Patents are granted by the Royal Institute of the Netherlands to natives or foreigners represented by a resident subject, which extend to a period of about two years, within which time the invention must be brought into use, and upon payment of an additional tax, a patent will be granted to complete its whole term of fifteen years. Unless these conditions are complied with, the patent ceases.

PRUSSIA.

Applications for patents in Prussia are examined by the Royal Polytechnic Commission, and unless there is novelty in the invention, the applicant's petition will be denied; and if it is granted, the invention must be worked within six months afterward. A respite, however, of six additional months may be obtained, if good and sufficient reasons for it can be shown.

AUSTRIA

Austrian patents are granted for a term of fifteen years, upon the payment of 1,000 florins, or about $500 in American currency. This sum, however, is not all required to be paid in advance. It is usual to pay the tax for the first five years upon the deposit of the papers, and the patent must be worked within its first year. The Emperor can extend the patent and privilege of working by special grant. In order to obtain a patent in Austria, an authenticated copy of the original Letters Patent must be produced.

SPAIN.

The duration of a Spanish patent of importation is five years, and can be prolonged to ten years; and the invention is to be worked within one year and one day.

To obtain a Cuban patent requires a special application and an extra charge.

RUSSIA.

Since the close of the Crimean war, considerable attention has been given to Russian patents by Americans. Russia is a country rich in mineral and agricultural products, and there seems to be a field open for certain kinds of improvements. The present Emperor is very liberally disposed toward inventors, and as an evidence of the interest which he takes in the progress of mechanic arts, we may state that we have had visits from two distinguished Russian *savans*, specially sent out by the Emperor to examine Amdrican inventions. As Russian patents are expensive, and somewhat difficult to obtain, we do not take it upon ourselves to advise applications; inventors must judge for themselves; and this remark applies not only to Russia, but also to all other foreign countries.

CANADA.

Patents of invention are granted only to actual residents of Canada and British subjects. Under the general Patent Law of Canada, an American cannot procure a patent for his invention there. The only way in which he can do so is by virtue of a special act of Parliament, which is very difficult, uncertain, and expensive to obtain. Several zealous friends of reform in Canada are working earnestly to bring about a reciprocal law, but their efforts have thus far proved fruitless.

BRITISH INDIA.

The date of the law, Feb. 28, 856; duration of a patent, fourteen years. Invention must be worked within two years from date of petition. Privilege granted only to the original inventor or his authorized agent in India.

SAXONY.

Duration of patent, from five to ten years. Invention must be worked within one year from date of grant. Careful examination made before granting a patent.

HANOVER.

Duration of patent, ten years; and in case of foreign patent having been previously obtained, an authenticated copy of said patent must be produced. Invention must be worked within six months from date of grant.

SARDINIA.

Duration of patent, from one to fifteen years. Patents for five years or less must be worked within one year, and all others within two years.

NORWAY AND SWEDEN.

Duration of patent, three years, at least; fifteen at most, according to the nature and importance of the invention. Patents for foreign inventions not to exceed the term granted abroad, and to be worked within one, two or four years.

AUSTRALIA.

Date of law, March 31, 1854. Careful examination made by competent persons previous to issue of patent, which, when granted, extends to fourteen years. Imported inventions are valid according to duration of foreign patent. It would require from twelve to eighteen months to procure a patent from the Australian government.

Parties holding foreign patents secured through our agency will be notified from time to time of the condition of their cases.

GENERAL REMARKS.

While it is true of most of the European countries herein specified, that the system of examination is not so rigid as that practised in this country, yet it is vastly important that inventors should have their papers prepared only by the most competent solicitors, in order that they may stand the test of a searching legal examination; as it is a common practice when a patentee finds a purchaser for his invention for the latter to cause such examination to be made before he will accept the title.

It is also very unsafe to entrust a useful invention to any other than a solicitor of known integrity and ability. Inventors should beware of speculators, whether in the guise of patent agents or patent brokers, as they cannot ordinarily be trusted with valuable inventions.

Messrs. MUNN & CO. have been established *fifteen years* as American and Foreign Patent Attorneys and publishers of the SCIENTIFIC AMERICAN, and during this time they have been entrusted with some of the most important inventions of the age; and it is a matter of pardonable pride in them to state that not a single case can be adduced in which they have ever betrayed the important trust committed to their care. Their agents in London, Paris, and other Continental cities, are among the oldest and most reliable Patent Solicitors in Europe, and they will have no connection with any other.

CAUTION.—It has become a somewhat common practice for agents located in England to send out circulars soliciting the patronage of American inventors. We caution the latter against heeding such applications, or they may otherwise fall into the hands of irresponsible parties, and thus be defrauded of their rights. It is much safer for inventors to entrust their cases to the care of a competent, reliable agent at home.

FEES.—The fees required by us for the preparation of foreign applications are not the same in every case; as, in some instances, when the inventions are of a complicated character, we are obliged to charge a higher fee. Applicants can always depend, however, upon our best terms, and can learn all particulars upon application, either in person or by letter.

Parties desiring to procure patents in Europe can correspond with the undersigned, and obtain all the necessary advice and information respecting the expenses of obtaining foreign patents.

All letters should be addressed o Messrs. MUNN & CO., No. 37 Park-row, New York.

CHANGE IN THE PATENT LAWS.

NEW ARRANGEMENTS—PATENTS GRANTED FOR SEVENTEEN YEARS.

The new Patent Laws, recently enacted by Congress, ar now in full force, and promise to be of great benefit to all parties who are concerned in new inventions.

The duration of patents granted under the new act is prolonged to SEVENTEEN years, and the government fee required on filing an application for a patent is reduced from **$30** down to **$15**. Other changes the fees are also made as follows:—

On filing each Caveat	$10
On filing each application for a Patent, except for a design	$15
On issuing each original Patent	$20
On appeal to Commissioner of Patents	$20
On application for Re-issue	$30
On application for Extension of Patent	$50
On granting the Extension	$50
On filing Disclaimer	$10
On filing application for Design, three and a half years	$10
On filing application for Design, seven years	$15
On filing application for Design, fourteen years	$30

The law abolishes discrimination in fees required of foreigners, except in reference to such countries as discriminate against citizens of the United States—thus allowing English, French, Belgian, Austrian, Russian, Spanish, and all other foreigners except the Canadians, to enjoy all the privileges of our patent system (except in cases of designs on the above terms.

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than FIFTEEN THOUSAND Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees, at home and abroad. Thousands of Inventors o whom we have taken out Patents have addressed to us most flattering estimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

Rejected Applications.

We are prepared to undertake the investigation and prosecution of rejected cases, on reasonable terms. The close proximity of our Washington Agency to the Patent Office affords us rare opportunities for the examination and comparison of references, models, drawings, documents, &c. Our success in the prosecution of rejected cases has been very great. The principal portion of our charge is generally left dependent upon the final result.

All persons having rejected cases which they desire to have prosecuted are invited to correspond with us on the subject, giving a brief history of their case, inclosing the official letters, &c.

Testimonials.

The annexed letters, from the last three Commissioner of Patents, we commend to the perusal of all persons interested in obtaining Patents:—

Messrs. MUNN & Co.:—I take pleasure in stating that, while I held the office of Commissioner of Patents, MORE THAN ONE-FOURTH OF ALL THE BUSINESS OF THE OFFICE CAME THROUGH YOUR HANDS. I have no doubt that the public confidence thus indicated has been fully deserved, as I have always observed, in all your intercourse with the Office, a marked degree of promptness, skill and fidelity to the interests of your employers. Yours, very truly,

CHAS. MASON.

Immediately after the appointment of Mr. Holt to the office of Postmaster-General of the United States, he addressed to us the subjoined very gratifying testimonial:—

Messrs. MUNN & Co.:—It affords me much pleasure to bear testimony to the able and efficient manner in which you have discharged your duties of Solicitors of Patents while I had the honor of holding the office of Commissioner. Your business was very large, and you sustained (and, I doubt not, justly deserved) the reputation of energy, marked ability and uncompromising fidelity in performing your professional engagements. Very respectfully,

Your obedient servant, J. HOLT.

MESSRS. MUNN & Co.:—Gentleman: It gives me much pleasure to say that, during the time of my holding the office of Commissioner of Patents, a very large proportion of the business of inventors before the Patent Office was transacted through your agency, and that I have ever found you faithful and devoted to the interests of your clients, as well as eminently qualified to perform the duties of Patent Attorneys with skill and accuracy. Very respectfully,

Your obedient servant, WM. D. BISHOP.

The Validity of Patents.

Persons who are about purchasing Patent property, or Patentees who are about erecting extensive works for manufacturing under their Patents, should have their claims examined carefully by competent attorneys, to see if they are not likely to infringe some existing Patent, before making large investments. Written opinions on the validity of Patents, after careful examination into the facts, can be had for a reasonable remuneration. The price for such services is always settled upon in advance, after knowing the nature of the invention and being informed of the points on which an opinion is solicited For urther particulars, address MUNN & CO., No.37 Park-row, New York.

The Examination of Inventions.

Persons having conceived an idea which they think may be patentable, are advised to make a sketch or model of their invention, and submitit to us, with a full description, for advice. The points of novelty are carefully examined, and a reply written corresponding with the facts, free of charge. Address MUNN & CO., No. 37 Park-row, New York.

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patert Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. Over 1,500 of these examinations were made last year through this Office, and as a measure of prudence and economy, we usually advise Inventors to have a preliminary examination made. Address MUNN & CO., No. 37 Park-row, New York.

Caveats.

Persons desiring to file a Caveat can have the papers prepared in the shortest time by sending a sketch and description of the invention. The government fee for a Caveat, under the new law, is $10. A pamphlet of advice regarding applications for Patents and Caveats furnished gratis on application by mail. Address MUNN & CO., No. 37 Park-row New York.

Foreign Patents.

We are very extensively engaged in the preparation and securing of Patents in the various European countries. For the transaction of this business, we have offices at Nos. 66 Chancery-lane, London; 29 Boulevard St. Martin, Paris; and 26 Rue des Eperonniers, Brussels. We think we can safely say that THREE-FOURTHS of all the European Patents secured to American citizens are procured through our Agency.

Inventors will do well to bear in mind that the English law does not limit the issue of Patents to Inventors. Any one can take out a Patent there.

Circulars of information concerning the proper course to be pursued in obtaining Patents in foreign countries through our Agency, the requirements of different Patent Offices, &c., may be had gratis upon application at our principal office, No. 37 Park-row, New York, or either of our Branch Offices.

Extension of Patents.

Valuable Patents are annually expiring which might be extended and bring fortunes to the households of many a poor Inventor or his family. We have had much experience in procuring the extension of Patents; and, as an evidence of our success in this department, we would state that, in all our immense practice, we have lost but *two* cases, and these were unsuccessful from causes entirely beyond our control.

It is important that extension cases should be managed by attorneys of the utmost skill to insure success. All documents connected with extensions require to be carefully drawn up, as any discrepancy or untruth exhibited in the papers is very liable to defeat the application.

Of all business connected with Patents, it is most important that extensions should be intrusted only to those who have had long experience, and understand the kind of evidence to be furnished the Patent Office, and the manner of presenting it. The heirs of a deceased Patentee may apply for an extension. Parties should arrange for an application for an extension at least six months before the expiration of the Patent.

For further information as to terms and mode of procedure in obtaining an extension, address MUNN & CO., No. 37 Park-row, New York.

It would require many columns to detail all the ways in which the Inventor or Patentee may be served at our offices. We cordially invite all who have anything to do with Patent property or inventions to call at our extensive offices, No. 37 Park-row, New York, where any questions regarding the rights of Patentees, will be cheerfully answered.

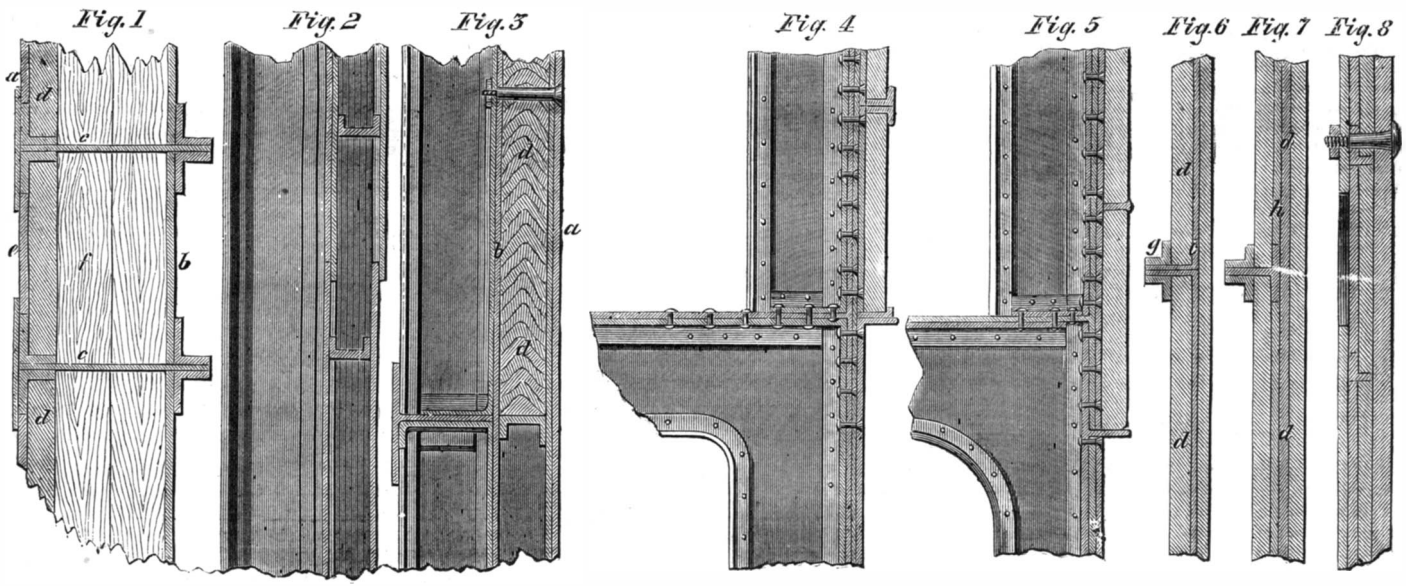
Communications and remittances by mail, and models by express (prepaid), should be addressed to MUNN & CO., No. 37 Park-row, New York.

RATES OF ADVERTISING.

Thirty Cents per line for each and every insertion, payable in advance. To enable all to understand how to calculate the amount they must send when they wish advertisements published, we will explain that ten words average one line. Engravings will not be admitted into our advertising columns; and, as heretofore, the publishers reserve to themselves the right to reject any advertisement sent for publication.

Scott Russell's Iron War Ships and Batteries.

On page 138 of the present volume of the SCIENTIFIC AMERICAN, we directed attention to "improvements wanted" in the construction of iron-plated ships, and we said: "What is wanted is some better mode of fastening iron plates to a ship's side." Since then our London cotemporaries, the *Engineer* and *Mechanics' Magazine*, have come to hand, illustrated with engravings of recent improvements relating to this very subject, for which no less eminent a person than Mr. Scott Russell, builder of the *Great Eastern*, has lately obtained patents. As iron shipbuilding, especially as it relates to iron-plated war vessels, is almost a new art and as it is probable that it will become universal, it opens up a very extensive prospect to inventors for making new improvements.



CONSTRUCTING IRON WAR VESSELS.

The British government has expended hundreds of thousands of dollars in experimenting with iron-plated vessels, and yet there are many defects in their great frigates, the *Warrior* and *Black Prince*. It requires practice to develop defects, and inventive genius to provide remedies. Mr. Scott Russell, in the accompanying illustrations, has presented a new method of fastening and plating war vessels. The improvements, he states, are also applicable to floating and land batteries.

They are constructed double, with an inner and outer skin or plating, and the space between the two skins is divided by longitudinal partitions only, or upright partitions only, as may be required, which connect the two skins and produce numerous cells. Suitable angle iron is used in the structure. Into each of these cells, which come near to or above the line of flotation of a ship or floating battery, or which in a land battery is desired to be rendered more or less strong to resist shell and shot, a thick protecting plate of iron, in size suitable to fit into the cell, is introduced. The space between the inner surface of the thick protecting plate and the outer surface of the inner skin or plating is filled with wood, so that the thick protecting plate of iron introduced into the cell will be securely retained in position without other fastenings. The inner as well as the outer skin or plating, as well as the longitudinal and upright partitions, should, when for ships or floating batteries, be made watertight in all parts.

Fig. 1 of the accompanying engravings shows a traverse section of a part of the side of a ship; *a* is the outer plating or skin of the vessel, and *b* is the inner plating or skin, and they are shown to be connected by longitudinal partitions, *c c*, and it is preferred that both longitudinal and upright partitions and angle iron should be used; *d d* is the protecting plate, there being a filling plate, *e e*, intervened between the outer skin and the protecting plate, or the surface of the protecting plate may be planed or otherwise formed to fit close to the angle iron and the outer skin; *f f* are fillings of wood or of any other suitable and comparatively elastic material. In place of using one thick plate of iron in a cell, the requisite thickness and substance may be obtained by introducing two or more plates in like manner to what is above described in respect to a single protecting plate. By thus using the requisite plates of iron to resist shell and shot, they will be found to increase, and, not as heretofore, to reduce the strength of the structure; and such protecting plates will not be injured by bolt holes being made through them, in order to their being fixed by bolts to the structure, as heretofore has been the practice. Or, instead of filling the cells with a combination of thick protecting plates of iron and wood filling, the cells may be entirely filled with iron plates of such a thickness as may be required, in which case it may be found desirable to have longitudinal cells only, and to arrange the butts of the filling plates in such a manner that the butts of no two strakes in the same cell are in the same plane, technically called "breaking the joints."

Fig. 2 shows a vertical section of the side of a ship or of a fortification wherein protecting plates are employed one over the other, in such manner as to break joint. The plating of the inner and outer skin is riveted in the ordinary manner, and, if desired, these may be applied "through" bolts or rivets, so that the outer skin and inner skin, together with the interposed protecting plates, may be all fixed together, and to the inner ribs or framing of angle iron, whether of L or T, or other form. In certain cases, upright webs only are used, and the cells are then filled with bars or plates of iron placed with their edges against the inner surface of the outer skin or plating, and the outer surface of the inner skin or plating; these bars or plates may be placed close together, thus entirely filling up the cells, or there may in some cases be spaces left between the bars. These spaces may be filled with cement, wood or other substance desired, and the bars may be of any shape or size that may enable them to add strength to each other and to the general structure.

Fig. 3 shows a section which may either represent a horizontal or a vertical section, according as the angle iron or other partitions are used in a vertical or horizontal direction. *a* is the outer plating or skin, and *b* is the inner plating or skin, having between them angle iron partitions; *d d* are the projecting bars or plates, which are bent so as to fit into and on each other. The edges of the plates or bars, *d d*, it will be seen, come against the inner and outer platings.

Thus, in using two or double angle irons back to back in this way, one will be hammered or folded over or bent in one direction to hold one edge of one thick protecting plate or plates, and the other will be hammered or bent over in the opposite direction, so as to hold one edge of a neighboring thick protecting plate or plates, the other edges of the protecting plate or plates being held in a similar manner by other angle or other irons. Or, by using a single angle or T-iron, the edges of the thick protecting plates being rounded or chamfered at the angle farthest from the skin or plating, that part of the angle or T-iron that projects beyond the thick protecting plate or plates may be hammered or riveted down so as to hold the adjoining edges of two thick protecting plates.

From the above description, it will be understood that by thus using angle or suitably-formed iron on the skin or plating of the side of a ship, a number of recesses will be formed, each of a depth suitable for receiving a thick protecting plate or plates, at the same time allowing sufficient material to be hammered or bent over the edges of the thick protecting plates. The holding of the protecting plates to the skin or plating of the structure may, by these means, be very advantageously accomplished, and in a superior manner to that heretofore practiced, when holes have been formed in the protecting plates, and also in the frame to receive bolts, thus tending to weaken both the plates and the frame.

Figs. 4 and 5 show two sections of means of fixing protecting plates to the outer skin of a vessel or of a fortification. In these figures, the outer skin is shown to be of more than one thickness. In some cases, the requisite plates of iron for protecting a ship or battery from shell and shot are fixed by means of angle or suitably-formed iron fixed to the skin or plating, the projecting ribs of such angle iron being made suitable not only for receiving the desired thickness of protecting plate on either side of each of such ribs, but also to allow of the rib to project beyond the protecting plates on either side.

Fig. 6 shows a section of an arrangement where two angle irons, *c c*, are used back to back, to which the outer skin or plating is riveted; these angle irons extend beyond the protecting plates, *d d*, which may be single plates of considerable thickness, as shown, or two or more plates may be used to make up the required thickness; *g g* are other angle irons, which, being riveted on either side, securely hold the whole together.

Fig. 7 shows another section where, in place of using two single angle irons back to back, L or T angle iron may be used; and this figure also shows the use of protecting plating outside of the skin, *a*, as well as the inside thereof, the direction of the inner and outer protecting plates being reversed, and, by through bolts or rivets, the outer and inner protecting plates may be secured to each other; and to the angle iron, *h*, is a filling plate, when a single thick inner protecting plate is used, such filling plate, *h*, making up for the thickness of the angle iron. The great object is to avoid the injurious effects of having the protecting plates and the structure to which they are fixed perforated with numerous holes for the reception of bolts; and with this object, through bolts are employed as sparingly as may be. Screw bolts may be used, introduced from the interior, the inner surfaces of the thick protecting plates, in such cases, being tapped to receive the screws; the screws, when thus introduced from the interior, should not pass through the protecting plates, so as to appear on the outer surface thereof.

The edges of the other plates may be connected together by means of tongues and feathers formed on their edges, or by means of iron dowels, and then a certain number of through bolts used to tie the whole structure together. This will be understood by reference to Fig. 8, which represents a section of part of a ship or vessel, or of a fortification so constructed or put together.