Scientific American.

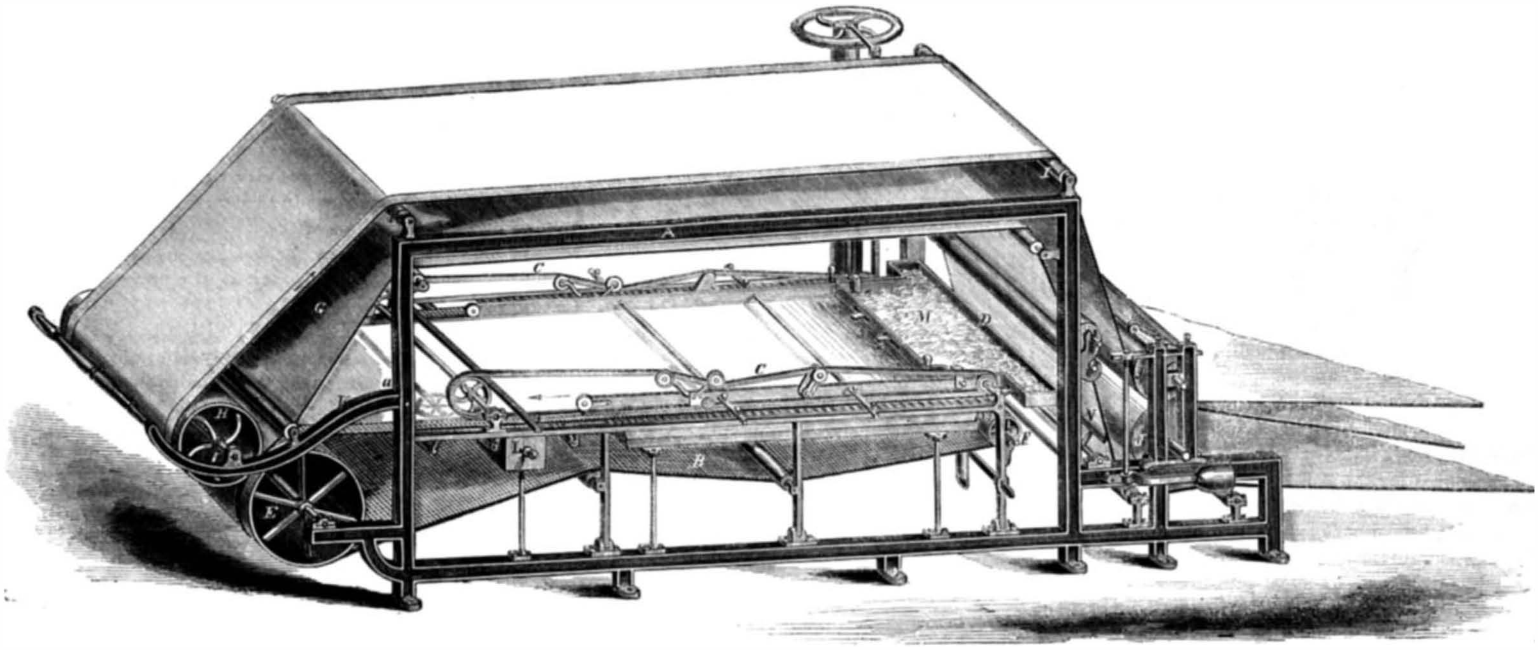
A WEEKLY JOURNAL OF PRACTICAL INFORMATION IN ART, SCIENCE, MECHANICS, CHEMISTRY AND MANUFACTURES

VOL. VII.---NO. 10. NEW YORK, SEPTEMBER 6, 1862. NEW SERIES.

Improvements in Paper Machinery.

The accompanying engraving illustrates some improvements in the Fourdrinier machine for forming sheets of paper from the pulp, recently invented by James Harper, of East Haven, Conn. The objects of these improvements and their nature will be understood from a brief description of the machine.

The pulp, M, flows from the trough, D, upon the upper leaf of the endless apron of wire cloth, B, by which it is carried along in the direction indicated by the arrow, over the suction boxes, L, being thus freed



HARPER'S MODIFICATION OF THE FOURDRINIER MACHINE.

from a considerable portion of its water, to the roller, E, where it comes in contact with the endless blanket of felt cloth, G, which takes it from off the wire cloth and carries it back to the front end of the machine, where it is delivered to the aprons that conduct it to the drying cylinders.

In the Fourdrinier machine, as ordinarily constructed, the pulp passes between pressure rollers at the point where it is transferred from the wire cloth to the blanket, and this involves the necessity of having rollers with solid peripheries covered with felt, in order to prevent the paper from being forced through the meshes of the apron and adhering to it, and even with this precaution the apron is injured by the pressure and rapidly worn out. To obviate this difficulty is the object of Harper's modification.

To this end the blanket, G, is allowed to press upon the paper pulp only with sufficient force to take it up, while the pressure is given by the rollers, J J, at the opposite end of the machine. In consequence of this arrangement, the roller, E, may be formed of wire cloth, through the meshes of which the superabundant water escapes as the paper is couched.

For the successful operation of this modification it is necessary that the couching felt should be kept clean, and this is effected by the revolving beater, N, operating in connection with jets of water.

One of these machines has been in operation nearly two years at East Haven, Conn., where it may be examined at any time. The inventor claims that it combines all the advantages of the Fourdrinier, with the economy of cylinder machines.

The patent for this invention was granted March 14, 1862, and further information in relation to it may be obtained by addressing the manufacturers, Rice, Barton & Co., at Worcester, Mass.

American Locomotives.

At the conclusion of an able paper by Mr. Zerah Colburn, on the "Traction of Locomotives," published lately in the London *Engineer*, he says :—In this lengthy communication I shall not trouble you with details of the mechanical construction of the engines. I purpose no further than to say I have ventured upon nothing new. My connection with locomotive building commenced fifteen years ago, and all this time I have been seeking, both as a designer and constructing engineer, to prove all things and to hold fast to that which is good. I have not only seen a vast variety of patterns of locomotives, but have had a tolerably wide field of observation for ascertaining their economical qualities. I have tried to divest myself of everything like prejudice, especially national prejudices ; but I cannot lose sight of the fact that engines built on the American plan are the cheapest in first cost ; and it is a mere matter of the comparison of statistics of working to prove that more work is got out of them for less money than for any other engines made anywhere.

Commenting on this the *Railway Times* says :— We believe in this, not only that Mr. Colburn speaks the thought of an impartial judge in this matter, but that he states facts very easy of proof. Certainly no one is better able to judge correctly in this department of engineering. The peculiar features of the American engine have been developed directly from the nature of the roads upon which they have been built to run, and from the work required of them. Whenever a new railway has been constructed, which in its grades, curves or other elements has called for a modification of the old pattern, such modification has been at once forthcoming. Besides such improvements, which may be called simply anatomical, our machinists have been introducing such changes as the increasing weight of trains and change of fuel demanded, in the furnace, boiler and steam consuming apparatus. The Bissel truck, spread wheels, horizontal cylinder, Griggs's wooden blocks, and other like innovations are slowly but steadily getting entire possession of the field. In every land where our locomotives have had a fair trial, they have been a credit to the mechanical engineers of America. Besides the improved pattern on which the latter engines are built, and completing the perfection of this department of railway operation, is the method of registering the individual performance of engines, and the monthly reports of the machine department, by which an engine is at once called to account for delinquencies, and shamed out of a low performance by comparison with its more active and economical fellow laborers. When the other departments of railway operation shall come up to the standard of improvement exhibited by the locomotive, we shall have nothing to be ashamed of in the results of the new mode of transport.

Polytechnic Association of the American Institute.

The next monthly meeting of the Polytechnic Association takes place on Thursday evening, September 11. The appointed subject is Highways, and as those who moved and seconded the adoption of this subject take a zealous interest in it, the discussion promises to be unusually intelligent and interesting.

BOTTGER, the great chemist, recommends chemists to use gun cotton as a filter for concentrated acids and liquids decomposable by organic matters. He employs it with the greatest advantage for filtering concentrated nitric acid, fuming sulphuric acid, chromic acid, permanganate of potash, and even concentrated solutions of potash, and aqua regia. He states that properly prepared gun cotton is only attacked at the ordinary temperature by acetic ether.

NOTES ON NAVAL AND MILITARY AFFAIRS.

RADICAL CHANGE IN THE PLAN.

Though the press of the country has been requested to refrain from publishing minute accounts of the military operations, sufficient information of the great movements in Virginia have been made public to indicate the general plan of the campaign. General McClellan's army has been withdrawn from its position 20 miles southeast of Richmond, and moved round to join the army of General Pope, at Culpepper Court House, 92 miles northwest of Richmond. General Burnside's army has also been moved to the same vicinity, and thus our forces have been concentrated in great strength in front of the principal rebel army. It will be observed that this plan of concentration of forces is a radical change from the scattered and teasing warfare which has been waged for the last 15 months. The combined armies of the Republic standing thus in front of the main force of the enemy, the nation is watching with intense anxiety to see whether our generals have also revolutionized their policy; whether they will move forward in a resolute and determined effort to crush the rebellion, or whether they will again resort to spades, while our armies are again wasted by disease, and the remaining resources of the country are frittered away.

THE GENERAL PLAN OF CONCENTRATION.

We have not full details of the several movements adopted in effecting the concentration of our forces, but such facts as we have been able to gather, we will lay in connected form before our readers :—

It seems that in order to prevent the enemy from disturbing McClellan during his evacuation of the peninsula, General Pope was ordered to advance toward Richmond, thus threatening the rebel capital and occupying the attention of the enemy on that side. This advance led to the battle of Cheat Mountain, described in our last. From the field of that battle General Jackson fell back several miles toward Richmond, but Jefferson Davis, learning that McClellan had departed from near Richmond, now ordered all of his forces northward to join Jackson, in hopes of being able to overwhelm Pope before McClellan should arrive to his aid. General Pope, however, in accordance with the general plan, fell back across the Rappahannock river, and on the banks of this stream planted his artillery and held the advancing hosts of the enemy in check until he was joined by the armies of Burnside and McClellan.

GENERAL POPE'S MOVEMENTS.

At the time of the battle of Cheat Mountain, General Pope's head quarters were at Culpepper Court House, a small village on the line of the Orange and Alexandria railroad, 62 miles southwest from Alexandria, and 92 miles by railroad northwest from Richmond. When General Pope discovered that the main rebel army, estimated at some 200,000 men, was advancing to overwhelm him, he determined to fall back across the Rappahannock, a considerable stream which crosses the railroad 11 miles to the northeast of Culpepper. The sick and wounded who could bear the journey were accordingly dispatched by railroad to the hospitals of Alexandria and Washington, and all superfluous baggage was removed to the rear. The army then followed, General Sigel's corps forming the rear guard.

THE FIGHT OF WEDNESDAY.

The enemy followed our retreating forces pretty closely, but their advanced corps first came in collision with our rear on Wednesday, the 20th of August. Our rear guard was at Brandy Station, 6 miles from Culpepper and 5 from the Rappahannock, when the head of the pursuing columns came in sight.

Our rear guard supposing that the rebel force was a mere skirmishing party sent in advance, and wishing to check such presumptuous reconnoitering, turned upon it and the order to charge was given. Immediately the three cavalry regiments of Hatch's Brigade—the Harris Lights, 1st Pennsylvania and 1st New Jersey—formed in line of battle and swept forward with tremendous cheers; but coming suddenly upon a broad and deep ditch they were compelled to draw rein and at the instant a large force of rebel infantry rose from cover and poured a heavy volley into the ranks, which emptied many saddles and threw our squadrons into confusion. The line gave way at the center, but the wings wavering and showing a disposition to hold their ground, another volley was poured into them by the enemy, and our whole force then rapidly retreated to the Rappahannock river. The rebel forces followed hotly after ; but at the moment when they thought they had driven us pell-mell over the river, and the capture of the railroad bridge must be an easy affair, the fire of two batteries—Matthews's Pennsylvania and Thompson's Maryland—was poured into their faces with terrific effect. Their impulsive advance was checked on the instant, and the exultant yells died upon their lips. In haste they retired from their exposed situation where they stood to the cover of a thick wood, which skirted the level plain at a distance of a half mile from the river. Their pieces not having been brought forward they could not reply to our fire, so their column moved to the left under cover of the woods, with a view of flanking us by effecting a crossing at one of the fords between Rappahannock Bridge and the Warrenton Sulphur Springs. Their design having been anticipated, was baffled by Gen. Pope, who pushed his column a corresponding distance along the north bank of the river, and guarded each ford with three batteries to command it in front and from either side. The two armies were kept thus moving all Thursday, each of the two able players at this grand game of war seeking to checkmate his antagonist without bringing on a serious engagement before his forces were fully massed. An attempt was made down at Kelly's Ford —on the left of our line—to cross and turn our position, but this was effectually foiled by Gen. Reno, who showed no force until he had lured the enemy into the place he desired, and then suddenly opened fire with his batteries, and then followed it up with a cavalry charge, which put the foe to flight, and determined him to make no more attempts that day to cross at Kelly's Ford.

THE GREAT CANNONADE OF FRIDAY.

In the course of Thursday most of our forces crossed the Rappahannock and were stretched along the northeasterly bank some eight or ten miles. Early Friday morning the main body of the enemy advanced to the southwest bank, and commenced a cannonade along the whole line which was replied to by our batteries, the fire being kept up throughout the day.

GENERAL SIGEL ACROSS THE RIVER.

Between 8 and 9 o'clock in the forenoon, the fire opposite Gen. Sigel's corps having lulled a little, this enterprising commander determined to feel the strength of the enemy across the river. Accordingly he ordered Gen. Carl Schurz to reconnoiter with his Division, and, if possible, to cross the river. Schurz's division comprizes two brigades, of which he took only the first, Gen. Bohlen's, for the reconnoissance. The 74th Pennsylvania was sent over first, the men wading breast deep through the water, holding their pieces and ammunition above their heads to keep them dry. The 8th Virginia and 61st Ohio followed and some time after McLean's Brigade was sent to support them in their engagement with the enemy. Schurz's crossing was unopposed. He kept on up the opposite bank, and out upon the level ground, and went more than a mile before his pickets came face to face with the enemy's. As soon as our fellows saw the "gray backs," they fired, but the rebels, instead of standing ground or making a show of force, fell back, in no very leisurely manner either, for half a mile. Sigel followed a while, until it was evident that they wished to entrap him into an ambush, when he halted and took up a fine position in the edge of some heavy timber, the approaches to which were over open fields. Their design foiled, the enemy had no choice but to face about and attack Schurz in his own position, which they did in force. The fight raged with great fury till 6 o'clock in the evening when, Sigel's object having been accomplished, and Schurz's force not being sufficient to hold his extremely advanced position, our troops were withdrawn to the north bank of the river. They were hotly pursued to the very water's edge by the enemy, who poured in their volleys during the passage through the ford. All of our killed and wounded were brought safely across, and a small number of prisoners (not five whole regiments, as one report has it). That General Sigel should have come safely through the day himself is truly remarkable, for he exposed himself in a most reckless manner wherever he thought it necessary to do so, and in the final grand fusillade he was in the midst of a real storm of bullets.

Brigadier-General Bohlen, however, was killed while waving his sword and cheering on his men.

On Friday evening Fitz John Porter's corps of McClellan's army joined General Pope.

GENERAL POPE LOSES HIS PRIVATE PAPERS.

On Friday evening about half past eight, a band of some 250 guerrillas made a successful raid on Catlett's Station, a point on the railroad 13 miles northeast from the Rappahannock, and thus in the rear of our army. The devoted band dashed in upon our small collection of men and wagons, and stampeding a lot of sutlers and servants and teamsters, burned seven wagons, ran off a number of horses, and took about a hundred prisoners. The most serious part of the business is that they took Gen. Pope's personal baggage and moneys, and all his official papers, correspondence, &c., which happened to be in one of the wagons which had been sent to the rear.

All the private papers and letters of Gen. Pope, copies of dispatches and reports, memoranda relating to the campaign and to the army, copies of telegrams sent, all dispatches received from the President, Halleck and the War Department, orders issued to Generals of corps and divisions, all maps and topographical charts, containing information of the greatest value; in a word, the whole history and plan of the campaign, the numbers and disposition of troops, all are revealed to the enemy by this disaster. Its seriousness can hardly be estimated. It is taking the rebel General into the confidence of Halleck, and may render it necessary to change the whole campaign.

THE CANNONADE CONTINUED ON SATURDAY.

On Saturday there was an artillery duel all along the opposing lines. The ball was opened at our center, and the firing extended not only up the river toward Sigel, but down toward the railroad bridge, where we occupied two hills across the river. It had been raining the evening before and almost all night, and the red waters of the Rappahannock had so swollen as to carry away the bridge above Barnett's Ford and the *débris* lodged against the lower one in such masses that there was great danger of its being carried away. Our advanced position had become very insecure, and it was accordingly determined to abandon it. The movement was executed in perfect order. Matthews's and Thompson's Batteries, supported by the 12th and 13th Massachusetts and 11th Pennsylvania, were safely withdrawn to this side of the river, while a company of Pennsylvania riflemen and a section of Matthews's guns held the position until the last man and last gun was safely brought over. New positions were taken on this side, from which the old ones could be enfiladed, and on the rebels appearing in strong force a terrific cannonade was opened upon them by Matthews's, Hall's, Thompson's and Leppier's Batteries of Rickett's Division, which caused great loss to the enemy. Every attempt to plant a battery on the abandoned eminences was repulsed with great slaughter, and the enemy were fairly driven back to the woods.

As on Thursday and Friday, so on Saturday, the enemy kept working up toward Warrenton White Sulphur Springs, on the south side of the Rappahannock, with the view of flanking us, and we moved further and further away from the railroad to baffle their design. As on preceding days, so on Saturday, the grand artillery duel went on from right to left and from left to right, the cannonade being heavier now at McDowell's position, now at Sigel's, now at Banks's. We were guarding, and successfully guarding, the whole river bank, and all the fords from Kelly's to Warrenton, and the enemy, with an army of 100,000 to 150,000, had been held in check by Pope with a much inferior numerical force. Their great game was to turn our position, take us in rear, whip us, and then rush on with streaming flags to Washington. Ours the desperate task of showing fight, and yet not fighting, of playing with our monstrous antagonist until he lost his golden time, and until our reenforcements from Fredericksburg, the Peninsula and the North would so strengthen us that we could crush his armies and capture his capital. If we could save ourselves until Saturday night, we would be safe. And the greatest crisis of the war occurred between Thursday morning and Saturday night. It is past, and we are safe. Again we have the annoucement that Washington is safe.

PARTICULARS OF THE CROSSING.

Gen. Pope's position at the railway bridge across the Rappahannock—the position deemed to be of greatest strength along the river was attacked in force on Saturday morning. The hill, redoubt and block-house on the southern bank, had been held up to that time by a portion of Gen. Hartsuff's brigade, the 12th and thirteenth Massachusetts and two batteries of artillery. The bridge had not been destroyed —was considered impregnable. But with the swelling stream came down so much timber that the bridge was endangered. Gen. Pope therefore determined to withdraw his forces on the opposite bank and destroy the bridge. The movement was accomplished in order and without loss, and the bridge was burnt. But the position which was thus abandoned was valuable to the enemy not less than to us, and when its evacuation was discovered, the rebels immediately advanced in force to occupy it.

On this side the Rappahannock, and to the right of the railway, is another hill and redoubt—the hill of about the same hight with the other and commanding the ground beyond. From this hill and from the high ground adjacent, the advance of the enemy was met by a heavy fire of artillery. They moved in line of brigade and with successive masses steadily advancing, covered also by their own artillery, pushed forward in spite of losses that must have been immense, and possessed themselves of the hill. They were driven from it more than once, and so long as our artillery kept its position could not retain it. But it was discovered that our batteries were enfiladed by a distant fire from the other side, and they were finally moved to a more secure position.

STRUGGLE OF THE ENEMY TO CROSS THE RAPPAHANNOCK.

All through the three days of Thursday, Friday and Saturday vast masses of the enemy were making most desperate efforts to cross the Rappahannock at all the fords along the stream for fifteen miles. But at all points the passage was successfully disputed by our batteries, and during Saturday so many of McClellan's troops arrived upon the ground that our army is now considered sufficient to cope with the whole rebel force.

GENERAL MC'CLELLAN'S MOVEMENTS.

Our last week's account left Gen. McClellan's army at Yorktown on the 17th of August. At this point it was surrounded by the intrenchments thrown up by the rebels, and under the secure protection of these fortifications it was embarked on board a great number of transports, for conveyance down the York river, and up the Chesapeake Bay, and the Potomac. Some of the divisions were landed at Aqua Creek, where they would be only 14 miles by railroad north of the Rappahannock, some were landed at Alexandria, and others continued six miles still farther up the Potomac to Washington city. On the 22d Gen. Kearney's division landed at Alexandria, and the river was then black with transports. Those which landed at Alexandria were immediately forwarded by railroad southwardly to join Gen. Pope's army on the Rappahannock, 51 miles distant, where they began to arrive on Friday evening, Aug. 23d, as we have already stated. It is understood that a sufficient force was left at Yorktown to hold that place, and thus the disastrous campaign of the peninsula was brought to an end.

GUERRILLA OPERATIONS AT THE WEST.

The States of Missouri, Kentucky and Tennessee continue to be infested with numerous small predatory bands of rebels.

On the 24th of August Major Leppert, with two hundred men, met a body of rebels three hundred and fifty strong in Missouri, between Bloomfield and Cape Girardeau, and after a fierce engagement routed them. Thirty were killed, fifty wounded, and sixteen taken prisoners. A number of horses, several wagons, a quantity of sidearms, ammunition and their camp equipage were taken. The rebels scattered in utter confusion through the woods, and it is not probable they will again join together. Parties of national troops, thoroughly equipped for guerrilla chasing, are after other rebel bands. General Blunt has driven three famous guerrilla leaders, Coffee, Quantrall, and Rains, out of Missouri into Arkansas. On the 24th of August, two hundred guerrillas, encamped on the Shelby farm, six miles from Danville, Ky., and near the line between Boyle and Lincoln counties, were eating and feeding their horses, when the Harrodsburg and Danville Home Guard, sixty strong, surprised them, killing three and wounding eight, some of them fatally, and took thirty horses. The Federal loss was one killed and two wounded.

ATTACK ON FORT DONELSON.

A special dispatch to the Cincinnati *Commercial* from the chaplain of the Seventy-first Ohio regiment, dated Fort Donelson, 25th ult., says that the rebels under Col. Woodward, the same who took Clarksville, made an attack on the fort, and were repulsed with the loss of thirty killed and wounded. Col. Woodward's horse was killed under him, and his saddle and pistols are now in our possession. The rebels sent a flag of truce previous to the attack, and demanded a surrender. The question was put to the officers, and every man voted "No." The force of the rebels consisted of four hundred and fifty infantry, three hundred and thirty-five cavalry and two field pieces. The fort was under the command of Major Hart, with four companies of the Seventy-first Ohio regiment—Colonel Rodney Mason's regiment.

INDIAN MASSACRES IN MINNESOTA.

The Governor of Minnesota has issued the following proclamation :—

EXECUTIVE CHAMBER, ST. PAUL, August 21, 1862.

The Sioux Indians upon our Western frontier have risen in large bodies, attacked the settlements, and are murdering men, women and children. The rising appears concerted, and extends from Fort Ripley to the Southern boundary of the State.

In this extremity, I call upon the militia of the valley of the Minnesota, and the counties adjoining the frontier, to take horses, and arm and equip themselves, taking with them subsistence for a few days, and at once report, separately or in squads, to the officer commanding the expedition now moving up the Minnesota river to the scene of hostilities. The officer commanding the expedition has been clothed with full power to provide for all exigencies that may arise.

Measures will be taken to subsist the forces so raised.

This outbreak must be suppressed, and in such manner as will forever prevent its repetition.

I earnestly urge upon the settlers of the frontier that, while taking all proper precautions for the safety of their families and homes, they will not give way to any unnecessary alarm. A regiment of infantry, together with three hundred cavalry, have been ordered to their defence, and, with the volunteer troops now being raised, the frontier settlements will speedily be placed beyond danger.

ALEXANDER RAMSEY.

Editors in the vicinity express the opinion that this rising of the Indians is the result of rebel machinations ; the Indian war being designed to keep at home a considerable portion of the military force of the frontier States.

A Suggestion for National Defence and Economy

Much has been said and written in regard to our national defences, and especially naval defence and protection ; but as economy is to be hereafter a national necessity, I deem it a great desideratum if our naval arm can be made to command respect abroad without an immense annual outlay, to keep in commission such unwieldy iron clad ships as our transatlantic neighbors are now putting afloat. They certainly are not needed in times of peace, and they subject the national treasury to an immense drain to counteract the destructive elements of exposure. To obviate this serious difficulty with wet, ill ventilated and expensive vessels, I would recommend that a number of invulnerable iron clad gunboats or batteries for specific harbor and sea coast defence, and also a few larger or sea service ships be constructed at a first cost of from three to five hundred thousand dollars each for the gunboats, and eight to ten hundred thousand each for seaservice ships. Have them put in perfect order for use, armed and proved. Then have each one hauled up on launching ways, in a secure situation in the different sea ports and naval stations along our coast, where emergency or convenience for their care might require them. Have them thoroughly cleaned, oiled, painted and housed, and let a practical engineer be attached to each vessel to keep it clean and free from rust or accident, and ready for launching.

We would then have for years to come, and ever ready at a few days' notice, a powerful fleet of gunboats distributed at all available points for the invasion of our vast coast line, of a kind able to cope with anything that can cross the ocean, with nothing required but their crews, ammunition, provision and fuel. A fleet of a hundred of such gunboats at a first cost of $50,000,000, with an annual expense of $100,000 for keeping in order, would present a wonderful bulwark against foreign intervention. For all the practical purposes of a peace establishment we can retain our present frigates and wooden gunboats as far more suitable, safe and convenient in times of peace, than the heavy, unwieldy, ill ventilated (if invulnerable) and expensive iron-clads. Such a dormant navy if properly built and cared for, will not rot or rust out in a hundred years; while our active wooden walls and well skilled officers and gunners will reflect abroad as brilliant moral light from our well housed iron navy at home as would radiate from iron walls in commission. In addition to the heavy armament of our harbor ports, the improvements lately made in casting large ordnance by core cooling, will no doubt be soon extended so as to admit of casting 30-inch mortars. Such a mortar located behind strong works commanding the narrow channels of our principal harbor to throw shells weighing 1,200 lbs., and charged with 200 lbs. of powder with inextinguishable fuse, would either destroy a fleet attempting to pass, by dropping its shells on their decks, or they would act as torpedoes by exploding on the bed of the channel, under or near the passing vessels.

A mortar of 36 inches was made a few years since in England by shrinking bars and bands together ; it soon became rickety by the fierce concussion, and the project was given up as a failure. A solid casting center cooled, would no doubt have stood the test. Let us have the great mortars. All that our country could desire to make it feel safe from external encroachment, is to have the certain knowledge that it is always ready for any emergency.

G. D. H.

The Salt Wells of Michigan.

There are six wells near Grand Rapids, which vary in depth from 400 to 500 feet. On the Saginaw river there are eight salt wells, varying from 350 to 800 feet in depth. The basin in which these salt springs are found is of great extent. In this basin the strata are made up of a series of salt bearing shales of the maximum thickness of 184 feet.

The annual consumption of salt in the United States for the year 1859, is estimated at 52½ lbs. *per capita*, or in the aggregate, about 30,692,000 bushels. Of this amount not quite 50 per cent is of domestic manufacture—the balance being an imported article. There is still a considerable margin to be filled up by our home produces of salt to supply the entire demand.

London Subterranean Railways.

Several miles of the underground railway under the streets of London are completed, a locomotive is on the track, and the whole will be opened to the public on the 1st of October next. The London *Times* states that the underground locomotive used condenses its steam and emits no smoke. The passenger carriages are lighted with gas, the tunnel is also lighted with gas, and is well ventilated and dry. It is intended to run trains every ten minutes during the day, and the fares are to be lower than those of omnibuses for the same distance. In second-class carriages the fares are to be four cents for about four miles, and one train morning and evening is to run for two cent fares.

PRUNING EVERGREENS.—The lowest boughs of a tree or bush should be left longer than those above them, if only the fraction of an inch, and the rule holds good from bottom boughs to the topmost ones. If the boughs or branches in any part of the tree or brush are allowed to get longer than those below them, the longest will throw off the drops when it rains, and shade those from the sun ; and when the sun and rain are kept from an evergreen bough it languishes and dies by inches.

THE amount of shipping in 1846 which entered and cleared from British ports was 12,415,586 tuns, of which 3,727,438 tuns were foreign ; in 1860 the amount of shipping which entered and cleared was 24,689,292 tuns, of which 10,774,369 tuns were foreign. The increase in steam vessels has also been very great, having risen from 1,319,226 tuns British and foreign in 1846, to 4,967,573 tuns in 1860.

THE exports of petroleum—crude and refined—for the first half year of 1862, amounted to 4,379,669 gallons, equal to 109,492 barrels, valued at $1,413,390.

GAS FURNACES FOR GLASS.

The following is a condensed abstract of a lecture lately delivered before the Royal Institution in London, by Prof. Faraday, on peculiar new furnaces heated by gas, the invention of C. Siemens. Such furnaces deserve the special attention of the Pittsburgh, Pa., and other glass manufacturers;—

Gas has been used to supply heat, even upon a very large scale, in some of the iron blast furnaces, and heat which has done work once has been carried back in part to the place from whence it came to repeat its service; but Mr. Siemens has combined these two points, and successfully applied them in a great variety of cases, as the potter's kiln; the enameler's furnace; the zinc distilling furnace; the tube-welding furnace; the metal melting furnace; the iron-puddling furnace and the glass furnace, either for covered or open pots, so as to obtain the highest heat required over any extent of space, with great facility of management, and with great economy (one half) of fuel. The glass furnace described had an area of 28 feet long and 14 feet wide, and contained eight open pots each holding nearly two tuns of material.

The gaseous fuel is obtained by the mutual action of coal, air and water. A brick chamber, perhaps 6 feet by 12 feet and about 10 feet high, has one of its end walls converted into a fire-grate, *i. e.*, about half way down it is a solid plate, and for the rest of the distance consists of strong horizontal plate bars where air enters; the whole being at an inclination such as that which the side of a heap of coals would naturally take. Coals are poured through openings above upon this combination of wall and grate, and being fired at the under surface, they burn at the place where the air enters; but as the layer of coal is from 2 feet to 3 feet thick, various operations go on in those parts of the fuel which cannot burn for want of air. Thus the upper and cooler parts of the coal produces a larger body of hydro-carbons; the cinders or coke which are not volatilized approach in descending toward the grate; that part which is nearest the grate burns with the entering air into carbonic acid, and the heat evolved ignites the mass above it; the carbonic acid passing slowly through the ignited carbon becomes converted into carbonic oxide, and mingles in the upper part of the chamber (or gas producer) with the former hydro-carbons. The water, which is purposely introduced at the bottom of the arrangement, is first vaporized by the heat, and then decomposed by the ignited fuel and re-arranged as hydrogen and carbonic oxide; and only the ashes of the coal are removed as solid matter from the chamber at the bottom of the firebars.

These mixed gases form the gaseous fuel. The nitrogen which entered with the air at the grate is mingled with them, constituting about a third of the whole volume. The gas rises up a large vertical tube for 12 or 15 feet, after which it proceeds horizontally for any required distance, and then descends to the heat-regenerator, through which it passes before it enters the furnaces. A regenerator is a chamber packed with fire bricks, separated so as to allow of the free passage of air or gas between them. There are four placed under a furnace. The gas ascends through one of these chambers, while air ascends through the neighboring chamber, and both are conducted through passage outlets at one end of the furnace, where mingling they burn, producing the heat due to their chemical action. Passing onward to the other end of the furnace they (*i. e.* the combined gases) find precisely similar outlets down which they pass; and traversing the two remaining regenerators from above downward, heat them intensely, especially the upper part, and so travel on in their cooled state to the shaft or chimney. Now the passages between the four regenerators and the gas and air are supplied with valves and deflecting plates, some of which are like four waycocks in their action; so that by the use of a lever these regenerators and airways, which were carrying off the expended fuel, can in a moment be used for conducting air and gas into the furnace; and those which just before had served to carry air and gas into the furnace now take the burnt fuel away to the stack. It is to be observed that the intensely heated flame which leaves the furnace for the stack always proceeds downward through the regenerators, so that the upper part of them is most intensely ignited keeping back as it does the intense heat; and so effectual are they in this action, that the gas which enters the stack to be cast into the air is not usually above 300° Fah., of heat. On the other hand, the entering gas and air always passes upward through the regenerator, so that they attain a temperature equal to white heat before they meet in the furnace, and there add to the carried heat that due to their mutual chemical action. It is considered that when the furnace is in full order, the heat carried forward to be evolved by the chemical action of combustion is about 4,000°, while that carried back by the regenerators is about 3,000°, making an intensity of power which, unless moderated on purpose, would fuze furnace and all exposed to its action.

Thus the regenerators are alternately heated and cooled by the outgoing and entering gas and air, and the time for the alternation is from half an hour to an hour, as observation may indicate. The motive power on the gas is of two kinds—a slight excess of pressure within is kept up from the gas producer to the bottom of the regenerator to prevent air entering and mingling with the fuel before it is burnt; but from the furnace, downward through the regenerators, the advance of the heated medium is governed mainly by the draught in the till stack or chimney.

Great facility is afforded in the management of these furnaces. If, while glass is in the course of manufacture, an intense heat is required, an abundant supply of gas and air is given; when the glass is made, and the condition has to be reduced to working temperature, the quantity of fuel and air is reduced. If the combustion in the furnace is required to be gradual from end to end, the inlets of air and gas are placed more or less apart the one from the other. The gas is lighter than the air; and if a rapid evolution of heat is required, as in a short puddling furnace, the mouth of the gas inlet is placed below that of the air inlet; if the reverse is required, as in the long tube-welding furnace, the contrary arrangement is used. Sometimes, as in the enameler's furnace, which is a long muffle, it is requisite that the heat be greater at the door end of the muffle and furnace, because the goods, being put in and taken out at the same end, those which enter last, and are withdrawn first, remain, of course, for a shorter time in the heat at the end; and though the fuel and air enters first at one end and then at the other, alternately, still the necessary difference of temperature is preserved by the adjustment of the apertures at those ends.

Not merely can the supply of gas and air to the furnace be governed by valves in the passages, but the very manufacture of the gas fuel itself can be diminished, or even stopped, by cutting off the supply of air to the grate of the gas-producer; and this is important inasmuch as there is no gasometer to receive and preserve the æriform fuel, for it proceeds at once to the furnaces.

Some of the furnaces have their contents open to the fuel and combustion, as in the puddling and metal-melting arrangements; others are inclosed, as in the muffle furnaces and the flint-glass furnaces. Because of the great cleanliness of the fuel, some of the glass furnaces, which before had closed pots, now have them open, with great advantage to the working and no detriment to the color.

The economy in the fuel is esteemed practically as one-half, even when the same kind of coal is used either directly for the furnace or for the gas producer; but, as in the latter case, the most worthless kind can be employed—such as slack, &c., which can be converted into a clean gaseous fuel at a distance from the place of the furnece, so many advantages seem to present themselves in this part of the arrangement.

Molding in Brass.

Brass molding is carried on by means of two distinct kinds of molds, namely, earthen or sand and metal molds; we shall now enter upon the investigation of the former of the two. The formation of earthen molds requires long practical experience to overcome the disadvantages attendant upon the material used. The molds must be sufficiently strong to withstand the action of the fluid metal perfectly, and at the same time must be so far pervious to air as to permit of the egress of the gases formed by the action of the metal on the sand. If the material were perfectly air tight, then damage would often ensue from the pressure arising from the rapidity of the generation of the gases, which would spoil the effect of the casting, and probably do serious injury to the operator. If the gases are locked up within the mold, the surface becomes filled with bubbles of air, rendering its texture porous and weak, besides injuring its appearance.

Sand mixed with clay or loam is used for brass and other alloys. In the formation of brass molds, old damp sand is principally used in preference to the fresh material, being much less adhesive, and allowing the patterns to leave the molds much easier and cleaner.

Meal dust or flour, is used for facing the molds of small articles, but for large works, powered chalk, wood ashes, &c., are used, as being more economical. If particularly fine work is required, a facing of charcoal or rottenstone is applied. Another plan for giving a fine surface, is to dry the molds over a slow fire of cork shavings or other carbonaceous substance, which deposits a fine thin coating of carbon. As regards the proportions of sand and loam used in the formation of the molds, it is to be remarked that the greater the quantity of the former material the more easy will the gases escape, and the less likelihood is there of a failure of the casting; on the other hand, if the latter substance predominates the impression of the pattern will be better; but a far greater liability of injury to the casting will be incurred from the impermeable nature of the molding material.

For some works where easily fusible metal is used, metallic molds are adopted. Thus, where great quantities of one particular species of casting is required the metallic mold is cheaper, easier of management, and possesses the advantage of producing any number of exactly similar copies, such as casting bullets, printing types, and various other articles composed of the easily fusible metals or their compounds, are molded on the same principle. The pewterer generally uses brass molds; they are heated previous to pouring in the metal. In order to cause the casting to leave the mold easier, as well as to give a finer face to the article, the mold is brushed thinly over with red ocher and white of egg. The founder finds that the proper time for pouring the metal is indicated by the wasting of the zinc, which gives off a lambent flame from the surface of the melted metal. The moment this is observed the crucible is to be removed from the fire in order to avoid incurring a great waste of this volatile substance. Previous to raising the crucible the molten brass is skimmed and then immediately poured. The best temperature for pouring is that at which it will take the sharpest impression, and yet cool quickly. If the metal is very hot and remains long in contact with the mold, what is called sand burning takes place and the face of the casting is injured. The founder then must rely on his own judgment as to what is the lowest heat at which good sharp impressions will be produced; as a rule, the smallest and thinnest castings must be cast the first.

A New Rifle Manufactory.

At Bridesburgh, near Philadelphia, Alfred Jenks & Co., have converted their large establishment, which was formerly devoted to the manufacture of excellent cotton machinery, into an armory, and the first installment of one thousand rifles made for Government has lately been completed and accepted. These rifles are of the Springfield pattern, and Government has contracted for the supply of a large number. The new machinery put up for their manufacture cost over half a million of dollars, and it is said to be of a very superior character. In the fabrication of cotton machinery, a very high degree of skill and ingenuity is required. The experience and skill of Mr. Jenks as a manufacturer of cotton machinery must be of great advantage to him in his new business. Some of the most successful locomotive establishments in our country, were previously successfully engaged in the manufacture of carding, spinning and weaving machinery. Seven hundred persons are employed in the Bridesburgh armory; the best Swedish iron is used for making the locks and the mountings of the rifles, and Marshall's English, and Cooper Hewitt's American iron are employed for the barrels.

IRON FOR BUILDINGS.

The following is an extract from a very interesting essay on "Iron—its Uses and Manufacture," in the last number of the *Edinburgh Review*:—

The experiments which Mr. Fairbairn conducted, in order to ascertain the strength of the materials to be employed in the tubular bridges, led him to the discovery, which he tells us he had not anticipated, that wrought iron answers better than cast iron for many of the purposes to which cast iron exclusively had hitherto been applied. The reader is doubtless aware that pig iron is the raw material of both wrought and cast iron; but, while the former is brought to its perfection by repeated working, the latter is produced by merely once more making the metal fluid in the cupola furnace, and then pouring it into a mold of the form required. Hence, as the process of manufacturing is so much less laborious, cast iron is proportionably cheaper than wrought; but it must not be supposed that these two forms of iron resemble each other in kind, and differ only in degree. For all practical purposes they are distinct metals. "Cast iron differs from wrought," says Mr. Fairbairn, "in its physical as well as its mechanical qualities. It is a hard rigid crystalline unmalleable substance. It possesses great powers of resistance to that of extension, and from its low degree of ductility it undergoes but little elongation when acted on by a tensile force. On the contrary, wrought iron is a flexible malleable ductile substance, which presents great resistance to a force of extension, but a somewhat less resistance to a force of compression; from its high degree of ductility it undergoes a considerable elongation when acted upon by a tensile force. And for a long time it was assumed that when applied to resist compression, it would crumple like leather."

Mr. Fairbairn gives a most interesting account of the experiments by which he disposed of the "crumpled leather" theory. On the other hand, he gives excellent reasons why cast iron cannot be depended on. The unequal contraction of the metal which takes place when it is exposed to great variations of the temperature, causes it to snap. Moreover, the nature of the materials is treacherous: "all crystalline bodies are of a more brittle and uncertain character than those which are of a fibrous structure." Flaws and imperfections are of frequent occurrence in the casting, which cannot be discovered by the minutest inspection of the surface.

Repeated instances have occurred wherein castings presenting every appearance of perfection have been found to contain the elements of destruction, either in concealed air bubbles, or in the infusion of scoriæ, which had been run into the molds and skinned over by a smooth covering of apparently sound iron.'

It is a fearful addition to all these causes of insecurity, that cast iron when it breaks gives not the slightest warning.

In the first instance, cast iron was exclusively applied to the construction of fire-proof buildings. In the year 1801 the first cotton mill of this description was erected, by Messrs. Lee and Phillips, of Manchester, with cast-iron beams and cast-iron pillars. It was constructed with great skill, and for many years remained the model of all similar works. But since then the subject has been more carefully investigated. The account which Mr. Fairbairn gives of the experiments, chiefly conducted by himself and Mr. Hodgkinson at his works, by which he has established the theory, and improved the practice, of cast-iron architecture, is highly interesting, and very valuable to those who still continue to prefer that material; but he in some degree supersedes his own work by proving (quite, we own, to our conviction) that not only strength, lightness, and roominess, but even economy, will be consulted by substituting wrought for cast iron. The difference in the weight compensates for the difference in the cost. A wrought-iron beam of 18 cwt. Mr. Fairbairn sets down as equivalent to a cast-iron beam of 40 cwt. Moreover in many ways the expenses of construction are diminished by the use of wrought iron, and more especially the supporting columns may be retrenched with not less advantage of convenience than economy.

Mr. Fairbairn justly remarks that the construction of buildings of this kind must not be attempted without a considerable amount of scientific and practical knowledge. He mentions a mill at Oldham which fell down in the year 1844, and seems to attribute the disaster to some defect in the construction; but the date leads us to suspect there may also have been some fault in the iron. Long previously to the year 1844 cheap iron was common in the market, and the effect of cheapness upon quality was imperfectly understood by consumers. Would it were duly appreciated even now!

The late destruction of the iron fire-proof warehouse on the Thames has somewhat discredited this application of iron; but we think unreasonably. It is plain that if highly inflammable goods are stored in an absolutely incombustible warehouse, in which there is an unimpeded communication between the parts, and a free circulation of air, they will be much in the condition of fuel arranged for lighting in the grate. Mr. Fairbairn gives many valuable directions for excluding the external air, and dividing the various parts of the building; but sooner or later the skill of the architect is neutralized by the carelessness of the warehouseman. On some unlucky day the requisite combination of untoward incidents take place, and a conflagration which no exertions can extinguish ensues. In such a case, no doubt, the iron-built warehouse will be destroyed, and as in the great fire at Liverpool, in 1844, the gutters will run molten iron—whereas a series of fire-brick vaults would remain in the state of a kiln when the contents are withdrawn. But the enormous expense of such a construction is hardly repaid by the preservation of the mere shell of the building. The wisest course is to store away all inflammable goods, and especially those which are liable to spontaneous combustion, in separate warehouses, or in vaults which realize Mr. Fairbairn's conditions of safety—exclusion of the external air and non-communication; and here fire bricks should be the material. But most inflammable substances are far less easily ignited when compressed in bales or stowed away in casks; and they are safe if the building in which they are deposited is secured from the danger of combustion to which buildings of ordinary construction are exposed. Loose paper is highly inflammable, but the closely packed treasures of the British Museum are perfectly safe in the new Library—the most commodious and the most beautiful of fire-proof magazines.

Iron is quite sufficient to insure the safety of dwelling houses; but unfortunately very little advantage of the plentifulness and cheapness of this material has as yet been taken in London, and few of the noble mansions which have been raised in the country within the last forty years are secured, by a fire proof construction, from the casualties which have reduced so many of their predecessors within the same time to a heap of ashes. It is strange that in the seat of the iron trade, this most important application of iron should be the one (happily, we believe, it is the only one) which is generally neglected. The popular dislike of innovation, and the additional expense of iron, are great obstacles to its introduction; but greater still, we suspect, is the unwillingness of our architects to meddle with a material with which they are not familiar. The objection that by the use of iron an architect is turned into a civil engineer no more appals us than the often repeated threat that a late dinner may be called a supper. If it means that engineering skill excludes architectural taste, the best answer is supplied by Rennie's Waterloo and London Bridges, which are among the very best specimens of modern architecture. If it means that our architects are often deficient in the constructive skill of the engineer, there is only too much truth in the admission, and the sooner so lamentable a deficiency is supplied the better. We are pursuaded that if any able member of the profession would bestow on the construction of private dwellings the study which Mr. Fairbairn has given to that of warehouses, he would discover the means of building houses, on a large or small scale, with fire-proof materials, at very little additional expense, and with as much increase of convenience as of security.

Benzole is obtained from coal oil, but none has yet been discovered in petroleum. As this is the substance from which aniline is made, the rich coloring agents—magenta, mauve, &c., for cotton and silk cannot be made from the products of petroleum, at least so far as experiments have yet been made.

Oakum a Substitute for Lint in Wounds.

In a communication to the American *Medical Times*, Dr. Lewis A. Sayre of the Bellevue Hospital gives very useful and interesting information respecting the treatment of wounds made by rifle balls, and the use of oakum as a substitute for lint. The following are his remarks which should be read by every surgeon in our country, and especially by all in our army hospitals. He says:—

I have for many years past been in the habit of using picked oakum, in all cases of suppurating wounds, particularly in connection with opened joints, where the suppuration is excessive. The great number of gunshot wounds now in Bellevue Hospital, where I use it entirely to the exclusion of lint, has furnished an opportunity for a number of army surgeons to examine its advantages, and they have requested me to make the subject more generally known to the profession through the medium of your valuable medical journal.

One of the objects of lint applied to a suppurating wound, is to absorb the discharge; now as most of the lint is composed either entirely or in great part of cotton, it acts more like a tampion, or a retainer of the secretions, than as an absorber.

If you will take a bale of cotton and immerse it in the river for one month, or even longer, and then remove it, you will find on opening it that the cotton in the center of the bale is perfectly dry, thus proving that it cannot be soaked through any great thickness, or that it will not absorb moisture. So, when placed over a suppurating wound and left for some hours, it will be found perfectly dry except at the point of contact; acting, in fact, like a bung in a barrel, or a cork in a bottle—to prevent the escape of the pus—which necessarily burrows in different directions, thus forming extensive abscesses, and adding greatly to the danger of the patient; and, when removed, the pus will gush out in large quantities. Now, if you place picked oakum over these same wounds, you will find after the same number of hours, that the oakum is perfectly saturated with pus, and the wound itself almost perfectly dry and clean—the oakum acting like a syphon, and discharging the contents of the abscess by capillary attraction.

It is necessary to place under the wound a piece of india-rubber cloth, or oiled muslin, for the sake of cleanliness; and in case of much inflammation, by simply wetting the oakum in cold water, and wrapping the oiled muslin around the limb or wounded part so as to exclude the air, you have at once the neatest and most comfortable poultice that can be applied to it. In gunshot wounds, which go through and through a limb, particularly if made with the Minié ball, the whirl or screw of the ball entangles in its thread the muscular fibers and cellular tissue, and separates them from their attachments for a long distance from the real track of the ball itself.

As the muscle and tegumentary tissues are more freely supplied with blood vessels than the fat and cellular tissues, the consequence is that they begin to granulate much more readily than those other tissues, and will thus often close up the wound, and prevent the free escape of pus, before those parts have perfectly healed, and thus lead to the formation of extensive secondary abscesses. I therefore in all cases where no blood vessels prevent it, pass an eyed probe through the wound and draw through it a few fibers of the oakum or tarred rope, which keeps it perfectly free, and the tar is a very excellent antiseptic, and removes all unpleasant odor.

A few fresh fibers are twisted on the end of the seton at every dressing, and drawn into the wound, and the soiled pieces cut off and removed with the dressings.

Agricultural State Fairs for 1862.

Vermont	Rutland	Sept. 9—12
Canada East	Sherbrooke	Sept. 17—19
Kentucky	Louisville	Sept. 16—19
Illinois	Peoria	Sept. 29—Oct. 1
New York	Rochester	Sept. 30—Oct. 3
Ohio	Cleveland	Sept. 16—19
Iowa	Dubuque	Sept. 30—Oct. 3
Michigan	Detroit	Sept. 23—26
Pennsylvania	Norristown	Sept. 30—Oct. 3
Indiana	Indianapolis	Sept. 30—Oct. 3
New Jersey	Newton	Sept. 30—Oct. 3
Connecticut	Hartford	Oct. 7—10

It has been ascertained by direct experiment that arsenic, opium and other poisons are injurious to plants as well as to animals.

Correspondence

The Quicksilver Mines of California.

Messrs. Editors :—The following is an account of the quicksilver mines of California, taken from my journal of a recent voyage through that country. Among the inexhaustible resources of California quicksilver is one of the most interesting and profitable, for the simple reason that the cost of mining and extracting the metal from its ore, the cinnabar, is the least expensive of all the valuable and costly ores, such as gold, silver and copper. The yield of quicksilver is from 70 per cent down to 25 per cent, and the mode of separating is very simple.

The new Almaden mine has sixteen furnaces, containing 20,000 lbs. of the cinnabar, and two larger ones, containing 90,000 lbs. of the ore, and producing daily 100 flasks of 75 lbs. of quicksilver each. Having visited many localities in the month of May, 1862, I feel satisfied that quicksilver will, ere long, form an important item of export to every part of the world, for the steamer on which I left San Francisco had a considerable number of flasks for China, Mexico and England, and with the increased demand in the Washoe district for the extraction of silver, the new gold placers of Victoria and Cariboo, and all the other cinnabar mines of the Sonoma and Napa valleys will likewise be put in requisition. The new Almaden mine has long been known to the Mexicans and Indians, the cinnabar, when ground fine, being called vermilion. It was made an article of traffic by the Indians along the coast as their red paint. From them the early white settlers of California learned the locality, and a Captain Castillero, of the Mexican service, registered the lands as his property and formed a company for the purpose of extracting the quicksilver. Messrs. Bolton & Barron now hold the Castillero title, and an injunction which had been laid upon the mine for several years has been removed this year and the mine is now their rightful property. From the magnitude of the mine as well as of the smelting works and the proper manner of operating, I feel satisfied that a more prolific mine does not exist anywhere. Along the range of these mountains, only three miles distant, is another quicksilver mine, called the Guadaloupe, which yielded considerable quanities a year ago, and the new Price & Enriquets mines, belonging to the same range of mountains, yielded 14,007 flasks of quicksilver in 1860.

A very rich and extensive deposit of cinnabar, called the Aurora Quicksilver Mine, occurs in the quartz of Monterey. In Sonoma county, in the vicinity of Mount St. Helena, near the famous Geyser Springs, a range of mountains about 10 miles in length, is found quicksilver ore in great abundance. The Pioneer mine is nearest the Geysers, and the pure metal may be detected every where running out from the rocks. Next comes the Pacific mine, which has likewise fair prospects for a solid and regular vein of the cinnabar. The Denver mine and the Dead-Broke mines have also the strongest indications of regular veins. In Knight's Valley, in Sonoma county, in Santa Clara county, in El Dorada county, are also found indications of regular mines ; and in Mariposa county, at Phillips Ferry, near the Stanislaus river, in the Mono diggings, a lead of cinnabar thirty feet in width and seven miles long, has been discovered. At the Rogue and Klamatts rivers rich leads of quicksilver have also been discovered.

The geological and metallurgical parts I will be pleased to given in a more extended article.

Dr. L. Feuchtwanger.

New York City, Aug. 19, 1862.

Force—Laws of Motion.

Messrs. Editors :—Under this head, the Scientific American of the 16th of August, contains an extract from a lecture by Professor Tyndall, at the Royal Institute, London, stating the descent of a weight 16 feet in one second, and then having attained a velocity of 32 feet, and that a force imparted to a weight upward of 32 feet would impel it to the same hight (16 feet) in the same time (1 second). And proceeds : "If instead of 32 feet we impart a double velocity or 64 feet, it might be supposed the weight would rise to twice 16 feet only, but it would rise to four times or 64 feet."

From the above truisms the Professor deduces this rule : "Therefore the mechanical effect or work done is as the square of the velocity." The rule would be correct if the weight would rise 64 feet in 1 second, but 2 seconds are required for the ascent. Then the true and practical mechanical effect on a given expenditure of force, is as the squares of the velocity *minus* the time, or as the velocity multiplied by the time. We cannot throw time out of the estimate, or all degrees of force would become equal. For war projectiles we may disregard time and look only to the final effect, which under double velocity would be quadrupled. T. W. B.

Cincinnati, August 18, 1862.

[If we wish to express merely the mechanical effect, or "work" as it is technically called, the element of time is not considered ; but in stating "power" the time in which the work is performed is material, as power is measured by the amount of work done in a given time. The raising of 33,000 pounds one foot is 33,000 foot-pounds of work, whether ten seconds or 10,000 years are occupied in the labor, but to raise 33,000 pounds one foot high in one minute requires 1-horse power. Professor Tyndall, doubtless, understood these elementary truths, and his language is precisely accurate.—Eds.

Dead Black for Rifle Sights.

Messrs. Editors :—A rifle sight is usually made of German silver, and unless it is shaded with a small tube it dazzles the eye in clear sunshine and prevents the marksman from taking accurate aim. As an open-sighted rifle should always be used by a person who wishes to become expert in the use of the musket rifle for army purposes, could you give a gunsmith instructions how to make a dead black sight for a rifle, one that will absorb and not reflect, the rays of light? W. B. S.

New York, August 24, 1862.

[A dull black varnish may be made with lampblack mixed with gum shell-lac. Such a varnish is used for the interior of telescope tubes. Applied to the sight of a rifle with a camel's hair pencil and allowed to become dry, it will remain a considerable time under the care of a sportsman but not a soldier. With rough service this varnish will not last longer than a few days. Some chemical compound that will act upon the metal of a rifle sight and make it a permanent dead black would be most suitable. The French makers of spyglasses coat the interior of their brass tubes with a chemical dead black by a process not yet made public. It is the secret which would give a dead black for rifle sights. A mixture of nitric acid and the nitrate of silver will render brass black, but not the dead black required for rifle sights and the tubes of spyglasses. Some of our readers may be acquainted with the mode of producing the French chemical dead black, and may give the information desired for the benefit of those who manufacture rifles and rifle muskets for army and hunting purposes.—Eds.

On the Conservation of Force.

Messrs. Editors :—Since the experiments of Mr. Joule in obtaining a mechanical equivalent for a unit of heat, by proving that the temperature of a pound of water will be raised 1° by the same quantity of power that will raise a weight of one pound 772 feet high, the theory that heat is a condition of matter, and not a substance, is more generally admitted than formerly. But the popular idea of a material heat is one from which it is very difficult to disembarrass the mind. A few instances of the action of force therefore will be presented, to show how heat may be viewed as the effect upon the senses which is caused by the changes matter undergoes.

Plunge a piece of hot iron into water, and it hisses, changes color, and becomes cool. That is, the motion or change of the particles affects the senses of hearing, sight and touch, but it no more follows that some matter called heat is gone from it because it affects the feeling than because it affects the hearing or the sight, and unless we had been taught otherwise it would be much more natural to say that by contact with the water some change is produced amongst the particles of iron by means of which it affects at the same time the hearing, sight and feeling. Take another instance of change of particles of matter, and follow the force resulting from this change through its action in giving motion to other particles. Kindle a fire under a steam boiler the results are as follows. An intense activity of movement amongst the particles of fuel and the air, forming new combinations. This movement is imparted to all things in contact, setting them in agitation so that they are only kept from moving by the cohesion which prevents the iron of the boiler from flying apart, and the force transmitted to the iron is in turn transmitted to the water above, which is slightly held together by cohesion and atmospheric pressure. When the intensity of the forces acting on the water equals the resistances it will not move, just as when a pound weight equipoises another weight in a balance, or a pressure on one side of a piston a resistance on the other. The particles of water, moving with the force impressed upon them, transmit that force to the sides of the boiler and to the air and, being condensed fall at rest again. But if a piston is exposed to them, they transmit their force to it and it is then obtained in the form of useful mechanical effect. As the mind becomes familiar with the idea of heat as a sensation, the various changes of matter daily occurring in nature can all be satisfactorily viewed without recurring to the notion that any invisible substance is entering or leaving the particles.

McD.

A Cork Ring on a Jet of Water.

Messrs. Editors :—I noticed in Nos. IV. and V. current volumes of the Scientific American the question and explanation of a ball balancing on a jet of water. I would ask if the same explanation applies to a ring supported by a jet of water? I have repeatedly seen in the yard of the late Dr. Comstock, of Hartford, Conn., a cork ring placed at the side of a jet of water, which would be immediately carried up to within four or five inches of the top of the jet and there remain without rising or falling, but revolving rapidly for hours without changing its position, except moving around on another or even on the opposite side of the jet by the slightest breath of air. It is evident the ring does not sit on top of the jet, as it continues on above the ring without deviating from the perpendicular, while the ring continues rapidly revolving on the side of the jet. Let those who wish to try the experiment make a cork ring of about two inches in external diameter ; the rim of the ring round and about three-eighth of an inch in diameter, as smooth and perfect as cork will admit of being cut. The ring must be very perfect, equally balanced, and the experiment tried when there is very little air moving. A. P. P.

Hartford, August 18, 1862.

A Military Mechanic.

WANTED AT THE U. S. ARMORY WATER SHOPS, old leather boots and shoes, for annealing.
au16 6d A B. DYER, Capt. Ord. Com'd'g.

Messrs. Editors :—You are interested in all new improvements, and I send a notice of one of the latest. This slip is cut from the Springfield *Republican* of to-day. Is not it a little too bad that when good mechanics abound, and good officers are so much needed on the battle field, that the mechanics should not be found in the shop, and the men who have been educated at the expense of the nation for military purposes, be found at the head of our armies, or in the ranks if they are unfitted to command "Old leather boots and shoes for annealing?" That will do for a man in charge of a great national army, employing 2,500 men, and making 16,000 guns per month. How many could the same number make with a practical mechanic to direct the work? Common Sense.

Springfield, August 16, 1862.

Grooved Friction Gearing.

Messrs. Editors :—Messrs. Dougherty and Bement have given their experience with grooved wheels ; mine also may perhaps be of some service. I made a pair with the V of 60° ; that is, with the entering wedge less than a right angle by 30°. The diameters were such that the parts in contact at the middle of the faces did not come together at two successive revolutions ; that is, one main diameter was not a multiple of the other. One bearing was elastic, so that when jammed it allowed a little play, but not enough to slip the faces of the wheels. They were so arranged that the weight that was hoisted jammed them, and a light weight pressed them more slightly together than a heavy one. They did the following duty :—For two years almost daily they hoisted stone of one to six tun weight, sixty feet in hight, in all between 20 and 30,000 tuns of stone, running from one up to 250 revolutions per minute, with a fourfold purchase. In about the first week they glared over, wore a little, and at the end of two years were still fit for service and noiseless.

T. McDonough.

Middletown, Conn., August 10, 1862.

Explosive Bullet.

Messrs. Editors :—Recently it was my privilege to examine in the hands of a man just from Fortress Monroe, an explosive bullet, such as was used by the rebels in the six days' battle. It is conical in shape, about an inch long, made of lead, and consists of two parts, viz., a solid head piece and a cylindrical chamber, which are united together by a screw. From the point of the bullet, projects a little rod, which passes down through a small hole in the head piece, into the chamber below, where it is connected with a percussion cap. The chamber contained about a table spoonful of powder. You can readily perceive that if the bullet should encounter a bone or other hard substance, when entering a man's body, it will explode, and thereby produce a fatal wound.

F. J. C.

Philadelphia, August 23, 1862.

[Explosive bullets are old and well known, but for some reason, probably owing to their expense, our Government has not used them. They were used in the Chinese war to set fire to baggage trains.—Eds.

A Pictorial on Big Guns---Erroneous Description.

The following is from the Pittsburgh *Dispatch* of the 19th ult. *Harper's Weekly*, of August 23d, gives a series of cuts purporting to represent the Fort Pitt Works in this city, and the operation of casting heavy guns as carried on there. The descriptive accompaniment occupies just twenty lines and contains almost as many blunders. It says :—

" On page 587 we give a series of illustrations representing the manufacture of the guns with which the *Roanoke* and new *Monitors* are to be armed. They are what are called Rodman guns, having been first made by Captain Rodman, of the artillery, who afterward turned traitor and is now in the rebel service. Their peculiarity consists in their size, which is far greater than that of any other guns in existence. After being cast, a stream of water is poured through the muzzle, coming out at the vent, so that the gun is cooled from the inside, thus obviating flaws. There are being cast of these guns at Pittsburgh, Pennsylvania, quite a large number, some 15-inch, some 20-inch and we hear of some even larger in the bore. The 20 inch guns will throw a solid ball weighing 1,500 pounds, which would go through the side of any vessel ever constructed, or batter down almost any wall. It is intended to arm the new *Monitors* and all our coast fortifications with these guns."

We give the entire description that our readers may judge of its accuracy. The guns with which the navy is armed are not Rodman but Dahlgren guns. Capt. Rodman, whose name is given to the former class of guns, was not even the "first" to improve the Columbiad, but his plans for casting such guns and his improvements of the model have been generally adopted. He has not turned traitor, nor gone into the rebel service, since he is in active service in the Ordnance Bureau of the War Department. The peculiarities of the guns made on his model does not consist in their size, but in the peculiar massing of the metal and the "water circulating core" on which they are cast. The water is not "poured into the muzzle," however, neither does it come "out of the vent, "after being cast." The water enters and escapes from the core barrel, during the casting, and in casting Dahlgrens a modification of the plan has been adopted, by which water is run into the bore after the barrel is removed ; but there is no "vent" in the gun until it has been turned and finished in other respects, so that no water can escape through it. There has never been a twenty-inch gun cast at the works, and those "even larger in the bore" may have been heard of by the writer but certainly were never seen by him. The twenty-inch guns will not "throw a solid ball weighing 1,500 pounds ;" the solid ball twenty inches in diameter weighs about one thousand pounds. It is no wonder our pictorials are not looked upon as furnishing information for either friend or foe.

[A description of the large 15-inch guns with the mode of cooling them upon Capt. Rodman's principle was given on page 393 of o r last volume.—Eds.

London Exhibition---Propellers of Steamers.

The following is condensed from *Mitchell's Steam Shipping Journal* on this subject ; and the information is of great importance, as propellers for sea-going vessels are now fast superseding paddle wheels :—

There are thirteen different sorts of propellers exhibited in the International Exhibition. From the first introduction of the screw as a propeller there have been some thousands of so-called improvements, the majority of which have been patented, but the one now most in favor is Griffiths's.

Mr. Robert Griffiths, of Regent's Park, exhibits a full-sized model of his propeller (illustrated page 352, Vol. XII. (old series) Scientific American), so fixed as to show its action. It consists of a boss, which is keyed on to the screw shaft in the usual manner, and two blades, having turned shanks fitting into bored recesses in the boss. The blades are retained in their position, respectively, by a cotter, which is adjusted into its place after the blades have been inserted, and turned in their sockets about 90°, or until an arrow mark on the flange points to the pitch which it is desired the screw shall have. The pitches are all accurately measured on each screw, allowing a sufficient range of pitches to meet all practical requirements. To alter the pitch, the glands or covering-caps are taken off, the wedges taken out, and exchanged for others corresponding to the altered angle. This screw, having such a large round boss to receive the arms, does not strike a spectator as a likely one for obtaining speed, yet practice has demonstrated the correctness of Mr. Griffiths's theory. He has devoted some years in experiments, and finds that the extremities, or outer parts of the blades, do not propel, but act as feeders for the supply of water to the inner, or central, part of the screw. A screw propeller is a fan, which drives a column of water through its disk when in operation ; and to obtain its supply it has to draw it from all around and each side of its periphery.

When a ship is underweigh there is a strong eddy under her quarters, which is caused by the water rushing in to fill the space the ship has left or displaced. The screw works in this eddy, which eddy is considerably increased when the ship is propelled by her canvas at a greater speed than by her engines. When the screw is in operation and the ship propelled by her canvas at the rate of ten or twelve knots per hour, the forward side of the blades, when they are on either side or below the ship, comes in contact with the eddy water, which takes off the thrust from the screw shaft and causes a back lash in the thrust block, so that the power that is exerted by the engines is lost. Mr. Griffiths confidently asserts that by curving the blades of the screw forward to the ship's quarters, commencing the curve at about the middle of the blades, he overcomes this defect entirely, and the eddy, instead of coming into contact with the back or forward sides of the blades, goes to the face or propelling side, and thus assists in propulsion. Mr. Griffiths claims for his propeller a saving of power in its central portion being filled up by a sphere, whereas other screws have their centers made as small as the necessary driving strength will allow. Their blades, consequently, at that part, are nearly at right angles with the line of motion, and force is lost by driving the water outward instead of astern, thus seriously disturbing the water upon which their more effective parts act. This central sphere also dissipates the flapping tendency, of ordinary screws, and the blades of his propeller assimilating to those which nature has supplied to swift birds and fishes, assist in doing away with tremulous motions and vibrations.

B. P. Johnson, Esq., in a letter to the New York State Agricultural Society from England, states that he attended the sale of a South Down flock at Babraham, which realized the large sum of £17,646 ($88,230), for 437 animals—149 bucks and 288 ewes.

How Phosphorus is Made.

The following is an extract from a late lecture of Prof. Playfair before the Royal Institution in London :—

The earthy matter of bones consists of three equivalents of lime united with one equivalent of phosphoric acid. It is what chemists term "a tribasic phosphate of lime" Phosphoric acid, consists of one equivalent of phosphorus united with five equivalents of oxygen. In order to obtain the phosphorus, it is only necessary to take away those five equivalents of oxygen, which we can do by mixing the compound with charcoal after some preliminary operations, and heating them together. The charcoal takes away the oxygen and forms carbonic oxide with it, while the phosphorus distils over. In this way we get phosphorus in the condition in which you are very familiar with it. It is a wax-like substance, which I must handle with care, because if I allow it to dry, the heat of my fingers would be sufficient to inflame it. Now, observe what this substance looks like. It is semi-transparent ; it is soft ; you can cut it like wax. It is exceedingly poisonous, and in the making of lucifer matches it is found to be a very insidious poison. Lucifer match makers are apt at first to be subject to an affection which does not draw much attention. They complain frequently of toothache, but they do not know the insidious disease which is creeping upon them. The lucifer match makers who make lucifer matches from this phosphorus are subject to the most distressing of all diseases ; the jawbone becomes destroyed, and frequently disappears or becomes useless, and some of them spend the greater part of their lives in the wards of hospitals. It therefore became an important point for science to find some way by which this phosphorus should be deprived of its poisonous properties without losing those chemical characters which make it so useful in making matches for instantaneous light. Prof. Schrotter, of Austria, who is at present in London, as one of the jurors of the Great Exhibition, met this want of science in a very skillful way. Bodies are capable of assuming two conditions, and sometimes more, which the chemist calls "allotropic" conditions ; that is to say, they are, in fact, old friends with new faces given to them by some artifice, but still being the same body and not having gained or lost anything. Now, here is our old friend phosphorus with certainly a new face. By taking common phosphorus and exposing it for some time to a temperature of 47°, this yellow waxy transparent substance transforms into a dark brick like substance It is no longer so inflammable as to ignite spontaneously. It may be packed up in boxes without danger of spontaneous combustion ; but what is more important, it has lost all its poisonous properties. The phosphorus, which was poisonous before, is no longer poisonous in this allotropic condition, and it is still capable of being used for making lucifer matches. In passing into that allotropic state it has lost its power of dissolving in bisulphide of carbon, and if any of the old phosphorus remains in it, it may be dissolved out by this bisulphide of carbon. I have here some of this ordinary substance which is dissolved in bisulphide of carbon, and if I pour it now over this paper you will see the properties which it possesses in a very short time. It will ignite of itself as soon as it becomes sufficient dry by the passing off of the bisulphide of carbon. When this evaporation takes place the phosphorus is left in such a fine state of division upon the paper that it bursts into flame. The allotropic phosphorus is altered very considerably in its chemical characters.

Be Careful in Writing Proper Names.

Mr. T. E. M. White, of New Bedford, Mass., writes an unusually plain and handsome hand, but he makes a capital T so much like a Y, that it is impossible to determine for which letter the character is intended, and when we published the description of his invention of an artificial leg, that appeared on page 120 of the current year, after repeated examination of the signature, we concluded that the first initial was probably meant for a Y. But we are informed by a note from Mr. White that we did not guess right; his address is T. E. M. White. In writing proper names for publication, great care should be taken to make every letter so plain that it cannot be mistaken.

Improved Index Scales.

Messrs. Editors:—Some two years since a notice appeared in the Scientific American, stating that a good domestic weighing apparatus was greatly needed, and having been previously impressed with the same idea, we turned our attention in part to that subject, and after much labor and not a little perplexity, we have produced the instrument which we now send you for your examination and opinion in the Scientific American.

Platt & Rosecrans.
Yellow Springs, Ohio, July 31, 1862.

Our opinion thus frankly asked shall be as frank. ly given. We think this is one of the most novel inventions, and one of the most promising for large profits of any that we have examined for a long time. While this instrument has the accuracy of steelyards or balances, it is free from the objections of loose peas or weights, and is remarkably compact and convenient; we have little doubt that it will meet with a large sale.

Fig. 1 of the engravings is a perspective view of the scale and Fig. 2 is a longitudinal section.

The pan, *a*, to receive the article to be weighed is supported upon one end of the lever, *b*, which has its fulcrum at *c*. The lever, *b*, supports two light tubes into which two heavy metallic rods, *d* and *e*, are loosely inserted, so that they may be partially drawn out. When the rods are pushed into the tubes as far as they can be, the lever, *b*, is just balanced on its fulcrum, while the farther the rods are drawn outward the greater weight will it take in the pan to restore the balance. Consequently by ascertaining the distance at which each rod must be drawn out to balance a pound weight in the pan, and then graduating the rods to correspond with this, a weighing instrument is produced.

The weight of the pan is balanced by a weight, *f*, turning on a fine screw by which means the instrument is readily adjusted.

For weighing fractions of pounds and ounces the rod, *e*, is furnished with a rack on one side meshing into a pinion which carries an index traversing over a graduated plate.

The inventor says: We have attached to this one only avoirdupois weight, but intend in future to mark a center line in the bar, and mark avoirdupois weight on one side and the French decimal system on the other, and put in double marking and indices in the same inclosure so as to weigh both systems at once.

The following are some of the advantages claimed for this scale:—First, it is entirely new and original in all its parts. Second, it weighs from one-eighth of an ounce to thirty pounds. Third, the weight of the machine is only six pounds. Fourth, it wholly dispenses with the use of weights. Fifth, It is light, strong, durable, compact and very simple. Sixth, it gives both net and tare weight simultaneously. Seventh, it is especially adapted to general domestic use. Eighth, the same machine will weigh according to avoirdupois weight and the French decimal system.

Fig. 1

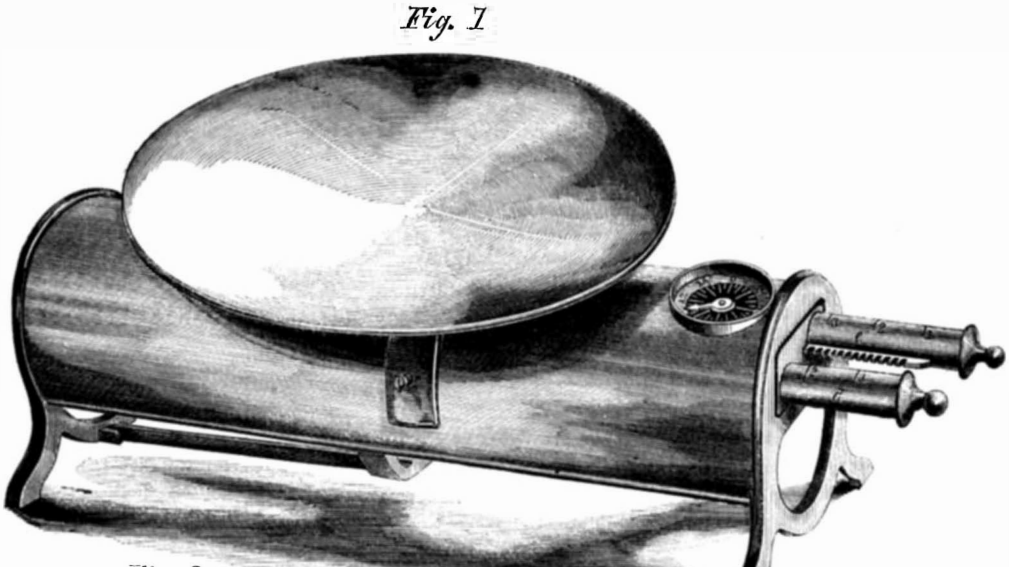
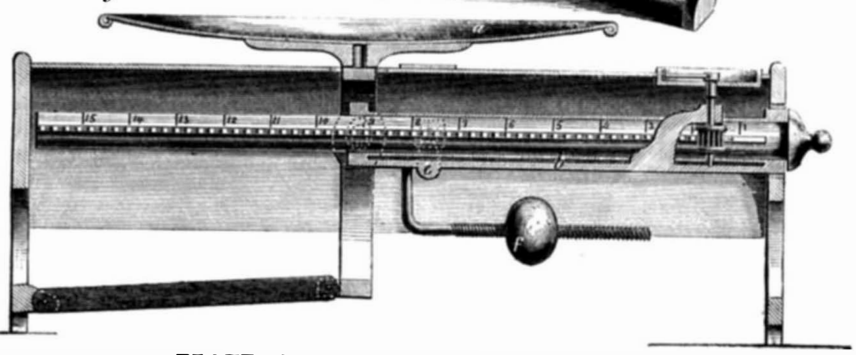


Fig. 2



PLATT AND ROSECRANS'S INDEX SCALES.

This instrument was invented by Dr. A. H. Platt and Gen. W. S. Rosecrans, of Cincinnati, Ohio.

The American patent was granted Oct. 1, 1861, and the French and English patents have also been very recently secured. Further information can be obtained by addressing Dr. A. H. Platt, Yellow Springs, Ohio, or James McGinnis, Cincinnati, Ohio.

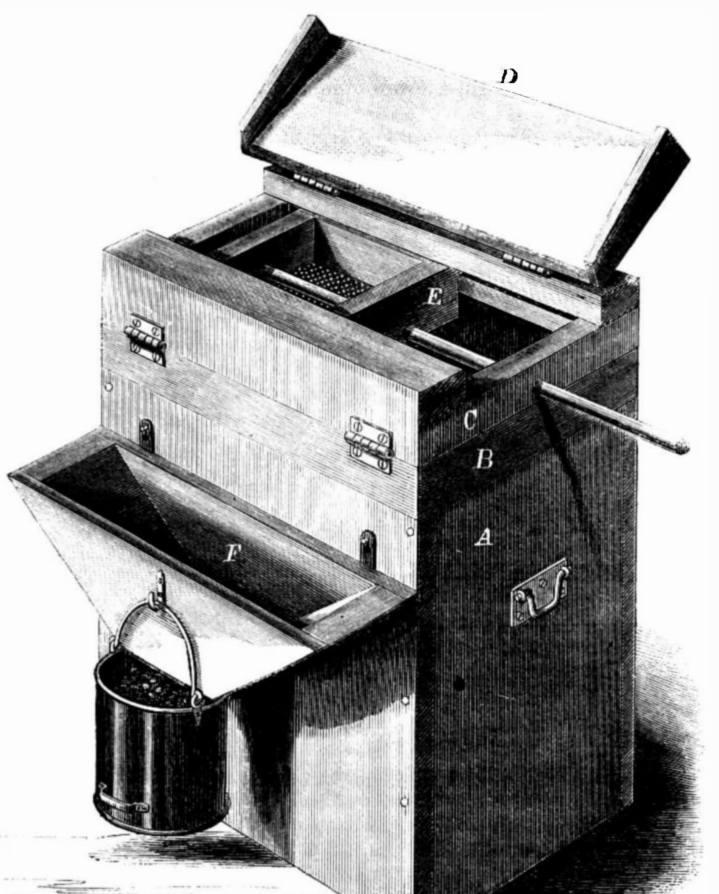
Improved Coal Sifter.

There is an unusual amount of ingenuity displayed in the coal sifter here illustrated; the object of the devices being to produce an implement which will be very convenient and rapid in its operation.

Upon the ash box, A, the frame, B, is fitted tightly by a rabbeted joint; being held on by hooks. To the frame, B, a similar frame, C, is secured by hinges and closed by a hinged cover, D. Within the frame, C, the sieve, E, is fitted to slide back and forth, and is furnished with a rod protruding from the frame for imparting the motion. The ashes are placed in this sieve, and, the cover being closed, the sieve is shaken back and forth a few times; sifting the ashes through, and as soon as the dust has had time to settle, the cover is opened, when the cinders may be readily picked from the sieve and dropped among the ashes. The frame, C, is now turned over in such position that the edge of the cover may catch upon the outer edge of the hopper, F, when the flanges upon the side of the cover form a trough by which the good coal is guided into the hopper through which it falls into the scuttle suspended below.

It will be seen that the position of the hinges of the frame, C, and of the cover, D, upon opposite sides of the apparatus, causes the parts on the swinging over of the frame, C, to assume the positions by which the coal is emptied from the sieve and guided into the scuttle.

The patent for this invention was granted through the Scientific American Patent Agency, August 19, 1862, and further information in relation to it may be obtained by addressing the inventor, Chas. G. Austin, at Nantucket, Mass.



AUSTIN'S COAL SIFTER.

Effective Use of Mortars.

The navy department have just printed in a pamphlet the official reports of the naval engagements on the Mississippi, which resulted in the capture of New Orleans. These reports are accompanied by some very interesting maps and sketches, among which we observe one of very singular character. This is an accurate plan of Fort Jackson, made by some of the assistants of the Coast Survey, showing every hole made by a shell or shot. The entire work and its surroundings are dotted over with these marks, as if sprinkled from a pepper caster. A great deal of the ground near the fort and within the outworks was overflowed, and no less than three thousand three hundred and thirty-nine shells are computed to have fallen in these parts. Eleven hundred and thirteen, however, were counted in the solid ground of the fort and levees, and eighty-seven round shot; one thousand and eighty shells exploded in the air, about seven thousand five hundred having been expended in all. The casemates were cracked, and in some places broken through, and the outer walls cracked from top to bottom. This map exhibits something never before attained by the vertical fire of mortars.

The Scientific American.

MUNN & COMPANY, Editors and Proprietors.

PUBLISHED WEEKLY

At No. 37 Park Row (Park Building), New York.

O. D. MUNN, S. H. WALES, A. E. BEACH.

TERMS—Two Dollars per annum—One Dollar in advance, and the remainder in six months

Single copies of the paper are on sale at the office of publication, and at all periodical stores in the United States and Canada.

Sampson Low, Son & Co., the American Booksellers, No. 47 Ludgate Hill, London, England, are the British Agents to receive subscriptions for the SCIENTIFIC AMERICAN.

☞ See Prospectus on last page. No traveling agents employed.

VOL. VII. NO. 10.....[NEW SERIES.]....*Eighteenth Year.*

NEW YORK, SATURDAY, SEPTEMBER 6, 1862.

THE QUALITY OF IRON PLATES.

The great advancement made in the useful arts during the present century is chiefly due to the more extended employment of iron. It is the foundation upon which the useful arts rest, because it is the principal metal employed in the fabrication of tools, machinery, and works of civil and mechanical engineering. The present age is distinguished for its vast production of iron. In 1740 the total amount of iron made in England was 18,000 tuns. Forty-eight years later, 1788, it had only increased to 70,000 tuns, but last year (1861), it was no less than 4,150,000 tuns. In 1771, about 7,500 tuns of iron were made in the American colonies, half of which was exported. In the year 1861, about 900,000 tuns were manufactured, but, instead of exporting, about 300,000 tuns were imported. The great development of the iron manufacture in England is due to inventive genius and acquired skill. Incessant attention has been paid to improve the processes of manufacture, and large sums have been expended by associated capitalists and men of science, in making experiments. There are almost numberless varieties of iron, each possessing peculiar qualities, and each adapted for a specific purpose. Pig iron, steel and wrought iron, are three distinct varieties of the same metal, but for practical purposes they are distinct metals. And in these three distinct classes of iron there is quite a variety of qualities. Their respective peculiarities are believed to be due to admixtures of foreign substances, but this is an intricate question, involved in much obscurity. As it relates to their respective qualities, however, in connection with their adaptability for different purposes, we have more information. Thus pig iron is the raw material, of which cast, malleable, wrought iron and steel are made. But it is stated that most of the varieties of iron have depreciated in quality, both in Europe and America within the past twenty-five years, by the general application of the *hot* in place of the cold-blast in smelting ores. A higher heat being obtained with the hot than the cold blast, more injurious impurities, it is alleged, are fused and combined with the metal than formerly. The more general use of mineral coal in place of wood charcoal in smelting, it is also charged, has tended to depreciate the quality of the metal now manufactured. With the vast increase in the amount of iron manufactured, and the many improvements made in producing it at less cost and in larger masses than formerly, it has not been improved in quality. Various considerations prompt us to direct special attention to one point in this connection.

We have just started upon a new career in the manufacture and application of iron plates for ship-building purposes, and care should therefore be exercised that we start aright. In the manufacture of armor plates, for example, the metal best suited for the purpose should be chosen, and all others rejected. Now, as there are so many varieties of wrought iron, the best to use can only be determined by experiment. Mr. William Fairbairn, F.R.S., who has conducted many experiments in this connection, asserts that the tough wrought iron made from clay iron ores is the best for this purpose, and should be exclusively employed. And in connection with the selection of the best iron for this purpose, the hammering and the rolling operations to form thick plates must be conducted with skill, or the very best iron may be rendered worthless. It has been found that after a certain number of heats—not exceeding six—the best wrought iron depreciates in strength by every subsequent heating and hammering. In fabricating such plates, therefore, they should be finished with a very few heats. At present the demand for certain qualities of iron plates cannot be supplied with sufficient promptness, and for many years to come it is probable that all the powers of our large rolling mills and forges may be taxed to furnish an adequate supply. It is not only the navy but the mercantile marine which is now beginning to draw so largely upon our iron manufacturers for plates in steam shipbuilding. The safety of life and property, and the national reputation, all demand that the utmost attention should be bestowed upon the production of plates of superior quality first, then quantity afterward.

THE WORTHLESSNESS OF OUR FORTS.

In a recent visit to Fort Richmond, at the southerly entrance of this harbor we observed that the barbette guns are being mounted, and that they are of small caliber. Now, it has been repeatedly demonstrated in the course of this war that for the protection of the city of New York, with its enormous stores of wealth, Fort Richmond might just as well be armed with fowling pieces.

We have been inclined to agree with the officers of the Engineer and Ordnance corps of our army in the opinion that our sea-coast fortifications would be found effectual in preventing the entrance of hostile fleets into our harbors; but this opinion was always based on the supposition that the forts were to be armed with very heavy cannon and garrisoned by artillerists so trained that they could strike a passing vessel at nearly every shot. We still think that if Forts Richmond, Hamilton and Lafayette were fully supplied with 15-inch guns, and if every gun was manned by artillerists who had practiced with it till they had learned the proper elevation at every point across the channel, it would be impossible for even an iron-clad fleet to work its way through the Narrows. But this opinion is merely an *à priori* conclusion, resulting from a course of reasoning, and may be blown to the winds by the first experimental trial.

At all events, the passage of the Mississippi forts, and the repeated running of the Vicksburg batteries, have conclusively shown that a fleet of even wooden vessels might sail into this harbor in broad-day light past the forts at the Narrows, while the attempt of these forts to prevent the passage of an iron clad fleet in the night would be ridiculous.

If a single French or English frigate were lying in the harbor with its shell guns trained upon the city, would not our banks very quickly pay the thirty-five millions of gold in their vaults to prevent a bombardment? And would it not be cheaper, as well as more manly and agreeable, for our citizens to advance the money to the General Government, first to ascertain whether the large guns could prevent the passage of an iron-plated ship, and if it was found that they could, then to have these guns cast and mounted in the forts?

POROUS WATER-PROOF CLOTH.

This quality is given to cloth by simply passing it through a hot solution of weak glue and alum. This is what is done by paper makers to make writing paper, the very thing which constitutes the difference between it and blotting paper, only on cloth the nap like the fur of a beaver, will preserve the cloth from being wet through as the rain will not adhere but trickle off as soon as it falls, and moisture will not adhere at all.

To apply it to the cloth, make up a weak solution of glue and while it is hot add a piece of alum, about an ounce to two quarts, and then brush it over the surface of the cloth while it is hot, and it is afterward dried. Cloth in pieces may be run through this solution and then wrung out of it and dried. By adding a few pieces of soap to the glue the cloth will feel much softer. Goods in pieces may be run through a tubfull of weak glue, soap and alum, and squeezed between rollers. This would be a cheap and expeditious mode of preparing them. Woolen goods are prepared by brushing them with the above mixture, first in the inside, then with the grain or nap of the cloth, after which it is dried. It is best to dry this first in the air and then in a stove room at a low heat, but allow the cloth to remain for a considerable time to expel the moisture completely. This kind of cloth, while it is sufficiently waterproof to keep out moisture and rain—being quite impervious to water—is pervious to the air. Many fishermen know that by boiling their pants, jackets, nets and sails in a pot with oak bark and fish skins, and afterward drying them, they become waterproof. The composition mentioned above is of nearly the same nature as the fish glue and oak bark, and consequently the same effects are produced. The composition is stated to be improved by adding about one-fourth the quantity of the sulphate of copper to the alum. Cloth made waterproof in this manner will resist the effects of water even if it is somewhat warm, but it loses its waterproof properties if boiled. Persons who are exposed to the inclemency of the weather will find it to their advantage, as a means of preserving health to prepare their clothes in the way we have described. Several corps in the French army are provided with porous water-proof cloth tunics prepared in a similar manner. They have been found very beneficial when the troops are in active service.

COAL—ITS COST AND SUPPLY.

Coal is the grand agent of mechanical power for driving machinery, and it may also be ranked among the prime necessaries of life. It has almost become as essential to the sustenance of life, in winter, as the food we eat. Every effort, therefore, should be made to procure it in abundance, and at the lowest possible cost. As there are no natural supplies of coal in New Jersey, New York and New England, the manufacturers, steamboat proprietors and citizens in these States are chiefly dependent upon Pennsylvania for this fuel. The great expense connected with it is its long inland transportation by railroad and canal. Coal which is sold at the mines in Pennsylvania for $1 50 per tun, is sold for no less than $5 50 in New York; and we learn from the report of Mr. Thatcher Perkins, Master of Machinery of the Baltimore and Ohio Railroad, that the cost of coal per tun on the Parkersburg Branch is only seventy-five cents. Along the valley of the Ohio, from Wheeling to Pittsburgh, the best bituminous coal is obtained for about $1 per tun, while in New York and Boston the same quantity of coal cannot be obtained for less than $6 and $7. Anthracite coal is $1 50 per tun higher in price in our sea board and inland cities this year than it was in 1861. This rise is attributed to an increase in miners' wages, and a decreased amount sent to market, on account of breakages in the canals, and injuries to railroads sustained by freshets. Miners' wagers have been very slightly increased; the principal cause of the rise in price, we believe, is an increase in the rates of freight. For the fruits of the field we are dependent upon sunshine and showers, and as man cannot control these, there will always be fluctuating supplies of food. But it is very different with our mineral fuel; it exists in unlimited quantities, subject to the industry of the miner. Several millions of our people are deeply interested in obtaining a supply of coal at moderate and unfluctuating prices. As coal is one of the great items of constant expenditure in many manufacturing operations, our Eastern manufacturers are perplexed in making contracts when they cannot depend on the prices of fuel. The question is also very frequently asked, "Cannot coal be obtained in our sea-board cities for less than about five times its cost in the vicinity of the mines in Pennsylvania?"

These statements and questions are of general interest. If it is possible, and we believe it is, to improve the facilities for carrying coal from the mines to our distant cities and hamlets, so as to reduce the expenditure of transport, and thus reduce its price to consumers, an enlightened self-interest should prompt those who have the abilities to make the effort to accomplish such a desirable result.

A NEW large tubular bridge has lately been completed on the Berne and Lausanne Railroad, near Friburgh, in Switzerland. Including the abutments, it is 1,290 feet long; the tube weighs 1,200 tuns, and the piers are 260 feet high.

MANURING PLANTS THROUGH THEIR LEAVES.

The farmers of Long Island who use great quantities of fish for manure, have discovered that the most effective method of applying this kind of manure is to spread it upon the surface of the ground; if the fish are covered up they do very little good. This fact would be quite inexplicable if plants derived their food wholly through their roots; but this is not the case.

Numerous and careful experiments made many years ago have demonstrated that a large portion of the solid substances of plants enters in the form of invisible gases through the pores of the leaves. After plants are deprived of the water which they contain, just about one-half of the solid portion remaining is carbon, and the whole, or nearly the whole, of this enters the plants through the leaves.

Carbon passes into the leaves of plants combined with oxygen in the form of carbonic acid; which at ordinary temperatures and under the pressure of the atmosphere is an invisible gas. In the leaf, under the action of the sun's rays, the carbonic acid is decomposed, the oxygen returning directly to the atmosphere, and the carbon being carried by the sap to build up the trunks, stems and roots of the plant.

If the plant is heated to a temperature of about 1,000° in contact with the atmosphere, the carbon again combines with the oxygen of the atmosphere, and goes away in the invisible form of carbonic acid gas. But if the plant is covered with sods, or placed in a close oven and heated, the more volatile portions are driven away, and the carbon remains in the form of charcoal.

Manhaden, the fish principally used for manure, are very fat, and fat is composed to a very large extent of carbon. In the process of animal decay the carbon is separated mostly in combination with oxygen as carbonic acid, and if the separation takes place immediately under green leaves, a considerable portion of the carbonic acid will be caught by the leaves, and appropriated to the growth of the vegetable.

OUR MILITARY DEPARTMENT.

We announced, two weeks ago, the addition to our regular establishment of a recruiting station for the purpose of mustering soldiers into the Union army. Our experiment has been eminently successful—so much so that we are encouraged to think we shall continue it "during the war." Within the time specified we have recruited and mustered into the service fifty-one men, the majority of whom are now in the field.

Our experience satisfies us that considerably more work, and a good deal less talk, is now the one thing needful. Mere talk will frequently damage the cause, while a few dollars judiciously expended will encourage a good man to enlist, especially if he has a family depending upon him day by day for support. We know of one rich man who has talked excessively patriotic during the past year and who has abused his neighbors for want of zeal, that was nearly squelched out when called upon to give a few hundred dollars to further the work of enlistment. He has said but little about the war since. We must make up our minds to talk less and to work and give more.

We take pleasure in acknowledging efficient pecuniary aid in our work from the following gentlemen: Joseph Park, Jr., S. T. Hyde, William Sewell, B. & S. D. Cozzens, A. P. Cumings, Roswell Skeel and A. H. Almy.

NEW DISCOVERY IN IRON-CLAD SHIPS.

A new development in the history of iron-clad ships has been made, for which the country is indebted to the genius of Commodore Porter, the gallant destroyer of the once formidable rebel ram *Arkansas*. By the official report to the Navy Department of his daring attack, single-handed, upon the *Arkansas*, under the heavy batteries at Vicksburg, on the 22d of July, we learn the following important facts:—

The *Essex*, although clad with iron plating only one inch thick at the thickest part, was for "two hours and a half under fire of seventy heavy guns in battery, twenty field pieces and three heavy guns on board the ram."

This fire was indeed terrific. In the intrepid Commodore's words, "so rapid was this fire that for half an hour the hull of the ship was completely enveloped in the heavy jets of water thrown over her by the enemy's shot, shell and balls." At one time this cannonading was at so short a range that he says, "we were so close that the flashes of the enemy's guns through my gun holes drove my men from the guns." These astonishing results are due to the scientific skill of Commodore Porter in constructing the now famous *Essex*. She was completed under his own eye and according to his own plans. Unable to adopt for service in the Western rivers, the heavy plating used upon the *Monitor* and the *Ironsides*, Com. Porter conceived the idea of constructing the *Essex* in such a manner that most of the shot would be received at an angle and be compelled to glance off by an elastic backing to the plates.

By careful experiments upon targets he found that by using a peculiarly-prepared lining of india rubber between the iron plates and the wooden backing, an iron armor of only one inch thick would not be affected by a shot that would penetrate five inches of solid iron. The immense saving of weight and of expense effected by this important discovery will at once be appreciated. Indeed, it is the only method by which the use of iron-clad gunboats on our Western rivers is practicable. Gunboats plated in the ordinary manner with inch iron, have proved worthless, and the experiment will no longer be repeated. For patriotic reasons we do not propose to describe, in detail, the mode of construction adopted by Com. Porter, it is enough to announce the great fact. The success of this practical experiment of the *Essex* for two hours and a half under the impregnable batteries of Vicksburg, is decisive.

The result of this terrific fire from "a battery not over one hundred feet off," is thus described in the official report:—

"A heavy ten-inch shot from the nearest battery struck my forward casemate about four feet from the deck, but fortunately did not penetrate. A rifle seven-and-a-half-inch shot from the same battery struck the casemate about nine feet from the deck; it penetrated the iron, but did not get through, although so severe was the blow that it started a four-inch plank two inches thick and eighteen feet long, on the inside. A conical shell struck the casemate on the port side, also, as we were rounding, penetrated the three-quarter-inch iron and came half way through the wooden side; it exploded through, killing one man and slightly wounding three."

During the heavy cannonading most of the shot glanced from the sides of the *Essex*, but "during that time this vessel was heavily struck forty-two times and only penetrated twice." This penetration was by the rifle seven-and-a-half-inch shot and the conical shell above described.

We believe that the annals of the war record no exposure of a gunboat to a cannonading so severe as this, and the results are regarded by military men as perfectly conclusive and satisfactory.

We learn that our Navy Department have already adopted some of the features of this plan in the new iron-clad steamers, and that the thin plating of the decks is to be protected by an under sheathing of india rubber. This will remove one of the great sources of annoyance which has been found in the *Monitor* from the leaking of her decks, and it will effectually prevent any further mortifying occurrences like the penetration of the deck of the *Galena* from the fire of Fort Darling.

Gird's Budding Knife.

Mr. E. D. Gird, one of the inventors of the budding knife illustrated on page 160 of our last volume, brought into our office a few days since, a trunk of a seedling peach tree with a small scion, and requested us to try the knife in the practical operation of budding. We found it a very convenient implement, and have no doubt that nearly twice as many buds can be inserted with it as with the knife in general use. Mr. Gird's address is Cedar Lake, N. Y.

Old England seems to possess almost as much vitality as some new countries. In 1828 there was not a solitary habitation at Seaham Harbor, in the county of Durham; now it contains 10,903 inhabitants, and about 700,000 tuns of coal were shipped from it last year.

VALUABLE RECEIPTS.

Beet Root Coffee.—A very good coffee can be made of beet root in the following manner:—Cut dry beet root into very small pieces, then gradually heat it in a close pan over the fire for about fifteen minutes. Now introduce a little sweet fresh butter, and bring it up to the roasting heat. The butter prevents the evaporation of the sweetness and aroma of the beet root, and when fully roasted it is taken out, ground and used like coffee. A beverage made of it is cheap, and as good for the human system as coffee or chicory.

Crystal Varnish.—First, genuine pale Canada balsam and rectified oil of turpentine equal parts; mix, place the bottle in warm water, agitate well, set it aside in a moderately warm place, and in a week pour off the clear. Used for maps, prints, drawings and other articles of paper, and also to prepare tracing paper and to transfer engravings. Second, mastic 3 ounces; alcohol 1 pint; dissolved. Used to fix pencil drawings.

Etching Varnish.—First, white wax 2 ounces; black and Burgundy pitch, of each half an ounce; melt together, add by degrees powdered asphaltum 2 ounces, and boil till a drop taken out on a plate will break when cold by being bent double two or three times between the fingers; it must then be poured into warm water and made into small balls for use. Second, linseed oil and mastic, of each 4 ounces; melt together. Third, soft linseed oil 4 ounces; gum benzoin and white wax, of each half an ounce; boil to two-thirds.

Flexible Varnish.—First, india rubber in shavings 1 ounce; mineral naphtha 2 pounds; digest at a gentle heat in a closed vessel till dissolved, and strain. Second, india rubber 1 ounce; drying oil 1 quart; dissolve by as little heat as possible, employing constant stirring, then strain. Third, linseed oil 1 gallon; dried white copperas and sugar of lead, each 3 ounces; litharge 8 ounces; boil with constant agitation till it strings well, then cool slowly and decant the clear. If too thick, thin it with quick-drying linseed oil. These are used for balloons, gas bags, &c.

Hall's Arctic Expedition.

Mr. C. F. Hall, who went to the Arctic Regions on the new Franklin Expedition, is on his way home in the bark *George Henry*, which put into St. Johns, Newfoundland, on the 22d ult., short of provisions. From this place Mr. Hall sent the following dispatch to Henry Grinnell, Esq., patron of the expedition:—

Henry Grinnell, Esq.:—

I am bound for the States, to renew my voyage to the Arctic region. I have not prosecuted my mission to the extent proposed on account of the want of suitable craft, but, thank God, he has empowered me to do something.

I have determined the fate, probably, of two boats' crews of Sir John Franklin's Expedition, solved the mystery of three hundred years relative to Sir Martin Frobisher's Expedition under the auspices of Queen Elizabeth, have learned the fate of five men captured from Frobisher by the Esquimaux, found and identified the exact place of his landing and prior account of Warwick's Sound. Therefrom Frobisher attempted to plant the colony of one hundred men. I have recovered Avassa Varede and a large number of relics of said expedition, and have explored over one thousand miles of coast, including the so-called Frobisher's straits, which I have discovered to be a deep bay terminating in latitude 63° 48' north, and longitude 70° west. Have also discovered a great glacier and a mountain of fossils between Hudson straits and Frobisher's bay.

The *George Henry* was about to return for the States, October 18, 1861, but thick-ribbed ice kept her entombed until August 9th. The ship's company subsisted through the winter mostly by the generous hospitality of the Esquimaux. I have with me a family of these people—man, wife and child. The record of my work north exceeds three thousand pages. C. F. Hall.

The Ironsides.

The armor-plated frigate *Ironsides*, which was built at Philadelphia, has gone to sea under sealed orders. Her form is like that of our wooden frigates; the only difference between her and the old screw steamers consists in her having a strong iron frame and armor plating four and a half inches thick laid upon a lining of heavy oak planking. Her armament is very heavy and consists of sixteen 11-inch Dahlgren guns on the gun deck, and two 200-pounder Parrot guns on the spar deck. She is intended to be a good sea-going vessel, but as her draft of water is over 20 feet, she will be able to enter but one or two Southern harbors, as most of them are shallow.

The visitors from the rural districts of England to the International Exhibition now average five thousand a day.

MISCELLANEOUS SUMMARY.

An Extraordinary Phenomenon.—A telegraphic item comes from California stating that a waterspout burst in the sparsely settled portion of Los Angelos county on the 18th of August, fifty miles from the ocean, filling the long ravine with water fourteen feet deep. A man and woman riding in a carriage were caught in the flood, and the woman and horses drowned. The man floated more than a mile to a place of safety.

It is perhaps not generally known that black pepper is a poison for many insects. The following simple mixture is said to be a good destroyer of the common house fly :—Take equal proportions of fine black pepper, fresh ground and sugar, say enough of each to cover a ten-cent piece ; moisten and mix well with a spoonful of milk ; keep that in your room and it will keep down the flies. The flies seek the air, and never die in the house when the windows are open.

The Buffalo, N. Y., *Commercial* states that an order has been received in that city from three merchants in London for 10,000 barrels of refined petroleum, to be delivered in six months. The value of this order is over $152,000. Another order came from Liverpool for three hundred gallons of Pease's improved engine oil, and from London for three hundred gallons of Pease's extra lard oil.

The English steamer *Warrior*, launched in 1860, is 400 feet long, 58 feet beam, 41½ feet depth, 6,177 tuns, builder's measurement, engines 1,250 nominal horse power. Her sides, amidships, are 22 inches thick of wood, covered with 4½-inch iron plates, the bow and stern not being so thickly plated. She carries thirty-two guns, mainly 68 pounders and smooth bore.

The London *Times*, of August 1st, says :—The prospects of the operatives, so far as regards the amount of labor they are likely to obtain, are becoming darker every week. At Blackburn, out of a population of 63,000, 24,085 operatives, and 2,355 others in the different departments are wholly unemployed, owing to the scarcity of American cotton.

Buckwheat when sown on rich ground will kill grass effectually. It must be sown as soon as the ground is ploughed. Buckwheat seems to be poison to other plants, and it is even known to destroy insects. It does this probably by destroying the roots of the grasses and herbs on which they feed. No insect touches buckwheat in the ground.

Half a dozen iron vessels make up the British navy, and there are but two or three docks in which a first class frigate like the *Warrior* can be placed to to refit. So says the London *Saturday Review*. But for some unexplained reason, British papers, we have noticed, are more given to underrate than overate the English navy.

Two new iron-clad river boats have been commenced by Tomlinson, Hartupee and Co., Pittsburgh, Pa. Considerable delay is caused in the construction of such iron-clads, owing to the difficulty of obtaining plates as fast as the builders can put them on the vessels.

The force of Darius at the battle of Arbela numbered more than 1,000,000. The Persians lost 90,000 men in this battle; Alexander the Great about 500. So says Diodorus.

The rebel account of the battle of Baton Rouge, announced the death of Colonel Alexander H. Todd, a brother of Mrs. Lincoln. He was on Brigadier General Holme's Staff, and was instantly killed.

It is stated that wool is now higher than it has been for forty-four years. This is owing to the large demand for army goods, and to the advanced price of cotton.

How Prize Money is Distributed.

Prize money, belonging to officers and men in the navy, is distributed in the following manner :—The commanding officer of a fleet or squadron receives one-twentieth part of the prize money awarded to a vessel or vessels under his command ; the commander of a single ship one-tenth part, if such ship, at the time of making the capture, was under the immediate command of the commanding officer of the fleet or squadron, and three-twentieths if his ship was acting independently of such superior officer. The share of the commander of the fleet and of the commander of the ship being deducted, the residue is distributed among all others doing duty on board, according to their respective rates of pay in the service. The law provides that if one or more vessels in the navy shall be within signal distance of another in making a prize, all shall share in the prize, and the money be distributed among the officers and crew of both. Commanders of fleets or squadrons are not entitled to receive any share of prizes taken by vessels not under their immediate command, nor of such vessels, nor of such prizes as may have been taken by ships or vessels intended to be placed under his command before they have acted under his immediate orders. The question has been asked whether the officers and crews of armed vessels not belonging to the navy, are entitled to prize money. The law says that they are, and it provides for its distribution in the same manner as among the officers and seamen in the navy. It is generally supposed that the fees of the United States Marshal are excessive in prize cases; but a recent act provides that the annual salaries of the District Attorneys, Prize Commissioners and Marshal shall in no case be so increased under the several acts for compensation in prizes, as to exceed in the aggregate the following sums :—District Attorney, $6,000 ; Prize Commissioner, $3,000 ; Marshal, $6,000.

RECENT FOREIGN INVENTIONS.

Nitrate of Soda Gunpowder.—The nitrate of potash, which is employed in the manufacture of gunpowder, is the most expensive and difficult material to obtain during periods of war. Nitrate of soda would answer just as well for gunpowder were it not deliquescent. As it is very abundant, and comparatively cheap, it is proposed to correct its tendency to become moist in gunpowder, by mixing some of the anhydrous sulphates of soda and magnesia with it. A patent has been taken out by T. Roberts and J. Dale, of Manchester, England, for powder made of such a mixture. The gunpowder is made in the usual manner with charcoal, sulphur, and the nitrate of soda mixed with anhydrous sulphate of magnesia, as a substitute for the common saltpeter. Gunpowder so made may become efflorescent, it is stated, but not deliquescent.

Refining Petroleum.—L. Martin, of Paris, has taken out a patent for a method of treating petroleum and for a mixture of it with rape seed oil, to burn in common lamps. Supposing a tun of petroleum is to be operated upon, about eight per cent weight of caustic soda dissolved in water is added to the petroleum in a large vat, and the whole agitated for about six hours, after which about ten per cent of tepid water is added, stirred, and the whole allowed to rest for four hours. A precipitate falls to the bottom of the vessel, and the clear is then drawn off with a syphon and placed in a still. It is now distilled at a temperature of 248° Fah., steam heat being used for this purpose. A light eupion oil passes over at this heat, and 35 per cent of rape-seed oil is added to it and makes a good burning oil for common lamps. The remainder of the petroleum in the retort is now subjected to heat of from 437° to 600° Fah., when heavier oils are distilled. They are mixed with ten per cent of rape-seed oil for the lightest variety, and five per cent the heaviest. This heavy oil he also sometimes submits to another purification, by agitating it with very dilute sulphuric acid, then with a weak brine of common salt, and afterward washing with tepid water.

Lubricating Compounds.—A patent has been taken out by C. Hill, of Kidwelly, England, for a lubricating compound for machinery, consisting of the jelly made from boiled carrageen moss, 14 parts, by weight ; yellow soap, 1 part ; tallow, 1½ parts ; palm oil, 1 part ; soap stone dust, 3 parts, and black lead ½ a part. These ingredients are placed together in a kettle over a fire and thoroughly mixed, when about the same quantity of wheat flour as the moss jelly is added and incorporated, and the whole strained through a sieve. A heated mixture of 12 parts of lard oil, 4 of rape seed oil, and about ½ a part of caustic potash are added, and the whole thoroughly stirred and cooled. This forms the new lubricating compound, which is said to be good and cheap for heavy machinery.

Composition to Prevent Rust.—To prevent bright steel and other polished metallic surfaces from becoming tarnished and oxydized, T. and E. Myers, of London, have prepared and patented the following composition :—Take gutta percha, 10 lbs. ; mutton suet, 20 lbs.; beef suet, 30 lbs.; neat's foot oil, 2 gallons, and oil of thyme, 1 gallon. These ingredients are mixed together at a moderate heat in a kettle, and when cold the mixture is ready to be applied to the steel or other metallic article.

Boiler Scale Preventor.—J. H. Johnson, of London, has taken out a patent for a compound consisting of carbonate of potash, 8 parts, by weight ; molasses, 6 parts, well mixed together and thinned with water. It is fed into a steam boiler through the feed pump, and is said to be capable of removing old scale and preventing the formation of new incrustations.

Runaway Horse Arrestor.—M. A. F. Mennons (a prolific inventor), of Paris, has taken out a patent for checking the course of runaway, headstrong horses, by employing electric shocks. A pair of flexible conductors, formed of copper wire, are inserted in the reins of the bridle, and each of the forward extremities is connected with a piece of moistened sponge, so attached to the jaw bands as to press, when in position, against each side of a horse's head a short distance below the eye. The opposite extremities of these conductors are prolonged beyond the grasp of the reins, and are fitted with a metallic attachment to connect them with the poles of an induction coil by the driver, should the animal become restless. By such an arrangement an electric shock, sufficient to make any runaway horse see starlight and pause in his mad career, is proposed to be given.

Compound for Ships' Bottoms.—A new compound for protecting the hulls of iron vessels from sea weed and barnacles, has been patented by R. Johnson, of Liverpool. It consists of 2 lbs. of mercurial ointment (mercury mixed with lard) ; 2 lbs. of powdered arsenic, and 6 lbs. of black lead in powder, the whole being mixed up in a gallon of tar. These are the proportions for any quantity. Before being applied, the hull of the iron vessel should first receive two coats of asphalt varnish, each allowed to become dry before the other is applied.

Glass Manufacture in Pittsburgh.

The Pittsburgh *Post* gives some interesting particulars of the progress of glass manufacture in that city.

There are over forty glass factories in operation, employing some twenty-two hundred hands, whose annual wages are over $1,000,000. These factories consume material to the amount of $1,378,500—divided, in round numbers as follows :—

Soda Ash	$550,000	Fire and com'n brick.	$4,000
Sand	150,000	Fire clay	7,500
Lead	100,000	Cordwood	18,500
Saltpeter	75,000	Lime	56,000
Lumber	100,000	Salt	8,500
Nails	12,000	Pearls	80,000
Iron	10,000	Straw	16,000
German clay	3,000	Castings	3,000
Coal	170,000	Willows	15,000

The amount of capital invested, exceeds $1,000,000, and the annual product of all the factories is is over $3,000,000. This is divided among the several branches as follows :—

Flint glass	$1,300,000
Window glass	1,270,000
Vials, bottles and druggists' ware	390,000
Demijohns and black ware	40,000

Besides the regular glass factories, there are also in Pittsburgh and vicinity several glass staining and looking glass establishments, which add materially to the value of the glass produced there.

Turbine Water Wheels.

Turbine water wheels possess an advantage over undershot, breast and overshot wheels, in not being prevented from running in back water. They run under water just as well as out of the water. As they run at a high velocity they do not generally require so much intermediate gearing as overshot and breast wheels. On a high fall, an overshot is a very expensive wheel, whereas a turbine is comparatively cheap. Where the quantity of water in a stream, however, is very variable, the overshot is the best wheel for giving out the power of the water, because the bucket openings are of the same size in turbines for the lesser, as well as the maximum quantities of water. Adjustable buckets on turbines afford a remedy for this defect, but although we have seen several wheels constructed with such buckets, we understand they have proved troublesome, and have ceased to be used.

RECENT AMERICAN INVENTIONS.

The following are some of the most important improvements for which Letters Patent were issued from the United States Patent Office last week. The claims may be found in the official list :—

Salt Apparatus.—This invention consists in the arrangement of false metal bottoms resting on ribs projecting from the regular bottoms of the pans of a salt block, in such a manner that a space is formed which can be filled with steam or hot air, and that the salt brine passing through said pans is evaporated entirely by the action of the hot air or steam. It consists further in the arrangement of a graduation and purifying range, consisting of a long flat trough, with longitudinal partitions, forming a zig-zag channel in combination with the preliminary heating pan above, and a series of finishing pans below, in such a manner that the brine, after being heated in the preliminary pan is passed through the purifying range, where the same presents a large evaporating surface and consequently readily deposits its impurities before it passes to the finishing pans ; it consists, finally, in giving to the finishing pan a laterally-inclined position, so that the bitterns can easily be drawn off when it is desired to dry the salt on the pans. C. O. Garrison, of East Saginaw, Mich., is the inventor.

Pile for Rolling Rail.—This invention consists in forming the pile of several flat bars of iron, two of which are about of equal width, and placed in such a relative position to each other that they form an inverted T, the stem or vertical part of which is kept in position by two or more flat bars, that are placed on the sides of said vertical part, and on the top of the base, and the width of which is equal to one half the width of the base less one half the thickness of the vertical bar, the whole being arranged and combined in such a manner that ordinary bars of iron, such as are usually made and sold on the market can be used for forming the pile without subjecting them to the preliminary rolling or other operation, and that by passing the pile once through suitable rollers, finished shoe rails are produced. The patentee of this invention is John L. Lewis, of Pittsburgh, Pa.

Hooks and Terrets for Harness Saddles.—This invention relates to an improvement in the construction of that kind of saddle hooks and terrets which are covered with leather and provided with a metal lining to prevent the wearing of the leather under the friction of the reins and strap. Its object is to obtain a neater and more durable hook and terret than those constructed in the ordinary way, and also a more economical mode of manufacture, which will not only admit of the hooks and terrets being repaired with facility when worn or soiled by use, but which will also admit, when desired, of genuine silver plate being used as a lining—the old mode of construction being confined to German-silver lining for the best class of work. The inventor of this device is Samuel E. Tompkins, of Newark, N. J.

Dust Room of Cotton Pickers.—All cotton openers and pickers, and machines for picking and burring wool, of modern construction, have their own suction fans independent of each other, and it is customary to connect with several of these fans dust pipes, which all terminate and discharge into a dust room ; but there is one difficulty connected with this arrangement, namely, whenever it is necessary to stop one of the machines, the pressure of the air in the dust room, produced by the fans of the machines which continue in operation, being greater than the pressure of the atmosphere in the picker room, forces the air and dust back through the dust pipe of the machine that is stopped, into the picker room. The object of this invention is to obviate this difficulty, and to this end it consists in fitting the dust pipes of the pickers, at their connection with the dust room, with valves which close automatically when their respective machines are stopped. The inventor is Richard Kitson, of Lowell, Mass.

Bayonet Scabbard.—The leather scabbard which has hitherto been exclusively used for the common angular bayonet is well known to be the most perishable article in a soldier's accouterments. The present invention consists in forming an angular bayonet scabbard of steel. The new scabbard affords a better protection, is more convenient to use, more sightly, lighter, much less costly and incomparably more durable than the old, while in no single respect is it inferior. It is the invention of James E. Emerson, of the firm of Emerson & Silver, of Trenton, N. J.

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING AUGUST 19, 1862.

Reported Officially for the Scientific American.

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

36,201.—N. Aubin, of Canada, for Improvement in Water Meters :

I claim the combination of a diaphragm with a reversing apparatus and a short slide valve, connected each with the other without the use of stuffing boxes, and the whole inclosed within a proper receptacle containing a valve seat, and constituting a fluid meter, substantially such as is described and acting substantially as specified.

I also claim a receptacle constructed in two pieces, one half of which contains part of the side pipe, and the other half the other part thereof, when the joint between the two is made by a diaphragm, and the latter acts on a reversing apparatus contained in one half of the said receptacle; the construction being substantially such as described. And

Lastly, I claim in combination with a diaphragm of a water meter, a short slide valve of less length than the distance from the outside of one port, to the inside of the other port, the combination being substantially such as described.

36,202.—C. J. Austin, of Nantucket, Mass., for Improvement in Coal Sifters :

I claim the arrangement of the flap, D, hinged to the cover, B, as described, in combination with the reciprocating sieve, A, and hopper, E, all constructed and operating substantially as specified.

[An engraving and description of this invention will shortly be published in the SCIENTIFIC AMERICAN.]

36,203.—J. F. Black and Ambrose Buracker, of Lancaster, Ill., for Improvement in Cattle Pumps :

We claim the platform, C, with the weight, G, attached, in combination with the tubular piston rod, I, of the pump and the trough, O, attached to the platform, arranged substantially as and for the purpose herein specified.

We further claim the railing, M, and cover, N, when combined and arranged relatively with the platform, C, for the purpose herein set forth.

[This invention consists in attaching a tubular piston rod of a pump to a platform, which works on a joint at one end, and is provided with a water trough, and placed within a guard or railing at its free disengaged end, and covered at its opposite end, all being arranged in such a manner that a very simple and efficient pump is obtained for the desired purpose.]

36,204.—M. C. Burr, of Owatanna, Minn., for Improved Clothes Dryer :

I claim the straight bars, A E, in connection with the semi-circular, B, brace, D, and the arms, F F′ F′′ F′′′, connected by cords or ropes, j G, combined and arranged to operate as and for the purpose set forth.

[The object of this invention is to obtain a simple device which may be readily applied to the windows of dwellings, and admit of the clothes being placed on it and removed therefrom with the greatest facility, and when not in use, be capable of being compactly folded so that it may be stowed away in a small space.]

36,205.—W. H. Crawford, of New York City, for Improvement in Reflectors :

I claim a reflector, A, formed of two curved or bent surfaces, B C, with one high central ridge, D, as and for the purpose shown and described.

[This invention consists in a reflector having a high central ridge opposite the flame, and formed by placing two curved or bent surfaces together, in such a manner that said central ridge is produced, and that the rays of the light from the flame are spread by the action of the reflector over a large area.

36,206.—G. Y. Custer, of Norristown, Pa., for Improvement in Coal Oil Lamps :

I claim the reservoir, B, containing a supply of water, and arranged immediately below the perforated air chamber, G, of a coal oil lamp in respect to the wick tube, as and for the purpose herein set forth.

36,207.—Jonathan Dearborn, of Seabrook, N. H., for Improvement in Door Latches :

I claim my improved door fastener as made with its bolt case, A, its bolt, B, its knob shaft, h, constructed and arranged with respect to each other, and so as to operate substantially in manner as set forth.

36,208.—J. S. DeHaven, of Akron, Ohio, for Improvement in Machines for Loading and Pitching Hay :

I claim, first, The combination of the fork handle with the guides, H H′, substantially as set forth.

Second, The combination with shaft, e′, and lever, *, of the screw, m, sliding shifting piece, m′, and cam, m′′, for the purposes set forth.

Third, The combination with shaft, e, of clutch, i, pulley, J′′, and shipper, K, substantially as and for the purposes set forth.

Fourth, The combination and arrangement of mechanism, substantially as set forth for antomatically gathering and loading hay, substantially as described.

36,209.—J. E. Emerson, of Trenton, N. J., for Improvement in Steel Scabbards for Bayonets :

I claim, as a new article of manufacture, an angular bayonet scabbard, constructed of steel formed around a mandrel by pressing and united at its edges, in the manner and for the purpose herein specified.

36,210.—Samuel Etter and R. B. Neuman, of Fayetteville, Pa., for Improved Washing Machine :

We claim the compound lever, F, standards, d d′, and pivots, e e′, in combination with the compound lever, H, pivots, g g′, wrist pins, i i′, hooks, I I′, and rubber, C, when arranged to operate in connection with the wash board, in the manner and for the purpose set forth.

[This invention consists in suspending the rubber within the tub from a shaft, which is journaled at its ends in the upper ends of standards, rising from a compound lever, which is journaled at its back end to the projecting ends of two of the legs of the tub, and connecting the rubber to an oscillating compound lever by rods or hooks, whereby the rubber may be easily detached from its actuating lever, and by a simple movement of the pressure lever be turned up into such a position as to afford convenient access to every part of the tub, to facilitate the handling of the clothes, and the cleansing of the tub and rubber.]

36,211.—C. O. Garrison, of East Saginaw, Mich., for Improved Apparatus for the Manufacture of Salt :

I claim, first, The arrangement of the false metal bottoms, a, inserted into the pans, A B C D, of a salt block, and resting on ribs, b, projecting from the bottoms, c, of the said pans, substantially as and for the purpose described.

Second, The arrangement of the graduation and purifying range, F, in combination with the pans, A B C D, constructed and operating substantially as and for the purpose specified.

Third, Giving to the finishing pans, B C D, a lateral inclination, as and for the purpose set forth.

36,212.—C. L. Getz, of Philadelphia, Pa., for Pantographic Reversing Instrument :

I claim the described pantographic reversing instrument, in which the reverse movement of the copying pencil is derived from the action of the leading pencil, by means of the described combination of levers, H H′ I I′ K K′, links, M and M, with wheels, E E1 E2 E3, and bands, n n, or their equivalents, the whole being arranged and constructed substantially as set forth.

I also claim the employment of levers, P and Q, or their equivalents, when combined with the pencils, L and O, and operating substantially in the manner and for the purpose specified.

36,213.—W. A. Greene, of Albany, N. Y., for Improvement in Sad-Iron Heaters :

I claim, first, When arranged in combination with the fire box, A, and covers, F, the support plate, B, constructed substantially in the manner as herein shown and described, and for the purposes as set forth.

I also claim in combination with the support plate, B, and covers, F, the deflection and lateral support plate, C, when constructed and arranged substantially as herein described and shown, and operating for the purposes as fully set forth.

36,214.—Henry Heckman, of Danville, N. Y., for Improvement in Thrashing Machines :

I claim, first, In a combined clover thrasher and huller, the use of the detachable alternating shutes, F J, substantially in the manner and for the purpose described.

Second, In a combined clover thrasher and huller, I claim the use in combination of the detachable alternating shutes, F J, and the carrier, D1, running close in relation with the top and bottom of the table, D, substantially in the manner and for the purpose described.

Third, In a combined clover thrasher and huller, I claim in combination the use of the detachable shutes, F J, the flat wise arranged carrier, D1, and the fanning device, H I, the whole constructed, arranged and operating in the manner and for the purpose described.

36,215.—Nelson Hornaday (assignor to himself and Z. Stubbs), of West Elkton, Ohio, for Improvement in Portable Fences :

I claim the arrangement of oblique braces, B B′, secured at their lower ends by pivots, C C′, to a sill, A, and provided at their upper ends with notches, D D, running longitudinally of the fence, and forming a seat for the contiguous ends of the rails of two adjacent panels to rest in, the whole being combined in such a manner that the downward stress of the panels continually acts to firmly support and clamp the parts together, substantially as described.

36,216.—W. J. Huckett, of Marshall, Mich., for Improvement in Swings :

I claim the application and use of the pulley blocks, P1 P2, and connecting cord, x, when arranged and connected relatively with each other, and with the frame and swing, in the manner as and for the purposes specified.

36,217.—D. W. Hunt, of San Francisco, Cal., for Improvement in Brakes for Wind Wheels :

I claim, first, The strap, P, applied to the crank pulley, G, as shown and connected with the socket, K, which is placed loosely in the connecting rod, H, the socket being connected to the lever, M, through the medium of the clamp, L, and the lever, M, connected by a rod, j, with a lever, N, which is retained at any desired point by a rack, O, or its equivalent, the above parts being used in combination with a revolving crane, C, and the swivel, J, which connects the rods, H H, substantially as and for the purpose set forth.

Second, In connection with the foregoing, the flanches or ribs, f′, attached to the back parts of the pans, F, to operate as and for the purpose specified.

[This invention consists in a novel way of applying a brake to a wind wheel, whereby the speed of the wheel may be regulated as desired, without having the brake mechanism at all interfere with the operation of the wind wheel, either as regards its rotation or its shifting position, which keeps it in the face of the wind.]

36,218.—William Joslin, of Cleveland, Ohio, for Improved Clothes Wringing Machine :

I claim, first, The springs, F and F2, acting upon the levers, C and C2, as above described.

Second, The right and left hand circular incline planes, G and G2, the toothed mortise, a and a2, b and b2, and the shafts and handles, H and H2, the parts being constructed and operated substantially in the manner and for the purpose set forth.

36,219.—Richard Kitson, of Lowell, Mass., for Improvement in Dust Rooms connected with Machines for Picking Cotton, &c. :

I claim furnishing the dust pipes of the pickers or openers with valves, D D D, closing automatically, substantially as herein specified.

36,220.—G. W. La Baw and P. F. Campbell, of Jersey City, N. J., for Improvement in Carriage Springs :

We claim the toggle bars, c and g, fitted as set forth, in combination with the slide bar, h, and spring, m, in the manner and for the purposes specified.

36,221.—W. C. Leach and M. J. Knox, of Knox Corners, N. Y., for Improvement in Locks :

We claim, first, The slide, G, provided with the notch, g, in its upper edge, in combination with the tumbler, H, provided with the pin, f, all arranged so as to be operated by the key of the main bolt, D, substantially as and for the purpose set forth.

Second, The pin, e, on the slide, G, in combination with the notch, a, in the tumbler, E, and the projection, n, on said tumbler, arranged as shown, so as to admit of the latter being operated either by the key of bolt, D, or the key of the night latch, as set forth.

[This invention relates to an improved slide or guard for the keyhole of the lock, whereby the outer keyhole, when the lock is locked, will be effectually guarded, so that the lock cannot be picked or illegitimately unlocked.]

36,222.—Robert Leitch, of Baltimore, Md., for Improvement in Two-way Stop Cocks :

I claim a stop cock for street and dwelling purposes, constructed and operating substantially in the manner and for the purpose set forth.

36,223.—J. L. Lewis, of Pittsburgh, Pa., for Improvement in Pile or Fagot for Shoe Rail for Gun Carriages :

I claim the manner herein shown and described of arranging or disposing the bars, A B C C′, in forming a pile for the purpose set forth.

36,224.—J. W. Lyon, of Brooklyn, N. Y., for Improvement in Locks :

I claim a spring catch or dog, arranged substantially as described, in combination with a latch bolt and releasing mechanism, so as to seize the bolt when drawn back, for the purpose of opening the door, and to retain it within the lock while the door is open, and until released in the act of shutting the door, by the action of the door jamb against the releasing mechanism, substantially as hereinbefore set forth.

36,225.—Isaac Marsh, Jr., of Milton, and Griggs Marsh, of Lewisburg, Pa., for Improvement in Tile Roofing :

We claim the grooved tiles and thin strips of metal or other elastic material, made and joined together so as to construct a water-proof and fire-proof roof, in the manner and for the purpose herein fully set forth.

36,226.—Samuel Marshall, of Wilmington, Del., for Improvement in Lamps:
I claim the attaching of the supplemental cap, D, to the lamp, by means of one or more curved or bent plates, E, arranged as shown, so as to support the cap, D, and admit of it being adjusted higher or lower, to suit the hight of the wick tube, and at the same time admit of the wick tube passing through it at its upper part, to prevent any lateral movement or shifting of the cap, as and for the purpose herein set forth.

[This invention consists in adapting, by a simple contrivance, an ordinary fluid lamp to the burning of coal oil, without a chimney, and by such a means that will admit of being adjusted to suit the hight of the wick tube, and be capable of being manufactured and sold separately, and applied to any ordinary fluid lamp in use.]

36,227.—M. J. Martin, of Belleville, Ill., for Improvement in Stump Extractors:
I claim the combination of the frame with shifting braces, r, the screw with grapling hooks, h, and the nut with bent-power levers, C, arranged in the manner described and for the purpose specified.

36,228.—Benjamin Merritt, Jr., of Chelsea, Mass., for Improved Machine for Pebbling or Embossing Leather:
I claim the above-described machine for pebbling or figuring leather, consisting of the indented or engraved roll, C, with the elastic rolls, B and E, above and below it, with their bearings or boxes, d f g, sliding and supported in the housings, A, in the manner specified.
Second, I claim suspending the tables, F and G, and rest, k, on the boxes, f, of the roll, C, so that they shall maintain their proper position with respect to the roll, as it rises or falls.

36,229.—Purches Miles, of New Haven, Conn., for Improved Meat-Mincing Machine:
I claim the cutters, D, united solidly with a metal plate, C, by being cast thereon, in combination with the grooves, d, in the manner and for the purpose substantially as set forth.

36,230.—William Moller, of New York City, for Improved Oven for Re-burning Bone Black:
I claim the arrangement of circular and longitudinal ribs or flanches on the inside surface of a revolving retort, dividing the said surface in compartments, in the manner and for the purpose substantially as specified.

36,231.—Abram Paige, of Sp ingfield, Mass., for Improvement in Electrical Instruments for Medical Purposes:
I claim, for the application of medicaments for curation purposes by electrical agency, the instrument or apparatus substantially as herein before described and represented.

36,232.—J. G. Perry, of South Kingston, R. I., for Improved Sausage Filler:
I claim the combination of the leaves (two or more), with the case, substantially as herein described and for the purpose set forth.

36,233.—J. G. Perry, of South Kingston, R. I., for Improved Sausage Filler:
I claim the combination of the disks with the leaf or leaves and shaft, substantially as herein described and for the purposes set forth.

36,234.—David and John Pollock, of Cleveland, Ohio, for Improvement in Artificial Teeth:
We claim, first, The use of metallic strips or wires, composed of platina or other suitable metal, to be used longitudinally, transversely, or crossing each other like net work, inserted or molded in the plate, gums and base of artificial teeth, composed of porcelain or other substance, substantially as set forth in this specification, and as will best answer the purpose intended.
Second, The use of metallic strips or wires, composed of platina or other metal, to be used in sectional parts of artificial teeth, and also in the teeth, substantially as set forth and for the purpose intended.

36,235.—M. W. Pond, of Elyria, Ohio, for Improved Harness Buckle:
I claim, as a new article of manufacture, a buckle having its outside frame thrown out, Figs. 1 1, with three cross bars and an eccentric clamp, 3, hinged and arranged as herein described.

36,236.—J. P. Schenkl, of Boston, Mass., for Improvement in Concussion Fuse for Explosive Shells:
I claim, first, The arrangement and combination of the holding annulus, h', and the percussion-cup chamber, f, with the plunger, B, and its nipple, e.
Second, I also claim the construction of the inelastic abutment, in such manner as to extend through the metallic bottom or breech of the case, A, and project over opposite sides or surfaces thereof, substantially as explained.
Third, I also claim the formation of the inelastic abutment with a plug hole or passage for receiving a plug, to operate in manner and for the purpose substantially as set forth.

36,237.—J. W. Schreiber, of New York City, for Improvement in Mica Chimneys for Lamps:
I claim, first, A lamp chimney, composed of two conical mica tubes, a a', connected together at their larger ends, and provided with a metal top tube, c, and a perforated metallic base, C, substantially as set forth.
Second, The supplemental draught tubes, F H H, with cap, E, attached and arranged as shown, to form two eduction or escape pas sages for the draught, when said tubes are used in connection with the chimney, B, for the purpose set forth.

[This invention relates to a new and improved draught chimney and draught tubes connected therewith, constructed and arranged with a view of obviating the difficulty of breakage, and also of insuring a perfect draught, so that lamps provided with burners for burning coal oil and similar fluid hydro carbons, may be used in railroad cars, omnibuses and other wheel vehicles, and a good illuminating flame obtained.]

36,238.—Thomas Shaw, of Philadelphia, Pa., for Improvement in Blow-off Cocks for Pumps:
I claim the combination of a valve and faucet, when applied to a pump, substantially as shown and described.

36,239.—W. B. Shedd, of East Boston, Mass., for Improved Hat Brush:
I claim furnishing the brush with a spring clasp, applied and arranged upon its back, to operate substantially as and for the purpose herein specified.

[The object of this invention is to enable a hat brush to be carried in the hat without inconvenience; and to this end it consists in providing the brush with a spring clasp, suitably arranged on its back and near one end, to attach it to the sweat or head lining of the hat.]

36,240.—W. W. Simrell, of Great Bend, Pa., for Improvement in Auger Handles:
I claim the arrangement and combination of the collar or nut, B, brace, D, spring, P, thumb screw, T, shank, C, plates, L L', and handle, H, as and for the purposes set forth.

36,241—J. P. Sinclair, of Little Prairie Ronde, Mich., for Improvement in Car Coupling:
I claim the concave clasps, c, connected by pivots or joints, a, to springs, B B, attached to the draw heads or bumpers, A, in connection with the pins, F, and shackle, D, all arranged as and for the purpose herein shown and described.

[The object of this invention is to obtain a simple, economical and efficient car coupling, and one that will be self acting, that is to say, one that will engage itself by two cars coming in contact. The invention consists in the employment or use of two concave clasps, pivoted to springs and fitted in the drawhead or bumper, in connection with a vertical sliding pin, all arranged to effect the desired end.]

36,242.—Benjamin Snyder, of Trenton, N. J., for Reading Card:
I claim a reading card formed of two parts, a b, connected by a oint, c, and provided with a flap, B, substantially as set forth.

[The object of this invention is to obtain a simple and cheap device to assist persons in reading in railroad cars, and one which may be readily manipulated or adjusted over the paper or printed page from line to line, be firmly held in position, and, when not in use, capable of being compactly folded and carried conveniently in the pocket.]

36,243.—Edward Spencer, of St. Louis, Mo., for Improvement in Marking Machines:
I claim, first, In combination with the jaws, A A', the die, N, substantially in the manner described, for the purpose specified.
Second, In combination with the jaws, A' A, and die, N, the yielding bottom, r, under the die, as shown and described.
Third, In combination with the jaws, A' A, rollers, H H, and friction wheels, d d, the india rubber friction pieces, L L, as shown and described.
Fourth, In combination with the jaws, A' A, the perforator, C, as shown and described, for the purpose specified.
Fifth, In combination with the jaws, A' A, and perforator, C, the punch, B, as shown and described.
Sixth, In combination with the jaws, A' A, and die, N, the punch, B, as shown and described, for the purpose specified.
Seventh, In combination with the jaws, A' A, the perforator, C, the die, N, and the rollers, H H, as described.

36,244.—E. T. Starr, of New York City, for Improvement in Skates:
I claim having the foot stand, A, made adjustable in respect to the runner, B, substantially in the manner herein shown and described; so that the skate may be adjusted to boot heels of different hights; and the runner be thus readily made to occupy a horizontal position in respect to the bottom of the wearer's foot, all as set forth.

[The object of this invention is to obtain a skate which will admit of being adjusted in such a manner as to compensate for the varying hight of the heels of boots and shoes, and thereby admit of the foot of the skate having a proper relative position with the skate, so as to insure ease and comfort in skating.]

36,245.—C. E. Steller, of Genesee, Wis., for Improvement in Sod Cutters:
I claim, first, The arrangement of two or more vertically-adjustable cutter beams, A B, each being provided with a series of oblique cutters, C C', inclined laterally in opposite directions, in combination with the self-adjusting drag, G, constructed and operating as and for the purpose shown and described.
Second, The arrangement of the notches, i, in the top end of the cutters, C C*, in combination with the buttons, j, as and for the purpose specified.

[An engraving and full description of this invention will soon be published in the SCIENTIFIC AMERICAN.]

36,246.—J. Thompson and D. D. Dalrymple, of Cross Roads, Ohio, for Improved Sawing Machine:
We claim the combination of the frame, J, rollers, l l, and clamp, L, with the pivoted saw, I, bow, h, shank, d, rollers, e e, gate, H, disk, G, and wheel, F, the whole operating together in the manner herein shown and described.

[This invention consists in the arrangement of a horizontally-sliding slotted frame or gate, to which the saw is attached by a pivot, and which receives a reciprocating motion by means of an eccentric wrist-pin projecting from the face of a rotary disk, or by any other convenient means, in combination with a vertically-sliding guide frame, which serves to raise or lower the saw, and the weight of which assists to press the saw down upon the wood, thereby facilitating the operation of cutting.]

36,247.—Stillman Thorp, of Turner, Maine, for Improvement in Car Coupling:
I claim the chambered sliding box or tube, D, attached to buffer, C', applied to and operating in connection with draw bar, B, link, m, and coupling pin, i, substantially as set forth, for the purpose specified.

36,248.—S. E. Tompkins, of Newark, N. J., for Improvement in Hooks and Terrets for Harness Saddles:
I claim, first, Having the frame or body, A, of the hook or terret formed of two parts, a b, connected by screws or rivets, substantially as set forth.
Second, The leather covering, B, inserted between the two part, a b, of the frame or body, A, and fitted around the part, b, with the rivets or screws passing through it, substantially as and for the purpose set forth.
Third, The combination of the frame or body, A, formed of two parts, a b, connected together as shown, with the leathercovering, B, when the parts are so arranged that the inner part, a, of the frame or body will form the metal lining of the hook or terret, and also the tip of the hook, all in one piece, without a joint, while the part, b, serves as the body for the leather covering, as set forth.

36,249.—William Tunstill, of Paterson, N. J., for Improvement in Braiding Machines:
I claim the arrangement of the lever, g, catch bar, h, and stop motion lever, k, in combination with the miter gears, d and f, as and for the purposes set forth.

36,250.—W. H. Waldby, of Cooperstown, N. Y., for Improvement in Grain-Cleaning Machines:
I claim the screen, D, and the frustum of a cone, C, provided with the beaters or wings, a a, brushes, b b, and teeth or pins, c, in combination with the fan, G, and spouts, E F, all arranged as and for the purpose herein set forth.

[The object of this invention is to obtain a compact and portable machine for scouring grain and depriving the same of all impurities, such as smut, dirt, &c., whether mixed therewith in a loose state or connected to it so as to form a glazing thereon.]

36,251.—J. B. Watkins, of New Bedford, Mass., for Improvement in Awnings:
I claim attaching the awning, D, to the framing, A, by means of the rings, c, when said rings are used in connection with the stationary board or strip, C, and the sliding board or strip, E, to which the awning is attached, and cords or ropes, d e, connected to the board or strip, E, all arranged as and for the purpose herein set forth.

[The object of this invention is to arrange an awning for store fronts and like purposes, which will be capable of being extended and drawn up with greater facility than those provided with rollers and now quite commonly used, and one which will afford better ventilation for the awning when drawn up, so that it will not be so liable to mildew and decay, and also be capable of being put up and applied at a less expense than the roller awning.]

36,252.—William Webster, of Morrisania, N. Y., for Improved Fire-Damper Regulator:
I claim the combination and arrangement of the cylinder, A A B B, the piston, C C, and packing, D D D D, substantially as shown and described.

36,253.—A. K. Young, of Boston, Mass., for Improvement in Band and Skirt-Hoop Attachments:
I claim my improved band and skirt-hoop attachment, consisting of the metallic clasp, B, and the projection, a, constructed, arranged together and applied to the band and skirt hoop, substantially as described.

36,254.—J. A. Bassett, of Salem, Mass., assignor to the American Steam Gas Company, for Improvement in the Manufacture of Illuminating Gas:
I claim passing superheated steam into a retort containing carbonaceous material partly in an incandescent and partly in a bituminous state, substantially as set forth.

36,255.—S. B. Everitt (assignor to the Thomas Manufacturing Company), of Plymouth Hollow, Conn., for Improvement in Knife Handles:
I claim the construction of the handle of a pocket knife of two shells, A A, stamped or punched out of sheet metal or alloy, and having the ends of their concave interiors filled with fusible metal or alloy, as shown at a a, and herein described, or with an equivalent filling of hard metal.

[This invention consists in the manufacture of the handles of pen and pocket knives of two shells, one for each side of a handle, stamped or punched out of plates or sheets of silver, brass or other sheet metal or alloy, with convex exteriors of any form and design, and having the ends of their concave interiors filled with some metal of more fusible character to make them solid, for the reception of the handles.]

36,256.—J. S. McCurdy, of Brooklyn, N. Y., assignor to Wheeler and Wilson Manufacturing Company, of New York City, for Improvement in Sewing Machines:
I claim, first, The combination of a reciprocating eye-pointed needle for carrying one thread with a rotating hook-pointed shuttle, by means of multiple gearing, operating in such a manner that the shuttle rotates two or more times as fast as the crank pin, or its equivalent, for imparting the reciprocating movement to the needle, substantially as set forth.
Second, I also claim the combination of a spool bobbin with a rotating shuttle by means of a central spindle, substantially as set forth.
Third, I also claim the combination of a rotating shuttle with a thread tension for the shuttle thread that remains stationary within the shuttle, substantially as set forth.
Fourth, I also claim the combination of a rotating shuttle with a thread guard for the needle thread, substantially as set forth.
Fifth, I also claim the combination of a reciprocating eye-pointed needle and rotating shuttle with a positive thread take-up, operated by a rock shaft of the needle mechanism, substantially as set forth.
Sixth, I also claim the combination of the members for operating the needle with the rotating shaft of a sewing machine through the intervention of a crank, in connection with the combination of the spindle for operating the rotating shuttle with the same rotating shaft through the intervention of gearing, substantially as set forth.
Seventh, I also claim the combination of the rotating shuttle with the spindle that operates it, in such a manner that the shuttle is located over the head of the spindle and driven by a driver secured to said spindle, substantially as set forth.

36,257.—Dan Read (assignor to A. A. Taylor), of Boston, Mass., for Improvement in Covering Spinning Rolls:
I claim the combination of a spinning roll by the combination, in solid form, of india rubber with iron or other metal, and in said solid form vulcanized in the part composed of said india rubber, as herein described. Also the obtaining, by the aforesaid means, the harder and compact outer surface combined with an inner elasticity possessing the advantages aforesaid, and such other rolls as are substantially of the same construction, claiming to produce the same improvements.

36,258.—J. H. and A. E. Redstone (assignor to themselves and J. M. Ray), of Indianapolis, Ind., for Improvement in Harvesters:
We claim, first, The device, B, when operated in connection with the master wheel, A, and frame, substantially in the manner and for the purposes set forth.
Second, Operating the sickles of a reaper by means of inclined slots in plates or ears attached to the bar and operated upon by a connection rod, substantially as set forth.
Third, Operating the rake, F, by means of a crank placed over the main axle, and operated between the master wheel and the frame of the machine, substantially as described.
Fourth, The revolving band table, in connection with the arms, K, when operated substantially as set forth.
Fifth, The band twister, V', when constructed and operated substantially as set forth.

36,259.—R. A. Stratton (assignor to G. W. Carr & Co.), of Philadelphia, Pa., for Improvement in Apparatus for Hardening Strips of Steel:
I claim, first, Hardening strips of steel or steel wire by passing them at an uniform speed, and in a red-hot state, vertically through an opening in a trough containing water or other suitable fluids, when a constant stream of the latter is allowed to pass through the said opening in contact with and so as to surround the wire, as herein set forth.
Second, Heating the said strips of steel or steel wire by passing them vertically through guides, and in contact with or adjacent to a series of flames, as herein described.

36,260.—R. A. Stratton (assignor to G. W. Carr & Co.), of Philadelphia, Pa., for Improvement in Joints for Ribs of Umbrellas and Parasols:
I claim, as a new manufacture, the block, D, cast to the rib, A, and arranged for connection to the stretcher, B, as and for the purpose herein set forth.

36,261.—R. A. Stratton (assignor to G. W. Carr & Co.), of Philadelphia, Pa., for Improvement in Tips for Umbrellas and Parasols:
I claim, as a new manufacture, metal tips cast on to the steel ribs of umbrellas and parasols, as and for the purpose herein set forth.

36,262.—Emil Trittin, of Philadelphia, Pa., assignor to David Rice, of New York City, for Improvement in Lamp Burners:
I claim, first, constructing the wick tube of two parts, B E, connected together by the plate, D, and points, e, of the lower part, A, of the burner, with a space, g, between them, substantially as and for the purpose herein set forth.
Second, In combination with the wick tube thus constructed the jacket, G, supported on the burner by the points, d, of the plate, D, as and for the purpose specified.

[This invention consists in forming the wick tube of the burner of two parts, connected together in such a manner that the upper part will be insulated from the lower part, and the wick tube thereby prevented from conducting heat down to the fountain or reservoir of the lamp, so as to present an undue evaporation or volatilization of the oil, and consequently a too copious supply of vapor to the flame. The invention also consists in a novel way of fitting the cone and jacket to the burner, whereby the former is insulated from the latter, and heat also prevented from being conducted below to the fountain.]

36,263.—Turner Williams (assignor to himself and David Heaton, 2d), of Providence, R. I., for Improvement in Cranks for Driving Sewing Machines and other Machinery:
I claim, first, The construction and arrangement of the friction pawls, L M, substantially as herein shown and described for the purpose specified.
Second, I claim the use of a spring connection, k, or an equivalent yielding force, arranged and operating substantially as described for the purpose specified.
Third, I claim the peculiar construction of the connecting rod, l, substantially as herein shown and described.
Fourth, I claim the spring, N, in combination with the connecting rod, l, substantially as described for the purpose specified.

36,264.—H. S. Fisher, of Newburgh, Pa., for Improvement in Preserve Cans:
I claim, first, The can cap, H, constructed with the plane portion, d, and bulge portion, i, in connection with the can top, having a central orifice through it, all substantially in the manner and for the purpose described.
Second, I also claim the combination of the cap, H, constructed as described, can top and clamp, K, substantially in the manner and for the purpose described.
Third, I claim the cap, H, in combination with the orifice elevation, c, and fillet, g, in the manner and for the purpose substantially as described.

CLAIMS OF AUGUST 5, 1862.

36,078.—Christian Dorflinger, of Brooklyn, N. Y., for Improvement in Lamp Chimneys:
I claim, first, The blowing and molding of glass chimneys for lamp neck, bulb and base, oval throughout the entire length, instead of round as at present done.
Second, The blowing of such chimneys in a mold, which insures perfect uniformity of size and a greater weight of glass, in the manner and for the purposes set forth.

36,079.—Christian Dorflinger, of Brooklyn, N. Y., for Improvement in Lamp Tops:
I claim the making of the top of lamp burners oval instead of round so as to receive and fit all oval lamp chimneys, in the manner and for the purpose herein set forth.

RE-ISSUES.

1,328.—David Landis, of Lancaster, Pa., for Improvement in Screens for Flour Bolts. Patented October 23, 1860 :

I claim, first, The rotating cylinder, D, and screen, E, the latter being placed within the former, and both arranged essentially as shown to operate as and for the purpose set forth.

Second, The metal lining, a* b*, within the bolt chest, for the purpose herein specified.

Third, The combination of the cylinder, D, screen, E, and metal bolt chest lining, a* b*, as and for the purpose set forth.

1,329.—Adam Lebkücner, of Belleville, Ill., for Improvement in Lubricating Compounds. Patented June 25, 1861 :

I claim the use for lubricating purposes of rosin oil, muriate or chloride of zinc, lime and water combined together, as above described.

1,330.—G. W. Scollay, of St. Louis, Mo., for Improvement in Burial Cases. Patented March 18, 1862 :

I claim, first, Controlling, disinfecting and deodorizing the gases as they escape from the coffin, by making a tube or valve therein and combining and confining with or over said hole or valve the disinfecting and deodorizing material in some part of the coffin, which is to be otherwise air tight.

Second, Making a chamber in combination with the coffin, for the purpose of holding the deodorizing and disinfecting material, and causing the gases to pass through said chamber on their way out of the coffin.

Third, The use of the valve, a, in combination with the disinfecting and deodorizing chambers.

DESIGNS.

1,650.—E. J. Ney (assignor to the Lowell Manufacturing Co.), of Lowell, Mass., for Design for a Carpet Pattern.

1,651.—G. J. Mix, of Wallingford, Conn., for Design for Spoon Shanks.

1,652.—Myer Phineas, of New York City, for Design for an Inkstand.

[More than one-third of the patents in the above list were obtained through the Scientific American Patent Agency.]

PATENTS FOR SEVENTEEN YEARS.

The new Patent Laws enacted by Congress on the 2d of March, 1861, are now in full force, and prove 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, excepting 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 testimonials for the services we have rendered them, and the wealth which has inured to the Inventors whose Patents were secured through this Office, and afterward illustrated in the SCIENTIFIC AMERICAN, would amount to many millions of dollars! We would state that we never had a more efficient corps of Draughtsmen and Specification Writers than are employed at present in our extensive Offices, and we are prepared to attend to Patent business of all kinds in the quickest time and on the most liberal terms.

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 Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

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 consists, for the Patent Office. These should be securely packed, the inventor's name marked on them, and sent, with the government fees 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 little risk in sending bank bills by mail, having the letter registered by the postmaster. 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, in English and German, 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.

Rejected Applications.

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

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

ssignments 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.

Notes & Queries

O. B., of N. Y.—Your plan for utilizing the power of the tides by means of the rise and fall of heavy floats is not so good as the plans in common use. The motion of the floats would be so slow—about one foot an hour at this point—that very little power would be obtained. The usual plan is to set the mill on a narrow strait which connects a large pond or lake with the sea, and to construct the wheel so that it will turn in one direction as the tide is coming in, and in the other as the tide is running out. At the Mill Dam near Boston is such a mill, and there are several on Long Island. Some two years since we published the description of an improvement in tide mills invented in France, by which a constant current in one direction is obtained.

M. P. B., of Pa.—It is quite common to construct steamboats of very light draft for the Western waters with paddlewheels at the stern ; but this plan would be very unsuitable for sea-going vessels.

P. S., of Mass.—Attaching armor plates to ships' sides by hinges so that the plates may swing, has been repeatedly suggested ; but the plates are so heavy and the motion of the shot so rapid, that we doubt whether the plates would yield quickly enough to prevent them from being broken.

A. H. T., of N. J.—The only way you can get the Patent Office Reports is either from your member of Congress or the Commissioner of Patents. The latter officer is supplied with enough to furnish all patentees whose names are registered in the report. The balance are turned over for general distribution to senators and representatives, who ought to make a judicious distribution of them among their constituents.

F. M., of Pa.—There was once in force a law to prevent the Government from purchasing patented inventions. It originated with Jeff. Davis, but it did not work. Government found out that it could not get along without the aid of patente inventions Send along a sketch and description of your invention and we will examine it.

W. W., of N. Y.—" The History, Theory and Practice of the Electric Telegraph," by George B. Prescott, published by Ticknor & Fields, Boston, will give you the information which you want.

C. J., of Conn.—Sulphureted hydrogen gas is the most sensitive known test for lead in water. One grain of the nitrate of lead dissolved in 500,000 grains of water, when a stream of sulphureted hydrogen gas is passed through it, becomes sensibly discolored. Gold leaf is only about a quarter of a million of an inch in thickness

H. W., of Pa.—Jewelry is colored by what is called " gilder's pickle." It consists of alum and salt, each 1 ounce, saltpeter 2 ounces dissolved in one pint of water. The trinkets are boiled in this for a very few seconds, then lifted out and washed. This treatment imparts to them a rich color.

A. D. H., of Minnesota.—The tincture of arnica is made by macerating the flowers of arnica montana in dilute alcohol. You can obtain the plant in almost any druggist store and make the tincture yourself. It is much used as a linament for wounds and bruises. An infusion of arnica in water is as suitable for most purposes as the tincture.

W. H. W., of Mass.—A good alloy for casting figures is composed of copper 88 parts by weight, tin 9 parts, zinc 2 and lead 1. Melt the copper first, then add the tin and lead cautiously, and lastly the zinc. When melted run into ingots, and use these for casting your figures. You may cast figures in zinc which melts at a comparatively low temperature, then coat them with a thin pellicate of copper and they will resemble brass.

J. R., of Wis.—Address any of the manufacturers of water wheels and pumps who advertize in the columns of the SCIENTIFIC AMERICAN, stating the fall and quantity of water in your creek, the hight which you wish the water raised, and the distance carried and you will be informed respecting the cost and character of the requisite wheel and pump to accomplish your object.

B. C. M., of N. Y.—If you mix some alum dissolved in water with common mortar you will render it a good fire-proof cement. The plaster of Paris is used as a fire-proof material in safes. Kaolin or the porcelain clay used for making pottery ware, will answer just as well as fire clay for the cement of your furnace, but you should endeavor to obtain good fire brick and fire clay for setting your boilers rather than run any risk in trying a new material.

J. M. Y., of Ohio.—French and Italian peasants sometimes mix roasted chesnuts with their coffee, and they say its flavor is thus improved.

L. McD., of N. H.—The Paynising process for treating timber consists in first filling the pores of wood with muriate of lime, then forcing in a solution of sulphate of iron. This forms an insoluble sulphate of lime in the pores of the wood and renders it fire proof.

J. W. R., of Mass.—Pins are made of brass coated with tin. They are all made by machinery and the head and shank formed in one piece. The old pins were formed with heads and shanks in separate pieces, and most of the operations were executed by hand labor.

Money Received

At the Scientific American Office on account of Patent Office business, from Wednesday, Aug. 20, to Wednesday, Aug. 27. Persons having remitted money to this office will please to examine this list to see that their initials appear in it, and if they have not received an acknowledgment by mail, and their initials are not to be found in this list, they will please notify us immediately, and inform us the amount, and how it was sent, whether by mail or express.

I. S. S., of N. Y., $20; A. J., of Conn., $20; A. L., of Cal., $47; H. & C., of N. Y., $22; H. M. P., of Mass., $20; G. M. M., of N. Y., $20; E. B., of Conn., $20; S. A. S., of Mass , $20; B. Z., of N. Y., $20; I. R., of D. C., $22; T. S., of Conn., $45; C. B. M., of Ill., $45; J. W. W., of Mich., $20; A. M., of N. Y., $45; T. V. N., of N. Y., $20; S. A. B., of Conn., $20; D. & K., of Conn.. $20; R. H., of N. Y., $20; J. R. P., Jr., of N. Y., $15; C. T. B., of N. Y., $10; E. F. & J. H., of N. Y., $22; T. & S., of Cal., $15; T. J. K., of Ohio, $25; H. A. H., of N. Y., $15; S. F., Jr., of Mass., $25; J. C. C., of N. Y., $15; I. M. S., of Vt., $25; O. B. N., of Conn., $25; J. H., of Pa., $12; G. T. C., of Mass., $15; E. D., of Mass., $10; F. S., of Ill., $20; H. C. H., of Iowa, $40; H. S., of Pa., $15; H. F., of N. Y., $15; J. W., of N. Y., $15; O. S., Jr., of Iowa, $25; J. F. E., of Ill., $25; W. B. E., of N. H., $15; J. M. S., of N. Y., $20; C. & P., of Conn., $15; I. S. R., Md., $25; P. J. B., of Pa., $15; M. T., of Iowa, $30; A. M. B., of Ill., $25; H. H. S., of N. Y., $15; R. L. D., of Wis., $10; J. M., of N. Y., $35; J. L. B., of R. I., $15; T. W. W., of Mich., $15; L. J., of France, $15; S. R., of N. Y., $25; P. McG., of Iowa, $25; G. & C. of Iowa, $25; W. B., of Pa., $5; S. H., of Ind., $25; R. H., of N. J. $25; A. M., of N. Y., $25.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from August 20 to Wednesday, August 27, 1862:—

C. T. B., of N. Y.; S. S. T., of Cal.; I. M. S., of Vt.; H. C. H., of Iowa; T. J. K., of Ohio; O. B. N., of Conn.; C. W. T., of Ill.; S. F., Jr., of Mass.; J. P., of N. Y.; J. L. E., of Ill.; O. S., Jr., of Iowa; J. H., of Pa.; T. S., of Conn.; A. M. B., of Ill.; J. P., of N. Y.; M. T., of Iowa; I. S. R., of Md.; R. H., of N. J.; J. M., of N. Y.; S. R., of N. Y.; J. M. R., of N. J.; G. & C., of Iowa; W. B., of Pa.; S. H., of Ind.; G. C., Italy.

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RECEIPTS.—When money is paid at the office for subscriptions, a receipt for it will always be given ; but when subscribers remit their money by mail, they may consider the arrival of the first paper a *bona fide* acknowledgment of our reception of their funds.

INVARIABLE RULE.—It is an established rule of this office to stop sending the paper when the time for which it was pre-paid has expired.

Models are required to accompany applications for Patents under the new law, the same as formerly, except on design patents when two good drawings are all that is required to accompany the petition, specification and oath, except the government fee.

PATENT CLAIMS.—Persons desiring the claim of any invention which has been patented within thirty years, can obtain 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 at this office. Address MUNN & CO., No. 37 Park-row, New York.

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For further particulars, address—

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TO INVENTORS AND MANUFACTURERS.—PATENTEES who may have valuable Patent Rights granted and secured to them from the Government of the United States, and who may desire to secure for themselves the same Patents from the Government or Provinces of South America and the West India Islands; and manufacturers who have machinery and other articles suited to that section, which they desire to introduce there for sale, will be enabled to secure Patent Rights, and the introduction and sale of machinery, &c., through the commercial house of Messrs. Herrick & Willet, established in South America and New York. Apply to HERRICK & WILLET, 313 Greenwich street. 10 4

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PARTNER WANTED WITH MEANS TO INTRODUCE the original propeller for canal boats, illustrated in SCIENTIFIC AMERICAN, May 31, 1862. Experiments have been made with most satisfactory results. Particulars can be furnished by the assignee. Address Box 119, P. O., Toronto. 10 2*

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RENSSELAER POLYTECHNIC INSTITUTE, TROY, N. Y.—The thirty-ninth Annual Session of this Institution for instruction in the Mathematical, Physical and Natural Sciences, will commence on Wednesday, Sept. 17, 1862. Appropriate quarters, and a full supply of apparatus, will be provided, so that all the Courses of Instruction can be given precisely as heretofore. The new buildings for the Institute will be placed on a more commanding site, and be constructed as soon as possible.

The Annual Register, containing full information, can be obtained from Prof. CHARLES DROWNE, Director. 6 6

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SCIENTIFIC AMERICAN Office, No. 37 Park-row, New York.

IMPORTANT TO INVENTORS.

MESSRS. MUNN & CO., PROPRIETORS OF THE SCIENTIFIC AMERICAN, continue to solicit patents in the United States and all foreign countries, on the most reasonable terms. They also attend to various other departments of business pertaining to patents, such as Extensions, Appeals before the United States Courts Interferences, Opinions relative to Infringements, &c. The long experience Messrs. MUNN & Co. have had in preparing Specifications and Drawings, extending over a period of sixteen years, has rendered them perfectly conversant with the mode of doing business at the United States Patent Office, and with the greater part of the inventions which have been patented. Information concerning the patentability of inventions is freely given, without charge, or sending a model or drawing and description to this office.

Consultation may be had with the firm between NINE and FOUR o'clock, daily, at their PRINCIPAL OFFICE, No. 37 PARK ROW, NEW YORK. We have also established a BRANCH OFFICE in the CITY OF WASHINGTON, on the CORNER OF F AND SEVENTH STREETS, opposite the United States Patent Office. This office is under the general superintendence of one of the firm, and is in daily communication with the Principal Office in New York, and personal attention will be given at the Patent Office to all such cases as may require it. Inventors and others who may visit Washington, having business at the Patent Offices are cordially invited to call at their office.

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

A pamphlet of information concerning the proper course to be pursued in obtaining Patents through their Agency, the requirements of the Patent Office, &c., may be had gratis upon application at the Principal Office, or either of the Branches. They also furnish a Circular of information about Foreign Patents.

The annexed letters from former Commissioners of Patents we commend to the perusal of all persons interested in obtaining Patents:—

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

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

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

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

Communications and remittances should be addressed to
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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

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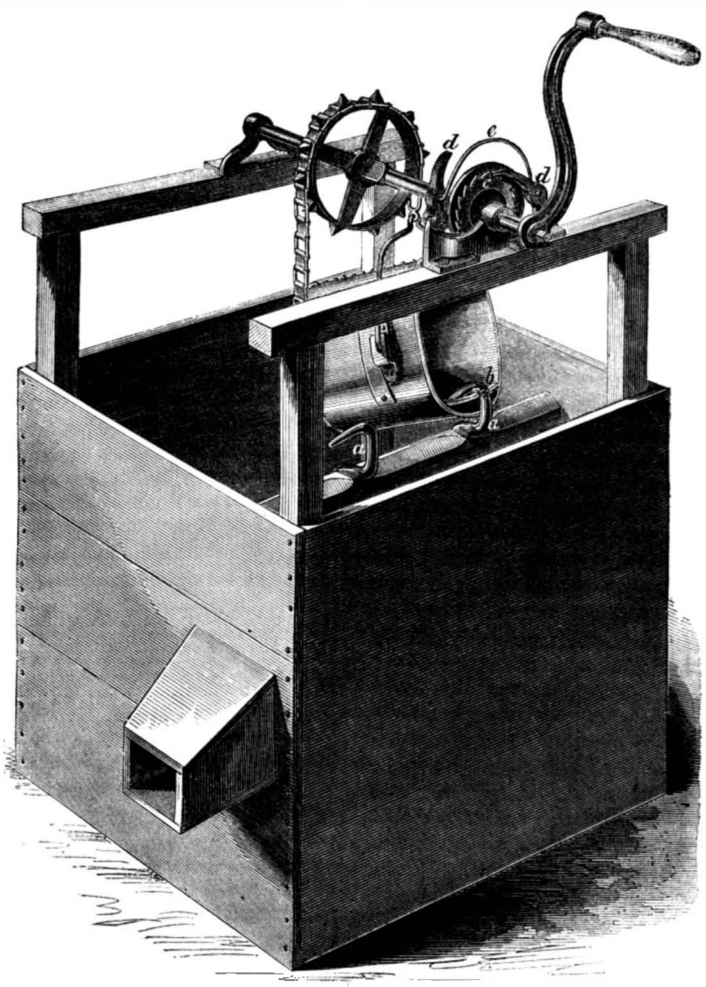
The organs of man's physical frame are made to run in water, and if they become dry their motions immediately cease. As the water carried in the system is constantly passing off through the pores of the skin, it is necessary to renew the supply very frequently, and it is fortunate that we are always able to obtain this indispensable fluid by penetrating a short distance into the earth. When the well is dug, the question arises of the best mode of raising the water to the surface, and an immense number of plans have been suggested for accomplishing this result. The best of all, however, is the plan of letting down a bucket by a rope, and pulling it up full of water. This avoids all waste of power in overcoming friction, and keeps the water pure and sweet, by leaving it open to the air and free from any contaminating substances. This truth is pretty generally recognized, and many plans have been devised for applying muscular power for drawing up the bucket in the most convenient and efficient manner. One of the best, and perhaps the best, of these plans is that of the windlass with a bucket at each end of the rope, as in this case the weight of one bucket is balanced by that of the other, and the resistance is at all times nearly uniform. In practice two inconveniences have been developed in this plan; one is the strain required to empty the bucket after it has been drawn to the surface, and the other is the danger from the rapid rotation of the crank, in case the hold upon it is accidentally loosed, and the full bucket is allowed to run down. Several patents have been taken for inventions designed to overcome these inconveniences, and one of the simplest and most effectual of these is illustrated in the annexed engravings.



M'GREGOR'S WELL CURB AND BUCKET.

Two stationary hooks, *a a*, are secured to a bar which passes across the interior of the curb, in such position that as each bucket comes to the level of the discharging spout its rim catches under the hook, and is held while the body of the bucket continues to be raised by the turning of the windlass, thus tipping it and pouring the water into the spout. A bar, *b*, is secured to the interior of the bucket, in such position that the hook may catch over it as the bucket is tipped; thus preventing the edge from slipping from off the hook.

To prevent the full bucket from running down in case the hold upon the windlass is loosed, a ratchet wheel, *c*, is secured upon the shaft of the windlass, and is furnished with a pawl, *d*. This ratchet is made double, one for each bucket, and the two pawls are connected by a bail, *e*, so that a slight brush of the hand reverses the hold of the pawls after one bucket is emptied and the act of drawing up the other is to be commenced. The buckets are made a little heavier upon one side than upon the other, to prevent them from assuming an upright position in the water before they are completely filled.

In place of a rope upon the windlass, the buckets are connected by a flat iron chain, the links of which are open and catch upon spurs on the windlass shaft, or upon a wheel secured to this shaft; thus surely preventing the chain from slipping, and causing the buckets always to present the proper side to the encounter of the hooks. The inventor prefers to make the buckets and chain of galvanized iron.

This apparatus has been in use for some time, in several wells ranging from 3 to 90 feet in depth, and gives universal satisfaction. It was invented by F. B. McGregor, and the patent was granted, through the Scientific American Patent Agency, June 18, 1861, and for the purchase of either curbs or rights, or for any further information in relation to the matter, inquiries may be addressed to McGregor, Hoyt & Co., at Pontiac, Mich.

Water-Proof Photographic Varnishes and Cements.

The following receipts have been communicated to the London *Photographic News*, by H. R. Nicholls. He says:—

The wants of the ardent student of photography being many, I forward you, as a contribution to the supply of some of them, the quantities for the compounds, to which I referred in a recent communication, of caoutchouc and gutta percha with pitch, their uses and application. They are great favorites with me, as I have used them successfully for photographic purposes now twenty-four years, and for some four or five previously for chemical, domestic and building purposes. The first purpose to which I applied such a compound was for lining a tank to supply my laboratory with water. Being at the time a very bad plumber, necessity compelled me to resort to other means than the soldering irons. I then used, caoutchouc, 1¾ lb; Stockholm pitch, 1 lb. Cut the caoutchouc in small pieces and melt in an iron ladle, stirring with an iron rod, add the pitch in small portions at a time, stirring it until the compound is perfectly smooth. For convenience in use, mold it in the form of a stick, in a stout paper tray. This compound is adapted for metal joints of tanks or pipes, above or below ground. To apply it, scrape the parts clean and apply the compound with a hot iron, smoothing it well over the edges of the joint or fracture. For stone, slate or glass, add to every four ounces of the compound a quarter of an ounce of glass flour. Care must be taken that no fatty substance comes in contact with the compounds, or their destruction will soon follow.

For wood work sunk in the ground, use, caoutchouc, 1½ lb; pitch ½ lb. Melted as before, apply in the same way.

FROM THE STEAM PRESS OF JOHN A. GRAY