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THE STEVENS BATTERY.

Early Propositions of the Messrs. Stevens to the Government---Nothing New or equally Good yet Suggested in Europe---Minute Details of the Ship, the Engines, the Armor and the Armament---Principles Involved---Philosophy of Impregnable Ships.

HISTORY OF THE ENTERPRISE.

No marine structure but the *Great Eastern* has so largely excited the curiosity of the American public as the Stevens Battery, not so much by reason of its supposed vastness, or its impregnable or destructive or any specially defined features, as from the mystery that has ever hung over its origin, character, size, appearance, destination, and perhaps its very existence. Imagination has indeed pictured it is as an exaggerated sword-fish, a multangular floating fortress, a steam-propelled carving knife and all things marine, by turns; but what it *is*, the government has wisely refrained from making known. Now that the responsibility of finishing or abandoning it is thrown upon the public, to a certain extent, the veil of secresy is removed—we would almost say unwisely, for the grand work still embodies features far in advance of any that have been developed by our transatlantic neighbors, and yet it is impossible to keep such matters secret from an enterprising rival.

The history of the Stevens Battery is full of interest to the public, not only on account of the unusual necessity of coast and harbor defense, but because it furnishes new evidence as to the genius of the American engineer, who, nearly a quarter of a century ago, had experimentally developed those great principles of speed, buoyancy, protection and offence, which are but just now, and not so well, practiced in the Old World. The screw, as an instrument specially adapted to the propulsion of war vessels, was invented and used in the last century by the father of the late Mr. Robert L. Stevens and Mr. Edwin A. Stevens. In 1816, the last-named gentlemen experimented on inclined iron plates, as best suited to the protection of ships. The following extracts, however, from a letter written by him to the Government Board, appointed with reference to coast and harbor defence, of which Commodore Stewart and Perry and Cols. Thair and Totten were members—a letter written just twenty years ago—its date being August 13, 1841, is the most interesting chapter in this history :—

It appears to us that steam vessels of war should possess the following qualifications, viz.:

That the motive power (so far as the steam is concerned), should be out of reach of an enemy's shot. That the vessel herself should be proof against damage from either shot or shell; that she should have the capability, when required, of great speed combined with the power of choosing, under all circumstances, her position with certainty and facility.

These qualities, we believe, may be combined in one vessel:—

First, By having the engine and boiler placed below the water-line, and by using as a propeller Stevens's circular scull where action is entirely below the surface of the water.

Secondly, By constructing the vessel above the water-line of such material as should be proof against shot or shell, and placed at such angle as should best resist or turn the one or the other.

Thirdly, By working the engine expansively in ordinary time with boilers capable of resisting a high pressure, and of generating by the use of a more concentrative and inflammable fuel, a very large quantity of steam, giving greater power and speed when required.

In the construction of the vessel we propose to substitute iron for wood; iron for ship-building being of less weight than wood, of equal strength, and capable of opposing an equal resistance.

The thickness necessary to resist balls of the largest size would require to be determined by experiments. This could be easily and quickly done, but we suppose a thickness of one-half or two-thirds the diameter of the ball (set at an angle of 45°) would be sufficient to resist or

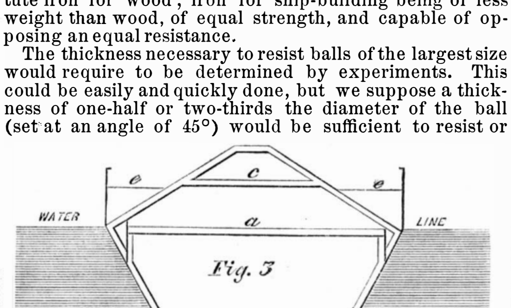


Fig. 3

glance it off. If so, it would require only 4½ or 6 inches to resist a 9-inch shell.

If a submerged application can be used at sea with the same advantage, and with no greater loss of power than takes place in our rivers in the comparative power of the water-wheel and circular scull, there can be but little question of the propriety of adopting the submerged propeller.

A steamship with her motive power completely protected would have an advantage equal to that an ordinary ship would have over her adversary by going into action with sails, rigging and mast protected from the enemy's shot.

An experiment on such a scale as to test fairly the value of a submerged propeller at sea would, we think, fully repay the cost to the government. We have but little question of its success.

Since the above was written, the following experiments were made:—

[The experiments are here detailed.]

From the above experiments it would appear that it takes wood sixteen times the thickness of iron to offer the same resistance to a ball fired with a full charge. Four inches of wrought iron, therefore, would be equal to five feet four inches of oak, which we suppose sufficient to stop the horizontal ball at point blank distance. Whether this ratio would hold good when balls of the largest sizes were used, experiments easily made will prove. We believe it will.

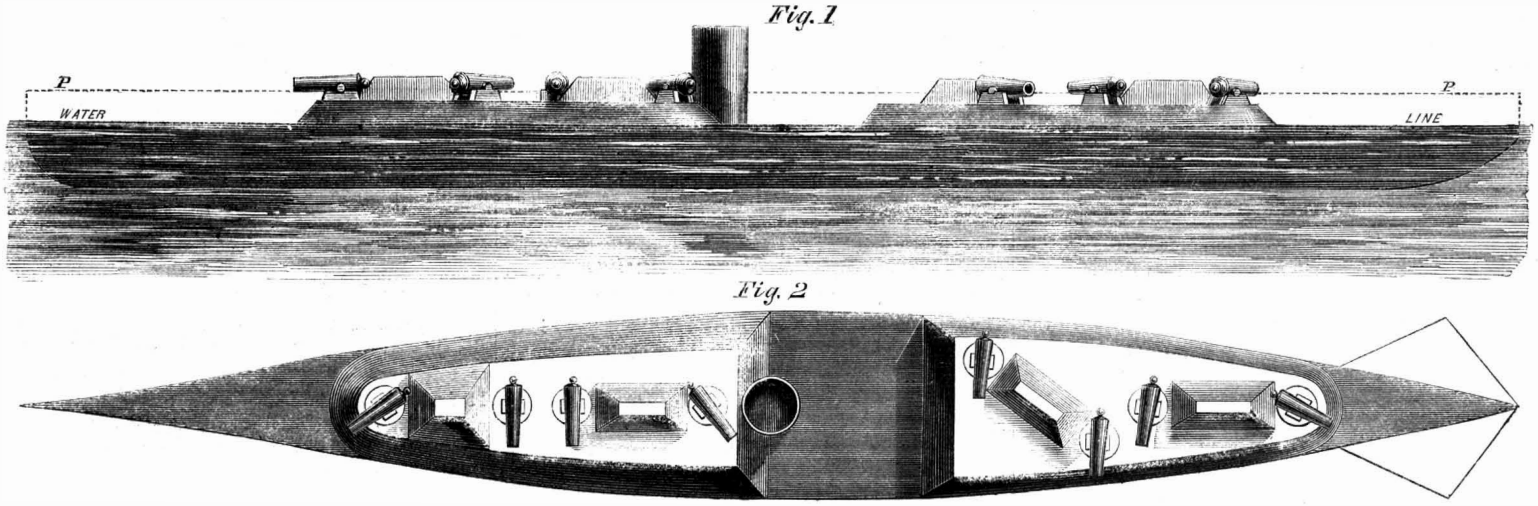
We would propose to rig the vessel in the ordinary way, and to depend upon her sails for cruising, with the exception of a small power to overcome the friction of the propellers, if it should prove difficult or not advisable to unship them.

We would arm her with a few guns of the largest caliber (made of the same material as the one lately constructed by Capt. Stockton, viz., wrought-iron,) that the experience of the present forges are competent to execute, as having greater strength in proportion to their weight and capabilities of resisting larger charges, and throwing shot to a greater distance than any now in use.

We would load them at the breech, which would enable us to rifle the gun, and by casting a thin covering of lead or pewter around the shot or shell, and making it a perfect sphere or cylinder, it would enable us to make the diameter of the base the full caliber of the gun, doing away entirely with windage, and of course increasing the range and accuracy of the flight of either shot or shell. This covering could be cheaply and quickly put on, and would protect the shot from any alteration of form by rust, and enable us to use and keep in order a more perfect gun.

The remainder of the armament would be shot guns of large caliber, to throw a great weight of shot or shell at short distances.

On this letter was based the contract to construct the present Stevens Battery. In 1843, the dry-dock where the vessel lies was commenced; but, on account of official interference, the ship was not begun till 1854, and in twenty months, all the work now done—the completion of the ship proper, and engines and boilers—was accomplished. The original sum furnished by the government, was $500,000, and beside this, the Messrs. Stevens spent $200,000 of their own money, after which the enterprise was brought to a stand-still by the death of Mr. Robert L. Stevens, and by the want of further appropriations. All that is asked of the government now is $500,000 more, which will complete the armor in a very short time, as this is a kind of work which can be rapidly pushed



THE STEVENS FLOATING BATTERY.

forward by an army of men. When a first-class passenger steamer costs over a million, we can hardly expect to get a mailed ship-of-war of 6,000 tuns for less, while but one-half this sum is now required to finish this great work.

DESCRIPTION OF THE VESSEL.

The hull resembles, in its general features, that of a large iron screw steamer with very sharp lines. Its principal dimensions are as follows :—

Length over all, 420 feet.
Breadth of beam over all, 53 feet.
Breadth of beam, exclusive of armor, 45 feet.
Depth from main deck, 21 feet.
Depth to upper or gun deck, 23½ feet.
Minimum draft of water, 16 feet.
Draft in fighting trim, 21 feet.
Tunnage, 6,000 tuns.
Weight of engines, 548 tuns.
Weight of boilers, 266 tuns.
Weight of hull, 1,447 tuns.
Weight of armor, 2,000 tuns.
Weight of guns and carriages, 198 tuns.
Weight of coal (entire capacity), 900 tuns,
Immersion without water, 17 feet.
Water to immerse 21 feet, 923 tuns.
Area of immersed mid-section, at 21 feet draft, 810 feet.

The construction of the hull is as follows : The bottom plates are one inch thick, and the sides taper toward the top, where they are half-inch thick. The plates are overlapped or clinker-built, like those of the *Great Eastern*. The ribs or frames are two feet apart throughout the entire vessel, and are constructed of two 6x3½-inch heavy angle irons, riveted together lengthwise by their 3½-inch flanges.

One of the 6-inch flanges is riveted all round to the ship's side ; the other is pinched for being riveted to an inner skin, should it be required in any part. The main or 21 feet deck (*a*, Fig. 3), is of wood, plated with iron, heavily enough to keep out any shells that may fall upon it through the light decks above. This main deck has no sheer, but is level in the direction of its length ; it has 6 inches camber. This forms the skin of the ship proper. The light sides above the main deck, and the plated parts or batteries will be again referred to. The main deck is supported by the sides of the ship and by trusses of boiler plate made into hollow beams, posts, &c. These trusses rise from the bottom of the vessel, between the boilers and abaft the engines. Over the engines, the deck is supported by the engine frames, and in the extreme fore and aft parts of the ship, and at other points it is secured by cross bulkheads. Longitudinally with the sides of the vessel, running each way from the engine compartment, are two lines of plate girders, lying on the before-mentioned vertical trusses, and supporting the deck beams. By all these means the main deck, *a*, is secured to every part of the ship, making a tubular girder and a trussed girder combined, of the whole fabric. About 120 feet from the bow, is the boiler compartment, which extends back 100 feet, to about the center of the ship. Here begins the engine compartment, which extends back 52 feet further. This 152 feet space in the middle of the vessel, devoted to motive power, occupies the entire hull (excepting the gangway to be mentioned), from side to side and from keelson to near the main deck ; but it is wholly submerged, the highest parts being several feet below the water line when the vessel is in action ; and it is further protected by the ∢ of oak and the 6¾-inch armor outside of it. In front of the boilers are the blowers and pumping engines, and in front of these, compartments for coal and for water, by which the vessel is to be brought down for action ; and above these compartments and immediately under the main deck, are quarters for men, on a deck 14 feet from the bottom of the ship. The extreme bow is filled with solid iron. The compartments below the 14-feet deck are formed of two other decks and cross bulkheads, which strengthen the ship, and, at the same time, prevent too much weight of water from entering if any one or two of the compartments should be broken open. Behind the machinery compartments are four longitudinal bulkheads, running nearly to the extreme stern, and up to the 14 feet deck which passes aft as well as forward, from the machinery compartments. These bulkheads, with the deck and ship's bottom, thus form two tubular girders to strengthen the structure. Through these tubular girders run the screw-shafts, one from each set of engines. There are two screws, as shown, one on each side of the stern. The extreme stern is divided by decks and cross bulkheads into small compartments, like those in the extreme bow. The space between the pairs of longitudinal bulkheads, as well as that within and outside of them, is devoted to coal. The keelson is two feet high—the ship has *no keel*—and forms a box-girder of boiler-plate On the top of it is a railway from stem to stern, for carrying coal from the various bunkers or coal compartments, already mentioned, to the boilers. The engines and boilers are so arranged—one set of them on each side the ship—that a passage (in which are the keelson and its railway) extends from stem to stern between them, at the bottom of the ship. This passage is furnished with water-tight doors wherever cross bulkheads occur, as in front of the boiler, between the boilers and engines, abaft the engines, and at other places fore and aft those mentioned. The exact arrangement of all the bulkheads and water compartments is not yet perfected.

We now have a general idea of the ship up to the main deck. To recapitulate—first, the water and coal compartments below the 14 feet deck, and the quarters between this deck and the 21-feet deck, the whole extending back some 100 feet ; then come the blowing and pumping engines, extending some 20 feet, and occupying all the space from top to bottom and side to side, and the boilers and main engines extending 162 feet, and from top to bottom and side to side. After these are the longitudinal bulkheads, or tubular girders, inclosing two screw-shafts, and reaching up to the 14 feet deck, above which, between this and the 21 feet deck are quarters ; and lastly, the water and coal compartments in the extreme stern.

The lines of the ship are remarkably fine and deserve attention. A cross section, at about 50 feet aft the center, is shown by Fig. 3. The bottom is nearly flat, like that of a North River steamer. The sides of the ship proper extend straight up, as shown, from a point below the water-line ; the corner at the water-line is made by the coat of mail, which shuts down over the ship like a cover. From this corner the sides extend up straight again for 8 feet. The beam of the armament thus widens the ship some 7 feet, which increases her steadiness and buoyancy. The water lines are hollow both fore and aft. The mean angle of the bow is 14° ; the stern is about the same, thus having an extraordinary fine run. The bow hollows in at the 14-feet deck about one 1 foot in 50. The proportion of length to beam is about 8 to 1, or nearly that of the *Great Eastern*, but the latter vessel is straight for some 200 feet in the middle, while the Stevens steamer tapers all the way. The deck lines of the bow are also hollow, and neither bow nor stern are overloaded with wide decks or other top-hamper, a plan which shall have to be adopted generally before vessels can avoid excessive pitching and rolling, and be made strong within reasonable limits of weight.

THE ENGINES AND BOILERS.

The engine compartment, as already stated, begins near the middle of the ship, and runs back 52 feet. There are eight engines, four on each screw-shaft. The two screw-shafts, lying side by side, are 8 feet apart at the center of the ship, where they start ; they diverge as they run toward the stern, at which point they are 22 feet apart. They also point down a little, to get a better hold on the water, being a foot lower at the screw end than at the engine end. Their distance above the bottom of the ship is about 10 feet. Each shaft is composed of sections coupled together, and extending in all 184 feet, with a maximum diameter of 17 inches. The four cranks of each shaft stand at the four quarters of a circle ; the cranks are forged in, and each cranked section is coupled to the next by a sleeve-coupling. The engine frames are, in general effect, eight arches running across the ship, from the bottom and from side to side, nearly up to the 21-feet deck. Each frame is a box or tubular girder of boiler-plate, and all are stayed to the bottom, sides, deck, and each other, so as to make a thoroughly solid but comparatively light structure. Upon the frames rest the hollow blocks of the shafts and of the beam centers, and between them are the cylinders and air-pumps. Each set or row of engines consists of four cylinders and two air-pumps situated above and below the shaft, next the respective sides of the ship, the two sets or rows facing each other and leaving two longitudinal passages in the center of the vessel, one under the 21 feet deck, and one on the bottom, containing the keelson and its railway, as before referred to. A description of one will answer for all the engines. The cylinder stands perpendicularly between the shaft and the side of the ship, and is 45 inches diameter by 42 inches stroke of piston. Above it, and connected to the crank in the usual North River steamboat way, is a wrought-iron walking-beam, six feet long, standing athwart ship. The beam-center (pin on which it vibrates) of one engine of each pair extends across the third frame, over the air-pump, and drives it by a lever and rod, there being one air-pump between each pair of engines, 40 inches in diameter by 21-inch stroke. Below the shaft, near the bottom of the vessel, and in front (toward the center of the ship) of the air-pump, is a relief or delivery-pump of 14 inches diameter and 21 inches stroke. It is worked by an arm on the beam-center, opposite to the air-pump arm. There are, in all, four of these pumps, and four air-pumps. Upon the cylinder, toward the side of the ship, is a valve-chest, containing a balanced slide-valve, which is worked by a link-motion (the common locomotive valve-gear), thus forming a variable cut-off and a reverse gear of the simplest kind. The link is moved by a quadrant and pinion actuated by a little pair of steam-engines, conveniently arranged for rapid maneuvering. The condensers, four in number, are cast-iron boxes, standing back of and above the air-pumps. A remarkable feature of the engines is, that all the principal journal-boxes, including the crank-pin ends of the connecting rods, are hollow and furnished with induction and return pipes which keep a continual stream of cold water running through them, rendering it impossible for them to heat, without the necessity of putting any water on the bearings themselves. This is probably the most thorough work of the kind in existence.

The steam pressure carried will be about 60 pounds, and the number of revolutions will be from 80 to 100. The power of 8,600 horses (equal to the maximum power of the *Great Eastern*), is based on 80 revolutions per minute.

The boilers are ten in number, five on each side of a central passage or fire-room ; they extend from the engine compartment, near the center of the ship, 76 feet forward, to within about 120 feet of the bow, and upward, some 17 feet from the bottom. The boilers are separated by the trusses before referred to, and are slightly different in size, on account of the taper of the ship, the general dimensions of each being about as follows :—Height, 14 feet ; length (fore and aft), 11 feet ; width, 14 feet. Each boiler has two furnaces in the lower part, the upper part being filled with 2¼-inch return flues, 10 feet long. The total heating surface of all the boilers is about 26,000 square feet. All the flues thus empty the products of combustion into a central space above the fire-room or lower passage. This upper passage is formed into a tight flue, increasing in size as it runs back, and empties into the single chimney, 12 feet in diameter, which stands in front of the engines, nearly in the center of the vessel. In front of the boilers are the blowing and pumping engines. The pumping engines stand like a Λ, the two cylinders, each having 24 inches stroke by 24 inches diameter, driving pumps below on the same piston rods. These pumps are arranged to take water either out of the sea, or out of the water compartments of the ship, or out of the hot well, and deliver it to the boiler, or to the sea. The blowing engine consists of two cylinders, of 40 inches diameter and 18-inch stroke, one on each side of the ship, in front of the pumping engines, and inclined upward toward the blower-shaft, which runs across the vessel. On this shaft are two fan blowers, 18 feet in diameter by 6 feet face each, with the before-mentioned continous center passage between them. They may be worked up to 500-horse power, and they are arranged to take air from any part of the ship, and blow it into the fire-room, whence it enters the fire. Blowing into an air-tight fire-room, instead of into the furnaces, is practiced on the Camden and Amboy Company's boats, and is a very safe and excellent method, as all sparks, smoke, &c., tend to enter the flue and chimney, rather than to blow out of the fire-doors and about the ship.

PRINCIPLES AND CONSTRUCTION OF THE MACHINERY.

However greatly the *economy* of commercial steamers may be promoted by improvements in expansion through two cylinders, superheating, very high pressure, surface condensation, &c.—improvements which are equally necessary in all *cruising* government vessels—we do not think that the general arrangement and principles of the power of this steamer could be improved in any important detail unless it be in the substitution of refrigerators for the ordinary condensers. In the latter particular, however, this vessel is quite equal to the best *average* of war and commercial vessels, the world over. In other particulars it is generally much superior, and we repeat that, on the whole, we do not see how it could be greatly improved. In the first place, the two screws have great advantages over one screw. It is impossible to drive a large vessel at very high speed with one screw, because the practicable draft of water is too small to allow sufficient diameter and propelling surface of screw. That two screws work well is a matter of practice, and is not disputed in this country. They also diminish by half the size of all parts of the machinery and bearings for a given power, thus reducing suction and spreading the weight over a larger portion of the ship. But the great feature of the two screws for a war ship is their ability to turn the ship round *on her own center*, just as if she were fastened by a pivot to the bottom of the sea, without obliging her to take a circuit of a mile or so. It is thought that the vessel can be turned end for end in one minute, by moving one screw ahead and backing the other. The advantage of this style of maneuver cannot be overestimated. That it can be done, is a matter of experiment. Some years ago, Mr. Edwin A. Stevens turned round a 225-foot boat, called the *John Nelson*, having two screws and a maximum speed of only eight miles, in one minute thirty seconds, and again in one minute twenty-five seconds.

The stroke of the engines is rather short, measured by the American standard, but the diameter of cylinders is not very great. While these cylinders have 45 inches diameter and 42 inches stroke, the *Great Eastern's* screw engines have 84 inches diameter and only 48 inches stroke; while the *Warrior* has, we believe, 144 inches diameter of piston by 48 inches stroke—proportions which are perfectly outrageous. Again: the four cranks, standing at the four quarters of the circle, perfectly balance each other, and must prevent the side motion common to screw ships. The disposition of the engines is admirable. They fill the whole space, still leaving a plenty of room for clearance, attendance, adjustment, repairs, and a tolerable long stroke. The relief of the ship from water is arranged to be performed by either the pumping engines, the air pumps, or the relief pumps below them, or by all combined. The ventilation of the ship is perfect. All the principal compartments and decks are airtight, and either can be put in communication with the blower. The engine room may thus be kept cool, and the hot or foul air from any part forced into the fires and up the chimney.

THE ARMOR AND ARMAMENT.

The fact has been referred to, that inclined sides were proposed by Messrs. Stevens long before Captain Coles, of the British navy, the reputed father of the scheme, had patented his arrangement. But the Stevens plan omits the objectionable feature of Capt. Coles's plan—the revolving houses covering the guns, and thus adding to the hight, weight and steepness of the sides. The centers of the guns are but 8 feet above water in Stevens's ship, and the highest part of the armed portion, or of any part of the ship except the chimney, is but about 10 feet above the surface of the sea. Thus, the angle of the mailed sides is very flat, being only 30°; while the top portion of the mailed part is entirely flat. Fig. 3 shows a section of the vessel with the shotproof sides and deck, and of one of the shotproof loading houses. The whole of the shotproof parts shut down over the vessel like covers, and consist of two batteries, as shown in the elevation, Fig. 1 and the plan Fig. 2, one beginning near the bow and extending to the chimney, and the other beginning aft the chimney and extending to near the stern. Upon the flat tops of each of these batteries or covers, stand two loading houses and four guns—in all, four loading houses and eight guns. From the point below water, where the sides of the ship proper begin to run up vertically, the armor starts and runs up, inclining outwardly to about the surface of the water, and leaving a <-shaped space between the armor and the sides of the ship proper, some 3 feet thick, which is filled with solid oak. From this corner the armor inclines inward at an angle of 30° from the horizon, joining the main deck at one level, the gun deck at a second level, and inclining at 45° from the gun deck to form the sides of the loading houses. The gun deck, the loading houses and all the inclined parts of the armor are 6¾ inches thick. The main or 21-foot deck, before described, is seen in the plan Fig. 2, in the middle of the ship and at the ends, and is covered with iron thick enough to keep out shells. Solid shot would strike it at such a very acute angle as to glance off. The main deck does not extend under the gun decks or mailed parts—or, rather, the mailed deck is a continuation of the main deck, at a higher level. Above the lower level of the main deck, as shown at *a*, is another deck, level with the gun deck, and extending the entire length and breadth of the ship. Three low cabins are thus inclosed on the main deck, one in the middle and two at the ends of the ship. Still above this wooden deck are light bulwarks, the upper sections of which turn down during action. All this last-mentioned work above the main deck is not at all a part of the vessel proper or of the armor; it is, in fact, a temporary arrangement for times of peace, and is expected to be vacated and carried away bodily in action, which will perhaps add to the convenience of fighting the ship.

The guns are arranged on deck as shown. The gun carriages are very heavy, solid, hemispherical masses of iron, let into and held in place by circular depressions in the plated deck. They are to be heavy enough to resist any known projectiles, at the shortest range. Each carriage, or turn-table, has a shaft passing down to the 14-feet deck, where it is trained by the necessary number of *protected* men. After firing, it is turned with its muzzle toward the small port in the loading house, where the charge is put in by the *protected* men inside. The only man not absolutely shielded from the enemy's shot is the one who aims and fires the gun, and he is entirely shielded in front by the gun and its carriage. The recoil of the guns is absorbed by rubber or other elastic substances placed behind the trunnions. Experiments show this plan to be feasible. The four midship guns are intended to be 10 or 12-inch rifled cannon. The four others will be the largest that can be produced—probably 15 to 18-inch guns. The vessel will be lighted by narrow slits in the top of the loading houses and the gun deck.

PRINCIPLES OF THE STEVENS BATTERY.

The leading principles of this grand work are as follows:—

1. Protection of the entire ship proper and its contents by water. The vessel, while having a minimum draft of 16 feet, may be sunk in an action to 21 feet in any weather when an enemy could be found to fight her, and in smooth water she can be sunk to the gun deck, if necessary. Water is the cheapest and most thorough protection against projectiles that can be found in Nature, on account of its perfect non-elasticity. Air, indeed, retards a ball, but its elasticity enables it to squeeze together into a smaller space, and so get out of the way instantly. But water, although perfectly mobile, when penetrated at comparatively moderate velocities, cannot get out of the way at anything like the speed of a cannon shot, because it cannot jam one particle into another, or squeeze together or occupy a smaller space; but each particle, in all its fullness and rotundity, must simply be removed and placed somewhere else—an operation requiring so much time as to take the dangerous velocity out of a projectile in a very short space. Now, the *Warrior*, *La Gloire*, and mailed ships generally, are so protected up to the water line, but they present a great mass of ship above the water line which must either be protected by an immense and unwieldy weight of mail, or else be knocked to pieces. The Stevens ship, however, is entirely protected by water, and only the loading houses and a cover running up high enough to give the guns the proper elevation require to be cased, thus giving the maximum strength with the minimum weight.

2. The inclined armament. Were this, as proposed by Capt. Coles, and very severely criticized by the English newspapers, a comparatively high structure, vast enough to take in the guns, steep enough to be hit at nearly right angles when rolling, and forming a part of the ship itself, so as to spoil or impair it for the purpose of habitation, &c., it would be of questionable value. But it is a simple cover put over the top of a ship, and not a part of the side of the ship. Hence the objections urged against inclined sides in general do not hold in this case. Again, the inclination of this cover is so small that no rifled projectile can strike it *flat*, but must necessarily glance off. The mail has then simply to *change the direction* of the projectile, and not to *stop* it, which is another thing altogether, and very much more difficult. Besides, the submersion of the ship proper increases her steadiness, and prevents excessive rolling, so that the angle of the mail never becomes much steeper than 30 degrees.

3. Great speed. This is simply *choice of position*. We know of no other war ship which is likely to run above 13 or 15 knots, while this vessel must run at above 20, having the horse-power of the *Great Eastern*, with less than half her immersed mid-section, at her 21 feet, or fighting draft. It is quite unnecessary to enlarge on the advantages of choice of position.

4. Turning with great facility on her center, by the action of her two screws. This, like the former adavntage in maneuvering, cannot be too highly estimated.

5. Adaptation of draft to various circumstances, by means of rising and sinking, and consequent economy of fuel and increased coal capacity. In addition to the protection thus afforded in action, it is evident that the vessel can throw away what would be, in sailing, a useless load; for the water-protection is so much resistance to locomotion, because it increases immersed section of the vessel. Steel plates, however, cannot be thrown away in passing from point to point. They must be carried until they are *shot* off, if the sides of the ships are to be shielded by them.

6. The perfect protection of all the men, except the eight who fire the guns (these eight being very well shielded by the guns themselves), within water sides and inclined steel or iron roofs. The port-holes of the *Warrior*, or any port-holes through which guns are to be aimed, are necessarily large enough to fire into, and will be very convenient places to put in small rifled shells at long range, and grape at close quarters. But in this case the 6¾-inch inclined armor, equal at least to foot-thick perpendicular armor, must be absolutely torn open, to put in so much as a musket ball.

7. The lightness of the protection, due to having the guns heavy enough to protect themselves, rather than a coat of mail outside of them. To the observer of this structure, the only defect upon immature consideration, appears to be the defencelessness of the guns themselves. Every thing else is impregnable; but will not the enemy's hundred-pound rifled projectiles, at short range, dismount or break the cannon on deck? Supposing, for a moment that it is necessary to inclose them—how shall it be done? Ports of any kind will take in rather too much grape and rifled shell; but the worst feature of this system is, that both sides of the ship have to be armed, as the guns of one side can only fire on that side, thus doubling the necessary weight of metal. But suppose the casement to revolve with them—suppose each gun to be covered with a hemispherical shot-proof shield, large enough to hold it, and the men necessary to work it, on Capt. Coles's plan. Can this mass be readily turned round, and does not the thinnest and weakest part of the gun project out of its casement, so as to be just as much exposed as if it stood on the open deck? And does not this plan also involve the port-hole? Or suppose the trunnions of the gun to be a sort of ball-and-socket joint at the muzzle, so as to avoid a port, the breech being shifted to train and sight the piece. The range will be very small, and, we think any one who will attempt to work out the details of the machinery for placing the whole weight of the breech in the various necessary positions, for rapid aiming and firing, will abandon the job as impracticable. The present guns balance on their trunnions, and are easily moved, however heavy. If it is not feasible, then, to protect the gun within a battery, what can be simpler than to make the gun heavy enough to protect itself? Even if the former plan were feasible as to range, safety, &c., the latter plan involves the least weight of material, for the ordinary gun is already nearly strong enough to resist any projectile, and a small increase of weight would render it absolutely proof, while building a cover to inclose it would require perhaps ten times the weight of material. Making the gun heavy enough to *pro-*

tect itself utilizes the entire metal of the armament, not only as armament, but as armor. Guns are not often broken by cannon shot, and they can easily be made quite proof; but they are often dismounted from ordinary carriages. The hemispherical carriages described, however, are not liable to be knocked away by anything small enough to be sent out of the muzzle of a cannon. Besides, hammering eight immense guns often and hard enough to break them all will require some hours good shooting, during which time it is fair to suppose that an invulnerable ship having choice of position, and throwing eighteen-inch balls at close quarters, would put any enemy extant—the 4½-inch vertical-plated ships of our neighbors, for instance—in a place where his powder would get too damp for rapid firing. The lightness of the protection of the Stevens vessel is also due to the submersion, so as to make use of water instead of iron, as a shot-proof material during action.

8. By arranging the guns to fire in either direction, one-half the weight of the ordinary armament is saved, for cannon that fire through port-holes can fire on but one side, and there must be an equal number on the opposite side, for *its* defence.

9. Guns thus arranged have far greater range—can sweep the whole horizon—while those fired through ports in the ship's side can sweep but a limited arc of the circle.

10. Two of the guns, it will be seen, are not in the center of the ship, longitudinally, but nearer the sides, so that three guns at a time can fire directly forward or directly aft. Were they all in line, but one gun could fire parallel to the keel, in either direction. Thus this vessel can stand bow on, presenting her sharp end to the enemy, and then throw 18-inch globes and rifled bolts into her sides from three guns at a time. That she *can* stand bow on, if she likes, is easily believed, when we consider her great speed and power of turning on her own center.

11. Lastly, this vessel, having only eight guns, can throw double the weight of broadside that the *Warrior* can handle. *Large* shot are what tell on the weight, and on the enemy's sides.

In conclusion it will be observed that most of the best features of modern marine practice and naval defence were 20 years ago embodied in the designs of this vessel, viz.: high steam, the screw propeller, hollow and fine water-lines fore and aft, the iron hull, the box or tubular-bridge framing, the link-motion and steam reverse gear and inclined armor. The improvements designed at that early day, and not yet adopted in the best practice—still ahead of the times—are the two screws for rapid turning, the water-armor during action, and the ability to rise rapidly to the surface; the use of guns heavy enough to protect themselves, instead of loading the ship with armor to cover them; the ability to fire, so to speak, a *broadside* in every direction, and the system of ventilation described. And yet the government is advised to throw away this work, and to build mailed ships on modern principles! We would urge the public, for their own sake, to instruct themselves and their representatives in this matter before it is too late.

Flax as a Substitute for Cotton.

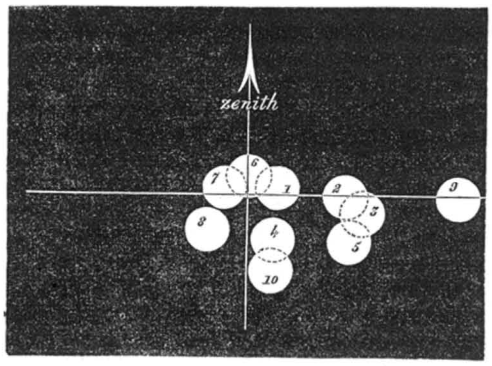
Several of our cotemporaries have been indulging in stupid comments respecting flax as a substitute for cotton. They discuss this question upon the supposition that it is something new to use flax in making cloth. The question is not: Can flax be used for weaving into cloth as a substitute for cotton, merely? but: Can it be produced at as low prices as those of cotton in years of peace and free commerce? If it can be produced as cheaply, just let those who are able to do so bring it into the market, and it will meet with a ready sale. Fine flax is an older fibrous material for making cloth than cotton, and it makes a more beautiful fabric. No man would wear cotton if he could obtain fine linen cloth equally as cheap. This is a question of cost, not of appliance—the use of one thing for another. Let those who talk and write about flax being produced at a small cost, by this and that process, "speak in deeds." Now is the time for action, not garrulity.

The atmosphere extends to a hight of about 45 miles above the surface of the earth. Air is 815 times lighter than water; still its pressure upon a square inch of the earth's surface is 15 lbs.

Correspondence

Extraordinary Rifle Shooting.

Messrs. Editors:—I send you a diagram of shooting made in this place on Wednesday, the 24th inst. Hearing of Berdan's great shooting, I thought I would send you a sample of "shooting as is shooting." These shots were made precisely as drawn, and can be done again. If physically capable, I would join the regular corps of riflemen. If allowed to go upon my "own hook," under the government employ, I would do such services among the rebel



10 shots, 200 yards, with rest. 8¾ inches from center of shots to the center of the target; or from edge of ball to center, an average of 3-5ths of an inch.—Rifle by James, of Utica, N. Y.—Shooting by Geo. N. Miller, of Allegheny City, Pa.

officers as would save thousands of useful lives. I am a locomotive engineer, getting $2.50 a day, but I would throw up all, if I could do so satisfactorily.

Shooting men will appreciate the accuracy of the target I send you, and there are many here who would like to see it published. If of sufficient interest I would be pleased to have you do so. I would refer to my master mechanic for the reliability of

Your obedient servant,

Geo. N. Miller.

Allegheny, Pa., July 25, 1861.

From a Washington Correspondent of the "Scientific American."

Washington, August 16, 1861.

Messrs. Editors:—The local news of Washington is neither very interesting nor encouraging. We are living here with a dark cloud hanging over and threatening us; living, as it were, within the walls of an extensive fortress, for we are surrounded by fortifications, and menaced on the north, south and west by the enemy in great and small numbers. We are all soldiers, and lie on our arms at night for fear of a surprise from some quarter. Reports of every conceivable description are circulated, and one day we are to fight and another to have peace; every day thus bringing with it its new story; but the truth is, we now have a competent commanding General who tells no one his business, nor seeks for newspaper fame by communicating important facts to others. He is making soldiers of the men sent here by requiring the employment of a rigid military discipline; he is omnipresent in his command, and his eye is upon every soldier and every point which might be taken advantage of by the enemy; he will advance *when he is ready*, and lead his army on to victory when he advances. The new system of purification is proceeding rapidly, and it works well through the public offices; beside, the government finds that its family, not being so large now (many expected to die soon), does not require so many servants in the household.

A great many persons have left the city "for good," and journeyed into the "happy land of Dixie," where they will find congeniality, and where they are sure to find promotion. For instance, a messenger in the War Office is promoted to the position of Superintendent of Lighthouse Board; several dry goods clerks have been appointed aids to commanding generals. I have an acquaintance who graduated in a shoe store who is now aid to the active general of the Southern army, Mr. Beauregard; and thus I might go on and enumerate instances, within my own knowledge, where men totally ignorant of the first principles of military tactics have been exalted to high and "honorable positions" in the Southern army. This certainly bespeaks a bad military *status* in the Southern army, if nothing else.

General McClellan is exerting every nerve to stop communication with the enemy, and many spies have been captured; but I see many loopholes through which information can pass freely outward, and I have no doubt but that spies roam our streets every clear day, gathering valuable information for their masters. Educated negroes are taken captives daily, and by some singular wire-pulling they are returned to their "loyal" masters again, after the lapse of a few weeks, during which time they have been employed on our intrenchments where they got much valuable information.

The intrenchments across the river at Arlington begin to assume a formidable appearance, and loom up around us in great strength and magnitude, and the encampments which encircle this city present the appearance of a beautiful white and unbroken fringe. Still, we have very little disorderly conduct anywhere, and old citizens say this city was never under better control and in better order. I must stop now, having written much more than I intended.

R. T. C.

Caustin's Night Signals.

Messrs. Editors:—I see that Congress has appropriated $30,000 for the purchase of the right to manufacture and use Caustin's night signals. Please describe their construction in the Scientific American.

B. P. Howland.

Battle Creek, Mich., August 12, 1861.

[If any of our readers can answer this correspondent, will they please do so?—Eds.

The Philadelphia Water-Wheels.

The three new Jonval water-wheels for the Philadelphia water-works, which are being constructed by Mr. Emile Geyelin are stated, by the *Ledger*, to be considerably advanced toward completion. When erected they will be among the largest ever built. Their principal dimensions are as follows:—The moving wheels are each 9 feet diameter, having 50 buckets: radical length of buckets 16 inches, depth of rim 12 inches. Each stationary or guide wheel contains 17 guides, depth of rim 19 inches. The cylinder surrounding each wheel is 9 feet 6 inches diameter at the increased portion below the moving wheel, and it is 7 feet 2 inches long. The moving wheels are placed in their cylinders at a hight of about three feet above the surface of the water in the tail race at low tide. The circular cast-iron gates sliding on the lower part of each cylinder are ten feet three inches diameter, and 30 inches high, they rest on base rings of cast iron, placed at the bottom of the tail race when the flow of water through the wheel is stopped. Above each cylinder is placed, in lieu of the forebay, a large cast-iron reservoir, twelve feet diameter, with an opening at one side of elliptical form. Each chamber or reservoir has a cast-iron cover, strengthened by ribs, and is thus made to carry the upper bearing of the Turbine shaft and the first bearing of the counter shaft.

The water is brought from the dam to each reservoir by a wrought-iron flume of the same section as the opening at the side of the reservoir. The transverse diameter is 12 feet 10 inches, and the conjugate 7 feet 2 inches. The gearing for conveying the motion and power produced by the wheels to the pumps is also of a massive character, the counter shafts being 12 inches diameter, and the crank shafts 16 inches in diameter at their ends, and 18 inches diameter at their middle. The fall at Fairmount varies with the different states of the tide in the river, from 6 to 14 feet. Each Turbine is, however, rated at 100-horse power, with a fall of eight feet. A portion of the above-described machinery is in its place at Fairmount, and the remaining portions are nearly completed. Each wheel is to drive two pumps.

Boston Boot and Shoe Market.—The *Reporter* this week records a slight increase in the sale of boots and shoes in our market. Some of the Western buyers are beginning to take hold, and extra qualities are being forwarded to Cincinnati, Louisville and St. Louis. Many of our manufacturers are engaged in making up work for the government, which seems to be the best customer and the promptest paymaster in these times.

A Substitute for Glue---Vegetable Albumne.

An improved process has been invented by E. J. Hanon, of Paris, for which he has obtained European patents, by which he obtains vegetable albumine from gluten, for the purpose of applying it as a cheap agent for fixing printed colors on textile fabrics, and also for uniting pieces of wood, leather, &c. The following is the substance of the specification, as published in *Newton's London Journal of Arts*:—

Gluten is obtained by kneading wheat flour paste with water. During the operation of kneading, the feculent part of the paste is carried off with the water, and the glutinous parts unite and form an elastic substance called gluten, which contains about twice its weight of water; the gluten, in this state, is converted into vegetable albumine, by the process of fermentation.

In carrying out the invention, gluten of the best quality, free from fecula, and after having been well washed in warm water, is placed in vessels, in which it is left to ferment until it is completely soft, and has lost its elasticity, and until the greater portion of the water which it has taken up during the operation of kneading is combined with it; when the gluten has undergone the requisite fermentation or modification, it offers no resistance to the finger, or to any article which may be passed through the mass, and the modified gluten should also adhere to the object with which it is brought in contact. The gluten, so modified, is then ready for use; but, as it has been brought, by the process of fermentation, into a very thin paste, it is necessary to place it in molds for drying.

The process of fermentation may be performed, either with or without the aid of artificial heat; when artificial heat is applied, the process is considerably expedited, and the heat found most beneficial is about 20° to 30° Fah., above the temperature of the surrounding atmosphere. During the fermentation, it is requisite to stir the gluten frequently, and to remove the water which rises to the surface. With the above temperature, and in operating upon about fifty or sixty pounds of gluten, placed in a vessel, the fermentation will be sufficiently advanced in three or four days, and the fermented gluten or vegetable albumine, will then be in the proper state for being made into thin plates and dried. The greatest care must be taken that the fermentation is stopped at the proper point, for if it is allowed to proceed too far, the gluten is converted into a noxious mass.

When the gluten is converted into vegetable albumine, it is divided, and formed into plates of about one-quarter to three-eighths of an inch in thickness; this is effected by spreading the albumine in metal or other molds, by means of a spatula; it is then left to dry, either in the open air, or by the aid of a gentle heat, and the plates, when dry, are about one-eighth of an inch in thickness.

The process of converting gluten into vegetable albumine may be accelerated in the following manner:—The gluten is put into a vessel or boiler, and heated by steam, or in a water bath, but the heat must only be sufficient to soften the gluten, and should vary from about 105° to 140° Fah. The gluten combines and unites with the water which became incorporated with it in the operation of kneading; part of the water is, however, evaporated during the process of fermentation, and thus the time required for drying the modified gluten, in the manner before described, is reduced. The water and gluten, when united, form a perfectly homogeneous mass of a thin pasty consistency, which is removed from the vessel, and dried, as before described; or the drying chamber may be heated by steam, care being taken that the heat is very moderate. When dry, the vegetable albumine takes up the greater part of the water which it has lost through evaporation during the process of desiccation. In order to dissolve it, it is put to steep, for about forty-eight hours, in cold water, and, by preference, in soft water; during this time it should be frequently stirred. Before being used the liquid should be diluted with water, and well stirred and shaken up, so that the whole mass or solution is perfectly homogeneous. The quantity of water for dilution must be regulated according to the purpose for which the solution is required. One pound of the so-called vegetable albumine to one pound and a half of water will give a solution which may be used as a substitute for the strongest glue or gelatine, and which resists moisture to a great extent, and is not influenced by heat.

The solution may be used cold, and will retain its properties for from ten to fifteen days in summer, and twice as long in winter; that is to say, if it is kept cool, and, if possible, in a current of air.

This vegetable albumine is applicable, first, for uniting pieces of wood, in lieu of glue or gelatine; secondly, for uniting pieces of porcelain, earthenware, glass, enamel, and other similar articles; thirdly, for uniting pieces of leather, skin, linen, paper, pasteboard, and other similar substances; fourthly, for rectifying, clarifying, strengthening, preserving, and generally improving malt liquors; fifthly, for sizing paper and warps; sixthly, for sizing, dressing, stiffening, and thickening every description of woven fabrics and silks, instead of, or combined with, animal gelatine, gum, dextrine, fecula, or other substances; seventhly, for fixing all colors, except ultramarine blue, in printing fabrics; it is requisite to add from ten to twenty-five per cent of acetic acid, of the strength of seven or eight degrees of Beaumé's hydrometer, to the vegetable albumine, which is then thickened in the ordinary manner with fine wheat flour, starch, fecula, or dextrine of wheat; care being taken to boil the same from ten to thirty minutes, according to the degree of concentration, and the consistence of the color required. Before use, the mixture should be allowed to cool sufficiently to avoid coagulation. For ultramarine blue, a little ammonia is used, instead of the acetic acid; the vegetable albumine must then be dissolved in, or combined with, a solution of slacked lime or phosphate of lime or magnesia. Eighthly, as a mordant for fixing colors in dyeing; ninthly, as a means of fixing gold or other metal leaf on to fabrics, leather, or other materials. In this case, the vegetable albumine, in the form of a dry powder, is rubbed or spread on the surface of the fabric or other material; the gold or other metal leaf is then placed over the part to be figured, and it is fixed thereon by the pressure of a heated die or roller, on which the design is made in relief. The metal may be applied in any other form, instead of in the leaf.

Steam Shipping of Great Britain.

Mitchell's Steam Shipping Journal states that the Parliamentary returns have been published, giving the names of all steamships in Great Britain on Jan. 1, 1861, with their tunnage.

The total number of steam vessels is 1,945. Gross tunnage, 686,417 tuns; exhibiting an increase of 82 ships and 19,904 tuns over 1860. Of the ships thus registered, there were—

Paddle wheels	1,342
Screw	601
Screw and paddle	1
Experimental propeller	1
Total	1,945

Again: specifying material there were—

Built of wood	860
Built of iron	1,080
Built of steel	5
Total	1,945

The distribution in some of some of the principal ports was as follows:—

	Steam vessels.	*Tuns.*
London	525	276,133
Liverpool	214	91,662
Newcastle	116	19,445
Hull	66	26,007
Sunderland	71	13,304
Shields	132	8,830
Southampton	33	8,407
Bristol	66	7,416

Ventilation.—An English journal says that "the new system of ventilation, patented by the National Ventilation Company, consists in a nice adaptation of wire-gauze to open windows, so that the air is allowed to steal gently in and out, while violent draughts, and those enemies to ventilation, the blacks, are excluded." We should like to know what on earth is new about this mode of ventilation that it should attract the attention of the National Ventilation Company. The same thing is in extensive use in this country, and has been for years—used for the double purpose of ventilation and to keep out noxious insects.

The composition of the atmosphere is as follows: Oxygen, 20.61; nitrogen, 77.95; carbonic acid, .04. Aqueous vapor, 1.40 in 100 valumes. There are also traces of nitric acid and ammonia in it.

Shortest Voyages Across the Atlantic.

We take the following extract from an article in *Mitchell's Steam Shipping Journal*, advocating the opening of the Atlantic mail service to competition. The figures are taken from returns made by the Postmaster General to Parliament.

The Southampton lines, under the American or German flags, beat the British ships on an average of years, and this is owing to monopoly. Of voyages performed in 1860 under eleven days, only twenty-one are given, and these were performed by the following ships:—

		Days.	Hrs.
Vanderbilt, Southampton to New York, in	April	9	23½
" " "	May	10	21¼
" " "	June	10	17½
" " "	Sept.	10	14½
" New York to Southampton,	June	10	8¾
" " "	July	9	12¼
" " "	Sept.	10	23¾
Persia, Liverpool to New York,	May	10	19
" " "	Aug.	10	10¾
" New York to Liverpool,	June	10	1¾
" " "	July	10	12½
" " "	Aug.	9	19¾
" " "	Oct.	10	5¼
Adriatic, Southampton to New York,	June	10	7
" " "	Aug.	9	22½
" New York to Southampton,	April	10	22¼
" " "	June	10	2½
" " "	July	10	2¾
" " "	Oct.	10	8¼
Fulton, Southampton to New York,	Dec.	10	3¼
Asia, New York to Liverpool,	Sest.	10	18

It will thus be seen, that the shortest voyage out to New York was performed by the United States steamer *Adriatic*, and to England by the American steamer *Vanderbilt* Calling at Queenstown delays the British steamers, but even with this allowance the steamships under the American flag bear away the palm of victory. Taking the time from port to port, and comparing their voyages with the Montreal Company and Cunard's ships, they beat us considerably. Monopoly is a slow coach.

Ozone for Cleaning Books, Removing Ink, &c.

In Liebig's *Annalen*, ozone is recommended for cleaning and restoring the color of valuable old soiled books and prints from copper and steel plates. This substance removes writing ink, but does not attack printer's ink to any perceptible extent; while mineral colors are not affected by it. Ozone is prepared by placing in a sulphuric acid carboy a piece of phosphorus three inches long and half an inch thick; then pouring in as much water at 42° Fah. as will half cover the phosphorus. The carboy is then loosely corked, and allowed to stand in a moderately warm place until the air within it is converted into ozone. This requires about 18 hours. The article to be bleached, whether the print of a plate or roll of printed paper, is now moistened uniformly with distilled water, and suspended by a platinum wire within the carboy. The paper is soon observed to be surrounded by a column of vapor rising from the surface of the phosphorus. The time required for bleaching depends upon the nature of the article. Brown prints, covered with coffee spots, have been bleached quite white with two days' exposure. If the paper were dried immediately after being taken out of the carboy, it would not only become very brittle, but quite brown again, on account of the acid in it. To remove the latter, it must be immersed three or four times in clean, soft water, then in a vessel containing water to which a few drops of soda solution has been added; after which it is placed on a plate of glass held in an inclined position, and a thin stream of water allowed to flow upon it for about 12 hours. It is now allowed to stand until nearly dry, and then completely dried between sheets of blotting paper. Old soiled prints have been restored almost to their original condition by this operation.

Flint Locks.—We have already noticed the fact that the rifling of flint lock muskets was going on successfully at Cincinnati. Some fear having been expressed that the barrels would not stand fire, experiments have been made by a proper officer in the ssrvice to test their strength, the result of which showed that these muskets were perfectly strong and reliable.

M. Bouchet, of Paris, has reported to the Academy of Sciences that all reservoirs of water for supplying cities should be shaded from the rays of the sun, and cleaned out once a month, at least, during summer. Water in reservoirs exposed to the sun is liable to ferment in hot weather.

M. Pasteur has lately read a paper before the Academy of Sciences, in which he states that recent experiments made by him on fermentation corroborate the theory that the phenomena is due to exceedingly minute animalculæ.

THE WAR.

ARREST OF OUR LATE MINISTER TO FRANCE..

The government having obtained information that our late Minister to France, Hon. Charles J. Faulkner, had been busily engaged in procuring arms for the secessionists, caused him to be arrested in Washington, on Monday, August 12. The order was issued from the War Department, and executed by the Provost Marshal. The prisoner was taken to the jail, where the other prisoners of war are confined.

ARREST OF A SECESSION AGENT.

Among the passengers by the steamer *Persia*, which arrived at this port on Tuesday, Aug. 13, was a man named Thomas S. Serrell, a resident of New Orleans, who, as the statements of his fellow passengers go to show, avowed the most violent secession sentiments on the passage over, asserting that he was returning to the South with a large sum of money, the proceeds of a loan which he had negotiated in Europe for the Southern Confederacy. His opinions were expressed in language so offensive to the friends of the United States government (being often coupled with the coarsest epithets), that he was frequently involved in violent disputes, resulting in a determination on the part of some of the passengers to report his case to the government officials upon the arrival of the steamer at this port. Accordingly, when United States Deputy-Surveyors Isaacs and Bunn boarded the *Persia* at Quarantine, these facts were related to them, and upon their arrival at Jersey City, where the baggage of all passengers is inspected, particular attention was given to that portion of it claimed by Mr. Serrell. His person was also carefully searched, and resulted in finding £40,000 in Bank of England notes, together with a large number of letters and important papers, the contents of which (whatever may be their legal value as evidence) leave no doubt that the accused party is a violent partisan of Jeff. Davis, and an agent of the Southern Confederacy. Surveyor Andrews communicated the fact to Secretary Chase, at that time stopping in the city, who approved of the proceedings, and advised the arrest of Serrell.

The money, $200,000 in amount, with the letters and papers, were detained at the Surveyor's office, and an informal investigation was made into the case. Among other matters embraced in the letters in his possession, were the suggestion of plans for breaking up the blockade and supplying the Liverpool market with cotton. From the tone of the papers, the money, it is believed, is the proceeds of a loan to the Southern "Confederate States." Several passengers voluntarily made affidavits as to the declarations of Serrell while on board of the steamer. Serrell has for years been engaged in the cotton trade at New-Orleans. He is about 50 years of age, and is said to be possessed of wealth. At the request of Surveyor Andrews, a warrant was issued by a United States Commissioner, and Marshal Murray detailed one of his most trusty officers to make the arrest. On being brought to the Marshal's office, Serrell seemed very much chopfallen. Mr. C. N. Potter appeared as counsel for the accused, but as no Commisioner could be found, a commitment was made out, and Serrell was taken to the Tombs. He was subsequently sent to Fort Lafayette.

THE LOAN TAKEN.

The banks of Boston, New York and Philadelphia have taken $50,000,000 of the loan to government authorized by Congress at the late session; with the understanding that they shall have the privilege of taken $100,000,000 more as the money may be wanted

TEST OF THE DALGHREN GUN.—The work of testing the Dalghren gun, recently cast at the Fort Pitt Works, Pittsburg, was brought to a close on Friday. One thousand rounds were fired, yet the bore at the close exhibited an enlargement only of 0.26, or but little more than one-fiftieth of an inch. The result was most satisfactory, and shows the superior quality of the metal from which the gun was cast. The gun weighs considerably over eight thousand pounds, and during the firing was suspended from a heavy frame work erected for the purpose. Ten thousand pounds of powder and eighteen tuns of iron were used in the test, but much of the latter may be recovered. The Fort Pitt Works had a heavy contract for the construction of guns of this character, the fulfillment of which was contingent on the success of that just tried.

Warlike Operations at New-Orleans.

The intelligence from New-Orleans and cities along the river to Memphis is late and important, as communicated by travelers. At New-Orleans no fortifications have been erected, although preparations are being made to build them speedily. Gun carriages have been procured in considerable numbers, and fitted for the reception of guns. The new custom-house has been converted into a foundry, and guns are cast for special use at New-Orleans. The armament will soon be completed, and the city placed in a state of defence. But few soldiers are in or around the city, the Louisiana troops having been drafted for service at Pensacola or Virginia.

At Berwick's Bay, fortifications have been thrown up, also at other points between that and New-Orleans. So undefended is this location, however, that it is thought that Federal troops could be landed there and march to New-Orleans with but little molestation.

At Algiers, a formidable instrument of destruction is being prepared, and was expected to be launched about the 20th. It is intended to operate as a battering ram, and will be directed against the frigate *Brooklyn*, or any other blockading vessel at New-Orleans. The tug-boat *Enoch Train*, built in Boston, and one of the most powerful tugs of her class, has been converted to a purpose never intended by her builder, or the gentleman whose name she bears. The upper portion of the boat has been covered with railroad iron, and perfectly shielded from the attack of an ordinary cannonade. At the bow, a ram has been constructed. The bow has been built out to the extent of five feet, heavily framed with timber and then covered with heavy wrought metal.

At the extreme end, a formidable mass of iron projects in the form of a knob. Beneath this knob, and beneath the surface of the water, two strong grapples have been arranged, so fashioned that, upon colliding with a ship, the claws will fasten into the side of the vessel and take a firm hold. Protected by these grapples, in a manner not unlike an insect's lance or sting, there projects an augur, connected, by means of shafting, with an independent machine on the boat. This instrument is intended to operate as follows:—Upon the attachment of the grapples to the side of the attacked vessel, the auger will be set in rapid motion and bore its way into the side. When one hole has been forced through, the auger can be withdrawn, and, by means of an independent axle, the position will be changed, so as to operate upon another portion of the ship; thus, boring holes rapidly and large enough to sink the vessel. The boat will have a crew of six men, who will be protected beneath the iron roof—the pilot observing the direction through a tube or small telescope.

The Algerines are sanguine of the success of their pet invention, and have spent a large amount of money to perfect it. They evidently have not estimated the not very passive nature of the object against which it will be directed, or the chances of a failure, should the *Brooklyn* decline to remain stationary long enough for this monster mosquito to affix its sting.

How our Matters Strike an English Manufacturer.

Mr. John Bright, of Manchester, who has long been a prominent Member of the House of Commons, and one of the most extensive manufacturers in England, recently delivered a speech to his constituents at Rochdale, from which we make the following interesting extract, as it relates to the cotton supply:—

Mr. Cheetham has referred to another question, as to which I should like to say one or two words before I sit down; and that is with regard to the perilous position in which this country is placed in consequence of the unhappy transactions which are now happening on the other side of the Atlantic. Mr. Cheetham did not tell you what I can tell you. He paid me some compliments which, as I am not a candidate, will not be of much service to me just now; but without complimenting Mr. Cheetham, I can tell you that he is a most active—I believe the most active—member of an association formed in this district for the purpose of promoting a better supply of cotton, not from India alone, but from all parts of the world where cotton can be grown, and although perhaps it would be too much to say that that association had been able to produce any great results, because so short a time has elapsed since its operations began, yet it has now sown the seed, as it were, of a production of cotton in very many parts of the world, where that production probably would never have been heard of or thought of if it had not been for the labors of that association. With regard to the supply from India, I may tell you this, that there is no man from Lancashire of late who has been more assiduous in his attendance in London whenever anything was to be done with the Minister for India, or with the House of Commons with the view to promote the opening out of the industry of that vast country, so as to increase the production and export of cotton to this country. I think that just now, if you can find a man who, on questions of great state policy, agrees with us, at the same time having a deep personal interest in this great cotton question, and having paid so much attention to it as Mr. Cheetham has, I think there is a double reason why he should receive the votes and have the confidence of this division of the county. [Cheers.] Now, is this cotton question a great question or not? I met a spinner to-day—he does not live in Rochdale, though I met him here—and I asked him what he thought about it; and he said, "Well, I think cotton will come somehow." [Laughter.] And I find that there is that kind of answer to be had from three out of four of all the spinners I ask. They know that in past times, when cotton had risen 50 or 80 per cent, or some extravagant rise, something has come—the rate of interest was raised, or there has been a commercial panic from some cause or other, and down the price has gone, and when everybody said "There would be no cotton at Christmas," there proved a considerable stock at Christmas. And so they say now. I don't in the least deny that it will be so; all I assert is that the particular case is new, that we have never had a war in the United States between different sections of that country affecting the production of cotton before; and it is not fair, nor wise, but rather childish than otherwise, to argue from past events, which were not a bit like this, of the event which is now passing before our eyes. They say, "It is quite true, there is a civil war in America, but it will blow over; there will be a compromise; or the English government will be breaking this blockade."—Now, recollect what breaking the blockade means. It means a war with the United States, and I don't think myself that it would be cheap to break the blockade at the cost of a war with the United States. I think that the cost of a war with the United States would give, probably, half wages, for a very considerable time, to those persons in Lancashire who would be out of work if there was no cotton, to say nothing at all of the manifest injustice and wrong against all international law, that a legal and effective blockade should be interfered with by another country. It is not exactly the business of this meeting, but my opinion is, that the safety of the products on which this country depends, rests far more upon the success of the Washington government than upon its failure; and I believe that nothing could be more monstrous than for us, who are not very averse to war ourselves, to set up for critics—carping, caviling critics—of what the Washington government is doing. I saw a letter the other day from an Englishman, resident for 25 years in Philadelphia, merchant there, and a very prosperous merchant. He said, "I prefer the institutions of this country (the United States) very much to yours in England:" but he says also, "If it be once admitted that here we have no country and no government, but that any portion of these United States can break off from the central government whenever it pleases, then it is time for me to pack up what I have, and to go somewhere where there is a country and a government." Well that is the pith of this question. Do you suppose that if Lancashire and Yorkshire thought that they would break off from the United Kingdom that those newspapers who are now preaching every kind of moderation to the government of Washington would advise the government in London to allow these two counties to set up a special government for themselves? When the people of Ireland asked that they should secede, was it proposed to London that they should be allowed to secede peaceably? Nothing of the kind. I am not going to defend what is taking place in a country that is well able to defend itself. But I advise you, and I advise the people of England, to abstain from applying to the United States doctrines and principles which we never apply to our own case. At any rate, they have never fought for "the balance of power" in Europe. They have never fought to keep up a decaying empire. They have never squandered the money of their people in such phantom expeditions as we have been engaged in. And now at this moment, when you are told that they are going to be ruined by their vast expenditure, why the sum that they are going to raise in the great emergency of this greivous war is no greater than what we raise every year during a time of peace. [Loud cheers.] They say that they are not going to liberate slaves. No; the object of the Washington government is to maintain their own constitution, and to act legally, as it permits and requires. No man is more in favor of peace than I am; no man has denounced war more than I have, probably, in this country; few men, in their public life, have suffered more obloquy—I had almost said, more indignity—in consequence of it. But I cannot, for the life of me see, upon any of those principles upon which States are governed now—I say nothing of the literal word of the New Testament—I cannot see how the state of affairs in America, with regard to the United States government, could have been different from what it is at this moment. We had a heptarchy in this country, and it was thought a good thing to get rid of it, and to have a united nation. If the thirty-three or thirty-four States of the American Union can break off whenever they like, I can see nothing but disaster and confusion throughout the whole of that continent. I say that the war, be it successful or not, be it Christian or not, be it wise or not, is a war to sustain the government, and to sustain the authority of a great nation; and that the people of England, if they are true to their own sympathies, to their own history, and to their own great Act of 1834, to which reference has already been made, will have no sympathy for those who wish to build up a great empire on the perpetual bondage of millions of their fellow-men. [Loud cheers.]

EXPULSION.—Hon. Judge Catron, one of the Judges of the Supreme Court of the United States appointed by General Jackson, was recently expelled from Tennessee by the Vigilance Committee. He was not in favor of secession, and regarded it as treason. The Louisville *Journal* says "the old man took his departure from Tennessee, leaving his aged wife behind him, as she was too sick and feeble to be removed."

IT is reported that the privateer *Sumter* is captured.

DIRECTIONS TO ARMY SURGEONS ON THE FIELD OF BATTLE.

The following is from Mr. G. J. Guthrie's pamphlet on the Hospital Brigade, published in the *Lancet*. Mr. Guthrie was Surgeon-General to the British forces during the Crimean war, and consequently speaks from extensive opportunities of observation :—

1. Water being of the utmost importance to wounded men, care should be taken, when before the enemy, not only that the barrels attached to the conveyance carts are properly filled with good water, but that skins for holding water, or such other means as are commonly used in the country for carrying it, should be procured and duly filled.

2. Bandages or rollers, applied on the field of battle, are, in general, so many things wasted, as they become dirty and stiff, and are usually cut away and destroyed, without having been really useful ; they are therefore not forthcoming when required, and would be of no use.

3. Simple gun-shot wounds require nothing more for the first two or three days than the application of a piece of wet or oiled linen, fastened on with a strip of sticking-plaster, or, if possible, kept constantly wet and cold with water. When cold disagrees, warm water should be substituted.

4. Wounds made by swords, sabres, or other sharp-cutting instruments, are to be treated principally by position. Thus, a cut down to the bone, across the thick part of the arm, immediately below the shoulder, is to be treated by raising the arm to or above a right angle with the body, in which position it is to be retained, however inconvenient it may be. Ligatures may be inserted, but through the skin only. If the throat be cut across in front, any great vessels should be tied, and the oozing stopped by a sponge. After a few hours, when the oozing is arrested, the sponge should be removed, and the head brought down toward the chest, and retained in that position without ligatures ; if this is done too soon, the sufferer may possibly be suffocated by the infiltration of blood into the areolar tissue of the parts adjacent.

5. If the cavity of the chest is opened into by a sword or lance, it is of the utmost importance that the wound in the skin should be effectively closed, and this can only be done by sewing it up as a tailor or lady would sew up a seam, skin only being included ; a compress of lint should be applied over the stitches, fastened on by sticking plaster. The patient is then to be placed on the wounded side, that the lung may fall down, if it can, upon or apply itself to the wounded part, and adhere to it, by which happy and hoped-for accident life will in all probability be preserved. If the lung should be seen protruding in the wound, it should not be returned beyond the level of the ribs, but be covered over by the external parts.

6. It is advisable to encourage previously the discharge of blood from the cavity of the chest, if any have fallen into it ; but if the bleeding from within should continue, so as to place the life of the sufferer in danger, the external wound should be closed, and events awaited.

7. When it is doubtful whether the bleeding proceeds from the cavity of the chest or from the intercostal artery (a surgical bug-bear), an incision through the skin and the external intercostal muscle will expose the artery close to the edge of the rib, having the internal intercostal muscle behind it. The vessel thus exposed may be tied, or the end pinched by the forceps, until it ceases to bleed. Tying a string round the ribs is a destructive piece of cruelty, and the plugs, &c., formerly recommended, may be considered as surgical incongruities.

8. A gun-shot wound in the chest cannot close by adhesion, and must remain open. The position of the sufferer should therefore be that which is most comfortable to him. A small hole penetrating the cavity is more dangerous than a large one, and the wound is less dangerous if the ball goes through the body. The wounds should be examined, and enlarged if necessary, in order to remove all extraneous substances, even if they should be seen to stick on the surface of the lungs ; the opening should be covered with soft oiled or wet lint—a bandage when agreeable. The ear of the surgeon and the stethoscope are invaluable aids, and ought always to be in use ; indeed, no injury of the chest can be sufficiently treated without them.

9. Incised and gun-shot wounds of the abdomen are to be treated in nearly a similar manner ; the position in both being that which is most agreeable to the patient, the parts being relaxed.

10. In wounds of the bladder, an elastic catheter is generally necessary. If it cannot be passed, an opening should be made in the perinæum for the evacuation of the urine, with as little delay as possible.

11. In gun-shot fractures of the skull, the loose broken pieces of bone, and all extraneous substances are to be removed as soon as possible, and depressed fractures of bone are to be raised. A deep cut made by a heavy sword through the bone into the brain, generally causes a considerable depression of the inner table of the bone, whilst the outer may appear to be merely divided.

12. An arm is rarely to be amputated, except from the effects of a cannot-shot. The head of the bone is to be sawn off, if necessary. The elbow-joint is to be cut out, if destroyed, and the sufferer, in either case, may have a very useful arm.

13. In a case of gun-shot fracture of the upper arm, in which the bone is much splintered, incisions are to be made for the removal of all the broken pieces which it is feasible to take away ; the elbow is to be treated in a similar manner ; the splints used should be solid.

14. The hand is never to be amputated, unless all or nearly all its parts are destroyed. Different bones of it and of the wrist are to be removed when irrecoverably injured, with or without the metacarpal bones and fingers or the thumb ; but a thumb and one finger should always be preserved when possible.

15. The head of the thigh bone should be sawn off when broken by a musket-ball. Amputation at the hip-joint should only be done when the fracture extends some distance into the shaft, or the limb is destroyed by cannon-shot.

16. The knee-joint should be cut out when irrecoverably injured ; but the limb is not to be amputated until it cannot be avoided.

17. A gun-shot fracture of the middle of the thigh, attended by great splintering, is a case for amputation. In less difficult cases, the splinters should be removed by incisions, particularly when they can be made on the upper and outer side of the thigh. The limb should be placed on a straight, firm splint. A broken thigh does not admit of much, and sometimes of no extension, without an unadvisable increase of suffering. An inch or two of shortening in the thigh does not so materially interfere with progression as to make the sufferer regret having escaped amputation.

18. A leg injured below the knee should rarely be amputated in the first instance, unless from the effects of a cannon shot. The splinters of bone are all to be immediately removed by saw or forceps, after due incisions. The limb should be placed in iron splints, and hung on a permanent frame, as affording the greatest comfort and probable chance of ultimate success.

19. An ankle-joint is to be cut out, unless the tendons around are too much injured, and so are the tarsal and metatarsal bones and toes. Incisions have hitherto been too little employed in the early treatment of these injuries of the foot for the removal of extraneous substances.

20. A wound of the principal artery of the thigh, in addition to a gun-shot fracture, renders immediate amputation necessary. In no other part of the body is amputation to be done in the first instance for such injury. Ligatures are to be placed on the wounded artery ; one above, the other below the wound, and events awaited.

21. The occurrence of mortification in any of these cases will be known by the change of color in the skin. It will rarely occur in the upper extremity, but will frequently do so in the lower. When about to take place, the color of the skin of the foot changes from the natural flesh color to a tallowy or mottled white. Amputation should be performed immediately above the fractured part. The mortification is yet local.

22. When this discoloration has not been observed, and the part shrinks or gangrene has set in with more marked appearances, but yet seems to have stopped at the ankle, delay is, perhaps, admissible, but if it should again spread, or its cessation be doubtful, amputation should take place forthwith, although under less favorable circumstances. The mortification is becoming or has become constitutional.

23. Bleeding, to the loss of life, is not a common occurrence in gun-shot wounds, although many do bleed considerably, seldom, however, requiring the application of a tourniquet as a matter of necessity, although frequently as one of precaution.

24. When the great artery of the thigh is wounded (not torn across), the bone being uninjured, the sufferer will probably bleed to death, unless aid be offered, by making compression above and on the bleeding part. A long, but not broad, stone, tied sharply on with a handkerchief, will often suffice until assistance can be obtained, when both ends of the divided or wounded artery are to be secured by ligatures.

25. The upper end of the great artery of the thigh bleeds scarlet blood ; the lower end dark venous-colored blood ; and this is not departed from in a case of accidental injury, unless there have been previous disease in the limb. A knowledge of this fact or circumstance, which continues for several days, will prevent a mistake at the moment of injury, and at a subsequent period, if secondary hemorrhage should occur. In the upper extremity both ends of the principal artery bleed scarlet blood, from the free collateral circulation and from the anastomosis in the hand.

26. From this cause, mortification rarely takes place after a wound of the principal artery of the arm, or even of the arm-pit. It frequently follows a wound of the principal artery in the upper, middle, or even lower parts of the thigh, rendering amputation necessary.

27. It is a great question, when the bone is uninjured, where and at what part the amputation should be performed. Mortification of the foot and leg, from such a wound, is disposed to stop a little below the knee, if it should not destroy the sufferer ; and the operation, if done in the first instance, as soon as the tallowy or mottled appearance of the foot is observed, should be done at that part ; the wound of the artery and the operation for securing the vessel above and below, the wound being left unheeded. By this proceeding, when successful, the knee-joint is saved, whilst an amputation above the middle of the thigh is always very doubtful in its results.

28. When mortification has taken place from any cause, and has been arrested below the knee, and the dead parts show some sign of separation, it is usual to amputate above the knee. But not doing it, but by gradually separating and removing the dead parts, under the use of disinfecting medicaments and fresh air, a good stump may be ultimately made, the knee-joint and life being preserved, which latter is frequently lost, after amputation, under such circumstances.

29. Hospital gangrene, when it unfortunately occurs, should be considered to be contagious and infectious, and it is to be treated locally by destructive remedies, such as nitric acid, and the bivouacking or encamping of the remainder of the wounded, if it can be effected, or their removal to the open air.

30. Poultices have been very often applied in gun-shot wounds, from laziness, or to cover neglect, and should be used as seldom as possible.

31. Chloroform may be administered in all cases of amputation of the upper extremity and below the knee, and in all minor operations ; which cases may also be deferred, without disadvantage, until the more serious operations are performed.

32. Amputation of the upper and middle parts of the thigh are to be done as soon as possible after the receipt of the injury. The administration of chloroform in them, when there is much prostration, is doubtful, and must be attended to, and observed with great care—the question whether it should or should not be administered in such cases being undecided.

THE RANDALL STEAMSHIP PROJECT.—A large meeting has been held in Philadelphia for the purpose of establishing a line of steamships between that city and Liverpool, the vessels to be constructed upon what is called the "Randall system." These vessels are designed to be very long, and of light draft and great carrying capacity. The floors will be very flat, and four paddle wheels will be employed on the sides, so as to distribute the propelling powers more uniformly over the entire length.

Improved Breech-Loading Rifle.

Among all the breech-loading guns that we have examined, we have seen none that impressed us more favorably than Schubarth's, which is represented in the annexed engraving. It has no sliding or rubbing joint, but the parts are simply pressed together, so that it would seem as if they should last for an indefinite period. The great desideratum of perfect packing of the joint is also effectually accomplished. The arrangements, too, are very simple, and the parts are strong and securely held together.

It will be understood from an examination of the engravings, of which Fig. 1 represents the gun with the breech closed; Fig. 2 with the breech open, and Fig. 3 is a vertical section through the middle.

The projection, *b*, is firmly secured to the barrel, *a*, by a stout hook and screws, and is attached to the breech by the pivot, *c*. The chambered breech piece, *d*, is connected with the projection, *b*, by the pivot, *e*, and rests when in place against a solid iron block attached to the breech.

The cartridge with the bullet attached is represented in Fig. 4. The cartridge case, *f*, is formed of thin brass, and is attached to the Minié bullet, *g*, by pressing the rear of the latter into the mouth of the cartridge case; when the joint is made water-tight by dipping the cartridge in melted tallow. A cork wad is interposed between the powder and bullet to clean out the gun at the discharge. As the cartridge is entirely closed it is necessary to introduce percussion powder to the inside in order to fire the powder. This is effected by placing a common percussion cap on one end of a small wire, *i*, which is then fixed across the cartridge at its greatest diameter. A small blister is formed on the cartridge at the end of the wire, and a corresponding cavity is made at the breech of the gun to guide the cartridge at its introduction so as to bring the end of the wire directly under the cock.

When the breech of the gun is open, as represented in Fig. 2, the cartridge is pushed into the chamber in the barrel, as shown in dotted lines, and the breech is then closed by simply turning up the barrel upon the pivot, *c*; the barrel and breech-piece, *d*, coming together without any rubbing friction. The guard, *h*, is then turned up to its place, as shown in Fig. 1, carrying the slide, *j*, forward over the shoulder in the projection, *b*, and holding the parts very securely in place.

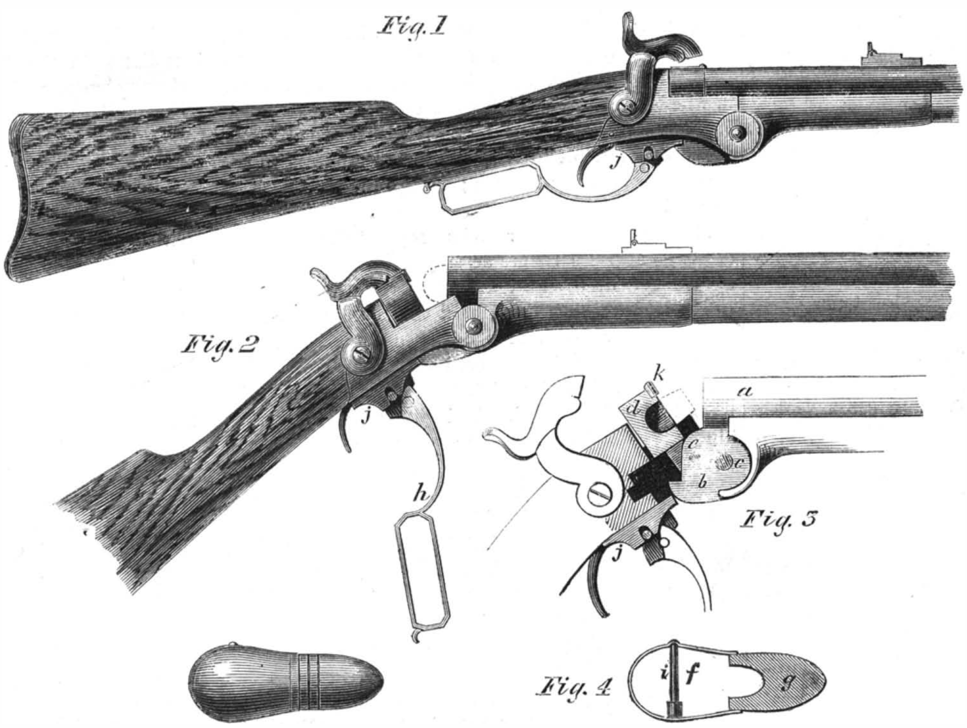
The gun is discharged by the cock striking upon the pin, *k*, which is directly over the cap in the cartridge, and which is held in place by a light spring. The gases expand the brass cartridge case, causing it to fit perfectly into the chamber of the barrel and breech-piece, and packing the joint between the two absolutely air tight. Mr. Schubarth says that a white cambric handkerchief placed around this joint is not soiled in the least by any number of discharges.

After the gun is fired, the guard is turned down, bringing the slide, *j*, away from the shoulder in the projection, *b*, and allowing the barrel to turn upon the pivot, *c*, so as to open the breech. The pin, *k*, presses upon the cartridge case and holds it so that it is drawn from the barrel as the breech is opened. The case is then taken out and is replaced by a new cartridge, ready for a second shot.

As the barrel is turned down, the breech-piece is raised a little, carrying up the cock, and half cocking the gun. For army use a ridge may be formed entirely around the cartridge and filled with fulminating powder, in place of the wire, *i*, and cap, so that the cartridge may be inserted in any position. But for sporting, it is more economical to adopt the arrangement represented, as the same case may be refilled and used many times.

It will be seen that the powder is fired in the middle of the charge, thus causing a rapid combustion. Mr. Schubarth says that this causes so great force to be generated, that 60 grains of powder has driven a bullet through 15 one-inch boards at a distance of one hundred yards.

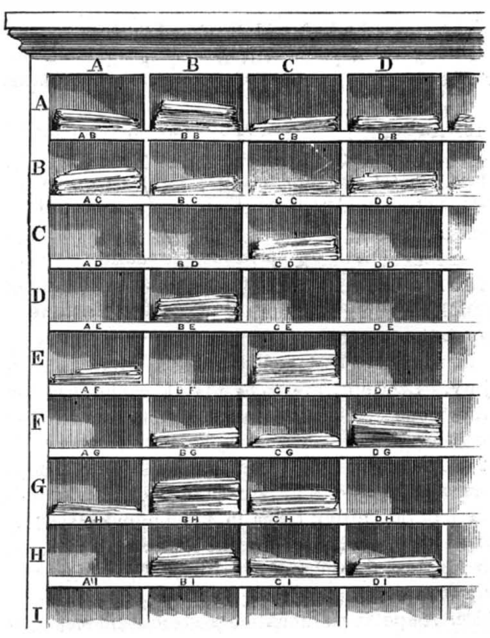
One patent for this admirable invention was granted July 23, 1861, and applications for others and for the cartridge have been made through the Scientific American Patent Agency. Further information in relation to it may be obtained by addressing the inventor, Casper D. Schubarth, at 6 North Main street, Providence, R. I. He would like to make an arrangement with some enterprising man to furnish capital for the manufacture of the guns. He is himself a practical gun-maker.



SCHUBARTH'S BREECH-LOADING RIFLE.

QUIMBY'S LETTER BOX FOR POST OFFICES.

We are informed that the Post Master of this city, after a thorough examination of the ingeniously arranged letter box here represented, has expressed the opinion that it will be adopted in all the principal post offices in the country.



The boxes are arranged in 24 rows with 24 boxes in a row; both the horizontal and the vertical rows being lettered in alphabetical order. The letters at the side of the case mark the initials for the surnames and those at the top mark those of the first name. Thus all persons whose surnames begin with B have their letters put in the row of boxes marked B at the side of the case, while all those whose first names begin with C have their letters put in the vertical row of boxes marked C at the top of the case. Hence Charles Brown's letters, or Christopher Barton's, will be found in the box, C B, while David Farnham's will be in the box, D F. Boxes for X and Z are omitted, these letters being put in the Y box.

A row of boxes at the bottom in a single alphabet is provided for dead letters; making six hundred boxes in the case. The case is 7 feet long 3 feet high, and 4¾ inches in depth. A clerk will soon learn so that he will put his hand instantly and almost instinctively on the very box containing the letter called for; and as this more perfect distribution will very largely reduce the number to be looked over for each caller, the delivery of letters will be materially facilitated; to the convenience of the public as well as of the post office clerks.

Steps have been taken to secure through the Scientific American Patent Agency a patent on this simple and ingenious contrivance, and further information in relation to it may be obtained by addressing the inventor, R. Quimby, at Sing Sing, N. Y.

Best Form of Chimneys.

L. C. Levoir, Phil. Nat. Doct., Leyden University, sends the following communication to the London *Chemical News*:—

It is a long-discussed question whether chimneys should be made conical with the largest base beneath, cylindrical, or conical with the largest opening at the outlet in the air. Some time ago I tried an experiment which apparently showed that the last form was the best one.

When two adjacent gas-flames are caused to burn from the same tube, the outlets being equal, and about a quarter of an inch wide, and the pressure very low, the flames have the same length when placed in the same horizontal level. But as soon as one is placed higher than the other that one becomes taller by the diminution of pressure higher in the atmosphere.

By putting a conical tube of about three feet in length on one of the flames, when they are burning equal, the greatest suction results when the conical tube is placed with the largest end upwards. The greater suction is not resulting from the higher temperature which the smaller end of the tube assumes, owing to its being placed so much nearer to the flame, for a stream of cold water flowing round the tube does not occasion a greater length of the flame on which the conical tube is not adopted.

This experiment is a confirmation of a fact which several engineers have long since observed. The reason why so many chimneys are still built cylindrical, or conical, with the widest section beneath, seems to me to be that the influence of the winds—especially those occurring in the daytime, which seem to have a less horizontal direction than those at night—interferes more with the flowing out of the products of combustion as the outlet of the chimneys becomes wider. Suitable covering head pieces, to turn with the wind, would highly improve the suction in conical chimneys, and also prevent the smoke from blowing down in so inconvenient a manner.

The Grain Trade of Chicago.—Chicago is the largest grain depot in the world, and the new wheat crop is now running in there over the rails at a price of 20c. per bushel lower than last year. The backwardness of business and small grain movements are a general complaint in respect to the high rates of exchange.

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NEW YORK, SATURDAY, AUGUST 31, 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 new 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 contemplating securing the same by Letters Patent, are advised to send a sketch or model of it to this office. An examination will be made and an answer returned by early mail. Through our Branch Office, located directly opposite the Patent Office in Washington, we are enabled to make special examinations into the novelty and patentability of inventions. By having the records of the Patent Office to search, and the models and drawings deposited therein to examine, we are enabled to give an inventor most reliable advice as to the probabilities of his obtaining a patent, and also as to the extent of the claim that it is expedient to set up when the papers for an application are prepared. For this special examination at the Patent Office we make a charge of Five Dollars. It is necessary that a drawing and description or a model of the invention should accompany the remittance. Address—

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

DEVELOPMENTS OF CHEMISTRY.

In the "olden time," the alchemists were infected with the belief that all things were transmutable; that iron could be converted into gold, and common pebbles into rubies, by experiments performed under the influence of certain stars. They also believed that life itself could be prolonged forever by a magic elixir, in the search of which many of them spent their days and nights in ceaseless toil. These old notions have been carried down to the very verge of our own days. The theory has been propagated that all matter has been derived from a nucleus, such as electricity, and that the various substances which we consider distinct in nature and form from one another, are but modifications of one grand original substance.

It is not many years since Dr. Brown, of Edinburgh, a distinguished professor of chemistry, became so infatuated with the idea of the transmutation of substances that he devoted the subsequent days of his life in pursuit of the phantom. Instead of one substance forming the essence of all others, modern discovery is continually extending the number of what are called "simple" substances. About thirty years ago, there were only about forty "simples" known to chemists; now there are nearly seventy, and the number is constantly increasing. It is only about a year since Kirchoff discovered that the dark lines which appear in the compound spectrum are caused by the absorbing influence of metals in flame, and that each—iron, chromium, gold, silver, copper, &c. —has its own peculiar lines. Several new metals have been discovered already by the method of spectrum analysis. Among these, we may mention cæsium, rubidium and thallium. This analysis is founded upon what is considered a general law, the nature of which is, that every simple substance—either in the earth, the stars, or the sun—has its peculiar bands of light, its own peculiar color and tint, which distinguishes it from every other. When viewed through a spectroscope, every simple substance, when inflamed so as to become gaseous, emits, radiates and absorbs its own colors. With the powerful light obtained from an electric lamp for volatilizing substances, and the employment of the spectrum analysis, one of the most beautiful and interesting mediums for chemical study and investigation ever discovered has been opened both to the practical and amateur chemist. We may reasonably anticipate many new discoveries, and a great development of chemistry from this peculiar mode of qualitative analysis.

STEAM CULTIVATION---DEEP PLOWING.

At the late meeting of the Royal Agricultural Society at Leeds, England, Professor Wilson, of Edinburgh, delivered a lecture on steam power as a substitute for horses, in which he presented new and important views on the subject. He stated that for light soils and shallow plowing the advantages were perhaps on the side of horses, but on heavy soils, and for thorough cultivation the steam plow possessed superior advantages and far heavier crops would undoubtedly be attained in Great Britain when plowing by steam became more general. There was a limit to the depth of plowing by horses, but with a steam plow having an engine of 10 or perhaps 20-horse power, any depth desired could be reached, and thus thorough subsoil plowing could be executed continually. In heavy soils, the steam plow could run furrows 12 and 15 inches deep, thus turning in the top soil and bringing up the indurated subsoil to the surface to be exposed to the air and moisture, and thus become fitted for yielding large crops. Professor Wilson stated that all soils intended for crops should be plowed in the fall before severe frost and cold weather set in. He said "an autumn day's dry tillage, when the temperature of the earth and atmosphere is high, is of far more value than a week's plowing after the cold and rains of winter." The steam plow affords facilities for cultivating a great space of land in a short period of time, so that every advantage can be taken of dry weather in using it to prepare the soil in due season.

We have no doubt but many large tracts of land in America, which have ceased to yield such large crops as were taken from them twenty and thirty years ago, may be brought back to their original fertility by deep plowing. Perhaps the greatest defect in the cultivation of soil by our farmers is shallow plowing. The horses which are generally employed for tillage have not sufficient strength to plow deep furrows.

Manufacture of Malleable Horn.

We learn from *L'Invention* that a patent has been taken out in France, by Messrs. Boulet, Sarazin & Co., for a new process for making malleable horn. The horn, in chips and shavings, is boiled a long time in a caustic lye of strength of 25° of the alcalimeter, by which it is entirely melted. The liquid is then reduced for evaporation to a plastic paste, which may be rolled into sheets, drawn into rods, or molded in any form.

This paste is rendered more strong and elastic by mixing it with india-rubber or gutta-percha. The substances are mixed together in a cast iron vessel, and passed between fluted revolving rollers, the vessel being heated by steam.

The inventors say that, by covering the fibers of cocoa or of aloes with this paste, they have obtained belts more solid than those of leather, and stronger than those of india-rubber.

Would not this substance answer for billiard balls?

THE OIL WELLS OF PENNSYLVANIA---CURIOUS SPOUTING PHENOMENA.

A correspondent of the *United States Railroad and Mining Register*, writing from Oil Creek, Pa., gives some very interesting information respecting the oil wells and the nature of the rocks in which they are found. He states that the yield from the wells has greatly decreased, and that the oil well region, for practical working, is of very limited extent. He says:—

Along the banks of the Allegheny, for five or six miles above the mouth of Oil Creek, and at a point some three miles below Franklin, operations have been and continue quite successful, so that these may be counted among the reliable sources of supply. Beyond them, the Allegheny river, for profitable oil production, may be considered *dry*.

The oil in most of the wells is found in a series of sandstone rocks, which are usually met with at about 190 feet below the surface, and the pockets of oil are located in fractures. In many borings, no oil has been found; while in adjacent drillings, which have been pierced into vertical fractures, large quantities have been obtained. Many wells which once yielded twenty barrels per day are now dry. The usual depth of working the wells is 200 feet, but the oil is obtained at various depths. After drilling down 200 feet, a mass of shales 100 feet in thickness is encountered, in which no oil of any account is obtained. At about 325 feet in depth, there is about 40 feet of white sandstone, near the top of which "spouting wells" are found. This is the second oil yielding strata. After passing through this rock, another mass of shales and fire clay are met with; and at 450 feet in depth, another stratum of sandstone, which forms the third oil-bearing series. Here the "big spouting wells" are found, the yield of which is from ten to two hundred barrels per day. These spouting wells are curiosities; they are genuine land whales, and twice as oily as their rival sea monsters. The spouting is caused by compressed gas, and the flow is periodical. One well will flow for five minutes with intervals of ten. Its neighbor will flow once an hour; while one flows four times, and another six times, in twenty-four hours. Again, the ten-minute well will change to a regular flow of three or four hours' duration. Most of them grow gradually less vigorous, and diminish in yield until they finally cease; but some of them stop suddenly.

They are curious objects of contemplation, and present a fruitful subject for the investigation of those who are fond of *deep* studies.

Increase of Iron-cased Ships of War.

France has now six iron-clad frigates afloat, and she is building ten others, which are expected to be completed in about eighteen months. In addition to these, she has eleven iron cased floating batteries, two of which are fit for sea navigation. England has two immense iron-clad frigates—the *Warrior* and *Black Prince*—afloat, but not quite finished. It is expected they will be ready for active service in about six weeks. They are the most powerful war vessels yet built. In addition to these, four smaller new iron frigates are being built, and orders have been issued for plating several of the large wooden frigates. In about two years, there will be a fleet of twenty iron-clad frigates in the British navy. This will be less than the French will have, but they will be of greater power. Austria is building two iron-cased frigates; the King of Italy has two, and has ordered two more; Spain has ordered two; Prussia is about to build one, and Russia four. Iron navies are becoming the rule.

The Stevens Battery.

We call the attention of our readers to the illustration of this famous battery on another page. For the elaborate description which accompanies it we are indebted to the New York *Times*.

IRON PAVEMENTS A FAILURE.—Some two years ago one of the tracks of the city railroad leading up Chatham Square, in this city, was paved with cast iron. The metal was arranged to present a series of rounded knobs about an inch square, and two or three inches apart, the spaces between being filled with gravel. This pavement was found to become so smooth that, after a thorough trial, it has been taken up and replaced with stone. The new pavement is formed of long blocks of granite, about three inches by four or five in size, set on end, and this makes an excellent track.

AN EXCITING QUESTION---BOILER EXPLOSIONS AND THEIR CAUSES.

The subject of boiler explosions has been discussed at great length during the past six months in English scientific periodicals. In the London *Engineer* and London *Mechanics' Magazine*, editorial articles and contributions from correspondents have appeared weekly, in which various theories have been advanced, attacked, and defended—and the conflict still goes on. We have waited for a termination of the discussion, hoping to obtain some new light to satisfy our own mind as to the cause of *some* explosions, and in order, if possible, to obtain some argument, based upon true science, from those who have advanced what appear to us, wrong theories.

Perhaps we have now obtained all the knowledge which really can be put before the public on this topic. The discussion has excited our attention not only on account of its nature, but also because of the persons who have taken part in it, such as C. Wye Williams, the author of a valuable work on combustion; D. K. Clark, author of the incomparable work on locomotive engineering, and Zerah Colburn (now in London), an able American writer on railway engineering topics. Quite a number of others, whose names we omit, have also taken part in the discussion.

There is still some apparent mystery connected with the phenomena of boiler explosions, or we would not have so many notions and theories floating about respecting their causes. The most common theory of boiler explosions is that of accumulated over-pressure of steam generated by the heat in the furnace. This theory embraces defects in the boiler, also the absence of a sufficient quantity of water, whereby the metal is permitted to become red hot and weak, and is capable of explaining most of the explosions which have occurred.

The theory of C. W. Williams is to the effect that steam is concentrated among water under pressure in a steam boiler, like carbonic acid gas in soda water, and when it is relieved of pressure it suddenly assumes a violent expansive action. It is not possible for steam to remain among the interstices of water under violent ebullition, therefore this theory, or rather hypothesis, may be dismissed without further comment.

The theory of D. K. Clark consists in considering the water in the boiler necessary to produce an explosion, by acting like a projectile with a bounding force against the metal. Water usually flows out in a column during an explosion, but the latter is the occasion, the water not the cause of the explosion. Guns are shattered to pieces by the expansion of gas and steam acts like an expansive gas under pressure.

Mr. Zerah Colburn's hypothesis consists in assuming that when water heated with steam above atmospheric pressure, is suddenly relieved of pressure by a large rupture, a considerable amount of the water is instantly flashed, gunpowder like, into steam.

Several of our railway periodicals have supposed that this is the theory put forth by D. K. Clark in the late edition of the Encyclopedia Britannica, but this gentleman repudiates the idea. In a letter to the *Mechanics' Magazine* he says :—"The spontaneous generation of steam will simply keep pace with the escape of steam; the density of the new steam cannot exceed that of the old." This is the view we took of this subject on page 345, Vol. II., Scientific American, New Series. We explained how this theory was opposed to the laws of heat, on page 217 of our last volume, and yet, we regret to state, it has been reasserted since in the London *Engineer*. We will explain this subject so that any mechanic will be able to understand the unscientific nature of the hypothesis. It assumes that when 75 cubic feet of water (4,650 lbs.) in a boiler having an equal steam space, with the pressure at 140lbs. on the inch, is suddenly relieved of pressure by a large rupture, 577 lbs. of the water (twenty-two times more than the weight of steam at 140 lbs.) is suddenly flashed into steam of atmospheric pressure. The reasons advanced to support this theory are, that as steam of 140 lbs. pressure is 361°—149° above the boiling point—all the heat in the water above 212° will instantly leave 4,073 lbs. of the water and concentrate in some special 577 lbs., converting it into steam. This hypothesis is opposed to the laws of heat. Take any body, such as 4,650 lbs. of water, and heat it to any temperature, it will give off its heat to a colder body, but not to another body of a higher temperature, and yet this is what is required to sustain this new theory of heat conduction for boiler explosions. If it were possible that the 577 lbs. of water in the boiler, could be raised a single degree above 361, the other 4,073 lbs. of water in the boiler would just be lowered in temperature in proportion, and the heat would flow back again to the colder molecules. Every pound of water in a boiler must contain about 1200 units of heat before it will become steam, and as a transfer of heat is impossible from one molecule of water to another, when all are in equilibrium, water at 361° temperature, in a boiler, cannot possibly be instantly converted into steam. When a large rupture takes place in a boiler containing high pressure steam and water highly heated above 212°, instead of any of the water being instantly converted into steam, it is immediately deprived of a portion of its heat by the escaping steam, according to the well known laws of refrigeration by the expansion of fluids. It would be more in accordance with philosophy to expect that water in a boiler, from which high pressure steam has been suddenly liberated, would be frozen, rather than a portion of it converted into steam. Gases and steam, when expanding in contact or in proximity with water, absorb its heat and act as refrigerating agents. It is upon this principle that ice is sometimes manufactured artificially.

As this new hypothesis of boiler explosions has been made so prominent as to have been offered for evidence in a court of law at Bridgeport, Conn., last January, in the case of an explosion, it is high time that those who have embraced it should submit it to a fair experiment with a suitable experimental boiler. We predict that such an experiment will confirm the opinions we have now advanced, because they are based upon established science.

THE MECHANIC ARTS IN CENTRAL AFRICA.

The recent explorations of tropical Africa by M. du Chaillu on the west, and Mr. Petherick on the east, have given us much interesting information in regard to that singular region. About 150 miles from the coast, M. du Chaillu found a tribe of naked brown-colored negroes who had never seen a white man before. At first they believed him to be a spirit, and were filled by superstitious dread with his appearance. This tribe is known as the Fans; the men are tall, finely formed and warlike, and are the terror of the surrounding tribes, but the women are exceedingly ugly. The Fans are cannibals, purchasing the bodies of the negro tribes around them for food, and selling the bodies of their own dead in return. The price of a human body among them is generally a small tusk of an elephant. M. du Chaillu saw a woman carrying a piece of the thigh of a human body just as we should carry a piece of beef from market.

The Fans are as superior in intelligence to the tribes around them as they are in military prowess. They understand the art of smelting and working iron, and manufacture their own knives, spear-heads, axes, &c., which are remarkable for their excellent temper, and are often beautifully ornamented with artistic designs. They also make jugs of a kind of reed tightly woven and afterward coated with a kind of gum. They make pans and pipes of clay, and quite a complicated musical instrument of reeds and gourds. The cloth manufactured by this tribe is not extensive in quantity or variety, but it is sufficient for the demand, which is very limited, as the clothing of the men consists of a narrow strip around the loins, while the women have literally "nothing to wear." The cloth worn by the men is made from the inner bark of trees. The women go naked not from poverty, but from choice. As M. du Chaillu walked along a woman gravely asked him why he did not take off his clothes, telling him that she was sure that they must be a great hindrance to him, and that if he would take them off he would walk more easily.

The eastern part of tropical Africa has been explored by Mr. John Petherick, F.R.G.S., who has traveled in that country for 16 years. He found a tribe very similar to the Fans described by M. du Chaillu. These were the Neam Nams, a warlike and formidable race of cannibals. They cultivate in gardens, cotton, vegetables, melons, gourds and pepper, and in large fields maize and beans. The work is performed by slaves, one person sometimes owning hundreds of them. If a slave runs away and is caught, he is invariably killed and eaten; and slaves are frequently purchased expressly for food. The state of the mechanic arts among the Neam Nams is about the same as among the Fans. They use the same sort of bellows in smelting iron. It is made of two cylinders formed from hollow trees and covered with loose skin. Their hammer, like that of the Fans, is an iron cone held like a pestle by the little end.

The Neam Nam women are in advance of their sisters among the Fans, in the article of clothing. They wear garments of green leaves fastened to a girdle around the waist and falling all around the body down to the knees. As they are scrupulously neat in their persons, and as the leaves soon wilt, they change their clothing very frequently. The Neam Nam women probably have more new dresses in the course of a year than any other women in the world.

The marriage relations of these tribes are very curious. The men purchase as many wives as they can afford, paying the parents of the brides, sometimes as much as a hundred head of cattle. Among the Hassanyey tribe the girl is sold to the highest bidder, (as in some of our own fashionable circles) but the marriage holds good only a certain number of days in the week, the remainder of the time the wife being free from all matrimonial obligations. M. Du Chaillu witnessed one of these sales of a girl, and describes a long series of chaffering in regard to the proportion of time during which the woman should be bound by the marriage contract.

In another tribe—the Apingi—if a man falls in love with his neighbor's wife, and his affections are reciprocated, he has only to tender the husband the amount which was paid for the wife in the first instance, when, by the custom of the tribe, she must be passed over to the new lover. There are no old maids. Mr. Petherick found no girls over 18 who were not either married or betrothed. Savage life has *some* advantages over civilization!

The geographical societies are making efforts to have the great region explored which lies between the two tracts examined by M. du Chaillu nda Mr. Petherick, when many other matters of interest will doubtless be developed.

An Invention Wanted in Relation to Iron-plated Ships.

On the first of August, some further experiments were made at Shoeburyness, in England, to determine the invulnerability of iron-plated vessels. Two targets were made to test two different plans of iron-plating. One target was formed of ¾-inch wrought iron placed upon ribs to represent an iron ship, and the shield, 5 inches thick, was placed directly upon what would be the outer skin of the ship. The other target was made of timber 18 inches thick, to represent a wooden ship. This was covered with iron plates 3 inches in thickness, of angular form, like a wide letter V.

In both cases, the plates were found practically shotproof, but the fastenings gave way by which the plates were secured to the target. The plates were fastened to the iron target by rivets passing through the skin and entering the plate like tapped screws, to the depth of an inch and a half. These screws were nearly all broken by the shots. The 3-inch plates were fastened to the target by ¾-inch bolts, 18 inches apart. These bolts were the first things to yield in this target. It is found also that when the plates are broken the fracture generally commences at a bolt hole. Now, what is wanted is some better mode of fastening iron plates to a ship's side.

Canada Agricultural Exhibition.—The Sixteenth Annual Exhibition of the Provincial Agricultural Association of Canada will be held at London, C. W., next month (September), from the 24th to the 27th, inclusive.

No less than 11,364 miles of submarine cables have been laid, of which only about 3,000 miles are now in actual operation.

An Austrian gentleman—Charles Schulhof—has imported a steam plow of 12-horse power from England for cultivating his estates in Hungary. It has been tried with great success.

Manufacture of American Gunpowder.

The *Railroad Journal* contains an account of a visit by the editor to Messrs. Lafflin, Smith & Bois's powder mill, situated near Saugerties, N. Y., which we transfer to our columns.

The mill is located in a valley, in the bed of which winds a stream capable of affording any amount of water-power. On either side rise the hills, covered to their tops with woods. The buildings are on the edge of the stream, and are connected together by a plank walk, in order to prevent stepping on the ground and getting any gritty substance into the soles of the workmen's shoes, which might easily explode the mill and destroy the life of the wearer.

The first building we entered is devoted to the charring of coal. Charcoal is the material most easily obtained, but to make good gunpowder, it is necessary that proper wood should be used, and that it be charred at a temperature of 500°. If charred at this temperature, it will afterward enter into combustion at a heat of 680°; but if charred at a higher temperature, it requires a still greater heat to burn it. Willow and alder are the woods mostly used for making the coal; they being of a porous nature, are easily burned, while woods giving a hard, flinty coal are objectionable, on account of the slowness of combustion. The building was perhaps 50x30, and contained six cylinders set in brickwork, into which workmen were engaged in throwing in alder wood. The cylinders, after being filled, are closed, and a fire built under them, soon changes the character of the wood, and upon opening the cylinders, the smaller sticks are found perfectly charred, of a dark brown color, and leaving no mark whatever upon the hand, like ordinary charcoal. Leaving the coal-house, we entered the building devoted to the clarification of saltpeter. This article is mostly imported from Calcutta, in a crude state, and is purified by being dissolved in large kettles, boiled down, the impurities skimmed off, and then crystallized. The sulphur is imported already purified.

The next building is the mixing room, where the ingredients are mixed in their proper portions; the charcoal and saltpeter being placed in the cylinders together with small copper balls, the cylinders revolve and the ingredients are thus thoroughly mixed, while the fine dust being confined in the cylinders is prevented from escaping. Having been thoroughly mixed in the proper proportions, the material is then taken to the wheel-house and placed in what appeared to us as a huge tub, perhaps 12 feet in diameter and 3 feet in hight. In this tub, the bottom of which is of solid iron 6 inches thick, the sides being constructed of wooden staves, two large iron wheels, weighing 7½ tuns each, were revolving upon a shaft set in an upright spindle, one being set nearer the spindle than the other, and so adjusted as to cover the entire bottom of the tub in their revolution. The material is placed in this tub, and pressed by these wheels for the space of three or four hours, it being constantly kept damp to avoid an explosion.

After being subjected to this process, the powder is taken to the press-house, and subjected to the operation of a powerful hydraulic press. The powder is placed between sheets of copper and duck cloth, and after receiving a pressure equal to 120 tuns to the square foot, it comes out in hard brittle cakes of a grayish-black hue, from one-quarter to one-half an inch in thickness, and from two to three feet square. This is called "mill cake," and is now ready to be reduced to the size required to make the powder. This is done by passing it through rollers, one of which is so adjusted as to yield when any hard substance gets between them—otherwise friction might be produced, and the mill blown up. The powder is then bolted, and the dust caused by the attrition of the particles is separated; it is then passed through sieves of different sizes, and the coarse and fine powder separated. The powder is then dried; and for this purpose is placed some in a room heated by an iron dome rising in the center of the floor, under which is a stove or kindled fire from the outside or beneath the building, and some in an iron pan heated by steam. The last operation is glazing, which is done by placing it in long wooden cylinders, and revolving them. This operation changes the powder from a dull grayish color to a shiny black, and renders it more saleable in market. The gunpowder is now completed, and ready for packing in kegs or canisters.

There are perhaps from 50 to 100 gunpowder mills throughout the United States, most of which are small mills located in the mining regions of Pennsylvania, where they manufacture blasting powder to be used in the vicinity. Of large manufacturers, beside the one whose mills we have imperfectly described, there are perhaps four or five; and among these, the most extensive are Messrs. Dupont, whose mills are in the State of Delaware, and the Hazard Company, whose mills are at Enfield, Conn.

Geology of Central North America.

A paper was read before the Geographical Society of London at its last meeting, by James Hector, Esq., on the geology of the country, between Lake Superior and the Pacific Ocean, within the forty-eighth and fifty-fifty parallel of latitude, explored by the Government Expedition from 1857 to 1860. The paper shows that the central portion of North America is a great triangular plateau, bounded by the Rocky Mountains and the Alleghenies, stretching to the Arctic Ocean, and divided into two slopes by a watershed which nearly follows the boundary line between the United States and British America. Along the Pacific Ocean, in the cretaceous and tertiary strata there found, lignite has been discovered of superior quality; it was determined by this expedition to be of cretaceous age. It has been worked for some years past by the Hudson's Bay Company, and is in great demand for the steam navy of the Pacific station, and also for the manufacture of gas. Extensive lignite deposits have also been found in the prairie to the east of the Rocky Mountains. Besides these, there were also found lignites of the tertiary period. It is supposed that the existence of this supply of fuel in the plains along the Saskatchewan, on Pacific coast, in Vancouver's Island and in the islands of Formosa and Japan, will exercise an important influence on the steam-route line soon to be opened across the continent and the Pacific Ocean.

India Cotton.

In the British House of Commons, July 25th, Sir C. Wood made some financial explanations relative to India, and asked for discretionary power to borrow £5,000,000 for railway purposes. He believed at the end of the present year the Indian expenditure and income would be balanced. He said the government had evinced great anxiety to develop the resources of India as a cotton-producing country. He believed the result would be that ultimately England would be rendered independent of America for cotton. This year the supply of cotton from India would be about 300,000 bales more than ever before.

The above paragraph has a great significance coming from such a source, and we have not a doubt it will be realized. We stated at the outset of our national troubles that if this war continued long, it would put an end to the pre-eminence of our cotton-producing States in the supply of this important staple, and thus would one of the great industries of our country be destroyed. We desire to see no such calamity fall upon the Southern States, and if the planters understand their true interests, they will see that they can gain nothing but destruction by encouraging the present rebellion against the government. They may seriously injure the North, but themselves will ultimately suffer most.

A Great Iron Steamship.

The new steamship *Scotia*, lately launched in Glasgow, for the Cunard Company, is intended to be the largest iron steamer, with the exception of the *Great Eastern*, afloat, and superior to any other with respect to some features of its construction. She is to be 400 feet over all in length, 366½ feet on the keel, and 47 feet 6 inches wide. The angle iron frames at the bow are placed diagonally, as in the steamer *Persia*, so as to strike almost "end on" in case of a collision. She has seven water-tight compartments, and goods are to be stored in two iron tanks or chambers in the center line of the vessel. These chambers are capable of stowing 1,500 tuns of goods; they are perfectly water-tight, and if a hole should be stove into the hull, they alone will be able to keep the ship afloat. The vessel will have a complete double bottom under the storage chamber, so as to keep the cargo absolutely dry. The coal bunkers will hold 1,800 tuns. She will have two side lever engines, with cylinders each 101 inches in diameter, and 12 feet stroke. The wheels will be 40 feet 8 inches in diameter. The engines appear to be the same old-fashioned kind as those on all the Cunard steamers. From accounts which have appeared at various times in British papers, we had thought that other marine engines of a very superior character were now coming into use in England. Probably the proprietors, or Napier and Sons, the engineers, may have good reasons for adhering to the old side levers. The engines of the *Scotia* will be the most powerful combined pair in any steamer known to us.

The weight of the iron in the hull of the *Scotia* is 2,500 tuns, which will be increased 300 tuns before it is finished. When the engines and boilers are on board, the immense mass will weigh 4,050 tuns.

Americans as Inventors.

The weekly "list of new patents, etc.," reminds one of the versatility and capacity of the inventive genius of our countrymen. Of late, owing of course to the war, there has been a large increase in the various kinds of inventions relative to war—cannons, mortars, every description of fire-arms, bomb-shells and other projectiles, gun-locks, cartridges, tents ambulances, &c., &c. Some of these have been patented; others will be, but it is quite likely that many if not most of them will not,—because either they will not be deemed worthy or they will be found to conflict with previous patents. The latter probability, however, does not detract from the merits of the inventions or their inventors, since it is plain that if the ground had not been fully covered it would now be occupied by the new inventors. All of the details of arms for all classes of soldiers have been the subject of most extensive and costly experiments by our own and foreign governments and of elaborate discussions by the foremost military minds of all civilized nations. Still there may be room for improvements, and if so the present state of affairs is likely to disclose the fact.—*Commercial Bulletin.*

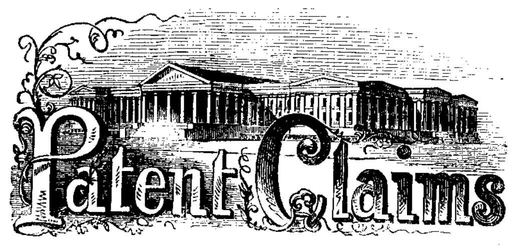
Explosion Preventive Boiler.

A patent has lately been taken out in England by E. H. Higginbotham and A. Beech, of Macclesfield, for preventing boilers exploding through a deficiency of water. The nature of the invention consists in conveying water to the fire in the furnace, for the purpose of extinguishing it, when the water in the boiler falls down to a certain line. A valve is enclosed in a small chamber below the water line of the boiler. This is attached to a lever turning upon a fulcrum, and connected with a float which rises and falls with the level of the water. To this lever the valve is attached, and when the float falls below the water line it lifts the valve, which permits water to flow through it into the furnace and extinguishes the fire, thus preventing the boiler flues from becoming overheated from a deficiency of water.

Eloquence of the Telegraph.

In a new edition of the "Telegraph Manual," by T. P. Shaffner, of Kentucky, just issued in London, there occurs the following eloquenl passage respecting telegraphing by sound:—"Of all the mysterious agencies of the electric telegraph there is nothing else so marvelous as receiving intelligence by sound. The apparatus speaks a language, a telegraphic language, as distinct in tone and articulation as belongs to any tongue. The sound that makes the letter is as defined in one as it is in the other. The operator sits in his room, perhaps some ten feet from his apparatus, and he hears a conversation held by two others hundreds of miles distant, and perhaps the parties conversing are equally far apart. He hears every word; he laughs with them in their merriment, or perhaps sympathizes with their bereavement. The lightning speaks and holds converse with man. What can be more sublime?"

A Hippopotamus.—Barnum has on exhibition at his famous museum a living hippopotamus, which is certainly worth seeing by all who take interest in natural history. We have no recollection that such an animal has ever before been exhibited in this country—and we well remember with what interest we first saw the specimens in the Royal Zoological Gardens in London and the Jardin des Plants in Paris. Barnum charges only twenty-five cents for a sight that is worth a journey of a hundrd miles to see. Barnum gives more novelties at his museum for twenty-five cents than can be found elsewhere on this continent. This is one of his peculiar ways of humbugging the public.



SSUED FROM THE UNITED STATES PATENT OFFICE
FOR THE WEEK ENDING AUGUST 13, 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.

*** Pamphlets giving full particulars of the mode of applying for patents, under the new law which went into force March 4, 1861, specifying size of model required, and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

2,021.—R. Boeklen and W. Staehlen, of Brooklyn, N. Y., for an Improvement in Buttons, or Garment Fasteners:

We claim a button, or garment fastener formed by the employment or use of two disks, A B, one being provided with an opening, a, and the other with a cam, b, substantially in the manner and for the purpose specified.

2,022.—I. V. Brower, of Millstone, N. J., for an Improvement in Corn Harvesters:

I claim the arrangement of the gaveling or endless apron, K, with its gearing, and the cutter with its gearing in relation to each other and to the stand or platform for the attendant, substantially in the manner and for the purposes specified.

2,023.—Samuel Brown, Jr., of Norristown, Pa., for an Improvement in Telegraphic Instruments.

I claim the clamps, as described, for holding the main line wires while it is separated by the cutter to open the circuit and prevent it from coming in contact with the ground, and the movable cross bar, I, for attaching the connecting wires, M and M, to the connecting posts, H and H, and the center screw, L, for moving the cross bar, I, so as to close the circuit by bringing the conducting facing or lining of the cross bar in connection with the jaws, A A, of the clamps, substantially as set forth and described.

2,024.—G. E. Burt, of Harvard, Mass., for an Improvement in Horse Powers:

I claim conducting independent rolls or an independent chain of rolls from the inside to the outside and from the outside to the inside of the endless platform of horse powers, so that the said rolls shall support both the upper and lower portions of the platform, substantially as explained.

2,025.—G. F. Case, of New York City, for an Improvement in Sewing Machines:

I claim, first, The semi-rotating feed, e, pressing against the under side of the cloth, close to the edge of the button hole, constructed and operated substantially as described and shown.

Second, I claim the combination of the finger or looper, f, the forked finger, g, and the incline piece, l, constructed and operated substantially as shown and for the purpose specified.

2,026.—M. C. Cronk, of Auburn, N. Y., for an Improvement in Churns:

I claim, first, The employment of a spiral spring, m, in combination with the main dasher staff, c, and circular plate, e, when all shall be operated in the manner and for the purpose specified.

Second, The revolving dasher staffs, c and d d, frame, B, funnel, a circular plate, e, and spiral spring, m, when all shall be arranged in the manner and for the purpose set forth and described.

2,027.—R. P. P. Dagron, of Paris, France, for an Improvement in Portable Microscopes:

I claim as a new article of manufacture, the jewel microscope substantially as described, the same consisting of a portable microscope with one or two objects and whether combined or not with articles of jewelry or other objects, and in which the object or objects form an integral part thereof.

2,028.—T. G. Eiswald, of St. Louis, Mo., for an Improvement in Boots and Shoes:

I claim the particular arrangement shown and described of the clinching nails, a, and the plate, A, with the sole, e, upper, c, and welt, d, so that the above parts will be firmly united by the said clinching nails, without any other fastening, all as set forth.

2,029.—Adam Exton, of Trenton, N. J., for an Improvement in Rolling Pin and Docker for Biscuit:

I claim the eccentric roller, I J, in its connection with the tail piece or stop, K, and also the combination of roller, I J, and stop, K, with the docker, pricker and stamper, M, substantially as described and for the purposes set forth.

2,030.—J. L. Faber, of Stein, Bavaria, for an Improvement in Pencils:

I claim the pencil handle with the bore adapted to receive and hold the cylindrical pencil, substantially as described, in combination with the split tube, and screw clamping cap, substantially as and for the purpose specified.

2,031.—James Forrest, of Manchester, N. Y., for Cattle Guard for Railings:

I claim the revolving, self-acting winged shafts placed in suitable bearings, conjointly with the general structure, operating as and for the purposes set forth and described.

2,032.—A. N. Gray, of Cleveland, Ohio, for an Improvement in Railroad Rail Couplings:

I claim the combination of the key, L, with a gib for clamp couplers for railroad rails, said key being self-fastening substantially as set forth.

Second, I claim the special combination and arrangement of the coupler, B C, gib, E, and key, L, with the rails, A A′, substantially in the manner and for the purposes described.

2,033.—J. P. Hillard, of Fall River, Mass., for an Improvement in Stop-Motion in Spinning Machinery:

I claim the combination of the cylinder, C2, constructed and arranged so as to lie on the sliver, as shown, with the lever, A2 B2, and its adjusting weight, E, substantially as described.

2,034.—R. E. Hitchcock, of Waterbury, Conn., for an Improvement in Picture Buttons:

I claim a picture medal or button, constructed with cups, a′ a′, or back, B′, in lieu of one of the cups, eyes, c, pictures, d, and cloth or velvet covering, b, and otherwise made, as shown and described.

2,035.—Kellis Horde, of Philadelphia, Pa., for an Improved Hydraulic Engine:

I claim, first, The hollow cut-off valves, D D′, open at both ends and perforated circumferentially and of taper form, in combination with an engine operating and arranged substantially as and for the purpose set forth.

Second, The combination with the above of a link, c, which, while it is arranged to play up and down, is adjustable inward and outward by means of a screw, e, or its equivalent, substantially as and for the purpose set forth.

2,036.—C. B. Horton, of Elmira, N. Y., for an Improvement in Buckwheat Hullers:

I claim, first, The construction and use of the stone concave, X, in combination with its iron back plate, W, as and for the purpose specified.

The elastic and flexible concave, U, with corrugated facing constructed and arranged as and for the purpose specified.

The combination of cylinder, B, with the checks, a, in the manner and for the purpose specified.

2,037.—Charles Kaiser, of New York City, for an Improved Engine for Cutting Saw Teeth:

I claim the combination of the following members constituting a saw cutting engine, viz., a mandrel to hold the saw plate, mechanism to turn the same intermittently to space the teeth, a chisel to cut the teeth, and mechanism to operate and control the chisel, the combination as a whole being and operating substantially as set forth.

I also claim, the combination of the above enumerated members in such manner that the cutting of one tooth of a saw removes the burr formed by cutting a preceding tooth, substantially as described.

I also claim combining a chisel having a groove in its face with mechanism that holds the same and causes it to strike the saw blank at the required angle, substantially as set forth.

2,038.—Charles Kaiser, of New York City, for an Improved Machine for Grinding Needle Points:

I claim a machine for grinding needles, consisting substantially of a combination of a grindstone, a revolving needle holder and an oscillating needle holder carriage, the combination as a whole operating substantially as described.

I also claim the combination of the first part of my invention with mechanism that imparts a vibratory movement to the grindstone crosswise to its movement for grinding, substantially as described.

I also claim the combination of the needle holder carriage with the remainder of the machine in such manner that the needle holders can be raised from the grindstone and moved toward it, substantially as described.

I also claim the combination of a tubular needle holder with an elastic clamp, substantially as described.

2,039.—E. F. Keeling, of Milton, Ohio, for an Improved Harvester Cutter Grinder:

I claim the special arrangement of one or more adjustable standards, H, and spring rest, J, when combined and operating conjointly with the grindstone, substantially as described and for the purpose set forth.

2,040.—G. W. Lawbaugh and John Williams, of Shanesville, Ohio, for an Improvement in Cultivators:

We claim the special arrangement of the side pieces, A B, hinge, D, arms, C C′, and H I, and handles, J K, and shovels, P O, the whole being constructed and operating as and for the purpose set forth.

2,041.—Wm. A. N. Long (assignor to J. B. Rand), of Fisherville, N. H., for an Improvement in Rocking Cradle:

I claim, first, The employment of the spiral spring, G, as and for the purpose set forth.

Second, The employment of a cradle whose bottom shall be inclined when said cradle shall be operated, substantially as and for the purpose set forth and described.

2,042.—G. A. Meacham, of New York City, for an Improvement in Buttons:

I claim a face button having a perforated revolving metallic eye constructed substantially in the manner described.

2,043.—Carlton Newman, of Pittsburgh, Pa., for an Improvement in Lamps:

I claim the use in burners for coal or carbon oil lamps of a supply tube for the oil, placed within the circumference of the burner frame and under the cone or cap, in combination with a burner frame having a chimney holder hinged or pivoted to the burner frame, for the purpose of enabling the lamp to be replenished without either unscrewing the burner frame from its socket, or removing the glass chimney from the lamp, substantially as described.

2,044.—John Pearson, Jr., of Newburyport, Mass., for an Improvement in Stoves:

I claim arranging the air-chamber, G G, formed as described—fire-chamber, A, and upper flue, B B, with reference to each other in such manner that the products of combustion shall be surrounded by a current of atmospheric air at the point of their discharge into the upper flue—substantially as described for the purposes specified.

2,045.—William Pierpoint, of Salem, N. J., for an Improved Thrasher and Cleaner of Grain:

I claim, in combination with an endless band elevator for grain, pullies as herein described, having a long outside bearing for the shaft and no inner bearing for the shaft as herein fully, set forth.

2,046.—Moses Pond, of Boston, Mass., for an Improved Cooking Range:

I claim, first, In combination with an elevated oven centrally placed over and above the fire-box and surrounded on five of its sides by flue passages, the broad vertical flue, f, for carrying the products of combustion into these surrounding flues, when arranged as set forth for the purpose specified.

Second, In combination with the above-described flues, f g h, I claim the hot-air flue, H I K L M, arranged substantially as set forth.

2,047.—Henry Port, of New York City, for an Improvement in Boots and Shoes:

I claim, first, Making the shank and heel-piece with the heads of the rivets incorporated therein, and with the points of the rivets projecting above the inner surface thereof, for the purpose of securing it to upper leather.

Second, I claim the use of flat staple rivets, with v points, for the purpose of securing the shank and heel piece to the upper leather, substantially in the manner described.

Third, I claim making notches in the metal face of the last in the manner described, for the purpose of given direction to the clinch of the rivet, as set forth.

2,048.—Jacob B. Rand and W. A. N. Long, of Fisherville, N. H., (assignors to J. B. Rand, of the same place,) for an Improvement in Corn Shellers:

I claim the rubbing wheel, B, provided with the slots, b b, in combination with the pressure-board, G, and circular casing, or their equivalents, substantially as and for the purpose specified.

2,049.—T. B. and R. N. Rockwell, of Batavia, Ill., for an Improvement in Seed Planters:

We claim the semi-circular or curved bars, L L, attached to the shafts, K K, and operated from the reciprocating slide, H, in connection with the hoppers, I J; all arranged for joint operation substantialls as for the purpose set forth.

We further claim placing the reciprocating, partially rotating, drum, F, provided with the spiral groove, a, for operating the slide, H, in an adjustable frame, F′, for the purpose of rendering the slide, H, operative or inoperative, as may be desired.

2,050.—George M. Selden, of Troy, N. Y., for an Improvement in Hydrants:

I claim the combination of the independent valves, H and I, with cross-piece, g, removable screw valve-seat, e, and sections, A B, substantially as set forth.

2,051.—Lyman Smith, of North East, Pa., and R. French, of Keokuk, Iowa, for an Improvement in Apparatus to form Soap into Balls:

We claim the attachment of the mold-box, E, to the conducting pipe, C, in connecting with an elevated cistern, A, or other means of giving pressure to the liquid substance by means of a spigot and faucet, c j, or equivalent joint, which permits the removal of the said box from the said pipe, and between which and the said box there is a stop-cock, k; all substantially arranged as described.

2,052.—Samuel G. Twambly, of Saco, Maine, for an Improvement in Chucks for Lathes:

I claim the open quadrangular chuck, constructed substantially as described, to enclose the work bounded by flexible arms or springs, which, by means of a gripe, or its equivalent, are so forced toward each other as to hold the work to be operated upon exactly at the center of rotation.

In combination with the above, I claim the sliding center pin, o, that supports the rear end of the arbor.

2,053.—James L. Vauclain, of Lafayette, Ind., for an Improvement in Locomotive Fire-Boxes:

I claim the combination of the the double fire-bottom, C′ E, hollow stay-bolts, F, water-jacket, D, and register, G g, perforated to correspond with the fire-bottom and sliding beneath the same, the whole being constructed and arranged and operating in the manner and for the purposes explained.

2,054.—G. W. Walker, of Boston, Mass., for an Improved Ash Pail:

I claim the described ash pail with its cover, F, spout, E, and opening, G, operating in the manner substantially as set forth for the purpose specified.

2,055.—Ferdinand Woodward, of Sacramento City, Cal., for an Improved Bee-Hive:

I claim, first, The arrangement for united use in a bee-hive of triangular mortices, e e, triangular tenons, e′ e′, inverted V-shaped stops, f f, and the rest or bearing knobs, E E, in the manner and for the purposes described.

Second, The combination of the upper outer box, G, inner boxes, H H, having glass slides, m m, the narrow movable frames, I, and cleats, n n n, having V-shaped notches for holding said frames in the manner and for the purposes described.

Third, I claim the arrangement of the glass valve, B′, of the ingress and egress passage, B, and spring clamps, d d, in the manner and for the purposes described.

2,056.—John Zeitler and Joseph Zuitl, of Dayton, Ohio, for an Improved Meat Cutter:

I claim, first, The employment of the rocking frame, D, provided with knives, constructed and used as and for the purpose set forth.

Second, The employment of the plates, E E, which are adjustable upon the uprights, C C, when constructed as set forth, and used in connection with the rocking frame, as and for the purpose specified.

Third, The arrangement of the springs, a a, with the connecting rods, c c, and arms, d d, upon the frame, D, as and for the purpose set forth.

Fourth, the combination of the revolving table with the rocking frame and its accompanying mechanism substantially as and for the purpose set forth.

2,057.—Levi Bronson, of Brockport, N. Y., assignor to himself and James Brayley, of Buffalo., N. Y., for an Improvement in Straw Carriers for Thrashing Machines:

I claim, in combination with an open raddle traveling around pullies or rollers, an adjustable shake motion when composed of the rock shaft, I, with its slotted arm, K, sliding wrist, i, and raising and lowering arms, J, arranged and operating substantially in the manner and for the purpose set forth.

2,058.—William Burnett, of Boston, Mass., assignor to Robert Burnett, of New York City, for an Improved Pressure Gauge:

I claim, first, The mode described of admitting the pressure into the chamber behind the elastic plate, viz: by first introducing the pressure into the ring in front of the elastic plate, thence through the plate itself, into a channel communicating with the pressure chamber, substantially in the manner and for the purpose specified.

Second, I claim the use of a spiral shaft, to give motion to a pointer, when the same is constructed by cutting away, spirally, one-half of the material of the shaft, so as to present, approximately, in its transverse section, a semi-cylindrical body, substantially as described, by which I am enabled to secure a working face equal to the whole diameter of the shaft, while sufficient stiffness is retained to present no obstacle to its manufacture, and to ensure permanency of character.

Third, I claim operating the spiral shaft, giving motion to a pointer, by means of a vibrating bar which is forced into proper contact with the spiral surface, by a spring attached to the bar and operating transversely to the axis of the shaft, substantially as described.

Fourth, I claim providing a guard to prevent the vibrating bar, which operates the spiral shaft, from receding so far from its proper contact with the spiral surface as to permit indications very materially differing from the true pressure, by placing an unyielding body near to the back of the vibrating arm, and parallel to the axis of the shaft, substantially as described.

Fifth, I claim a screw or spiral shaft of diminishing pitch, to give motion to a pointer, substantially as described.

Lastly, I claim forming the spiral surface of a shaft, employed to give motion to a pointer, with a reference to the point of suspension of a vibrating bar working in contact with said spiral surface, by which arrangement of the two I secure a proper working contact throughout the length of the shaft, and in all positions which are assumed by the vibrating bar, substantially in the manner and for the purpose specified.

2,059.—D. P. Foster, of Shelburne Falls, Mass., assignor to himself and S. L. Hill, of Florence, Mass., for an Improved Saw Set:

I claim the two jaws, B B′, one, B, being formed of a curve, b, and a tangent, c, with a concave face side, d, and the other jaw, B′, formed with a convex face corresponding inversely with the face, d, of jaw, B, all being arranged substantlally as shown to form a new and improved implement, for the purpose set forth.

2,060.—L. D. Hawkins, of San Francisco, Cal., assignor to Alfred Peabody, of Salem, Mass., for an Improved Machine for Scouring, Cleaning and Smutting Rice, Coffee and other Grains:

I claim, first, The combination of the stones, E E, and wire cloth covered frames, F F, whereby the pulverized skin and dirt from the surface of the grain is thrown out, leaving the stones free to act on the grain, and whereby the action of a cleaner and polisher is combined; thus, in most cases, doing away with the use of wire polishers as a supplementary process, and in all cases materially lightening the work to be done thereby.

Second, The adjustment of the wire polisher frames to be moved up toward or drawn back from the revolving drum simultaneously with the stones.

Third, The use of the iron shoes or slides, L M, upon which the stones and frames are placed, in combination with the cast iron bed plate, A, and the screws, c f, whereby the size of the hollow cylinder composed of the stones and frames may be increased or lessened, as desired.

2,061.—S. F. Hilton, of Providence, R. I., assignor to himself and W. D. Hilton, of Cranston, R. I., for an Improvement in Cement for Leather and other Substances:

I claim, as an improved article of manufacture, my improved ce ment, as made by combining the two materials mentioned, in the manner and in the proportions substantially as set forth.

RE-ISSUES.

114.—S. E. Oviatt, of Richfield, Ohio, for an Improvement in Thrashing Machines. Patented July 10, 1860:

I claim, first, The employment or use of suction tubes or pipes, in combination with the beater or thrashing cylinder of a grain-thrashing machine, for the purpose of receiving or "sucking in" the dust evolved during the operation of thrashing, and discharging the same at any convenient point, free from the operators or attendants, when arranged and operating substantially as set forth.

Second, The endless feeding apron and screen, J, arranged in relation to the thrashing cylinder, G, to operate as and for the purpose specified.

115.—J. F. Pond, of Cleveland, Ohio, for an Improved Washing Machine. Patented May 22, 1860:

I claim, first, The adaptation to a common wash tub, T, of a separate portable frame which supports the washing mechanism, consisting of the upright pieces, B B, the fluted roller, R, and yielding bed, C, constructed, arranged and combined in the manner and for the purpose set forth.

Second, I claim the obliquely-fluted spring bed, C, in combination with the fluted roller, R, arranged and operating substantially as and for the purposes specified,

116.—T. H. Dodge, of Washington, D. C., assignee of P. H. Kells, of Hudson, N. Y., for an Improvement in Harvesters. Patented March 21, 1854:

I claim, first, Attaching the shoe which runs on the ground and supports the heel of the finger beam in a mowing machine to the front inner corner of the main frame, in combination with the use and employment of a single drive wheel, a short finger beam, a hinged tongue and a small supporting wheel, whereby, as the machine is advanced, the finger beam is allowed to conform to the inequalities of the ground without danger of dragging cut grass, substantially as described.

Second, The arrangement with the main frame of a mowing machine of a hinged tongue and a single main supporting and driving wheel, in such a manner that the weight of the frame and the finger beam will preponderate in front of the axis of said wheel, in combination with supporting the front part of the frame with a small wheel arranged to run on the ground, cut by a previous swath in range with the heel of the finger beam, whereby the cutter will be allowed to run close to the ground, and yet the points of the cutters and guards prevented from being thrust into the ground in passing over water furrows and uneven surfaces, substantially as described.

Third, The combination, in a mowing machine, of a main frame of a proper rolling support to said frame, combined with mechanism for giving motion to the cutter, a short finger beam having a shoe which runs upon the ground interposed between it and the main frame, and a hinged draft beam or tongue, when constructed and arranged in relation to each other so that when the machine is advanced by the team, the cutter will not only be operated, but will also, together with the finger beam, have the capability of rising and falling to conform to the inequalities of the ground, independent of the up-and-down motions of said rolling support to the maine frame, while both ends of main frame are maintained in elevated positions, so as to be out of the way of cut grass, short stumps and similar obstructions, substantially as described.

Fourth, The combination with the shoe which runs upon the ground and supports the heel of the finger beam in a mowing machine, the cutter having the capabilities stated in the third claim, of a small guiding, leading or supporting wheel, whereby undue friction of said shoe and finger beam upon the ground is prevented, and the operation of the machine is rendered more uniform and easy, and a close cut of stubble insured, as described.

Fifth, The combination in a mowing machine having the advantages of an open and unobstructed space and a single drive wheel, as claimed by Wm. F. Ketchum in his patent of July 10, 1847, and reissued April 26, 1853, of a small wheel or roller with the heel of the short finger beam which is supported by a single downwardly projecting arm to render the action of the machine more easy, and to prevent side draft by bearing a part of the weight of the finger beam, substantially as described.

Sixth, Placing or arranging the shoe part, to which the heel of the finger beam is attached in a mowing machine, out from and lower than the front corner of the main frame, in combination with supporting it in that position near the ground from the front of the frame, by means of an upward inclined connection or extension piece, which extends up from the heel of the finger beam and toward the front of the frame in a line in range with the finger beam, in connection with the use of a hinged tongue or draft beam, whereby, as the machine is advanced the front of the frame is well elevated above cut grass and other obstructions, while the finger beam and cutters are permitted to run close to the ground, and are also allowed to rise and fall to conform to the inequalities in the surface thereof, and the machines rendered of easy draft, substantially as described.

117.—T. H. Dodge, of Washington, D. C., assignee of P. H. Kells, of Hudson, N. Y., for an Improvement in Harvesters. Patented March 21, 1854:

I claim, first, Extending the rear end of the shaft which operates the pitman and cutter of a mowing machine back of the rear end of the main frame, and providing it with a small pinion wheel, in combination with extending the rear end of another shaft whose front end is geared with the driving mechanism back of the rear end of said frame, and providing it with a large cog wheel to gear into said pinion wheel, whereby, when the machine is drawn forward, a rapid motion is imparted to the binion wheel and its shaft to operate the pitman and cutters, and whereby said rear gearing is brought near the center of the rear of the machine, and in compact form; and also so that said rear gears can be readily examined and replaced without necessarily removing their shafts or disturbing the bearings thereof.

Second, Placing the finger bar in a mowing machine at the side of the gearing and in front of the driving wheel, in combination with the use of a long eccentric or crankshaft and rear gearing, arranged as described.

118.—T. H. Dodge, of Washington, D. C., assignee of P. H. Kells, of Hudson, N. Y., for an Improvement in Harvesters. Patented March 21, 1854:

I claim the arrangement of the projecting or runner part of the shoe with the upwardly-inclined connection and main frame, substantially as described, whereby free access may be had to the shoe in advance of the frame, and, at the same time, an open and unobstructed space is left between the heel of the finger beam and the line of draft.

119.—T. H. Dodge, of Washington, D. C., assignee of P. H. Kells, of Hudson, N. Y., for an Improvement in Harvesters. Patented March 21, 1854:

I claim, first, Forming or constructing the cutters in mowing machines separately in the form shown in Figs. 2, 3 and 4 of the accompanying drawings, for the purposes specified.

Second, The use and employment in a mowing machine of a series of slotted fingers, in combination with a series of cutters fastened rigidly to their bar, in such a manner as to leave an open space between the cutters to facilitate the cleaning of the fingers as the cutter and cutter bar reciprocate through the slotted fingers.

DESIGNS.

93.—S. W. Gibbs, of Albany, N. Y., assignor to Abbott and Noble, of Philadelphia, Pa., for a Design for the Cap and Base of a Parlor Stove.

94.—E. J. Ney (assignor to the Lowell Manufacturing Company), of Lowell, Mass., for a Design for Carpets (seven cases).

101.—William A. Greene, of Albany, N. Y., for Laundry Stoves.

102.—Daniel Bickerby, of Boston, Mass., for a Design for Slate Roofing.

103.—C. A. Shaw, of Biddeford, Maine, for a Design for a Work-holder.

104.—C. A. Shaw and J. R. Clark, of Biddeford, Maine, for a Design for a Sewing Machine.

At a meeting lately held in Liverpool, Mr. Littledale said he expected that the commerce between that port and India would be so great ten years hence that vessels of the class of the *Great Eastern* will be employed to carry it on.

RECENT AMERICAN INVENTIONS.

Quartz Crusher.—This invention consists in the arrangement of a reciprocating cradle, in combination with a series of stampers, in such a manner that, by the motion of the cradle, the stampers are caused to act on the quartz or other substance to be crushed. It also consists in arranging the stampers by means of pins and cross bars in the cradle, in such a manner that the same are allowed to rise but prevented from coming down beyond a certain point; and it further consists in combining with the cradle and stampers a box containing stones or weights in such a position that said box and weights form a counterpoise to the stampers and facilitate the motion of the cradle, at the same time increasing the crushing power of the stampers. L. F. A. Legouge, of Grass Valley, Cal., is the inventor.

Bleaching Fatty Substances.—This invention consists in the employment of brown oxyd of lead, either pure or in composition with other substances, for the purpose of bleaching and refining fatty substances, such as linseed oil, rapeseed oil, poppyseed oil, animal or vegetable wax, palm oil, tallow, &c.—The inventor is Ferd. F. Mayer, of New York city.

Soap-Casting Apparatus.—This invention relates to the employment of a mold, or connected series of molds, arranged one above the other, in connection with an elevated cistern or other reservoir, from which the soap or other substance to be cast is forced in a liquid state into the mold by static or mechanical pressure. It consists in the attachment of the mold or series of molds to the conducting pipe connected with the elevated cistern or other reservoir, by means of a spigot and faucet or other movable joint between which and the mold or series of molds there is a stop-cock to shut the substance within the mold or molds, and retain the pressure thereon after the disconnection thereof from the pipe. The inventors of this device are Lyman Smith, of North East, Pa., and Robert French, of Keokuk, Iowa.

Thrashing Machine.—This invention consists in applying a suction tube or tubes to a grain-thrashing machine, in such relation with the beater or thrasing cylinder that all dust evolved by the operation of thrashing will be drawn into the tube or tubes, and expelled from the machine in such a manner that the operator cannot inhale any portion of the dust, nor be in the least exposed to the same. The invention further consists in the employment or use of a feeding apron or guard screen, arranged in such relation with the beater or thrashing cylinder as to greatly facilitate the manual operation of feeding the grain to the machine, and also prevent the admission of improper substances into the flue and pipes thereof. This device was invented by S. E. Oviatt, of Richfield, Ohio.

Boots and Shoes.—This invention relates to an improvement in the soles of boots and shoes, and consists in a novel mode of attaching metal plates thereto, whereby the expense of manufacture is materially reduced, and a more durable article obtained. The invention consists in the employment or use of a metal plate provided at its inner side with nails of sufficient length to pass through the leather sole or heel of the boot or shoe, and the edges of the uppers or the welt attached thereto, said nails by being clinched, serving as a means to connect the metal plate, leather sole or heel and uppers together, thereby avoiding all sewing and pegging hitherto employed for attaching the soles to the uppers. This invention was patented by T. G. Eiswald, of St. Louis, Mo.

Seeding Machine.—This invention relates to an improved seeding machine of that class designed for planting seed in hills, such, for instance, as the planting of corn. The invention consists in an improved means for distributing the seed or depositing the same in the furrow, whereby the seed is distributed evenly or uniformly in hills, and by an arrangement of parts not liable to get out of repair, nor become deranged by use. This machine was invented by T. B. Rockwell, of Batavia, Illinois.

Saw Set.—This invention consists in having the jaws provided with suitable handles, which cross each other, and are connected by a fulcrum pin, one of the jaws having a convex face and the other being correspondently concave, whereby the teeth of the saw will be set in curved form, and saws of different thicknesses set with one and the same implement. This improvement was patented by D. P. Foster, of Shelburne Falls, Mass.

Corn Harvester.—This invention consists in the employment or use of a rotary cutter or saw placed at one side of a mounted frame, in connection with an endless discharging apron placed on the machine, and so arranged that the cutter will be operated from one wheel of the machine, and the discharging apron operated from the other wheel, all side draft being thereby avoided, and a machine of light draft obtained.

Picture Button.—It has lately been proposed to make medals with two pictures, one on each side, surrounded by metallic rims, or having their rims bound with sheet brass which, it is true, may be raised or stamped and provided with various inscriptions; still it gives to such medals a monotonous appearance, and they cannot be put to any practical use; they are simply playthings for children, and at the same time the construction of said medals requires expensive dies and machinery. The object of this invention is to obviate the monotony in the appearance of said medals, and to reduce the expense of their construction, by using cloth or velvet of various colors for covering the rims, which are formed of small cup-shaped pieces of sheet-iron, and to render them useful for practical purposes by inserting one picture only in the front end, and the back of an ordinary button in the other, the rim being covered by cloth or velvet held in its place by the back, so that the picture buttons can be used like ordinary buttons, and that their color can be adapted to the color of the garment, or to the furniture, or to any other article where they are to be used. D. E. Hitchcock, of Waterbury, Conn., is the patentee of this device.

Cast iron for Cannon.

Mr. Wm. Fairbairn, F.R.S., has made a number of experiments with cast iron and nickel for the purpose of obtaining a more ductile metal; but instead of obtaining such a result, the strength of the metal was much inferior to that of cast iron itself. Meteoric iron contains a portion of nickel, and as from its well-known ductility it was supposed that by mixing iron and nickel artificially a product as strong and ductile as meteoric iron would be obtained. These hopes have not been realized. Referring to his experiments, Mr. Fairbairn says, in the transactions of the Manchester Literary and Philosophical Society, that "beside endeavoring to obtain a metal of greater ductility, another object of equal importance was aimed at in these experiments, namely, to produce a metal of increased tenacity, suitable for the casting of cannon and heavy ordnance. During the last two years innumerable experiments have been made for this purpose with more or less success; but the ultimate result appears to be, that for the construction of heavy artillery, there is no metal so well calculated to resist the explosion of gunpowder as a perfectly homogeneous mass of the best and purest cast iron, freed from sulphur and phosphorus."

Lots of Breech-loaders—Complicated Mechanism.

At an exhibition of ancient and modern arms lately held in the Naval School, New Cross, England, there were thirty-two samples of breech-loading rifles, comprising English, French, German and American inventions. After inspecting them and hearing an explanation of their construction, the editor of the *Mechanics' Magazine* says:—"Of one thing, however, we feel assured, the breech-loader has not yet been invented. The multiplicity and diversity of the plans prove the absence of any recognized or fixed principles of construction. Error is always multiform; truth is single and simple." This conclusion we consider erroneous. Simplicity is always to be desired in mechanism, but the perfection of tools and the skill which is now exhibited in combining machines, enables us to have complicated mechanism to great advantage for executing difficult movements. If we wanted a simple printing press, a rude screw press would answer, but is that to be preferred to the Hoe press because of its greater simplicity? Complicated mechanism has ceased to be a bug bear in this intelligent age.

M. de Luca obtains oxygen gas economically by passing the vapor of sulphuric acid through a porcelain tube heated to redness. The acid is put into a tubulated retort three-fourths filled with pumice stone, the stopper and joints are secured with asbestos and clay.

Notes & Queries

A. F. O., of N. Y.—It would require several engravings to illustrate the mode of sighting rifles and arranging elevating back sights.

N. P., of Ohio.—We do not know how many locomotives are employed on the railroads in New York. There is a Patent Bureau at Quebec, Canada, but a citizen of the United States cannot obtain a patent in that province. An English patent is of no force in Canada.

C. Z. G., of Conn.—So far as we know, block-tin pipe is about as durable as lead when laid in the ground.

D. B., of Ill.—Your twisted elliptical bore makes precisely what is known as the Lancaster gun, tried by the British government before and during the Crimean war, and soon abandoned.

H. M., of Mass.—To color cotton with aniline, the goods should be first steeped in sumac for eight hours, then they are worked in a solution of neutral chloride of tin, and washed in cold water. After this they are dyed in the aniline solution, which should be kept cold, like a "plum tub."

E. P. ., of Mich.—Prof. Grant lives in Brooklyn, E. D. N. Y. We do not know what Caustin's night signals are.

C. M., of N. Y.—A good lacquer for brass work is made by coloring shell-lac varnish with turmeric and a little annato. Lac varnish is made by dissolving colorless shell-lac in alcohol. You can obtain the annato and turmeric at any druggists. Strain the whole through a clean cotton rag before using it.

C. B., of Boston.—The trajectory is the path described by a bullet. If the curve is great, of course the bullet is not very dangerous, as it may not be able to strike but one person between the rifle's muzzle and the end of its flight. If the trajectory of a bullet were quite flat for 1,000 yards, of course the bullet would strike a person who stood at any point between the muzzle and the end of the bullet's flight—1,000 yards. The importance of securing flat trajectories will now be apparent to you.

L. V. R., of N. Y.—To remove stains from marble, first rub it with soap and water to remove all grease; then wash it with a clean sponge and some dilute muriatic or oxalic acid, and use warm water to rinse all off. Finally polish down with some fine French whiting.

J. M. B., of Iowa.—We do not know of whom you can obtain an ear-trumpet, such as you desire, for wearing continually upon the ear.

P. S., of C. W.—You can get a prism of Benjamin Pike & Son., 518 Broadway, this city. Write to them for the prices, which vary with the sizes.

C. W. R., of N. Y.—Your gun, constructed of a steel barrel and wrought-iron rings, resembles Armstrong's. He uses, however, a different breech. The screw-breech is an old device for breech-loading cannon. Your projectile has no patentable novelty—there are others which have a steel point and a skeleton covered with lead. Though your inventions have not been made early enough to be patentable, you are deserving of great credit for your ingenuity.

W. B. G., of N. Y.—The Whitworth rifle and cannon, and their balls, are polygonal. The attachment of a pin to the ball is also old. Pick your flint and try again.

A. D., of N. Y.—The first patent granted in England relative to rifled arms was obtained by one Arnold Rotsipen, in 1635. He designated it as "a new art, industry, way or means of making guns, being a work and invention not formerly performed and put in practice, whereof a pattern and proof was shown to the king's self." He had authority in his patent, accompanied by a constable, to enter and search any house on suspicion of an infringement on his rights.

I. R. A., of Colorado Territory.—Squaring a circle means a number which multiplied into itself gives the area of the circle. Squaring the circle is a hallucination.

An unknown correspondent, from South Harwick, Mass., has sent us a sketch and description of an improved lock. We shall be glad to write to him upon being furnished with his name.

L. M. D., of N. H.—The only danger that could attend a delay on your part in making application for your patent would grow out of the fact that some one else might apply for and procure a patent for the same thing in anticipation of your rights. This would cause you considerable trouble and expense. Inventors who expect to take patents for their improvements ought not to delay their application. They will ofttimes save themselves much trouble by acting promptly.

G. G., of Pa.—We think there is but little doubt of the novelty of your invention. If you will send us a model and the first installment of the government fee ($15) we will proceed with the case at once.

J. M. C., of N. J.—Pomegranate bark is used to detach the tapeworm from its hold upon the intestine and thus get rid of it altogether. You will find this and other remedies very fully discussed in Dr. Weinland's pamphlet, which you can probable secure for a trifle by writing to him. Bodies are embalmed by injecting sulphate of alumina, or still better the sulphate of zinc, into the veins. About a gallon of the solution is sufficient.

G. W.,, f Conn—You can run lead, zinc or tin in a copper mold. Silliman's Philosophy has accounts of mechanical and electrical experiments. You can magnetize a steel bar of horse-shoe form by placing the ends of an electro-magnet against the bar and rubbing them to the ends of the bar, always in this same direction. Write to Benjamin Pike & Son, 518 Broadway, New York, for the price of a Rhumkorff coil.

R. E., of N. Y.—Electricity passes less readily through perfectly dry air than through a vacuum. The action of a magnet is not affected by placing it in a vacuum.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Aug. 21, 1861:—

N. F. B., of Ind., $5; W. E., of N. Y., $15; E. A. W., of Cal., $25; J. S, C., of Pa., $15; W. O. L., of N. Y., $15; A. H. D., of Cal., $25; A. McG., of N. Y., $25; W. B. R., of Cal., $30; J. C. L., of Ill., $10; P. & O., of Mo., $10; T. V., of Cal., $15; R. H., of Cal., $15; B. H. & Co., of Cal., $25; B. F. S., of Wis., $40; W. H., of Iowa, $20; B. Z., of N. Y., $5; V. & N., of N. Y., $15; J. H. M., of Wis., $15; M. & N., of Mich., $15; J. D., of N. Y., $22; C. H. B., of Mass., $15; J. W. H., of N. J., $15; G. A. H., of N. Y., $25; S. H., of N. Y., $25; P. S., of Pa., $20; A. S. & J. A. H., of Ill., $20; H. V. D. W., of N. Y., $20; W. H. B., of Mass., $20; H. Q. H., of N. Y., $45; G. & B., of N. Y., $20; G. D. H., of Ill., $20; J. H. M., of Ill., $20; J. G. S., of Pa., $15; M. & B., of Conn., $45; D. & G., of Ill., $20; S. E. & P., of Wis., $15; E. & B., of N. Y., $25; J. T. W., of England, $30; R. H. J., of Ill., $30.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Aug. 14, to Wednesday, Aug. 21, 1861:—

N. H. B., of Mass.; M. M., of Mass.; W. C., of N. Y.; G. A. H., of N. Y.; S. H., of N. Y.; J. P. D., of N. Y.; W. B. R., of Cal.; J. C. L., of Ill.; W. M. M., of Ill.; J. M., of N. Y.; E. & B., of Vt.; J. B. M., of N. Y.; A. McG., of N. Y.; A. H. D., of Cal.; N. F. B., of Ill.; J. G. S., of Pa.; C. C., of Pa.; E. & R., of Maine; A. H. P., of Mo.; C. H. & C. R. A., of Conn. (2 cases); H. Q. H., of N. Y.

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 pate 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 s 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 for 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, wouldamount to many millions of dollars! We would state that we never had a more efficient co ps of Draughtsmen and Specification Writers than are employed at p esent 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.

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 submit it 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 Pater t 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 in structions 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.

Interferences.

We offer our services to examine witnesses in cases of interference, o prepare arguments, and appear before the Commissioner of Patents or in the United States Court, as counsel in conducting interferences or appeals.

For further information, send for a copy of "*Hints to Inventors.*" Furnished free. Address MUNN & CO., No. 37 Park-row, New York.

How to Make an Application for a Patent.

Every applicant for a Patent must furnish a model of his invention, if susceptible of one; or if the invention is a chemical production, he must furnish samples of the ingredients of which his composition is composed, for the Patent Office. These should be securely packed, the Inventor's name marked on them, and sent, with the government fee, by express. The express charge should be prepaid. Small models from a distance can often be sent cheaper by mail. The safest way to remit money is by draft on New York, payable to the order of Munn & Co. Persons who live in remote parts of the country can usually purchase drafts from their merchants on their New York correspondents; but if not convenient to do so, there is but ttle risk in sending bank bills by mail, having the letter registered by the postmaster. Address MUNN & Co., No. 37 Park-row, New York.

Extension of Patents.

Va uable 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.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, 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 anv advertisement sent for publication.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain a copy by addressing a note to this office, stating the name of the patentee and date of patent, when known, and inclosing $1 as fee for copying. We can also furnish a sketch of any patented machine issued since 1853, to accompany the claim, on receipt of $2. Address MUNN & CO., Patent Solicitors, No. 37 Park Row, New York.

NEW PAMPHLETS IN GERMAN.—We have just issued a revised edition of our pamphlet of *Instructions to Inventors*, containing a digest of the fees required under the new Patent Law, &c., printed in the German language, which persons can have gratis upon application to this office. Address MUNN & CO.,
No. 37 Park-row, New York.

A MESSIEURS LES INVENTEURS—AVIS IMPORtant. Les Inventeurs non familiers avec la langue Anglaise et qui préféreraient nous communiquer leurs inventions en Français, peuvent nous addresser dans leur langue natale. Envoyez nous un dessin et une description concise pour notre examen. Toutes communications seront reçues en confidence. MUNN & CO.,
SCIENTIFIC AMERICAN Office, No. 37 Park-row, New York.

Zur Beachtung für deutsche Erfinder.

Die Unterzeichneten haben eine Anleitung, die Erfindern das Verhalten angibt, um sich ihre Patente zu sichern, herausgegeben, und verabfolgen solche gratis an dieselben.

Erfinder, welche nicht mit der englischen Sprache bekannt sind, können ihre Mittheilungen in der deutschen Sprache machen. Skizzen von Erfindungen mit kurzen, deutlich geschriebenen Beschreibungen beliebe man zu addressiren an
Munn & Co.,
37 Park Row, New-York.

Auf der Office wird deutsch gesprochen.

Daselbst ist zu haben:

Die Patent-Gesetze der Vereinigten Staaten,

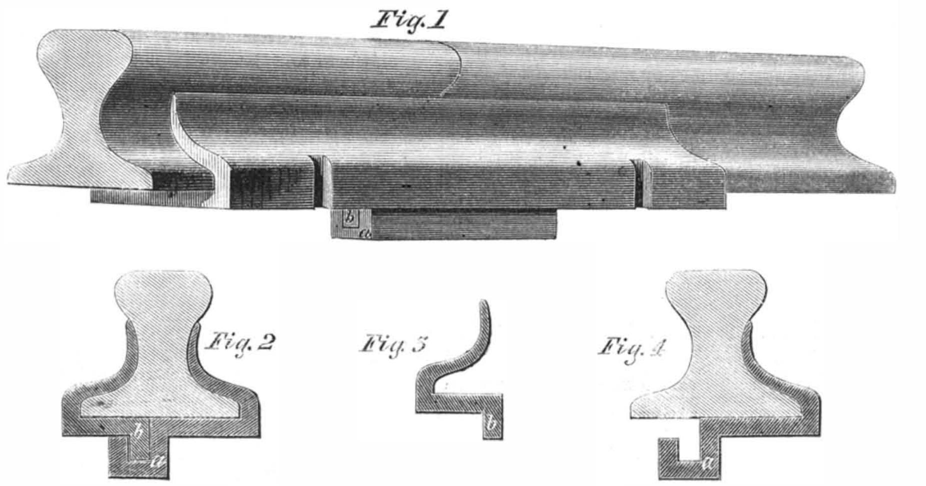
nebst den Regeln und der Geschäftsordnung der Patent-Office und Anleitungen für den Erfinder, um sich Patente zu sichern, in den Ver. St. sowohl als in Europa. Ferner Auszüge aus den Patent-Gesetzen fremder Länder und darauf bezügliche Rathschläge; ebenfalls nützliche Winke für Erfinder und solche, welche patentiren wollen.

Preis 20 Cts., per Post 25 Cts.

Improved Railroad Chair.

There is a decidedly novel feature in the chair represented in the accompanying engraving. A clasp chair of the form represented in Fig. 2 is divided into two parts longitudinally by a vertical cut which is not parallel with the sides, but inclined at a small angle thereto ; thus forming the chair in two wedge-shaped pieces. Upon the lower edge of one of the pieces is attached the hooked projection, *a*, Figs. 1, 2 and 3, while the other piece, Fig. 3, has a projecting lip, *b*, to fit into the hook, *a*, and be embraced by it.

If the piece having the hook upon it is placed upon the side of the rail, as represented in Fig. 4, and the other piece, Fig. 3, with the lip is placed with its wide end at the wide end of the piece, Fig. 4, and is pushed along so that the lip will enter the hook, it is evident that the farther it is pushed in, the nearer will the sides of the chair be drawn to each other, and consequently the more firmly will the rail be grasped. The two pieces then being spiked to the tie, the rail is very securely held in place.



MCGUEFIE'S RAILROAD CHAIR

With this mode of wedging, there is no danger of throwing the sections of the rail out of line, as in the ordinary mode. There is nothing complicated in the parts or their arrangement. The whole thing is exceedingly simple, and may be used by any laborer. The closeness with which the chain is drawn to the rail adds materially to the strength of the junction ; and this is farther stiffened by the material forming the hook and lip.

The patent for this invention was granted March 26, 1861 ; and further information in relation to it may be obtained by addressing the inventor, Archibald McGuffie, at Rochester, N. Y.

To Farmers---The Action of Peruvian Guano.

The following is an extract from a recent letter of the distinguished chemist, Professor Liebig, to Professor Blyth, published in the *Irish Country Gentleman*. He says :—

There is a very prevalent opinion among agriculturists that guano produces a greater effect than an artificial mixture containing the same quantity of bone phosphate (3 Ca, O P O^5) and of nitrogen in the form of salts of ammonia. I have myself observed, in experimenting on a piece of meadow land, that those portions on which guano was strewed became very soon conspicuous by darker green grass, whilst an artificial mixture, as above stated, appeared to exert scarcely any action. This hitherto unexplained rapidity of action is due to the presence of oxalic acid in Peruvian guano.

When guano is extracted with water, a solution is obtained which contains about 2 per cent of phosphoric acid, and 6 to 8 per cent of oxalate of ammonia. If, however, guano be mixed with water, and the moistened mass be left standing for some days (just the state in which it would be in the soil), it is found, on extracting with water from time to time a portion of the moistened mass, that the amount of phosphoric acid has increased, and that of oxalic acid diminished. This reaction continues many days, the quantity of soluble phosphoric acid daily increasing in proportion to the diminution of oxalic acid ; until at last the oxalic acid almost entirely disappears from the solution, and in its place is now found a corresponding amount of phosphoric acid. The idea immediately occurs that from the long contact with water the phosphate of lime and oxalate of ammonia decompose each other into oxalate of lime and phosphate of ammonia. But in a neutral solution of oxalate of ammonia, phosphate of lime is not decomposed, or, at least, only very slowly. There must, therefore, be in guano some other substance which is the means of causing in the moist manure the decomposition of the earthy phosphate. This substance is sulphate of ammonia, which is always present in Peruvian guano. In fact, on adding a little sulphate of ammonia to a mixture in water of oxalate of ammonia and of freshly precipitated phosphate of lime, mutual decomposition of the two salts took place in a few hours. The sulphate of ammonia renders the phosphate of lime somewhat soluble, and thus promotes its decomposition by the oxalate of ammonia.

The action of guano is, therefore, twofold, depending, in the first place, on its soluble nitrogen compounds, and in the second on its soluble phosphates. In this last respect its effect is similar to that of a superphosphate. The foregoing decomposition in guano depends, evidently, to a greater or less extent on the weather. Continued moderately moist weather promotes the conversion of its insoluble phosphoric acid into a soluble form, whilst heavy falls of rain retard it by washing out the oxalate of ammonia. Hence, from this dependence on time and moisture, we are not always certain of this transformation taking place in this manure in the soil. I have discovered a very simple method of rendering the action of guano constant in connection with the conversion of the phosphoric acid into a soluble form. It consists in moistening it, a day or two before its application, with a little water, to which a small quantity of oil of vitroil has been added, so as to render it distinctly acid. Under these circumstances decomposition takes place rapidly, and is completed in a few hours. The whole of the phosphoric acid, corresponding to the quantity of oxalic acid present, is separated from the lime, and rendered soluble by union with ammonia, and the oxalic acid disappears entirely as an insoluble oxalate of lime. I am very anxious that agriculturists may be induced to make comparative experiments with guano alone, and after being moistened with dilute sulphuric acid.

The Names of Ships.

The following, from *Chambers's Edinburgh Journal*, on the names of ships, is quite interesting in its way:

The most favorite names for British ships are those of sweethearts and wives, or women, at least, who may be sweethearts and wives. Their number is something prodigious. Look at the varieties under the letter A only. The *Amelias* are 40 strong ; the *Alices*, 62 ; while the varieties of *Ann*, *Anne*, *Anna* and *Annie* rise to the formidable number of 500. The most prodigious name, perhaps, is *Mary*, with its allied forms—*Maria*, *Marian*, *Marianna*, *Marianne*, *Marion*, *Marie*, *Marietta* ; these, with duplicate names beginning with *Mary*, figure in the mercantile navy to the amount of 1,100 ! The loyalty, too, of the shipnamers is something to admire. Beside a goodly list of kings and emperors, princes and princesses, we have 76 *Queens*, and 22 *Queen Victorias*, beside a sprinkling of *Queen Adelaides*, *Queen Annes*, *Queen Carolines* and *Queen Charlottes*. There are other queens, too, whose regality is of a somewhat different kind—*Queen Bee* and *Queen Mab*, *Queen Esther* and the *Queen of Sheba*, the *Queen of Beauty* and the *Queen of Trumps*, the *Queen of Clippers* and the *Queen of Freedom* ; as well as *Queens of the East*, *West*, *North* and *South* ; and *Queens of the Sea*, *the Ocean*, *the Lakes*, *the Isles*, *the Forest* and *the Chase*.

All the jewels, including the *Koh-i-noor*, have representatives among our trading ships, such as the *Diamond*, *Sapphire*, *Ruby*, and so forth ; and all the flowers, such as *Daisy*, *Forget-me-not*, *Mignonette*, that are familiarly known by name. As to astronomy, we have all the planets, from *Mercury* to widely-distant *Neptune* ; more than half of the asteroids, such as *Ceres* and *Pallas* ; and all the twelve signs of the zodiac, beside the *Zodiac* itself. Of course, everything that relates to the watery element on which the ship is borne is seized upon.

Books, too, and heroes, and heroines of story, are not neglected : thus, the shade of Sir Walter Scott might feel a little proud to know how many ships are named *Peveril*, *Rob Roy*, *Redgauntlet*, *Ivanhoe*, *Lady of the Lake*, *Pirate*, *Roderick Dhu* and *Helen Macgregor*. Ships have not forgotten to honor *Mary Russell Mitford* and *Dinah Mulock*, *Florence Nightingale* (15 of these), *Caroline Chisholm* and *Grace Darling* ; while *Jenny Lind* and *Taglioni* have come in for no small share of notice. All the pretty girls, too, who have ever been made the heroines of song are here. Of these, Miss Annie Laurie seems to be the prime favorite, for she is seven times repeated.

Those shipowners or ship captains must have been rather at a loss for titles who hit upon such names as *Thrasher*, *Spank Away*, *Sure Shot*, *Safe and Satisfactory*, *Ready Rhino*, *Rogue in Grain*, *Come On*, *Never Despair* and *Mrs. Caudle*.

In 1855, an act of Parliament was passed requiring every vessel registered in the British dominions to have an official number, which should be marked on the main beam and written on the certificate of registry ; and this number must not be changed while the vessel is afloat. This number identifies the vessel, irrespective of its name.

Feeding Air to Furnaces.—The Hon. W. E. Fitzmaurice, of London, has lately obtained a patent relating to improvements in supplying the fuel of furnaces with supporters of combustion. The invention consists essentially in mixing oxygen gas or atmospheric air, or oxygen gas with atmospheric air, with the vapor of water or steam, when the steam is passed into or through ignited carbonaceous matter, for the purpose of effecting the decomposition of the steam, and obtaining therefrom hydrogen gas, or carburetted hydrogen gas and carbonic oxyd gas, such gases and mixture of gases being intended to be applied in generating heat by any ordinary or other application thereof. The addition to the steam of the oxygen gas or of oxygen gas mixed with atmospheric air is made in order to facilitate the decomposition of the steam, through the greater heat developed by means of the action of the oxygen in contact with the steam and the carbonaceous matter.

FROM THE STEAM PRESS OF JOHN A. GRAY.