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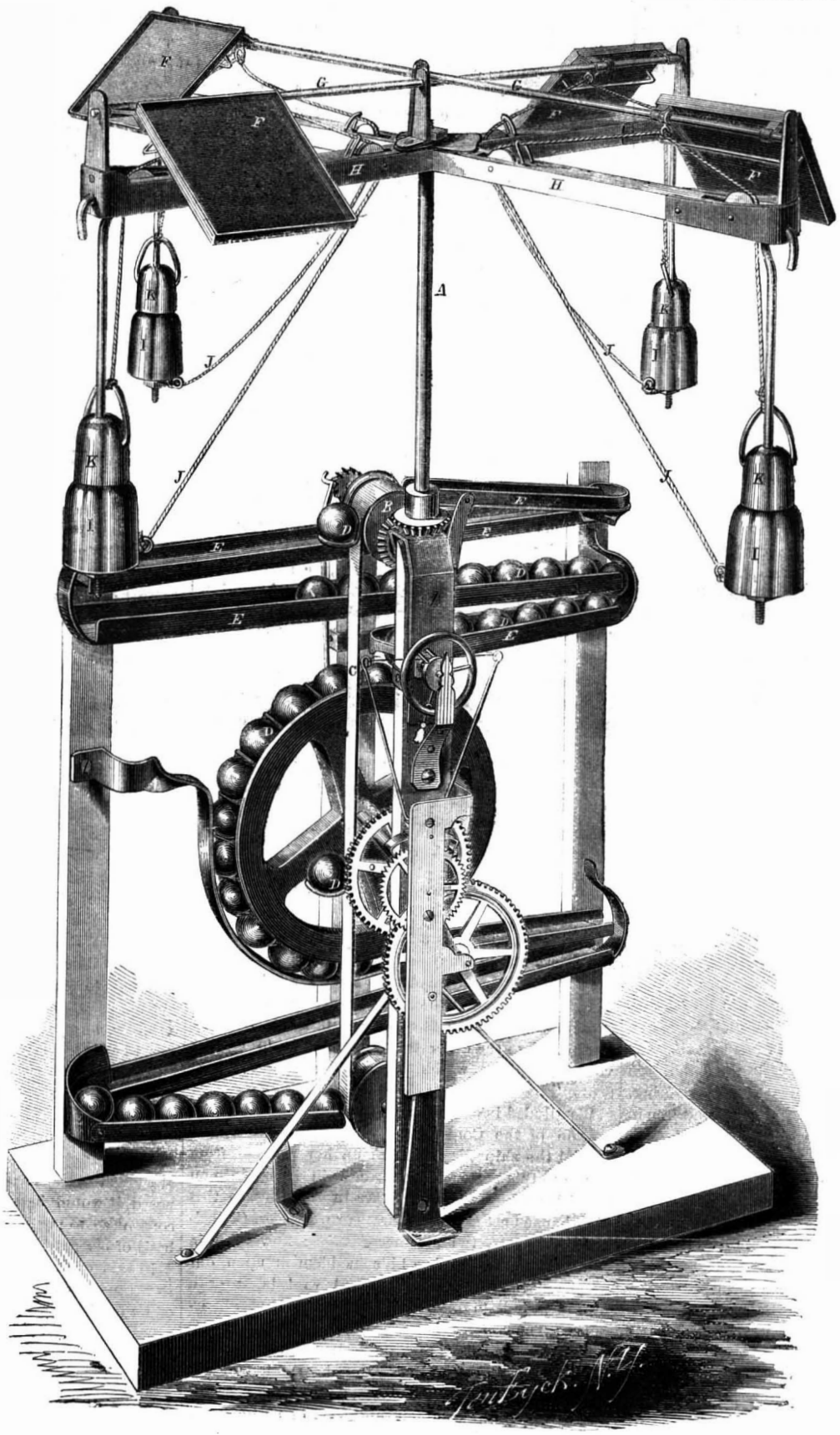
Improved Windmill and Motive Power.

One of the great forces nature furnished to man without any expense, and in limitless abundance, is the power of the wind. In the vast labor of transporting the surplus products of one country to another, this power is very extensively employed, and it has been used to a considerable extent for grinding corn, and other purposes requiring the operations of machinery. Its great unsteadiness, however, is causing it to be rapidly superseded for such purposes by steam and other constant powers.

Many efforts have been made to obtain a steady power from the wind by storing the surplus when the wind is strong to be used when it dies away. One of the latest and simplest of these is illustrated in the accompanying engraving. A windwheel is employed to raise a quantity of stone or iron balls, and then these balls are allowed to fall into buckets upon one side of a wheel, causing the wheel to rotate on the plan of a treadwheel, and thus to drive the machine. The vertical shaft, A, of the windwheel is connected by bevel gears with the horizontal pulley, B, which carries the endless belt, C. This belt is furnished with hooks or fingers, which pick up the balls, D D D, as they come from the bottom of the wheel, and carry them up to the troughs, E E, above the wheel. To enable the troughs to hold a large number of balls, they are extended back and forth across the frame of the mill, as shown, and are slightly inclined downward, to cause the balls to feed forward to the wheel by their own gravity.

The vessels or sails, F F, of the windwheel are hung at their upper edges upon the rods, G G, so that their lower edges may swing against the sides or the arms, H H. It will be seen that from whatever point of the compass the wind may blow, the wheel is always carried around in the same direction. When one sail is turned down against the arm the sail upon the opposite side of the wheel is turned up into an exactly horizontal position, not merely by the force of the wind, which would cause the sail to offer some resistance to the motion, but by means of arms, which are secured rigidly to the rods, G G. There is one of these arms opposite to each sail, and as one sail is turned down it rotates the rod, turning the opposite sail up by means of the rod against which it rests.



GIRAUDAT'S WINDMILL AND MOTIVE POWER.

The velocity of the motion is regulated by means of the weights, I I, which are suspended by hinged rods from the ends of the arms, and connected with the sails by lines, J J, that pass over pulleys at the inner ends of the arms. As the rapidity of the motion increases the weights are thrown outward by centrifugal force, drawing the sails inward toward the center of the wheel, and thus diminishing their power. As the motion slackens the weights, J J, fall, and the sail is drawn outward along the arms by the smaller counter weights, K K. The motion may be still more accurately governed by means of a pendulum and escapement, as represented in the engraving.

Patents for this invention were granted through the Scientific American Patent Agency, March 25 and August 27, 1861, and further information in relation to it may be obtained by addressing the inventor, A. Giraudat, at No. 45 East Fifteenth street, New York.

THE common lumber received at Detroit, is mostly shipped to the northern lake ports of Ohio, from which it is distributed over the whole state. The amount thus annually shipped is about sixty million feet, leaving a surplus on hand to be consumed in the city and adjoining country of ten million feet. Besides the lumber sent to eastern markets and the lake ports, a large amount is shipped into the country by rail, by way of the Michigan Central and Michigan Southern railroads. The city of Chicago, however, far exceeds Detroit in the quantity of lumber which it exports.

NOTES ON MILITARY AND NAVAL AFFAIRS.

A meeting has been called in Memphis "to devise measures to repel the invader whenever he appears." We suppose that the meeting passed a resolution that the invader should be expelled, which is an easy way of getting rid of him.

Small change is so scarce in Memphis that at a meeting of the merchants of that city a resolution was adopted recommending the banks to cut their bills into fractional parts, in order to supply the want.

The planters on the seaboard, since Commodore Dupont appeared to them, seem to have lost all confidence in their seacoast defences, and, reports say, have commenced to destroy their crops of cotton and rice, by the application of the flaming torch, for fear that it may fall into the hands of the enemy. Many of the plantations on North Edisto and the neighborhood elsewhere on the coast of South Carolina are one sheet of flame and smoke. If this be true it will hurt Jeff's Treasury bonds, as they are issued on the cotton basis. We don't believe all the stories we see in the newspapers.

The people of the amiable city of Memphis are getting scared. They are expecting a formidable expedition down the Mississippi, and that "a great battle will soon be fought at Columbus, and if overpowered Memphis will fall into the hands of the Federals unless Alabama, Mississippi and Louisiana help." The secessionists of Memphis did everything in their power to bring on the war, and if they feel the weight of its blows it will be no more than stern justice. Gen. Pillow told them at the outset that Memphis was safe, and urged the war upon Kentucky.

The third stone fleet is soon to sail from New York. It will carry over 6,000 tuns of stone, to be sunk in the channel between Morris and Sullivan islands, in Charleston harbor, and in the Stone Breach and other inlets running into the harbor.

An immense business is transacted in the Quartermaster's Department in Cincinnati. Directly and indirectly not less than 25,000 persons are employed in the manufacture of clothing, camp equipage, transportation, &c. The Quartermaster states that during the past four weeks he has paid out two millions of dollars, and that he has heavy payments now to make.

When some person, the other day, called General Buell's attention to the telegraphic statement that Jeff Davis's Congress had determined to transfer their "capital" from Richmond to Nashville, he seemed tickled at such presumption, and replied, "That's where *we* are going."

A large pile of several thousand bricks provided in Boston for Gen. Butler's expedition shows that something more substantial than wood will be used in the construction of the building necessary for the use of the soldier, and will obviate the necessity for such "underground" fireplaces as are common in the army of the Potomac.

A correspondent writing from Paducah, Ky., says "the first thing that arrests the attention of a stranger on his arrival is the great number of business houses that are closed. There are no bills on them, with the usual inscription, "To let," but the entire city presents the appearance of a place that has been abandoned, and is fast becoming the habitation of owls and bats. Another feature, equally striking, is the almost entire absence of women and children in the streets. I have walked through all the principal streets in the suburbs, and I believe it would be safe to say that four-fifths of the dwellings are deserted. Many of them look as though their occupants had been invited out to dine with a friend, and found the entertainment so pleasant that they forgot to return." This place was ruled by secessionists before Gen. Grant's forces took possession of the town.

A citizen of Meadville, Pa., has invented a bomb-shell to contain a half gallon of rock oil, which will ignite when the shell explodes and scatter fire and death wherever it strikes. Seceshers will go on their long journey with their boots greased when these playthings fly among them.

A report from Memphis, Tenn., *via* Cairo, states that a fight had taken place at Morristown, East Tennessee, on Sunday, the 1st of December, in which three thousand Union troops severely whipped the secessionists. It is alleged that the Union forces were led on by Parson Brownlow, and this seems to be credited at Washington. The Parson evidently belongs to the fighting stock of the church militant, and seems to have studied with effect the military career of Joshua, Gideon and Peter, who, in one of his fighting moods, struck off the ear of Malchus with his sword. In this war we trust that the Parson may be able to proclaim with great effect that he carries the sword of the Lord and Gideon.

The news from Port Royal is of a satisfactory character. The captured forts are generally in good condition, and earthworks are in progress on other parts of Hilton island. A temporary pier has been constructed for the purpose of enabling surfboats to land the immense supplies of building material and the materials of war, together with the supplies of the commissary department. Boxes of dry goods, provisions, stores, cannon, small arms, ammunition, gun carriages, camp equipage, horses, lumber, bricks and every conceivable article for the support and maintenance of an army of fifteen thousand men were scattered about in confusion.

In a few days, immense store houses, hundreds of feet in length, were constructed, and detachments from the different regiments were busy night and day in filling them with government stores. An immense stable, capable of holding hundreds of horses, has also been built. A large building is going up designed as a bakery. A substantial pier is being built, under the superintendence of Col. Serrell of the Artizan regiment, which command is of incalculable service to the expedition. This pier is composed of sections of cribs anchored by casks and barrels filled with sand, as there is no stone in all this region. It connects with the government warehouses, and will be extended sufficiently far into the bay to enable vessels to come along side and unload.

Major Gen. Halleck has issued an important order to his commanding officers in Missouri, directing them to arrest and hold in confinement every one found in arms against the government, or those who, in any way, give aid to the enemy, and ordering that all persons found within the lines of the army, in disguise as loyal citizens, and giving information to the enemy, and all those taken from the ranks of the rebels in actual service, shall not be treated as prisoners of war, but as spies, and shall be shot. He further orders that the Provost Marshals of St. Louis shall take in charge the numbers of Union families who are crowding into that city—having been plundered and driven from their homes by the rebels—and quarter them upon avowed secessionists, charging the expense of their board to them, on the ground that, although they have not themselves plundered and driven forth these unfortunate people, they are giving aid and comfort to those who have done so.

A correspondent, in alluding to the unpretending style and dress of the Vice President of the United States, says "the next plainest man of rank is Gen, George B. McClellan. Few men can find him, and few know him when he is found. At the best he only wears the undress uniform of a Colonel, and his shoulder straps—if any he wears—are covered with a coat much worse for wear. He has no fixed location and moves from spot to spot as duty calls. Of course, those who have business with him know where to find him. Not so the eager throng who wish to see the young shoulders which bear the armor of Gen. Scott."

We alluded in our last number to the fact that the captain of the Confederate steamer, *Nashville*, had burned the ship *Harvey Birch*, on her passage from Havre to this port, taking her crew in irons, into an English port. The London *Star* in alluding to this high-handed act says :—"Pirate or privateer, Confederate or corsair, the steamer *Nashville* now lying in Southampton waters, is a hideous blemish upon our nineteenth-century civilization. A wild beast or a bird of prey is an object of dread but not of abhorrence. The *Nashville* is both—a floating den of brutalized human beings making destruction the immediate business of their lives—the destruction of unarmed and unoffending ships carrying on a peaceful traffic upon the common highway of nations. If Captain Pegram holds a commission or a letter of marque, the law of nations—to our shame be it said—will have nothing to say to him ; but the moral sense of mankind will still pronounce his achievement an outrage on humanity. If he do not carry either of those documents, the law of England at any rate will adjudge him guilty of a very specific offence according to the facts stated against him and remit him to the authorities of the nation which he disgraces, to be dealt with according to its laws. In either case, we repeat, he has done a deed which should make the ears of all men to tingle, and bring to a speedy conclusion the abominable system of making war at sea upon the persons and property of peaceful citizens."

A skirmish took place on the Upper Potomac on the 7th, which resulted disastrously to the secessionists. The secessionists, with a battery of artillery and some six hundred troops appeared opposite Dam No. 5, and commenced shelling it with a view to its destruction. A company of Massachusetts troops, armed with Enfield rifles, returned their fire with great effect. Several secessionists were killed, and they abandoned their battery, but returned on Sunday night and drew it off. The Federal forces at that point were not sufficiently strong to cross the river and seize the battery.

The steamship Africa, which arrived in this port on the 8th, brings very important intelligence. At the time of her sailing from Liverpool, Nov. 23d, news of the capture of Mason and Slidell had not reached England, but at that time it was thought the U. S. war steamer, *James Adger*, then cruising in the English waters, would seize these distinguished traitors on their way to England. Communications had passed on the subject between the British government and the American minister, and it was ascertained to be the *opinion of the law officers of the crown that, according to the interpretation of the law, as laid down in former decisions, the relations of Britain to the American belligerents are, perhaps, such that there might have been fair legal grounds for the American cruiser seizing the mail steamer as a prize*, even in British waters, if it could have been shown that she knowingly harbored the persons and property of enemies of the United States, in the shape of the delegates and their dispatches.

The Map of our States to be Altered.

The Secretary of War in his recent report to Congress proposes as a measure of protection to the Federal Capital a reconstruction of the boundaries of the States of Delaware, Maryland and Virginia. Wisdom and true statesmanship, he says, would dictate that the seat of the national government, for all time to come, should be placed beyond reasonable danger of seizure by enemies within, as well as from capture by foes from without. By agreement between the States named, such as was effected, for similar purposes, by Michigan and Ohio, and by Missouri and Iowa, their boundaries could be so changed as to render the capital more remote than at present from the influence of State governments which have arrayed themselves in rebellion against the Federal authority. To this end, the limits of Virginia might be so altered as to make her boundaries consist of the Blue Ridge on the East and Pennsylvania on the North, leaving those on the South and West as at present. By this arrangement, two counties of Maryland (Alleghany and Washington) would be transferred to the jurisdiction of Virginia. All that portion of Virginia which lies between the Blue Ridge and Chesapeake Bay could then be added to Maryland, while that portion of the peninsula between the waters of the Chesapeake and the Atlantic, now jointly held by Maryland and Virginia, could be incorporated into the State of Delaware. A reference to the map will show that these are great natural boundaries, which for all time to come would serve to mark the limits of these States.

To make the protection of the capital complete, in consideration of the large accession of territory which Maryland would receive under the arrangement proposed, it would be necessary that that State should consent so to modify her constitution as to limit the basis of her representation to her white population.

In this connection, it would be the part of wisdom to reannex to the District of Columbia that portion of its original limits which, by act of Congress, was retroceded to the State of Virginia.

The alteration proposed by the Secretary of War is a very shrewd measure, and seems to be perfectly feasible. It would wipe from the map all Eastern Virginia by attaching it to Maryland, leaving the State of Virginia most of the Blue Ridge. Delaware and Maryland would both be much enlarged by the project.

THE value of domestic products from New York for nine months commencing the first of January last amounts to $90,061,000 against $63,528,000 in 1860.

REPORT ON IRON-CLAD WAR VESSELS.

In accordance with an order of Congress, the Secretary of the Navy appointed, on the 8th of August last, a Board of officers to investigate plans for the building of iron-clad vessels designed for naval uses. The Board consisted of Commodores J. Smith, H. Paulding, and Captain C. H. Davies. These naval authorities have made their reports, and as a whole it does not seem to be favorable to this class of war ships. It is admitted that a wooden frigate would be no match for an iron-plated ship in a close encounter, but the enormous load of iron which the latter must carry, thus requiring much more powerful engines, and involving a vastly greater cost in construction renders their adoption for sea vessels inexpedient for our navy at present. For river and harbor service, iron-clad vessels of light draught, serving for floating batteries, are held to be useful, especially for cruising in the inlets and rivers in the secession States. The report expresses a decided opinion that "no ship or floating battery, however heavily she may be plated, can cope successfully with a properly constructed fortification of masonry." We suppose this is a very safe conclusion, as a fort may be covered with much thicker iron plates than any vessel can sustain and float. But then it is also certain that an iron-clad vessel can pass many forts without receiving any injury, in situations where wooden ships would be battered to pieces.

No less than 17 plans and propositions for building iron-clad vessels were submitted to the Board, but of these three were recommended, namely, those of J. Ericsson, New York, (which has been described in our columns), Bushnell & Co., New Haven, Conn., and Merrick & Son, Philadelphia. The cost of constructing these three vessels is to be $1,290,210. This comes within the sum ($1,500,000) appropriated by Congress for that purpose. The Ericsson iron-clad vessel is considered a good plan for a floating battery, as it is designed to be shot and shell proof. The cost is to be $275,000, and to be built in 100 days after contract. Tunnage, 1,255 tuns, draft of water, 10 feet, speed, 9 miles per hour.

Merrick & Son's vessel is to be built of wood and iron combined. Length, 220 feet; breadth of beam, 60 feet; depth of hold, 23 feet; draft of water, 13 feet; displacement, 3,296 tuns; speed, 9½ knots per hour. Price, $780,000; time in building, 9 months. The plates are to be 4½ inches thick, 15 feet long, and 36 inches broad.

Bushnell's vessel is to be on the rail and plate principle. Length, 180 feet; breadth,——; depth of hold, 12 feet 8 inches; draft of water, 10 feet; speed 12 knots per hour; displacement not obtained. Price, $235,250; to be built in four months.

An appropriation of $10,000 is recommended for experimenting with iron plates, and it is asserted that 4½-inch plates are the heaviest armor a sea-going vessel can safely carry. This is a different conclusion from English naval authorities, who intend to use five and six-inch plates, we understand, in their new iron frigates. The above vessels are now being constructed, and the Navy Department has invited proposals for furnishing and fitting rolled iron plates 4½ inches in thickness, 33 inches in width, and 15¼ feet in length, for clothing a number of wooden vessels. As our readers have already been informed, the Stevens Battery is referred to a special committee which is now engaged in examining it and the subject will probably soon come up in Congress.

REPORT OF THE SECRETARY OF THE TREASURY.

The most important subject in relation to the war is the condition of the Treasury. So long as we can raise money we can carry on the war, but if the funds should fail we should be reduced to the humiliation of a disgraceful peace with the rebels. The report of S. P. Chase, Secretary of the Treasury of the United States, just submitted to the first regular session of the XXXVIIth Congress, deals with incomparably larger sums than any of its predecessors. The accounts of our treasury are made up to the 30th of June in each year, and, consequently, this report is made in the middle of the fiscal year, with the returns, however, from only one quarter as data for the estimates. These data show so much more serious interference of the war with our imports from foreign contries than was anticipated, that the Secretary is compelled to reduce his estimates considerably below those submitted to Congress at the extra session. The estimated receipts for the year from sources other than loans are now as follows :—

From duties on imports	$32,198,602 55
From lands and miscellaneous sources	2,354,062 89
From direct tax	20,000,000 00
Total revenue	$54,552,665 44

This is less by $25,447,334 56 than the estimate of July. The estimated expenditures for the year are $543,406,422 06. Nearly all of this sum is to be provided for by loans; of these all but 200,000,000 are already authorized and 197,000,000 are negotiated.

The Secretary, as usual, submits his estimates for the following year. In relation to this he says :—

ESTIMATES FOR THE FISCAL YEAR 1863.

For the fiscal year 1863, commencing on the 1st of July, 1862, and ending on the 30th June, 1863, no reliable estimates can be made. It is earnestly to be hoped, and in the judgment of the Secretary not without sufficient grounds, that the present war may be brought to an auspicious termination before mid-summer. In that event the provision of revenue by taxation which he has recommended will amply suffice for all financial exigencies without resort to additional loans; and not only so, but will enable the government to begin at once the reduction of the existing debt.

It is the part of wisdom, however, to be prepared for all eventualities, and the Secretary, therefore, submits the estimates of the various departments for the fiscal year 1863, based on the supposed continuance of the war, as follows :—

The estimated expenditures are :—

For the civil list, including foreign intercourse and miscellaneous expenses other than on account of the public debt		$23,086,971 23
For the Interior Department (Indians and pensions)		4,102,962 96
For the War Department		360,159 986 61
For the Navy Department		45,164,994 18
For the public debt :—		
Redemption	$2,883,364 11	
Interest on debt contracted before July 1, 1862	29,932,696 42	
Interest on debt to be contracted after July 1, 1862	10,000,000 00	
		42,816,330 53
Making an aggregate of estimated expenditures of		475,331,245 51

On the other hand the estimated receipts are :—

From customs, lands and ordinary sources	$45,800,000 00
From direct tax	20,000,000 00
From internal duties, including income tax	30,000,000 00
Making an aggregate of estimated receipts of	95,800,000 00
And leaving a balance to be provided for of	$379,531,245 51

The whole amount required from loans may, therefore, be thus stated :—

For the year 1862, under existing laws	$75,449,675 00
For the fiscal year 1862, under laws to be enacted	200,000,000 00
For the fiscal year 1863, also under laws to be enacted	379,531,245 51
Making an aggregate of	$654,980,920 51

The total may be stated in round numbers at $650,000,000.

THE PUBLIC DEBT.

It only remains, in order to complete the view of the financial situation, to submit a statement of the public debt as it was on the 1st day of July, 1860 and 1861, and will be, according to the estimates now presented, at the same date in each of the years 1862 and 1863.

The statement, in brief, is as follows :—

On the first day of July, 1860, the public debt was	$64,769,703 08
On the first day of July, 1861, the public debt was	90,867,828 68
On the first day of July, 1862, the public debt will be	517,372,802 93
On the first day of July, 1863, the public debt will be	897,372,802 93

To facilitate the negotiation of the large loans which are to be offered, Secretary Chase proposes a scheme for remodeling the bank note circulation of the country. It is essentially the application of the New York bank system to the whole country. By the law of this State no bank going into operation is allowed to issue notes for circulation unless security for their redemption is deposited with the proper officers. The securities usually deposited are State stocks, and as these draw interest, while interest is also obtained on the notes of merchants received in exchange for the bills, the bank gets double interest on that portion of its capital thus invested. This plan has worked well in this State, giving a safe currency and creating a large market for State stocks. In Illinois where the same system was tried, the banks generally bought the stocks of Southern States, and when the rebellion broke out these became unsaleable, rendering the redemption impossible, and utterly destroying the money in circulation. Mr. Chase proposes that the banks shall be offered United States stocks in place of State stocks, the stocks to be paid for and then deposited as security for bills which will bear the name of the United States, and will be receivable for all government dues except customs; the Secretary very wisely adhering to the safe system of conducting the operations of the Treasury in gold and silver.

Army Machine Work.

The Worcester *Spy* states that several concerns in that city are now engaged on heavy contracts for furnishing machinery for the manufacture of firearms to the U. S. Armory in Springfield, Burnside Rifle Company in Providence, Mr. Colt in Hartford, and for various other parties having contracts with the government, and for the navy yards, &c.

It says :—"The establishment of Fox & Mayo, long known as "Fox's Mills," is employing over 200 hands on a contract just completed for the manufacture, during the next four months, of 200,000 yards of sky-blue kerseys.

Mr. George Crompton's loom works have been running both night and day for the last two months making looms for weaving blankets in woolen mills. He is also building machinery for stocking guns. He employs about 100 hands.

Mr. Nathan Washburn, at his iron works, is making five tuns of rifle-barrel iron per day for the Springfield armory, on a large contract. In addition to this, he has contracted to furnish 150,000 musket barrels for parties outside the government. He employs 200 hands.

Osgood Bradley, car manufacturer, has been unusually full of work for the past two months, with some 110 hands, on a contract for making 55 six-pound gun carriages, 50 forges and 105 limbers for the government. One limber goes with each carriage and each forge, to carry the tools, ammunition, &c.

Mr. L. W. Pond has just completed, at the establishment of Goddard, Rice & Co., the manufacture of a battery of twenty light rifled cannon, of his invention, called the Ellsworth gun. It is a breech-loading rifled gun, four feet long, six inches in diameter at the breech, and three and a half at the muzzle, with a one and a half inch bore, carrying a chilled iron conical ball weighing eighteen ounces, which it will throw three miles. The weight of each gun, carriage and all, is 450 lbs., and the cost $350.—These have been sent to Washington.

The armory establishment of Allen & Whiduck employs 200 hands."

War Manufacturing Items.

A new steam engine of 70-horse power has been placed in the United States armory at Springfield, Mass., to afford additional power in the manufacture of army muskets.

The Bellknap Mills, at Laconia, N. H., are engaged in the manufacture of mittens for the army. They are made upon knitting machines, and 200 females are employed in attending them.

G. D. Cook & Co., of New Haven, Conn., have large contracts for making the carriages for batteries, also knapsacks and haversacks. They employ 450 operatives on army work.

The Colt's Firearm Company, at Hartford, Conn., employ 2,000 men in making revolvers.

S. Dean, Son & Co., of Newark, Del., have a contract for manufacturing 400,000 yards of army cloth and 200,000 blankets.

Messrs. Mills & Kershaw, of Philadelphia, are running their factory night and day, making blue kerseys at the rate of 6,000 yards weekly, for the army.

Messrs. Mansfields, of South Braintree, Mass., are making a pontoon train similar to that used in the French army. It is to consist of 64 flat-bottomed boats, to be connected together by chains in forming floating bridges.

THE California *Farmer* states that the wool clip for the present year in that State will not fall much short of four million pounds.

THE GEOLOGICAL HISTORY OF NORTH AMERICA.

BY DR. STEVENS.

Fifth Lecture.

The subject for the evening is one of the most interesting and exciting in the whole range of geological studies. That the North American continent, over a large portion of it, should have been populated with lizards of the most enormous dimensions, while the oceans and lagoons were vexed with similar monsters, might well excite our wonder and raise a doubt as to the genuinenese of our deductions from paleontological data.

In the reptilian age, the United States, as represented upon this map, had assumed a contour somewhat similar to its present coast outline, save that the islands along its seaboard and the peninsula of Florida were not then in existence. The strata of rock which compose the system or group known as the reptilian, commence at Martha's Vineyard, and extend in a narrow belt to New Jersey, then rapidly increasing in width, they stretch across this latter State and all the Atlantic States to Georgia, thence broadly across the Gulf States into the Indian country, and the wide savannas of the interior of the continent, through Kansas, Nebraska, the Red River of the North to the Saskatchewan, and probably to the north as far as the continent extends, again west of the Rocky Mountains, filling up the great interior basin of Utah, reaching into California and southwards into Mexico.

The Gulf of Mexico, you perceive is much larger than at the present. There is no peninsula of Florida. The delta of the Mississippi must have been as high up as Memphis if this river was then in existence. We suppose that it was, for at the close of the carboniferous age, and before the age under discussion this evening, the Apalachian mountain ranges had been elevated, and drainage of the continent must have been effected by a river system, much as at the present time. The high plateaus of the carboniferous were cut through by the Ohio and its affluents, on the west, the Potomac, Susquehanna, and Delaware on the east, while the valley of the Hudson, was filled by an estuary of the ocean extending by Lake George and Lake Champlain, into Canada, to meet with another estuary filling the valley of the St. Lawrence.

About the middle of this age the valley of the Farmington river, Connecticut, in part the Connecticut above Middletown to the Vermont line, and the New Haven valley up to the Farmington, was also an arm of the sea, in which the red sandstones were laid down, and on the shores of this estuary walked those strange animals revealed only to us by their

"Footprints on the sand,"

and pictured in our imaginations as birds of gigantic hight, kangaroos of enormous dimensions, batrachians of fabulous proportions, and unknown beasts of such strange pedal extremities that comparative anatomy knows not where to find their living analogues.

If some sporting cockney, some city Nimrod, should enjoy a hunting season in the green woods of New Jersey, and return bearing with him as a trophy of his prowess a land lizard the size of a small elephant, which he had successfully bagged—the monster not bagging him—we should all be astonished at this modern wonder of the world; Barnum would be on the *qui vive*, neither sleeping nor resting until it reposed by the side of his whale and river horse. Doctor Leidy made an incursion into the cemeteries of the dead of this era, in this State, and exhumed from the marl beds the entire skeleton of one of these strange and extinct animals. So accustomed are we to these feats of these resurrectionists and the wonderful discoveries they bring to light, we cease to marvel, and with all the composure of modern science proceed to arrange them in their proper position and assign them their appropriate niche in the grand mausoleum of the ancient dead.

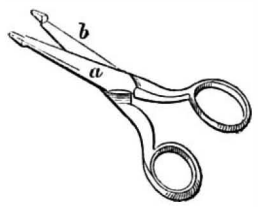
The valleys of the Deep and Dan rivers of North Carolina, were also filled with these red sandstones, and the tale they tell is of birds allied to the ostrich, roaming over the sands of the pine-wood State; of vegetable lizards feeding on the zamites and cycaides, plants found now only in Australia and the hot climates of the globe. And what is still more significant, they tell of marsupial animals, of which the oppossum is now our only representative in the United States, sporting in the evening twilight and moonshiny nights, feeding upon the fruit-bearing trees which, in this age, began to adorn the forests of America and enrich them with their luscious productions, thus giving a double promise of higher order in the vegetable kingdom, to be introduced into the "new earth" to be created in the succeeding age, and new and higher types of animal life, to enter upon and enjoy the full fruition of the prophecy.

While the woods and waters of the North were thus strangely tenanted, the savannas and lagoons of the South had, too, their monstrous saurians and crockodiles, and the waters of Alabama were vexed with the zeugladon, an animal allied both to the lizard and the whale, and rivaling the largest spermaceti whale in length and largeness of its dimensions. A botanical rambler in the woods peopled by these strange reptiles, would have had his senses regaled by spicy breezes from groves of cinnamon and the tulip tree, while fruits of the fig, persimmon and pawpaw would have melted with lusciousness upon his tongue, and satisfied his appetite. He could have gathered nuts from the chesnut, medicines from the willow, poplar and cedar. At night he could have spread his couch with branches of the spruce and made his siesta by day under the shade of the oak or elm as his fancy might choose.

The economic minerals of this age are mainly the coal of Richmond, Va., and of Deep and Dan rivers, North Carolina. The copper and lead ores of Perkiomen, Pa., and Belvidere, N. J., but in general the copper ores are not reliable. Iron ore, as hematite and bog ore, has been found in the Atlantic and Gulf States. The lime rocks of this age in Mexico and South America are silver-bearing. The lignite beds (coal), of the Rocky Mountains and Pacific coasts belong also to this age. The fertilizing green sand marls of New Jersey, Alabama, Mississippi and Tennessee, are the peculiar minerals of the cretaceous period. The rich colored fire stones of Connecticut and New Jersey are from the rocks of this age.

SCISSOR NIPPERS.

Combined tools and instruments have of late years received more attention than formerly, and they are yet destined to receive more attention still. A single instrument, possessing more than one function, when equally simple in construction, is far more convenient than one which can only be used to perform a single operation. The accompanying engraving represents a pair of scissors with the points of the blades formed into nippers, thus combining a cutting and grasping instrument in one. For cutting cloth, pulling out the ends of thread in cloth, &c., its objects and aims will be readily understood. Patented by H. D. Walcott, Boston, Mass., March 13, 1860.



HARDENING AND TEMPERING TOOLS AND METALS.

Number III.

For tempering steel wire a patent was obtained by H. Waterman, of Brooklyn, N. Y., in 1858, embracing the following features:—The wire to be operated is secured upon the circumference of a broad wheel which is provided with a tension brake. This wheel, with its steel wire upon it, is placed at one end of a furnace having a hole in its wall, through which the wire is drawn, passing through the fire, then into a trough containing oil placed on the other side, and from thence it passes to another reel, on which it is wound up. This latter wheel has a screw upon its shaft whereby it receives a lateral combined with its rotary motion, and the wire is thus taken up spirally without being overlaid. The fire for heating the wire must be bright and clear, and the metal should not be raised above a dull-red color. The tension on the brake and take-up reel takes all the crooks out of the wire while passing through the furnace, so that it is wound up evenly. The wheels are now removed from their position at the furnace, and the wire is wound back from the take-up to the delivery wheel, and in doing so it is passed through dry sawdust to remove the oil from it. After this the wire is tempered by placing it in an oven heated from about 550° to 570° Fah., and here it is kept moving from one reel to the other until the desired uniform temper is secured.

An acquaintance has informed us that he has tempered steel wire without first hardening it. He raised it to a red heat in a clear fire, then plunged it into a bath of hot oil instead of into cold oil, and then heating it afterward to "draw the temper," as by the common mode. This idea may be worthy of a more extensive application; it is at least deserving of further experiment.

It is now well known that better chilled surfaces of railroad wheel tires are obtained by pouring the molten metal into heated molds than by the old method of pouring it into cold molds. It was at one time supposed that in order to produce chilled iron the molds were required to be quite cold, but the chilled surfaces thus obtained were frequently crinkled, blistered and uneven. This evil has been completely overcome by the use of heated molds. At the Union Wheel Foundry, Toledo, Ohio, where a great number of railway car wheels are cast, the molds are heated by steam introduced from a boiler, by tubes, to the molds on the floor of the foundry. This is a decided improvement upon the former mode of heating the chills in an oven and then lifting them out on the floor. Kindred results may be obtained in tempering metals with hot instead of cold baths.

CHEMISTRY OF IRON.

Number VIII.

THE ALLOTROPIC STATE.

Of all the wonderful facts embraced in the science of chemistry, there is none more wonderful than that curious property which certain substances have of passing into an allotropic condition. Prof. Youmans compares it to the state of a man when he is asleep. The substance by being subjected to certain manipulations, has its properties so completely changed that it seems to be no longer the same substance. This property has lured some of our most eminent modern chemists into the old dream of the alchemists, of changing iron and other cheap metals into gold.

Perhaps the most valuable use that is made of the power of putting substances into an allotropic state, is in the manufacture of friction matches. Phosphorus takes several allotropic conditions, in one of which it is known as red phosphorus. In this state it does not take fire from friction, nor does it emit the deleterious vapors which have produced such frightful effects upon persons employed in match manufactories. The phosphorus is, accordingly, by exposure to light under certain conditions, and other manipulations, passed into the allotropic condition of red phosphorus, when it can be transported or handled with impunity. In this state it is used for making matches, and it then slowly returns to its normal condition.

By several processes iron can be thrown into an allotropic condition, which has been called the passive state. In this state it is not acted upon by nitric acid, and its properties vary in several particulars from those which it ordinarily exhibits. If a piece of iron is put into nitric acid of specific gravity of 1.3, it dissolves freely with effervescence, but if a piece of platinum wire be placed in the acid, and then the iron be introduced in contact with the platinum, the acid will not now act upon the iron, even if the platinum is withdrawn. Another piece of iron put into the acid in contact with the previous piece, will become affected in the same way, and so on with a third or more pieces. Another mode of making iron passive is to oxidize one end of the piece in the flame of a lamp. It may also be effected by making it the positive pole of a battery, by a blow, and in other ways. A piece of passive iron can be restored to its normal condition by rubbing it, or by bringing it in contact with active iron.

The allotropic state of substances is a comparatively new and very inviting field for chemical research. It is supposed by some chemists that all of the elements may be subject to this mysterious change, and the investigation of the subject will probably yield some very curious results.

SENATORS Fessenden and Trumbull have been appointed regents of the Smithsonian Institution in the places of Senator Douglas, deceased, and Senator Mason, the secessionist.

Correspondence

Projectiles for Rifled Cannons.

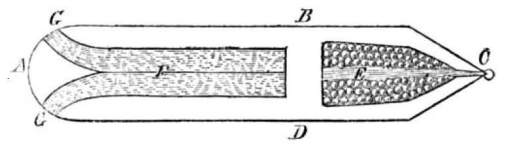
MESSRS. EDITORS.—The important results, in a military point of view, which have been obtained within the last few years, by rifling the bore of cannon and adapting thereto an oblong shot or shell of a cylindrical-conoidal form, whereby the explosive force of the charge is made to give the projectile a very rapid rotary motion around its axis, counteracting the inequalities in the density thereof, producing a greater precision and a more extended range, are facts familiar to every one conversant with this subject. It is not a little remarkable, however, that after the improvement has been for a number of years successfully applied to small arms, that so much time should be allowed to elapse before its introduction into the construction of ordnance. In fact, most practical men, in the earlier progress of the improvement, are said to have looked upon the application as practically impossible (*vide* Renwick's "Elements of Mechanics," article "Projectiles"). This we take as another demonstration of the difficulties to be overcome in the progress of improvement, early prejudices must be surmounted, and it is hard to divorce those who may be wedded to their idols.

In referring to projectiles fired from rifled guns, we wish particularly to call the attention to the condition and results which pertain to the projectile from said improvement, namely, that shot or shell thus projected, will have its axis firmly held and preserved parallel to the trajectory or path in which it moves during its flight. This condition, it will be seen, forms the basis or foundation favorable to the application of our proposed improvements. If we assume, for instance, the velocity of the projectile to be 1,500 per second, and the rifled twist of the bore of the gun from which it is projected, to make one turn in ten feet, the said projectile would make about 150 revolutions per second on its axis during its flight. This rapid gyratory motion most evidently gives the mass of the projectile a *vis viva* that would require a considerable disturbing force to resist and overcome it.

The range of the best constructed rifled ordnance, at the present time, I believe, is about five miles. Numerous devices are being made to improve the rifling of the bore of the gun and also the expanding appliances of the projectile adapted thereto, in order to secure precision of flight and to extend its range. The great resistance which it is known the atmosphere presents to cases of very great projectile velocities, will always tend, in cases where a single projectile force is applied (as in the ordinary mode of projection), very considerably to limit the ultimate range, and also to reduce the force of percussion at the intermediate points where the velocity is the greatest. The effect of this resistance, according to Hutton, reduces the flight of the projectile to about one-tenth of what it would be if the atmosphere did not interpose. The following proposed improvements are therefore designed to be applied to projectiles so as to compensate for the resistance of the atmosphere during their flight, and to preserve, as far as practicable, the initial velocity, and if possible to increase and accelerate the same. For this purpose two distinct modes are suggested, which, it is believed, may be used separately, or the two may be combined together as hereinafter described and illustrated.

The oblong projectile, constructed with the usual external appliances, to be fired from a rifled gun, must in both the modes of improvement here referred to, be formed or constructed with a suitable cell, chamber or barrel, in the tail or rear end of it, the same being made concentric with the axis thereof. In the first method referred to, I propose to fill the said chamber or barrel with rocket composition, so that after the projectile, thus prepared, shall be discharged from the muzzle of the gun, a new and auxiliary propelling force shall be made to act upon it, to counteract, in some degree, the resistance of the atmosphere, and thereby to preserve the initial velocity and force of the projectile during its flight. I have not as yet satisfied myself as to the most appropriate form or figure in the detail, which should be given to said chamber or barrel to answer most advantageously the purposes contemplated, but the general outline thereof, it is presumed, may be sufficiently illustrated and explained so as to be generally understood by the following diagram, Fig. 1, wherein A B C D, represents a longitudinal section of the body of a cylindrical-conoidal shot or shell, the external expanding portion thereof being omitted in the sketch. The chamber, E, in the head of the projectile may contain the explosive charge of powder, balls, &c., to be ignited by the cap on the nipple, C, when the same strikes any object. The chamber or barrel, F, above alluded to in the construction of the proposed projectile, may contain two or more rockets, or the composition thereof, packed therein, having their vents or chokes, terminating at G G. It will be understood

Fig. 1



that these vents or chokes, whether two or more in number, must be formed and arranged so as to be at equal distances apart around the exterior end of the projectile, so as to preserve an equilibrium of action around the axis thereof. This inclined action of the inflamed gas on the atmosphere, to propel the shot or shell forward in its course, as here suggested, cannot sensibly be affected by the partial vacuum which is known to exist in the rear of a projectile, when in very rapid flight, as the action in this case would be toward the sides of the projectile, where there must necessarily be a full medium. In fact it will be seen that the point proposed for the action of the inflamed gas is such, that it must meet a volume of atmospheric air pressing inward from the sides of said projectile towards its axis, to fill up and restore said void or vacuum as the projectile advances along in its course.

The effect of this proposed application to the projectile, when fired from a rifled gun, we think, must be obvious, if the rifled gun, simply by the force of the charge, can project a ball or shell, say four or five miles, as recent experiments at the Rip-Raps and other places have demonstrated; and, on the other hand, the ordinary military rocket (Congreve) of thirty, forty or more pounds weight, can be projected from a state of rest or quiescence merely by the propelling power of the composition used therein, with a range, it is said, of two or three thousand yards. Is it not plain and plausible, therefore, when these two modes of projection shall be combined together and made to act simultaneously on the same projectile as here proposed, that the result or effect thereof must be greatly increased, and per consequence, that the shot or shell must be sent forward in its flight with greater force and to a greater distance than could possibly be accomplished singly by either of the two modes of projection. The oblique action of the inflamed gas, as here proposed, it is believed, would also be efficient, in some degree, as a propelling power whatever may be the relative velocities of the projectile, and that wherewith the inflamed gas issues from the vents. The construction of the vents or chokes, G G, in addition to their being arranged for propelling the projectile forward in its course, as above suggested, may also be made to terminate at the exterior surface of the projectile, tangentially thereto, so as to discharge the inflamed gas, in a direction contrary to the intended rotation of the projectile, and thereby renew and keep up the gyratory motion of the projectile around its axis. It is suggested that probably this mode of action might be used advantageously with projectiles of an oblong form, fired from smooth-bored guns, so as to give to them nearly the same accuracy and range with the rifled guns.

The above embraces the first method proposed for the improvement of projectiles. Experiments are said to have been made to fire rockets from mortars, howitzers, &c., but with very partial success. The flight of rockets, even when thus projected, are very uncertain and not to be relied upon. In the arrangement above proposed the rocket principle is applied as an auxiliary to the most approved projectile of the present day, viz., those fired from rifled guns, and when properly constructed and applied must certainly improve the range or force of projection without in the least interfering with the accuracy thereof.

[Remainder next week.]

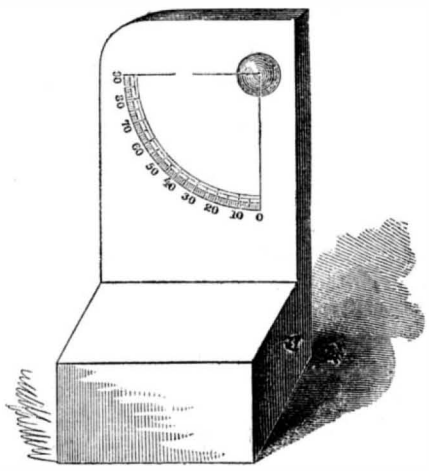
CHARLES POTTS, C. E.

Trenton, N. J., Dec. 2, 1861.

[We publish the above communication as it is written, but we must inform Mr. Potts that a vacuum in the rear of his projectile would not prevent the rocket composition from propelling the missile forward. If the composition were in a closed chamber, the gases resulting from the combustion would press against the walls of the chamber equally in all directions; but if an orifice is made in the rear by which the gases may escape, the pressure in that direction is removed, and as the pressure against the opposite wall of the chamber continues, the projectile is driven forward. A Barker mill or an Avery engine will run in a vacuum.—EDS.

A New Magnetometer.

MESSRS. EDITORS:—On experimenting with magnetic needles, the common mode of testing the strength of magnets by oscillation appeared to me to take too much time. I therefore tried another expedient, which is so simple and yet serves its purpose so well, that it may bear publishing.



A No. 12 sewing needle is magnetized to saturation in such a way that the point is positive and the eye negative. To guard against rust, the needle is immersed in a solution of sulphate of copper until it is coated with a thin layer of copper. A little wooden stand is prepared, with an upright at its back, also of wood, about three inches high and one inch and a half wide, and a quadrant is drawn upon the upright in front. The needle is hung up on a fine thread of silk or brass wire, so that its point exactly touches the O point of the scale, and plays easily upon the whole quadrant. In order to test the magnet its positive pole is brought to the O point. The positive pole of the needle is repelled and the degree of deflection measures the strength of the magnet.

B. FINCKE, M. D.

Brooklyn, Dec. 5, 1861.

Bird Tracks in the Sand.

MESSRS. EDITORS:—A few days since I discovered a very interesting leaf from the history of the past. The page had only two characters written on it, and yet those two characters open a wide field for contemplation. The facts recorded are simple, but the date and circumstances connected therewith are obscure, and leave a wide margin for speculation and error. But when viewed by the light thrown on them by such men as Hugh Miller, Hitchcock and Stevens we can derive much satisfaction from their study.

The characters referred to are simply two bird tracks on a red sandstone slab, from the valley of the Connecticut river. The tracks are each about four and a-half inches long, and indicate that the bird must have been much larger than a turkey, with a large, thick fleshy foot. The toes, three in number, were about as large as a man's thumb, with large, hooking nails, &c.

The slab is about eighteen inches long, and the tracks show about a 7-inch step, which, however, judging from the size of the foot, is not a full average one. The slabs are in relief, showing that the slab lay directly above the original, and may be technically called a positive.

In order to receive the impressions the sand bed

must be found in a certain condition. First, the face of the sand must be coated with a fine thin sediment, deposited from still water. Second, the water must retire from the sand bed, for if the sand be operated on by the action of the water, each returning wave will obliterate all the impressions made during the interval. Third, the bed must be partially dried by direct exposure to the sun before a track could be made to retain its perfect outline. Fourth, the water must rise quick without rain in that locality, and flow rapidly, filling the tracks with lively coarse sand. Fifth, all must sink again beneath the ocean for a long lapse of time, to go through the hardening process.

The necessity of these conditions accounts for the scarcity of such specimens. The fine sediment spoken of in the first condition forms in the stone what the workmen in foundries call "parting sand," which in this case forms a soft seam through the stone, which readily splits and exposes the tracks to view, while the solid and coarser grain on either side remains firm, preserving the impression.

Thus it is that through the writing of ancient literary birds we are enabled to look old time in the face and span a million of years. J. Harvey Corey.

Elizabeth, N. J., Dec. 3, 1861.

The Horsechestnut.

Messrs. Editors :—This is a highly ornamental tree, introduced originally from Asia. We have natives of the same genus, if anything, more handsome than the *æsculus hyppocastanum*. The port, foliage and flowers of the *æsculus flava* are superior to the horsechestnut, and it is, withal, easily cultivated. But the flowers of *æsculus Californica* are much more beautiful than any of the others that I have seen, and should be introduced into our Eastern States, if for no other reason but for their beauty and variety.

The *ungnadia speciosa* of Texas, or Texan buckeye, is said to be handsome, but I have only seen it in fruit. In eastern Texas it grows to be quite a tree, but in the neighborhood of El Paso and the arid mountainous regions of the southwest it dwindles to a mere shrub. The fruit and young leaves of *æsculus glabra* of Ohio are decidedly poisonous to cattle, and it is supposed all our native species possess, in some degree, the same poisonous qualities.

On the Mexican Boundary explorations some of our men temerariously eat of the fruit of the sweet and rather pleasant-tasted nuts of the *ungnadia speciosa*—which so much resembled filberts in size and flavor as to deceive them—upon which most alarming symptoms of nervous depression and precordial distress supervened in the course of an hour thereafter. They were relieved by active vomiting, and afterward the free use of stimulants. The toxical powers of our buckeyes are not, however, sufficiently concentrated as to render them dangerous, and should not prevent their introduction as ornaments into our gardens and walks.

The amylaceous or starchy principle is largely developed in all of them, and could be made a source of profit. The horsechestnuts, especially, are used in Switzerland to fatten sheep for mutton, the flavor of which is said to be highly improved by them. They are there crushed in mills similar to our cider mills, and fed in measured proportions, otherwise sheep, in their greediness, will injure themselves. In an economical point of view, the horsechestnut in this country must in time become an article of importance for the purpose of increasing our forage resources, from the fact that cattle are as fond of them and can be fatted by them as well as sheep.

In the great regions of the West, where land is plentiful and cheap, and timber for fencing rail abundant, it will not soon be needed ; but in all our extreme eastern and northern States, where the land is not well adapted to raising corn ; and also in the vast timberless plains of the extreme West, where fencing is one of the most considerable items of expense, the introduction of this tree must be a desideratum. It is difficult, if not impossible, to estimate with any degree of accuracy the amount of waste ground in our most highly cultivated districts, that could be filled with these trees without encroaching upon that adapted to cereals and other uses. Banks of streams, fence corners, hill banks, nooks and corners too small to be enclosed take up a space of almost every farm in the country, and in some to a considerable extent. These places, as well as replacing the otherwise useless shade trees for cattle and ornament, could be filled with them. In the course of a few years they would bear an immense amount of fruit, which could be stored and preserved with less difficulty, care and expense than common corn.

In the far west there are thousands and thousands of acres that cannot be put into wheat and corn on account of the want of fencing materials. This tree, not needing anything of the kind, can take their place, and a vast amount of forage obtained, with less than one-tenth the trouble and expense attending the cultivation of the cereals. The great disadvantages to be overcome are the difficulty and trouble of portioning out the food properly to the stock, which, from analogous processes of domestic economy, can doubtless be obviated. J. M. B.

Detroit, Mich., Nov. 28, 1861.

California and Pacific Items.

Experiment of the Camel.—We find an interesting account in a San Francisco journal of experiments now being made with the camel in Nevada Territory. Nine Bactrian camels are now running to and from a salt marsh, a distance of 140 miles, in carrying salt. The result so far is in some respects favorable, in others not. They are docile and tractable creatures, kneel down to receive their load, which, if well balanced, never gets out of order, nor requires adjusting, owing to the peculiar formation of the back. As to feeding these animals there is no difficulty ; they eat all kinds of grass, thistles, tule, willows, and are particularly fond of griswood. Their carrying capacity as well as speed has been much overrated. The average weight of salt to each animal has been inside of 450 pounds, which may be attributed partly to the season of the year, when feed is dry, and furnishes less strength than in the spring and summer. The Bactrian camel is inferior in size to the Syrian, which latter carries from 600 to 800 pounds. On good level roads their rate of travel is equal to a mule's ; on deep sandy soil they go at the pace of oxen ; and in stony, mountainous roads they show strong objections to travel at all. The greatest difficulty exists in the softness of their feet : on rocky ground the foot becomes tender and swells up, the skin cracks, the alkali dust enters and makes the animal lame. The recuperative power of the camel, however, is such that by not working it for two weeks it is well again. The climate seems to agree with the Bactrian camel, and must be similar to that of their native country. Great heat does not affect them, and against cold they are protected by a thick, shaggy coat of hair. Upon the whole, by studying their habits and wants, by selecting proper roads for them, they may turn out a valuable addition to our locomotive and carrying power ; but this region of the Great Basin, on account of the many stony mountain ranges which traverse it, is not likely to become what may be termed a real camel country.

Loss of Gold by Defective Mining.—It is utterly impossible, says the Columbia (Cal.) *Times*, to estimate the quantity of gold that is annually lost for want of a better method of saving it, particularly in quartz mills, but in placer mining we can arrive at a tolerably correct estimate of the great waste of the gold which the first washers of the dirt sustain, by tracing the profits made by those who wash the tailings. As illustrating this point, we took the trouble to find out—as near as we could—what is gained by the various fluming companies who wash the tailings which flow through the mill gulch in this district. In the first place, the "tailings," that is, the dirty water, sand and soil from all the claims in the neighborhood of the flume, after being as carefully washed as the miners consider possible, are led through long strings of sluices into the main flume, which is above a mile in length. This flume—when it was in good order, and before the company commenced lowering its grade, which has involved an outlay of some $40,000—used to pay between three and four per cent per month, on a capital stock of $40,000 over and above all its working expenses, and when it shall be completed at the new grade we believe it will pay even better. After the tailings have floated through this mile of flume, and as much gold as possible has been extracted, they then pass into the North American Company's flume, about one-fourth of a mile in length. Here again large quantities of gold are extracted, after which they pass into the flume of Waydle & Co., who have about 200 feet of fluming, out of which they manage to obtain $6 or $8 a day to each member of the company. The tailings then pass into the flume of Potter & Haynes, about 700 feet in length. One share—one-sixth—in this flume was recently sold for $600. Below this John Mitchell has 1,500 feet of fluming, and Duncan & Co. 1,200 feet, both of whom are making money by washing the dirt after it has passed through all the others ; and others would work below them, and do well too, but there is no fall for the water.

Natural Oil and Gas.—The miners for natural coal oil are very sanguine that they have their fortunes in store, in Lower Mattole Valley. Major McCoy has a natural spring, out of which he has dipped as many as 30 gallons in one week. Prospects upon Davis's ranch, where a well is being sunk on the principle of artesian wells, are also very flattering. There are also some other curious facts connected with this region of country which deserve notice. Near the Mattole river are a number of escapes, out of which is constantly issuing gas, which has the peculiar smell of the manufactured article which lights all of our principal towns and cities ; and when a blaze is applied it readily ignites, and will blaze up many feet in the air. One of these escapes is in the Mattole river, near the center ; and with a torch, any person who has the curiosity to try it ; may do what few people have thought possible—set the river on fire. These escapes are not confined entirely to this particular neighborhood. There are a number of them on Bear river, some 15 miles north of Mattole, and above Cape Mendocino.

Nature's Salt Works.—The *Silver Age* gives an account of the recent visit of a party of gentlemen to nature's great salt works in Nevada Territory, who gave fabulous accounts of the grand scale on which nature works. They estimate the amount of pure salt in sight and fit for sacking at 1,000 tuns, and so strongly are the waters of the pools or springs impregnated that when the encrustation, usually about three inches thick, is removed, six hours suffices to skim the pool over with a coating of salt. According to the report of those gentlemen, the capacity of these pools is beyond computation—perhaps sufficient to meet not only the present, but all the prospective demands of this Territory with an article superior to any imported salt for the reduction of silver ores, on account of the presence of a small portion of alkali. Returning by the way of Esmeralda, they discovered a practicable route from the salt pools to that locality, by which a supply can be shipped to that region, when the necessities of the mines shall require it.

Cinnabar.—There has been recently opened an extensive cinnabar vein in Pope's valley, Napa county, which promises to be rich. This was discovered by John Newman, of Pope's valley. The cinnabar was discovered by means of the fires which are made to burn off the chaparral. This exposed the outcroppings of the cinnabar. A company has been formed with an incorporated capital of $192,000. Some ten tuns of the ore have been dug out, and promise well. Samples of picked ore are now being tested, preparatory to an immediate working of the mines on a large scale.

There has been no rain in Santa Clara County, Cal., for six monts past, and yet the streams in the mountains are gradually rising, so that there is an abundance of water for mill purposes, when two months ago scarcely any milling could be done. It puzzles the people of San Jose why the streams should rise before the rains.

The work on the San Jose railroad is rapidly progressing. Over twenty miles of the track is graded, and by the first of next April the southern end will be in complete running order.

Lieutenant Rodman, in the course of his elaborate experiments on gunpowder, ascertained that the action of the explosive gas of gunpowder, sudden as it is, does not possess the characteristics of a blow.

The quantity of sorghum sirup made in the West will far exceed that of last or any previous year. The culture of the cane is becoming deservedly popular with western farmers.

At Paul's Mill, Washoe, Cal., the silver ore is yielding at the rate of $402 per tun.

The Introduction of Coaches.

The editor of *Chambers' Journal* gives the following interesting account of the introduction of coaches into Great Britain :—

Coaches became common in the reign of James I., although they were still reckoned as tokens of great wealth or great profuseness. They were then habitually drawn by six horses, the sovereign alone appearing with eight ; and Lady Hatton esteemed as a valuable privilege the royal license to harness four pair of long-tailed steeds at a time. The horses used for purposes of draught were all foreign. Flanders supplied the carriage horses, as Spain furnished chargers, since English horses were as yet but rough Galloways, ill-bred, and of trifling value. Postillions, a French device, were not employed, to the best of our belief, earlier than the civil wars. However, the coachman was assisted by running footmen and grooms who trotted on foot beside the ambling horses, and were ever ready to grasp a bridle in case of need. By the Restoration, a change had come over the aspect of the country.

Stage wagons, and even stage coaches, such as they were, ran, or rather crawled along the main roads. No coach, even of that slow order, went west of Exeter, or north of York. But women and infirm persons could from most places on a great high road, contrive to reach London, though at irregular intervals. Then came the innovation of the flying coaches, the first of which achieved the stupendous journey from Oxford to London between dawn and dusk of a single summer's day. The eminent successes of this enterprise, which many wiseacres had attempted to nip in the bud by derision and solemn warning, led to the establishment of such public vehicles in all directions.

Meanwhile London had enlisted the services of a few hackney coaches, and Paris, still more advanced, had started an omnibus. This latter throve wonderfully well and was formally "put down" by an act of the meddling Parliament of Paris, on the ground that it offered too convenient accommodation to the ignoble public. The beginning of the eighteenth century found our island still poor in vehicles, though much progress had been made. London and Bath alone appear to have possessed a hackney coach ; and in the latter town, the first specimen of a hired carriage was rabbled by the chairmen. The stage-wagons carried passengers at about three pence per mile—half the fare of a flying coach. The transport of goods by land cost from five to ten times its present rate. The carriages of the nobility were still tinselled arks, with the true gilt gingerbread display that we still admire in a sheriff's equipage ; they had yet room inside for six or seven persons, including the boot or well, in which were deposited the page, the chaplain, or the waiting gentlewoman, and they were drawn by six horses.

It led also to the famous petition of the saddlers, spurriers, and hirers out of saddle horses, that parliament would, in its wisdom, check the velocity of such flaming meteors, whose reckless speed of seven miles an hour threatened ruin to important trades, and the decay of horsemanship. And yet those Stuart fliers were poor affairs, after all ; they were irregular as to their departures and arrivals, they took twice as long in winter as in summer, and they were so continually overturned, that no outside passengers were ever taken for fear of broken necks.

Indeed, in summer, an adventurous esquire, with a light chariot, would sometimes journey with a pair ; but rainy weather was sure to disconcert him ; and the orthodox six steeds were needed to drag the lumbering vehicle through the mud of the villainous roads. In Scotland were few carriages ; in Wales, none. When Wade went to occupy the post of Lord Lieutenant of Ireland, it cost days of toil, and the labor of scores of stout peasants to get his gilded coach along the Holyhead road. Even so late as the French Revolution, country gentlemen were more used to ride a short journey with a servant armed with pistols, than to order out the awkward coach. Not till after the accession of the house of Hanover, did the caste of running footmen become extinct.

These men clad in white from head to foot, and with long wands in their hands, were accustomed to run at a swinging trot in advance of my lord's carriage, bawling to carters and drovers to clear the way. Many noblemen were thus preceded all the long way from Scotland, or the west, to London ; and the running footman was expected to do his forty miles at least, in a day.

Other rich and noble personages, when posting became the rage, were wont to travel with relays, compelling their servants to ride after them in all weathers, sixty, seventy, or eighty miles at a stretch. Some humane person invented the rumble or "dicky" as a mode of saving all this vicarious fatigue, and by the end of the century, journeys though slow, were not performed with any peculiar discomfort.

The Theory and Art of Shoeing Horses.

The following is an extract on this very important subject from the *Scottish Farmer* :—

The practice of shoeing requires from its devotees a knowledge of science and art. The art of shoeing horses bears little analogy to smith's work, with which it is commonly allied. The latter is a mechanical work, to be carried out by rule ; not so the successful application of an iron shoe to a living horse's foot ; in this process a knowledge of the organs and textures acted on is required.

In returning to discussions on the art of shoeing horses at this epoch, after a long stagnation, which succeeded much erroneous teaching, there is necessarily a great deal to pull down in order to make room for a sound theory and rational practice. Like every other branch of useful knowledge, this will progress and produce good results in proportion as the public is rightly informed of the true state of the art, its importance and required improvement. Those who require to learn enough about the art of shoeing to apply their knowledge to practice, can only attain to such proficiency by using the same means to learn the rules and apply them as are adopted in other arts neither more difficult nor more important.

The foot of a horse, as we investigate it, and more and more understand it, will be found to constitute one of the wonders of creative structure—endowed as it is with great strength to support weight, and endure long-continued exertion at great speed, yet exquisitely exact in all its movements. To protect this organ from being unduly consumed in the performance of the work to which man has submitted the horse, is our business.

The first requirement in a man who undertakes to shoe horses is a knowledge of the component parts of the foot, its normal form, and its movements when in exertion ; this may seem too much to exact from men to whom little opportunity to acquire the knowledge has been given. We are only stating, however, what is required, knowing well that for a while less must necessarily be accepted. The art of shoeing a horse is one that demands the application of mind no less than of hand and arm work.

The first undeviating rule to be carried out in shoeing is, that the natural bearing surface be given to the foot—any deviation disturbs the line of bearing, not in the foot alone, but in the whole limb. To carry out this rule in practice, the depth of the hoof in all its parts, front, quarters and heels, must be adapted under an intelligent understanding ; this done, the bottom circumference of the foot is thereby regulated. The man who understands to do his part is most likely to know how to adapt a shoe accordingly. In the earliest stages of horse-shoeing, and in those countries where up to the present time the art has undergone the least change, they understood the way that the hoof was worn, and modelled their shoe in accordance. How much the anatomy of the foot was understood, or how much was due to their intelligent observation on the external hoof, we cannot say, but since we know that the functions of the horse's limbs were so far understood as to lead to written descriptions by the Greek authors which we may read with profit, we think we are warranted in believing that the men understood why they were giving the shoe an adaptation to the foot, deviating from the straight or flat line, but in accordance with the motion of the foot. In these islands it seems that no account was ever taken of the necessary deviation from a flat or level surface ; the horse's foot was reduced from its overgrown state to something like its required proportions, and made level on its bearing or ground surface, and the shoe was then fitted accordingly. The man was considered the best workman who could adapt the two straight surfaces of hoof and iron with the greatest nicety.

The Bronze Doors for the National Capitol.

Several years since the artist Rogers was commissioned by our government to model and have cast, in bronze, folding-doors for the Capitol. These were recently cast at Munich, the capital of Bavaria—a city celebrated for works of art in bronze. An English writer who has examined these bronze doors describes them as follows :—

The bronze doors intended for the Capitol at Washington, designed and modeled at Rome by the American artist, Rogers, have lately been on view at the Royal Foundry, where they were cast. The workmanship, as is always the case with whatever emanates from the Munich foundry, is admirable. There is a sharpness in the lines and a finish in the minutest detail which are in the highest degree creditable. Of the doors themselves it is not easy to convey an adequate idea by a mere description ; for an enumeration of all that is represented might induce the belief that there was a crowding of objects, and that the allotted space was overfilled ; and this is not the case. Each door —the whole forms a folding-door—is divided into four compartments or panels. Thus, with a semicircular space above, which has the breadth of both the doors together, there are nine divisions, in each of which an important moment of Columbus's life is represented.

The figures stand out in full relief, and some of the groups are eminently successful. The crowning event of the discoverer's career occupies the commanding spot over the top of the doors. Here Columbus, standing on a mound, forms the central figure. He has just landed from a boat, and with the standard of Arragon and Castile planted on the new soil, and with sword upraised in his right hand, he takes possession of the land in the name of his sovereign. Some boatmen are still in the skiff, others are kneeling on the shore, while a group of Indians, peeping from behind a tree on the opposite side, look on in wondering astonishment. In one compartment is represented the triumphal entry of Columbus into Madrid on his first return from America, amid crowds of gazers at him, the hero of the triumph, and at the Indians, who precede the procession with paroquets on their upraised arms.

The next panel is occupied with a sadder story. Here Columbus, in chains, surrounded by a sorrowing population, is about to embark for Europe. Then, the last scene of all, accomplishing his strange eventful history, we see him on his deathbed, attended only by a nun and some priests, who administer to him the consolations of religion. His son stands beside him. In the thickness of the door itself niches are formed at certain intervals, and in these are small whole-length figures of the great cotemporaries of Columbus—kings, statesmen, ecclesiastics and warriors. In the center, close to each other, are two such lines of niches, while on both sides a single row of figures, one above the other, fills up the intermediate space between the outer edge of the panels and the door-post. The large bosses, so often seen on doors, are here the heads of those historians who have written on the discovery of America.

The ornaments below each niche are heads of animals indigenous to the country, with fruits and flowers entwined, also characteristic of the New World. Every ornament is appropriate, and though they are manifold there is no confusion. As there will be no chance of the work being forwarded to the place of its destination for some time to come, it might be possible to induce the authorities to allow it to be sent to England meanwhile, where it could not fail to be looked at with the greatest interest. The Exhibition of next year might present the desired opportunity for taking such a step. The artist would be glad that so good an occasion offered for making his work known ; and the Americans would surely not be unwilling to show the world how munificently they had come forward to erect a grand national monument.

A Compliment from a High Authority.

Hall's Journal of Health commences a new volume with the January number. In the December issue we find the following :—

There are two papers which we cannot say are good, better, or best, for they are alone in their glory ; and consequently, peerless in their sphere. Both of them are so neat in their exterior, that the very fact of a man's having one of them in his hand is *prima facie* evidence that he is a person of refinement, or of superior education in his line—the *Home Journal* and the Scientific American, issued weekly in New York at two dollars a year. These papers are so well adapted to the spheres they were intended to fill, and so completely fill them that they have no rivals ; there is no room for rivalry, and it would be no use to attempt it. There is but one Morris and Willis on this or any other continent, and Munn &. Co. will, as they have done, stand alone for many a long year ; and in ability, too, as well as in prosperity.

We can say of *Hall's Journal of Health* that there is not another periodical that comes to our office which we welcome and read with so much interest. Its articles are original, short, spicy and practical. Published and edited by Dr. W. W. Hall, at 42 Irving-place, New York. Price $1 per annum.

The Great Eastern.—*Mitchell's Steam Shipping Journal* says :—This vessel is now lying safely moored at Milford Haven, where she has satisfactorily ridden out the recent terrific gales. She is discharging her coals into vessels alongside, to hasten the completion of which relays of men are at work day and night so that she may be placed on her gridiron at Nayland (prepared for her purposely when she was last here) with all possible dispatch. Every necessarx preparation is being made for speedily effecting her repairs, to evpedite which even the resources of the adjacent Royal Dockyard are readily afforded.

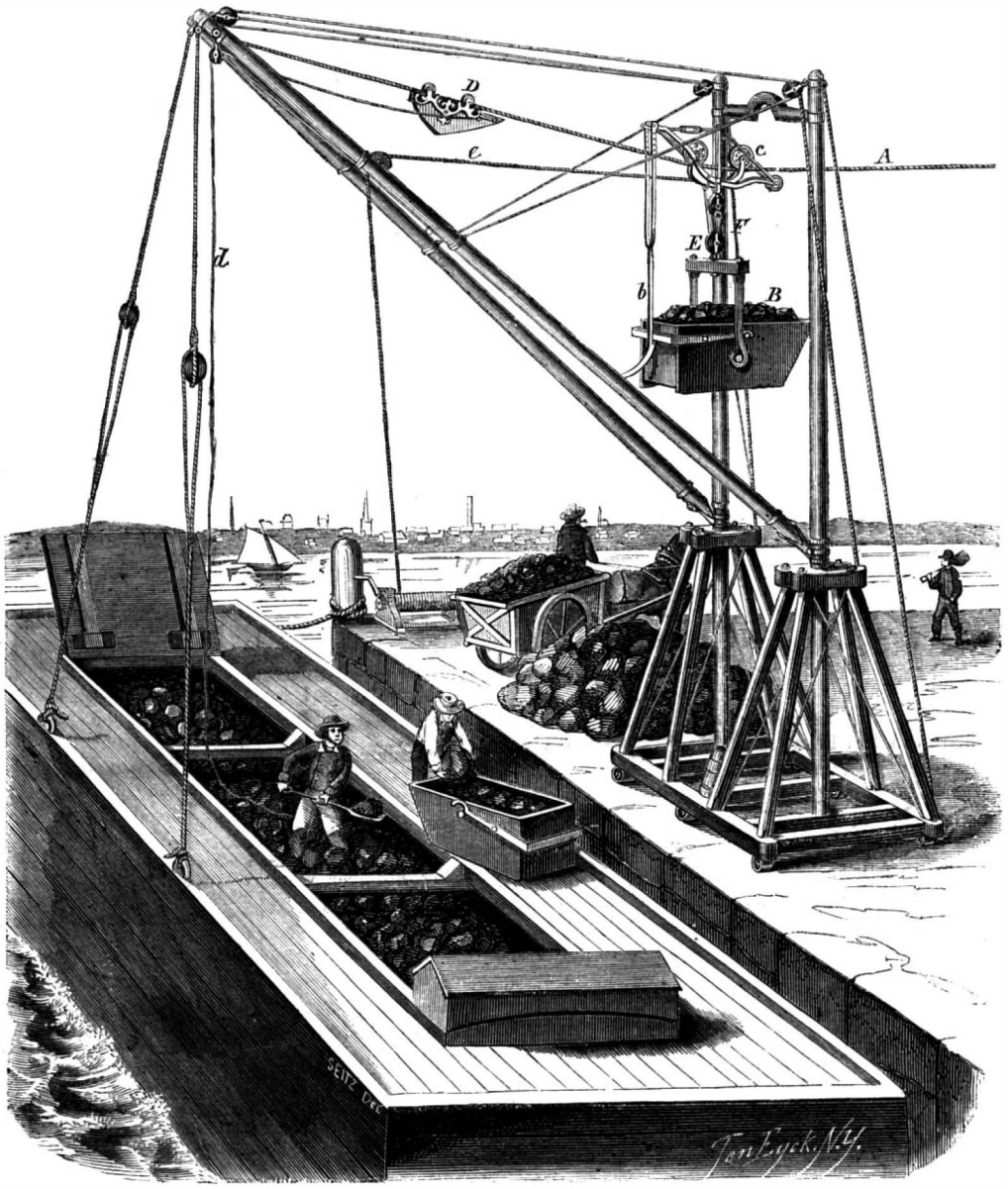
Improved Automatic Lifting and Suspension Car.

In the yards of our city gas works the cannel coal is piled from twenty to thirty feet high by gangs of laborers who work on movable platforms, resembling stairs, throwing it upward with shovels. This labor involves a vast expense annually to all large gas works, which the automatic mechanism illustrated by the accompanying perspective view is designed to supersede, by making a steam engine of about ten-horse power, with one attendant, execute the work of a hundred laborers. The figure represents the mechanism unloading coal from a barge and carrying it to any required distance upon a suspension cable, after which it piles it at any desired hight, or discharges it upon the ground.

A movable derrick is shown standing on the dock; its arms extend over and above the coal barge, to which they are held fast by ropes passing through rings in the deck. A is a strong wire cable secured at one end in a swivel fastened in the arms of the derrick; the other end of this cable is fastened to a swivel placed in an elevated frame or stage at the extreme distance to which the load is to be carried. The wire cable, A, forms a suspension bridge or elevated rail for the carriage which takes the coal into the yard. B is the scoop or coal bucket, and C is a carriage having grooved wheels for traveling on the suspension cable. D is an arresting buffer placed upon the cable above the barge or spot where the carriage is to stop and the coal scoop is to descend. E is a ship's block secured fast to the frame of the coal scoop, and F is a similar block fastened to the lower part of the carriage, C. The carriage always remains upon the cable, but the scoop descends to obtain a load, and then ascends to the carriage when loaded. These movements are executed by the rope, *e*, being alternately wound up and slacked. The rope has its upper end secured to block, F, thence it passes through the wheels of the two blocks in the common way of "block and tackle," and from the lower movable block, E, it passes to the windlass, which is operated by a steam engine or any suitable power. On the upper part of the block, E, there are spring jaws with a conical pin between them, and on the sides of the upper block are pins for the spring jaws to catch and hitch to the carriage, C. Supposing the scoop to be loaded, the rope *e*, is then wound on the windlass by the engine, and the scoop ascends to the carriage. The spring jaws on block, E, now catch upon the cheeks of the upper pulley, F, and the scoop is made fast to the carriage. As the buffer, D, holds the carriage above the barge, the cord, *d*, is pulled, the carriage is set free, and away it runs forward on the suspension cable, A, until it comes to a buffer, like D, which tips the forward end of the scoop, B, unhitching the catch, *b*, and the scoop swings over and discharges its load. When the carriage is running forward, the rope, *e*, is rapidly given off the windlass; when coming back the rope is wound up on the windlass. After the carriage has come back above the barge, the scoop is detached from the block, F, and the carriage, by winding the rope, *e*, tight on the windlass. The spring jaws open and the scoop unhitches and descends for another load. The operations are thus repeated until the cargo is discharged.

The scoop or bucket carries a tun of coal at each load and with a suitable engine 60 tuns can be discharged every hour. This invention is also applicable for armies in transporting field cannon and baggage across rivers by the erection of a portable derrick on each bank, and with similar buffers and windlasses at each end, for making the carriage bucket ascend and descend. It is also admirably suited for transporting blocks of stone, &c., for building piers in rivers.

One of these derricks has recently been put up at the Manhattan Gas Works, foot of Fourteenth street, East river, this city, where it has been employed in piling coal in the yard; and the operations of lifting one tun of coal in the scoop at a time, running it along the cable a distance of nearly two hundred feet and there dumping it, have been executed with a small steam engine with one attendant. The economical application of this ingenious mechanism to a hundred different purposes of engineering, will be apparent to every person without further enlarging upon the subject. The inventor and patentee is Capt. W. H. Brown, of Erie, Pa., from whom more information respecting it may be obtained.



BROWN'S AUTOMATIC LIFTING AND SUSPENSION CAR.

The Enfield Rifle.

We understand that the Twenty-fourth (Col. Stevenson's) Regiment, find great fault with their Enfield rifles. A distinguished merchant of this city, whose son is an officer in the regiment, made a visit to the regiment the other day when his attention was called to the fact. He describes the rifle as one that was well calculated to shoot round a tree with; the mere jamming of the muzzle upon a wooden bench was sufficient to crook the barrel; the bayonet would bend like lead by merely sticking it in the ground; and the ramrod could be bent over the knee like a piece of ratan. English manufacturers of shoddy blankets and rifles have good reason to wish for a continuance of the war, if our government is going to patronize them.

[The above is from the Boston *Commercial Bulletin*. We suppose those rifles which have been purchased in England for our volunteers were not the genuine Enfield, but some made at Birmingham. Whether this is so or not, the Enfield rifle has been condemned by Mr. H. Ross, the best marksman in Great Britain. He asserts that this rifle is almost useless for ranges exceeding 600 yards, and that an army furnished with them may be annihilated by an opposing army equipped with superior rifles before coming within a range of 650 yards.—Eds.

To Keep Potatoes, Bury Them.

A correspondent of the *Scottish Farmer* relates the following case respecting the preservation of potatoes. He says:—"I had an old ice well of the ordinary description, which I abandoned when I built one constructed of double timbers on the surface, after the American fashion. My gardener used, for several years, the old well as a potatoe store. It happened three years ago that the roof fell in and buried several hundred weights of potatoes, which, as we had plenty, was not cared for at the time. Last year we required stones and had those forming the sides and roof of the old well dug out, when to our astonishment we found almost the whole of the potatoes as sound as those of the same year's crop. I mention this as it may be turned to account in seasons when we have, as we had last year, a surplus crop; by burying them deep enough and in a dry place, we might secure ourselves against a short crop, as in all probability will be the case this year on account of the prevailing disease. In mentioning this to a friend learned in such matters, he tells me that potatoes buried one foot deep produce shoots near the end of spring; at the depth of two feet they appear about the middle of summer; at three feet in depth they appear very short and never come to the surface; and between three and five feet they cease to vegetate. He further informs me that he has buried potatoes in his garden at the depth of three and a half feet, which were not removed until after one or two years, when they were found quite sound and possessed their original freshness, firmness, goodness and taste."

Bleu de Mulhouse.—At the May session of the Mulhouse (French) Industrial Society, Messrs. Schaffer and Grosrenaud communicated a new and very interesting reaction respecting the products known as cianine-red. When a mixture of this red and an alkaline solution of gum lac are kept for some time at a boiling heat, they produce a very beautiful blue. The experiment has since been repeated by several members, and the committee on chemistry proposed for this color the name of *bleu de Mulhouse*.

It is mentioned in the Manchester *Guardian*, that throughout the Lancashire cotton districts the spinners are now generally making experiments with Indian cotton, and that the opinions expressed of the result are various, but that it is evident that, by a slight alteration in the machinery, this cotton may be made to enter, in various proportions, into much higher numbers than has hitherto been supposed likely.

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VOL. V. NO. 25.....[NEW SERIES.]....*Seventeenth Year*

NEW YORK, SATURDAY, DECEMBER 21, 1861.

TO OUR FRIENDS.

NOW IS THE TIME TO FORM CLUBS.

Only one more number after the present and another volume of this journal will be closed. We appeal to its friends in all sections of the country where mail facilities exist to endeavor to form clubs for the coming year. We feel justified in asserting that no other journal in this country furnishes the same amount of useful reading, and especially at the extraordinarily low price at which it is furnished. Ten persons can club together and get the paper at $1.50 each for one year. Twenty persons clubbing together can have it at the rate of only $1.40. Think of getting a volume of 832 pages of useful reading matter, profusely illustrated with between 500 and 600 original engravings, for such a small sum of money. Single subscriptions, one year, $2; six months, $1. Even though the times may be hard, the long winter evening must be relieved of its dullness, and we must keep reading and thinking, and thus be prepared to overcome temporary difficulties and open new channels of wealth and prosperity. Friends, send in your clubs; at least renew your own subscriptions promptly.

See prospectus on the last page of this sheet.

IRON WAR VESSELS.

A number of iron-clad vessels are now being built for our navy upon contracts which are based upon definite designs and specifications. Scarcely two of these vessels will be alike, yet, however faulty some of them may appear to be, it would be very unwise, in a financial sense, to make any material alterations now in their designs and construction. But as iron must hereafter enter far more largely into the construction of national vessels, it will be well for our government and people not to disregard the great amount of experience which has already been gained in shipbuilding. It is known that ships which are covered above the water line with thick plates of iron have a great draft of water, which is due to their greatly-increased weight. Such a frigate as the *Warrior*, for example, draws twenty-six and a half feet of water, and it cannot enter harbors where the *Great Eastern*, which is three times the tunnage, can pass easily. In order, therefore, to secure as light a draft of water as possible with ships heavily plated with iron, some have been designed with flat floors and very light hulls under the water line. Some advantages are undoubtedly obtained by such a design of vessel, but perhaps the disadvantages resulting therefrom will be much greater, therefore a very careful scrutiny of this entire subject should be undertaken. Vessels designed for permanent war purposes should be screw propellers, and all their machinery and boilers should be under the water line, so as to secure them from the enemy's shot. Now, it has been found that vessels having hulls with flat floors and a light draft of water are not well suited for screw propellers, however eminently adapted they may be for paddle wheels. In a heavy sea the stern of such a vessel is so frequently lifted out of the water that the propeller is thereby rendered unavailable, and the consequence is the vessel becomes almost stationary.

Another important point in the construction of such vessels is the kind of material which should be used for their entire construction. The fact must not be overlooked that an iron-plated vessel requires a much stronger hull under the plates than an unplated vessel. A greater superincumbent weight has to be supported, and the necessary increased strength requires an increase of material. The strongest material in proportion to its weight, and the facility with which it can be arranged for sustaining pressure and strains, should be used for making the under hulls of such vessels, so as to secure the least possible draft of water. The best material for this purpose is the higher quality of rolled iron. Timber is not be compared with it; therefore, it appears reasonable that the entire framing and sheathing—outside and inside—should be of iron. It has been asserted that the armor plates of ships require a backing of thick timber planking, to serve as a cushion for the metal when the latter is struck with shot. Unless such a cushion is provided, it has been said, the plates will easily crack and splinter when struck. We doubt the correctness of this assertion; no experiment has yet verified its accuracy, but even if it were true it cannot have the least significance as applied to that part of the hull which is below the water line.

There is also another point to be considered in connection with the construction of screw propellers. It is now known that the action of the screw upon the hull of a vessel tends to open its seams, and in the case of wooden vessels this involves very frequent repairs.. On the other hand, iron screw ships do not require to be repaired so often, because their hulls are much stronger, and more nearly resemble a single piece. The metal of which they are made permits of being rolled into the best shape for the most perfect union of all the parts, so as to obtain the greatest strength and durability with the least weight of material. These considerations should be pondered, we think, by all who are interested in the construction of our national iron-plated vessels.

FRANKLINITE.

On another page will be found the report of a short discussion on the franklinite metal, about which so much has been said. A large amount of money has been expended by some of our citizens in attempts to render available the peculiar hardness of the pig metal in the construction of burglar-proof safes, and in other ways. A few months ago a gentleman told us that he had been using saws for a special purpose, and that made of steel they cost him twenty-five dollars a set, but that he could procure them of franklinite metal for thirty-seven cents a set, and that the iron ones were better than those made of steel. The ore is a combination of the oxides of iron, zinc and manganese. Booth regards it as a combination of the protoxides of iron and zinc with the sesquioxides of iron and manganese; giving as the probable formula:—

$$\left.\begin{matrix}\mathrm{Fe\,O}\\ \mathrm{Zn\,O}\end{matrix}\right\} \left\{\begin{matrix}\mathrm{Fe_2\,O_3}\\ \mathrm{Mn_2\,O_3}\end{matrix}\right.$$

The pig metal is simply an alloy of iron and manganese, with or without some admixture of zinc; most of the zinc probably being evaporated and driven off in the melting process. The alloy is exceedingly hard. There is now a scratch on the window by our side which we made several months since with a piece of franklinite metal. As our readers know, the presence of zinc in the ore interfered so seriously with the smelting that the working of the mines was abandoned for many years. The fumes of the zinc choked up the flues, and its evaporatiou carried off the heat so rapidly as to retard the fusion. But after the zinc is removed the iron can be separated; and now that the ore is worked for the sake of the zinc, the iron also is successfully extracted.

In 1853 the New Jersey Zinc Company commenced the smelting of iron from the residuum of their ores, and they produce about 2,000 tuns annually. The bar iron from this ore is of remarkable purity and strength, and is well adapted to the manufacture of steel. There will doubtless be found many purposes in the arts for which the properties of the pig metal will render it valuable. The plate exhibited at the Polytechnic Association represents a new device for employing it, but we should suppose that a thin sheet of cast steel between two sheets of wrought iron would make a better self-sharpening shovel or plowshare than that plate. The use to which we are most desirous to see either this or some other suitable iron ore applied is the manufacture of cast steel, either by the Bessemer or some other process.

GIFFARD'S INJECTOR FOR ELEVATING WATER

A correspondent makes the following inquiries:—

I wish to be informed through your columns upon the lowing points:—First, if Giffard's injector will force a stream of water into a boiler, why will not the same power force a stream of water through a pipe to a greater or less altitude? I have discussed this with several railroad men and machinists, and they generally seem to think it practicable, but none were prepared to speak definitely. Possibly this is a new idea, and one that I have struck that will require your services as Patent Solicitors? But I presume the whole subject has been discussed and settled by the *savans* of your paper.

Second, if the above is practicable and the injector is the most economical method of supplying boilers, why would not the injector likewise be the most economical power to elevate water to any hight?

The principle of the Giffard injector has been claimed as the invention of Capt. Savery, who published a pamphlet on the subject in England in 1702. He erected several of his engines for elevating water by the force of steam without the use of pump or piston. In several features the mechanism was different from that of the injector, but the force of the steam raised the water against the pressure of the atmosphere in the one case, just as it forces in water against the steam pressure in the boiler in the other. Savery's engine is illustrated and described on page 52, Vol. IV. SCIENTIFIC AMERICAN (new series), and all those who are interested in the inquiries of our correspondent will find the subject interesting to study, because it is perfectly practical, and our correspondent is correct in his conjectures. A Giffard injector is now in successful operation as a water elevator in the Kippax colliery, near Leeds, England. A small portion of this coal mine lies a little below the main drainage level, at a considerable distance from the shaft, and the extent is so limited that it will not allow for a special pumping engine. Heretofore this space has been pumped by hand, but as the water was gaining upon hand labor, a Giffard injector was suggested as an experiment. The steam is supplied from a boiler at the surface of the ground and is conducted a distance of 1,000 feet by an inch and a half pipe into the mine. The water is raised by the injector 27 feet to the level, from which the pumping engine lifts it to the top of the pit; but in being raised this hight it is driven through an incline pipe 300 feet in length. As considerable steam is condensed in the pipe leading from the boiler to the injector, it is carried off by a steam trap so as to permit the steam alone to pass into the injector, which works day and night without stopping, and requires no attendant. This injector water-elevator has been in operation for several months. The injector has also been applied in elevating water to cool the tuyeres of blast furnaces in England, and it has been found more convenient and reliable than a force pump.

WHY WILL NOT WET WOOD BURN?

There is no event of our daily lives, however common or apparently significant that does not enfold an unfathomable mystery. We all know that it is difficult to burn wet fuel, but how many have considered that this fact is connected with some of the most comprehensive laws, and some of the most recondite principles of chemistry and physics?

The burning of wood, like nearly all other burning, is its combination with oxygen. The only combustible elements in organic substances are carbon and hydrogen. The hydrogen combines with oxygen to form water, and the carbon to form carbonic acid. At a high temperature, the affinity of the hydrogen and carbon for each other as they are united in the wood is less than their affinity for oxygen, and they accordingly leave their union and enter into combination with oxygen. The transaction is accompanied with light and heat and other phenomena of combustion, and is called burning.

Below a certain temperature the change does not take place, but if a portion of the wood is heated sufficiently for the combustion to commence, then the caloric generated by the combustion heats the con-

tiguous parts, and thus the burning continues. It is a case of single elective affinity as modified by caloric. At a low temperature, the affinity of carbon and hydrogen for the elements combined in the wood is stronger than their affinity for oxygen. But at a higher temperature the relative strength of affinities is changed, and they leave their combination in the wood and enter into combination with oxygen. So much for the relation of the question to chemical affinity.

Now let us examine its relations to latent heat. When water is evaporated it absorbs about 1,000 degrees of heat. That is to say, if we pass 1,000 degrees of heat into a quantity of water, the temperature of which has been previously raised to 212°, and the heat just suffices to evaporate the water, then we find that the vapor is no warmer to the touch, or, as measured by the thermometer, than the water was before. The 1,000 degrees of heat have been hidden or rendered latent. If the water is in contact with wood, when a portion of the wood is set on fire, the heat generated by the combustion, instead of being imparted to contiguous portions of the wood, and thus raising its temperature to the point at which the elective affinities are changed, is absorbed and made latent by the vapor of the water, hence the combustion ceases.

REFORMS OF THE BRITISH COLONIAL PATENT SYSTEM.

THE CANADIAN PATENT SYSTEM.

The Canadian press is devoting unusual attention to the importance of a thorough reform in the Canadian Patent system. This looks as though this desirable object was about to be accomplished, which we certainly hope may be the case. We regard their Patent system as a disgrace to the spirit of the age. The Toronto *Leader* of the 22d ult., contains an editorial on this subject, in which it is remarked that

Our Patent laws are framed in the narrowest spirit of illiberality; but while we intended to be very selfish, our exclusiveness has injured our own people more than any other. Our Patent laws have one leading object; to consecrate the sacred right of theft, and make the practice of it profitable. There can be only one object in refusing to give a foreign discoverer the same security that he obtains everywhere else: to secure the right of stealing the product of his brain.

The *Progressionist*, published at Morpeth, C. W., in a recent number says :—

We have reason to believe that measures will be taken at the coming session of Parliment to wipe out these defects, and reorganize the system in accordance with enlightened policy. First, and mainly, this policy will enable us to reciprocate with our inventive neighbors, the Americans, who are renowned for producing the best and cheapest agricultural implements extant; it will bring manufacturing capital and capitalists into the country, from all parts; it will enliven competition with us; cheapen machinery, and thus effect incalculable good throughout all branches of the industrial arts; other needful improvements will follow as a matter of course. The benefits accruing from this policy to American inventors, as well as others, will also be immense, and this will establish an enlarged system of reciprocity for a common good. When this policy is inaugurated, we can bequeath the old one to the Japanese, or some such unexpansive race. Our Canadian exchanges, within the past two or three weeks, have given abundant evidence that a movement is on foot which will result in producing the desired reform.

The *Progressionist* also alludes to the fact that the Scientific American has long advocated a liberal international Patent system.

NEW BRUNSWICK PATENT SYSTEM.

Peter Stubs, Esq., Patent solicitor, residing in St. John's, New Brunswick, in a recent letter to the *Courier*, published in that city, discusses very intelligently the new modification of our Patent system in its influence of inventors in that Province. After quoting the 10th Section of the Patent Law Amendment Act of March 2, 1861, which brings inventors of all nations upon the same footing as respects fees, except those of countries that discriminate against us, says :—

In New Brunswick, the government charge upon the issue of a patent to a British subject, is $21.50, whilst a foreigner is charged $40 for the same service. The consequence is, that as we in this Province thus discriminate against the citizens of the United States, our Provincialists are subjected to a payment of $500 in that country, which virtually amounts to a prohibition.

A short time since I wrote to the eminent patent solicitors, Messrs. Munn & Co., of New York, proprietors of that excellent journal, the Scientific American and stated to them that a person now residing in this city, who was born in England, was desirous of taking out a patent through their agency for the United States, and wishing to know what the government charge would be in such a case. Their reply was that he could make an application upon the same terms as one of their own citizens. And in the concluding paragraph of their letter reiterated this statement in these words :—"All natives of the United Kingdom of Great Britain and Ireland can apply on the same terms here as if they were citizens." And the reason of this is plain; it is because, high as the patent fees may be in the mother country, there is no discrimination there adverse to American citizens, as I have shown to be the case in New Brunswick.

It is for the members of our Legislature to remedy the evil, which the *Courier* I hope may be the means of presenting to them by the publication of this communication.

The followiug are the charges in three of the B. N. A. Colonies for Letters Patent "for new and useful inventions :—"

New Brunswick Government $21 50, and Attorney General's fee, $14; Nova Scotia altogether, $4; Canada, in all $20.

These facts need no comment. They require the pruning hand of the General Assembly, so far as this Province, is concerned.

The *Courier*, in alluding to Mr. Stubs's letter, says :—

The sooner Bluenose is relieved from the predicament in which his Patent Laws have placed him, the better, as at present, he is deprived of an important privilege, which can be freely enjoyed by his countrymen—English, Irish, Scotch and Welch.

Condition of the Patent Office.

The Secretary of the Interior in his report to Congress gives the following exhibit of the condition of the Patent Office :—

No branch of the public service connected with this department has been so much affected by the insurrection of the Southern States, as that of the Patent Office. The receipts of the Office from January 1 to September 30, 1861, were $102,808 18; and the expenditures were $185,594 05, showing an excess of expenditures over receipts, of $82,785 87. During the corresponding period of the last year the receipts were $197,348 40, being $94,840 22 more than the receipts for the same part of this year. During the same period 3,514 applications for patents and 519 caveats have been filed, 2,581 patents have been issued, and 15 patents bave been extended. To meet this deficiency in the income of the office, the Commissioner with the concurrence of the department has reduced the clerical and examining force by the discharge of thirty of the employees, and reduced the grade of the remainder in order to lessen their compensation. By this reduction it is believed by the Commissioner that the expenditures will be brought within the receipts.

The expenses of the office have been increased during the present year by the printing of the drawings and specifications authorized by the fourteenth Section of the Act of March 2, 1861. The Commissioner contracted for the printing in conformity with the law, and the work was executed in a satisfactory manner until the 1st of November, when in consequence of the decline in the receipts of the office it was discontinued.

The printing of the drawings and specifications of patents, in the manner in which it has been done under the law of March last, would unquestionably be of great service to the office, as well as to all interested in its business, and should, if possible, be continued. Although the expenses of the Patent Office have been increased by this printing, a saving of a larger amount has been effected to the Treasury. The mechanical reports of the Patent Office have heretofore been printed at the expense of the government. These reports consist of extracts from the specifications of the patents issued, giving a brief and general description of the improvements or inventions for which the patents were issued. They possess no interest for the general reader, while they are too brief to be of service to mechanics or inventors. The plates for the Mechanical Report of 1860, cost the government $47,398 21—a sum greater than the entire cost of printing provided for by the law of March last. The cost of paper, printing and binding was probably as much more, while the work was without practical value. The printing of the drawings and specifications, as provided for by the law of March last, will render unnecessary the printing the mechanical reports, and save the expense heretofore incurred for their publication.

Several amendments to the law of March last are proposed by the Commissioner of Patents, which would doubtless render it more effective, and they are recommended to the favorable consideration of Congress. The law regulating copyrights should be amended to effect the objects contemplated by Congress.

The act of February 3, 1851, authorizes the clerks of the United States District Courts to grant copyrights, and requires the author to deposit a copy of his work with the clerk. The clerks are required to send to the Department of the Interior all such copies deposited in their offices. This duty is very imperfectly performed. Probably not more than half the books, maps, charts and musical compositions which are copyrighted are deposited in this department as required by law.

The object of collecting in one library copies of all the copyrighted literary productions of the country is thus defeated. To secure this object, amendment of the law is recommended which shall give the sole power of granting copyrights to the Commissioner of Patents, and require from every applicant the payment of a fee of one dollar, and a deposit in the Patent Office, of a copy of the work to be copyrighted.

Discussion on Franklinite.

At the meeting of the Polytechnic Association of the American Institute, on Wednesday evening, Dec. 4th, the following discussion took place on the subject of franklinite :—

Prof. Mason—I have here a specimen of wrought iron and franklinite combined, which the inventor gave me with some reluctance, as he intends to exhibit at our next meeting some better samples. It consists of nine thin layers or strata, five of wrought iron and four of franklinite, all welded together into one sheet; and it is sufficient to say that we have no tool that can penetrate it. The best steel drill glides over it without cutting it in the least.

Mr. Smith—What is franklinite?

Prof. Mason—During the life time of Dr. Franklin a mine of peculiar iron ore was discovered in New Jersey, and Dr. Fowler erected a furnace for the purpose of smelting it. Dr. Fowler, being a friend of Dr. Franklin, called the ore franklinite. It is composed of iron, manganese and the red oxide of zinc; the proportions of the iron and manganese being constant and that of the zinc variable. The peculiarity of the metal is its extreme hardness. It is harder than the best steel. It is now smelted in considerable quantities, and great efforts have been made to use it in the construction of burglar-proof safes. It is very brittle, however, and the impossibility of cutting it with any tools is of course a great obstacle in the way of working it. If it can be formed in alternate layers with wrought iron, as in this sample, perhaps a sheet of it between two layers of wrought iron would make a hoe or shovel, or a plowshare which would be self-sharpening. Mr. Butler, will you tell us exactly how this sample was prepared?

Mr. Butler—We pulverized a quantity of the franklinite pig metal, and sprinkled a layer of it upon a sheet of wrought iron, covering the iron also with a dusting of borax as a flux. We then laid a second sheet upon the top of this, and covered it also with the franklinite and borax. In this way we built up a pile of alternate layers of wrought iron and franklinite till we had five sheets of wrought iron and four strata of franklinite. We then put the mass into a furnace and raised it to a white heat, when we took it out and passed it between rollers. The rollers were set to compress it very much, perhaps too much; for the franklinite, being very limpid indeed, was forced out in streams; flying across the shop more than twenty feet. You see that the mass was very thoroughly welded together. The plate was eight or nine feet long and about a foot wide. This piece was cut off with shears. We cautioned the owner of the shears in regard to the hardness of the metal but he thought that he could cut it, and you see that he did, though I believe he broke his shears a little. His success I attribute to the fact of the outer layers on both sides of the sheet being wrought iron, which consequently was the only substance that came in contact with the blades. In this form there is no doubt the sheet might be punched.

Mr. Jones—Were the sheets of iron brightened?

Mr. Butler—No; only as they were brightened by the borax.

It is very generally supposed that hogs thrive best when they are freely allowed to "wallow in the mire" and remain as damp and dirty as possible. This is an erroneous notion. Various experiments have proven conclusively that hogs when kept clean, warm and dry, thrive best and are most easily fattened. They should be kept in well shaded, dry and clean pens, and they should be fed regularly three times per day.

NOTES OF SHIPBUILDING AND THE CONSTRUCTION OF MACHINERY IN NEW YORK AND VICINITY.

Notwithstanding the dark clouds of civil war which hang over our country at the present period, there is considerable activity manifested in our various shipyards and machine shops. It is true that the prominent feature of the work in progress comprises the construction of gunboats, side-wheel steamers, sloops-of-war, iron-clad frigates, floating batteries, &c., for our government, demanded by the exigencies of the times, but they do not monopolize the whole of it, as during the past three months, several magnificent steamships of large tunnage have been constructed for private individuals, and others are now on the stocks, or undergoing the process of completion. Many of these vessels, however, have been sold or chartered for an indefinite period to the government, and are now being used as gunboats or transports.

It is an indisputable fact that the shipping interests of the Northern States have been for the past fifty years steadily on the increase, and but temporarily interfered with by the several financial crises we have passed through in that time. Although we have never boasted of the immensity of our tunnage, we have advanced with that steady and marked progress which has attracted toward us the attention of European countries, and they have expressed their astonishment at our enterprise and energy in naval architecture, and the excellency of our machinery.

Science and art have extended their aid in no other department of handiwork more particularly than in this, and the appreciation of the fact that our models of vessels, and the skill and ingenuity manifested in their construction, are universally regarded as of a superior order, is practically shown by numerous foreign nations, who fly their ensigns over the decks of many formidable men-of-war composing their fleets, whose construction is due to American skill and American ingenuity. And more than this, many of their citizens are owners of vessels of fine models, well constructed, sent forth from our yards and now plying their seas.

If more evidence of this character is required to prove our assertion, we think the fact that special agents have recently been sent to this country by foreign powers to superintend the erection of vessels intended for them, now being commenced at the yard of one of our most successful ship-builders, will certainly be sufficient.

During the past few days we have visited the several shipyards and machine shops to be found within New York and vicinity, and as a result of our observations and inquiries, we present herewith annexed a review of the operations for the past three months including those now in progress. It will give an impression of the state of the business ; but the most indubitable evidence, to our minds, of the great activity existing, is the merry chorus of the ringing axes and clanking hammers that strike the ear at every turn.

THE STEAMER SANTIAGO DE CUBA.

The hull of this vessel was built by Messrs. J. Simonson & Co., Greenpoint, L. I. ; machinery was constructed at the Neptune Iron Works, New York ; the owners are Messrs. Valienti & Co., St. Jago de Cuba ; her intended service, New York to Santiago ; superintendent of construction, Mr. Wm. D. Phelps.

Hull.—Length on deck, 240 feet; breadth of beam, molded, 38 feet; depth of hold, 19 feet 6 inches; depth of hold to spar deck, 27 feet; frames, molded, 15 inches; sided, 18 inches, and are 26 inches apart at centers; draft of water at load line, 14 feet; rig, brigantine; tunnage, 1,650 tuns.

Engines.—Vertical beam ; number and diameter of cylinders—one of 66 inches; length of stroke of piston, 11 feet.

Boilers.—Two, return flue ; length of boilers, 30 feet ; hight of same, exclusive of steam chimney, 12 feet; breadth, 12 feet.

Water Wheels.—Diameter, over boards, 29 feet; length of blades, 9 feet 6 inches; diameter of shaft, 17 inches; material, iron.

This vessel was intended as a pioneer of a line of steamers between the port of New York and St. Jago de Cuba, but is now in the service of the United States. Her frames are of white oak, hacmetac, chestnut, &c., which are square, fastened with copper and treenails. Her keel is of white oak, and her floors are filled in solid to the floor timber heads, fore and aft. She has iron straps, diagonally and double laid, 4½ by ⅞ inches, extending from her bilge to second deck, secured to frames by ⅞-inch bolts and an iron strap of same dimensions, running entirely around the ship inside. All her arrangements were such that at the time she was finished she was surpassed by few steamships afloat.

THE STEAMER PAQUETTE DE MAULE.

The hull of this vessel was built by Messrs. Lawrence & Foulkes, Williamsburg, L. I.; the machinery was constructed by the Neptune Iron Works, New York ; owner, Mr. George K. Stevenson, Valparaiso ; intended service, Valparaiso to Maule, Coast of Chili.

Hull.—Length on deck, 165 feet; breadth of beam, molded, 29 feet; depth of hold, 9 feet; depth of hold to spar deck, 9 feet 6 inches; frames, molded, 12 inches; sided, 6 inches, and are 24 inches apart at centers. These frames are square, fastened with copper and treenails, and are strapped with diagonal and double laid braces, 4½ by 7-16 inches; draft of water at load line, 8 feet 6 inches; rig, brigantine ; tunnage, 400 tuns.

Engines.—Vertical beam ; number and diameter of cylinders, two of 32 inches; length of stroke of piston, 8 feet.

Boilers.—Two, return flue ; do not use blowers.

Water Wheels.—Diameter, over boards, 24 feet; material, wood.

This vessel is of white oak and locust and constructed in the most thorough manner. She is the first vessel ever built in this country for the trade for which she is intended, and this fact may be considered a recognition of the superiority of our naval architecture, as those steamers previously employed where the *Paquette de Maule* is to run have never fulfilled the requirements of the locality. The interests of the government have heretofore secured the patronage of ship owners there for English ship builders, but by the untiring exertion of Messrs. Lawrence & Foulkes, American skill achieves another triumph.

THE STEAMER MERCEDITA.

The hull of this vessel was built by Mr. Edward Lupton, Williamsburgh, L. I.; the machinery was constructed by Messrs. Murphy, McCrady & Worden, New York ; owners, Havana and New York Steam Navigation Company ; intended service, New York to Havana.

Hull.—Length on deck, 195 feet; breadth of beam, molded, 30 feet ; depth of hold, 11 feet 3 inches ; depth of hold to spar deck, 19 feet; frames, molded, 14 inches; sided, 7½ inches, and are 30 inches apart at centers. They are square fastened and strapped with wooden braces; draft of water at load line, 10 feet; rig, three-masted schooner ; has two athwartship bulkheads; tunnage, 838 tuns.

Engines.—Vertical direct acting ; number and diameter of cylinders, two of 30 inches; length of stroke of piston, 2 feet 8 inches.

Boilers.—Two, horizontal tubular, constructed in the best manner.

Propeller.—Diameter, 10 feet; pitch, 18 feet; number of blades, 4 ; material, cast iron.

This vessel is the first of four steamships intended to ply between Texas, New York and Havana. She was constructed with a view to attain great strength and speed. She is built of white oak, hacmetac and chestnut, and is ceiled with yellow pine. Instead of using iron straps as braces for her frames, she has every four feet over her ceiling, diagonal oak braces, 9 by 2½ inches, being 5 inches in thickness, running from her upper deck clamp to 15 inches below floor heads, each intersection being bolted with iron, and all the treenails passing through the ship, and wedging in these braces, thus forming, it is asserted, greater strength than was ever before attained in a vessel of her class. She is fitted with all the modern improvements, and cost at completion $95,000.

THE STEAMER SHANTUNG.

The hull was built by Mr. Thomas Collyer, New York ; machinery was constructed by Neptune Iron Works, New York ; owners, Messrs. Everett & Co., China ; intended service, coast of China.

Hull.—Length on deck, 150 feet; breadth of beam, molded, 25 feet 6 inches; depth of hold, 10 feet; depth of hold to spar deck, 17 feet 6 inches; frames, molded, 12 inches; sided, 5 and 6 inches, and are 26 inches apart at centers; they are square, fastened with copper and treenails, and are braced with iron straps, diagonally and double laid, 3½ by ⅞ inches, extending entirely around them : draft of water at load load line, 7 feet; rig, foretopsail schooner ; tunnage, 445 tuns.

Engines.—Vertical beam ; number and diameter of cylinder, one of 36 inches; length of stroke of piston, 10 feet.

Boilers.—One, return flue, located in hold; uses blowers.

Water Wheels.—Diameter, over boards, 22 feet; material, iron.

This steamer is constructed of white oak and chestnut, and put together in a masterly manner. Her model seems to be without fault, and bespeaks great speed. The reputation which Mr. Collyer has achieved in China for building steamships is surpassed by no other constructor. He has sent to the Chinese seas some eight or ten vessels, all of which have beat in many an exciting race the boasted steamers of England.

THE STEAMER HONDURAS.

The hull was built by Mr. Thomas Collyer, New York ; the machinery was constructed by the Neptune Iron Works, New York ; owners, Messrs. S. H. Ackerman and others, New York ; intended service, Honduras to Cuba.

Hull.—Length on deck, 150 feet; breadth of beam, molded, 26 feet; depth of hold, 10 feet; frames, molded, 12 inches; sided, 5 and 7 inches, and are 28 inches apart at centers. They are square, fastened with copper and treenails, and have iron straps, diagonally and double laid, 3½ by ⅞ inches, running around them : draft of water at load line, 7 feet; rig, schooner, two masts; tunnage, 375 tuns.

Engines.—Vertical beam ; number and diameter of cylinders, one, of 36 inches; length of stroke of piston, 8 feet.

Boilers.—One, return flue, located in hold ; does not use blowers.

Water Wheels.—Diameter, over boards, 22 feet; material, iron.

This vessel is built of white oak and chestnut, and has water-wheel guards for half width, and slatted underneath. She is of beautiful model, and is expected to be very fast. She is supplied with all the necessary pumps, &c., required by a sea-going steamer.

THE STEAMER FLAMBEAU.

The hull was built by Messrs. Lawrence & Foulkes, Williamsburgh, L. I.; the machinery was constructed by Messrs. Henry Esler & Co., South Brooklyn, L. I.; owners, Messrs. P. J. Forbes & Co., China ; intended service, coast of China.

Hull.—Length on deck, 185 feet; breadth of beam, molded, 30 feet; depth of hold, 11 feet; depth of hold to spar deck, 18 feet; frames, molded, 14 inches; sided, 8 inches, and are 30 inches apart at centers. These frames are square, fastened with copper and treenails, and are strengthened in the best possible manner by iron straps, diagonally and double laid, 4 by ½ inches, extending around them. Draft of water at load line, 10 feet 6 inches ; rig, brigantine ; tunnage, 791 tuns.

Engines.—Vertical beam ; number and diameter of cylinders, one, of 50 inches; length of stroke of piston, 5 feet.

Boilers.—Two, return tubular, constructed in the best manner, and located in hold.

Propeller.—Diameter, 10 feet; pitch, 18 feet ; number of blades, 4 ; material, iron.

This steamer, as mentioned above, was intended for the coast of China, but owing to the admirable cargo-carrying capacities she possesses she was chartered by the government at the period of her completion. She is built in a masterly manner, of white oak, chestnut, &c., and is of beautiful model. The builders of her machinery had two objects in view at the time of its construction, viz., great strength and speed, and the trial trip of the vessel, recently made, proved very conclusively to them that they had succeeded beyond their most sanguine expectations.

A New Pad to Prevent Interfering.—Mr. William Somervill, a veterinary surgeon of this city, has invented a pad to prevent interfering in the action of trotting horses. It seems well calculated to effect the object, and there is a good deal of ingenuity in the plan. The pad consists of a piece of india rubber, made concave inside, so as to fit the hoof, and kept in place by means of its elasticity, and a tongue held between the wall of the hoof and the shoe. No horse can cut his knee with this pad upon his hoof. The method adopted to fasten it is entirely successful. At the same time it is so inconsiderable an addition to the edge of the shoe and the horn of the hoof, that at a very little distance it cannot be perceived.

Golden Clay.—Gold is disseminated among the alluvial deposits of the earth to a far greater extent than most persons suppose. Mr. Eckfeldt, the principal assayer of the U. S Mint, at Philadelphia, has discovered it in the soil beneath the paved streets of that city. Philadelphia clay contains one part of gold in every 1,224,000 parts of clay. There are three cents' worth of gold in every cubic foot of such clay. It will not pay for the working, but it is a curious fact, that in every million cubic feet of such clay there are $30,000 worth of gold. No wonder the Philadelphia bricks are so famous when it is considered they are all made of gold.

The commerce of Baltimore is reviving again, under firmly established Federal sway. The business of last week at the custom house showed $359,052 exports, being nearly $300,000 more than the previous week, but the imports were not so heavy. The exports were principally flour, wheat and tobacco to Europe.

Several beds of lignite have been discovered in Carson river in the Washoe district, California.

AN INGENIOUS ATTEMPT TO REDUCE DAMAGES.

SHERWOOD'S DOOR LOCKS—THE UNITY OF AN INVENTION —LAW AND EQUITY AS TO DAMAGES.

Most of the door locks used in this country, till within a few years past, were imported from England. But the mechanical genius of our countrymen soon placed us beyond the necessity of depending upon foreign countries for an article so universally useful and important. Previous to Sherwood's invention it was an important object to discover some lock cheaper and better than the imported article. This object was in part effected by making the locks of cast iron ; but a difficulty was found to exist in the fact that door locks had to be made right and left, and a lock made for a right-hand door would have to be turned upside down in order to be used on a left-hand door, and *vice versa.* An American named Sherwood, under whom the complainants, Livingston & Co., claimed, was the first inventor to effect this object, and soon succeeded in establishing a manufacture at once cheaper and better than the imported. His patent was for "a new and useful improvement in door locks." There was necessarily in Sherwood's improved locks a vast deal, much the greater part of which had been in previous locks, and he claimed of course no merit for inventing door locks generally. "What I claim as my invention," is the language of his application for Letters Patent, "is making the case of door locks and latches double faced, or so finished that either side may be used for the outside in order that the same lock may answer for a right or left-hand door."

After Sherwood obtained his patent and sold it to the plaintiffs for about $600, the respondents, Jones & Co., conceiving that the invention was without originality, undertook to disregard the patent, and during a term of two years and six days did disregard it. And being able to sell for $31 per dozen locks, which cost but $10.64 to make, their profits were large. The plaintiffs having filed a bill sometime since in the U. S. Court obtained a perpetual injunction, and a decree and reference for account. The account being taken it appeared that, making a deduction for the interest of money invested in the manufacture, the cost of machinery, wear and tear, expenses of sales, insurance agencies, transportation, bad debts, &c., the net profits upon all the locks (including every part of the lock) which the defendant made or sold were $13,282 93. But the defendants denied that they were liable to profits on the whole lock, or for any profits except those properly springing from the case of the lock ; that part of it alone of which Sherwood claimed to be the inventor. Their idea was that they could apportion this sum of $13,282 93, reported as their profits to the different parts of the lock ; the profits on each part being fixed on an arithmetical proportion to the cost of each. The account then would stand thus :—

Profits on the case (the improvement for which Sherwood got his patent,)	$3,123 48
Profits on latch and keeper	1,221 53
Profits on other parts of the lock	4,577 01
Profits on trimmings	4,360 91
Total	$13,282 93

The questions then before the court were :—

First, whether the respondents were to be charged with $3,123 48, profits on the case alone on the basis of computation just stated, or with $13,282 93 profits on the whole lock.

Second, whether assuming, as proved, that the violation had been willful and gross, the court, in a form of proceeding coming from a bill in equity, could treble the damages.

The following is a portion of the opinion of the court, given by Judge Grier, bearing upon the questions considered :—

The great question of the case now recurs : Is this Janus-faced lock a peculiar and distinct machine introduced into market as a cheaper and better article than other machines without the peculiar characteristics of the patented one? Does the value of the patent to its owners consist in the close monopoly of the right to make and sell this species of lock as one individual machine? Has it peculiar characteristics which distinguish it from other machines of the same genus, and which give it a peculiar value in the market? If so, the complainants have a right to demand that the defendants, having infringed their exclusive right to make and sell this peculiar machine or manufacture, are justly liable to refund all the net profits made by such infringement. If, on the contrary, the patent is for some addition or improvement on an old and well-known implement, or some separate part or device thereof of small importance compared with the whole, if the license to use the improvement or addition was sold, as separate and distinct from the whole machine, the measure of damage would be the price of a license, and not the profit made by the exclusive right to make and sell the whole machine. The history of this invention, its objects and results, are fully stated in the case of Livingston & Co. *v.* Jones & Co., between these same parties when the originality of Sherwood's invention was assailed. The claim of the Sherwood patent was for "making the case of door locks and latches double faced, or so finished that either side may be used for the outside." The arrangements of the internal parts of the lock and devices necessary to such a lock, are set forth in the specification. They were rather complex, and required that, in order to change the lock from a right-hand to a left-hand lock, it should be opened, and some change made in the position and arrangement of the internal parts. For the purpose of the present discussion it is unnecessary to describe these devices. The name "Janus-faced" locks was given to this machine to distinguish it from others which had its peculiar qualities.

Now it is evident that, although the patent of Sherwood may be said to be for an improvement in the manufacture of locks, a well-known implement or machine ; nevertheless the lock contrived by him was a new and distinct species, having certain qualities differing from all other locks ; that the Janus-faced lock is a specific article (although of the genus lock) known in the market, having peculiar value, and that the value of the monopoly granted by the patent consisted in the exclusive right to manufacture this peculiar machine without any competition, and have all the profits of such a monopoly. The respondents have made large gains by trespassing on the rights of the complainants. The profits they made by this trespass justly belong to the true owner. They have partaken equally with the complainants in the profits of the monopoly granted to them alone without license, and in defiance of their rights. The only measure of redress to which the complainants are entitled is an account of the actual profits made by the respondents. It has been argued that it is not full measure of compensation for the injury done to complainants, but it is all that can be made matter of account in equity ; all that is specifically claimed in the bill, and all that comes properly within the sphere of the remedies administered by a chancellor.

The machine being a unit, a specific article well known in the market, having a peculiar value because of the patentee's discovery or invention, the attempt to arbitrarily divide the profits of the monopoly of the whole machine among its parts is without precedent, and receives no countenance from the case of Seymour *v.* McCormick.

Although the statute gives original cognizance of patent controversies equally to courts of equity as to courts of law, and consequently the chancellor may decide a controversy as to infringment without requiring a previous verdict in a court of law, yet it does not follow that all distinction as to remedies granted by each tribunal is to be abolished ; a court of law cannot issue an injunction, nor a court of equity take jurisdiction to enforce a penalty or merely punitive damages. Each court will give the remedy peculiar to its own functions. The remedies of a court of chancery are by injunction and account ; penalties and vindictive damages can be recovered only in courts of law.

Shoe-Sewing Machine.

In our last week's paper, we gave some account of a shoe-sewing machine exhibited in Coventry, England. We are informed that the machine spoken of was made by Mr. R. W. Drew, a young man in Boston, and that the patent for this country is held by A. B. Ely, Esq., of that city, where there are some of the machines in use. The work done by them is more durable and substantial than hand sewing, consequently better adapted for army work. Two minutes is all the time required to sew a pair of the heaviest kind of shoes. They work equally well, for sewing the lightest kind of boots or shoes.

RECENT AMERICAN INVENTIONS.

Firearms.—This invention is more especially applicable to revolvers, but is also, to some extent, applicable to single shot breech-loading firearms. Its principal feature consists in a peculiar construction and mode of applying a movable breech pin, and another feature consists in the peculiar construction of the chamber for the reception of the breech pin. Invented by C. H. Alsop, of Middletown, Conn.

Mode of Attaching Engraved Blocks to Belts.—This invention, which is due to Alexander S. Davis, of Boston, Mass., relates to an improved mode of attaching engraved or indented blocks to an endless belt which is used in a machine for printing addresses on newspapers, and for which Letters Patent were granted to C. W. and Daniel Davis. In this patented machine a series of wooden blocks with the subscribers names engraved or stamped thereon are attached by tacks to an endless belt, which passes over a pulley at the upper part of the machine, and underneath a bed which serves as a bearing for the blocks as the papers are pressed against them in the act of printing. The difficulty attending the operation of this machine is the trouble and embarrassment of changing the blocks or altering them to suit the constantly varying subscription list. It will be understood that all papers which are sent to one post office have their addresses placed side by side so as to facilitate the mailing operations, and all the blocks on the belt must be placed in contact, side by side, for convenience of inking ; hence by the old mode of attaching the blocks to the belt in many cases a large number must be detached in case a block requires to be added to or taken from the belt, and much time is, therefore, consumed in keeping the endless belt of blocks correct with the mail book. The object of this invention is to obviate this difficulty, and to this end the blocks are attached to the endless belt by means of straps or loops in such a manner that the blocks may be shoved along on their belt, and any one of them readily detached therefrom, or a new one added, as may be required.

Cartridge.—This device, patented by the inventor, Rollin White, of Bridgeport, Conn., is applicable to revolvers and other firearms in which a joint is formed between the chamber and the barrel in front of the chamber, for the introduction of cartridges at the breech. It consists in the construction of the case of two or more pieces of metal, movable longitudinally in relation to each other, so that when the charge is fitted one portion may be driven, by the force of the explosion, forward against the barrel or fixed portion thereof, and the other portion backward against the breech, to prevent the escape of the gas ; and it further consists in a certain construction of the cap or pellet containing the percussion priming, and fitting the same to a metallic cartridge case, whereby it is made to close the vent of the said case by the force of the explosion of the charge, and whereby it is supported in such a manner against the blow of the hammer as to insure its explosion.

Cut-Off.—This invention, patented by John Broughton, consists principally in the operation of the cut-off valve or valves of a steam engine with a positive movement, which is so controlable by a governor, or other means independent of the eccentric or its equivalent, from which such movement is derived as to be capable of producing a variable lead of the valve, and as to make the amount of lead determine the point in the stroke of the piston at which the steam is cut-off.

Stock Pump.—The object of this invention is to obtain a simple and efficient pump, or water elevator, by which stock may draw their own water for drinking purposes. The invention consists in the employment or use of a force pump, in connection with a loaded or counterpoised tilting platform, so constructed and arranged that the desired result is attained. Pumps or water elevators of this class, commonly termed "stock pump," should be so arranged as to preclude the possibility of freezing up in winter, and at the same time admit of the water being elevated at a considerable hight. They should be simple in construction, not liable to get out of repair, and the pump cylinder should always be filled with water beneath the piston when the latter is elevated. These ends, it is believed, are fully attained by the invention. Invented by E. A. and S. Moore and D. Mooney, of Findley, Ohio.

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 in the fees are also made as follows :—

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

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

During the last sixteen years, the business of procuring Patents for new inventions in the United States and all foreign countries has been conducted by Messrs. MUNN & CO., in connection with the publication of the SCIENTIFIC AMERICAN ; and as an evidence of the confidence reposed in our Agency by the Inventors throughout the country, we would state that we have acted as agents for more than **FIFTEEN THOUSAND** Inventors! In fact, the publishers of this paper have become identified with the whole brotherhood of Inventors and Patentees at home and abroad. Thousands of Inventors for whom we have taken out Patents have addressed to us most flattering 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 submitit to us, with a fulldescription, 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.

Rejected Applications.

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

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

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 no 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.

Assignments of Patents.

The assignment of Patents, and agreements between Patentees and manufacturers, carefully prepared and placed upon the records at the Patent Office. Address MUNN & CO., at the Scientific American Patent Agency, No. 37 Park-row, New York.

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

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

ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING DECEMBER 3, 1861.

Reported Officially for the Scientific American.

THE PRINTING OF PATENTS ABANDONED.

The plan adopted by Commissioner Holloway of printing the specification which forms part of the Letters Patent, he has been obliged to abandon owing to the reduced receipts of the Patent Office. Hereafter, for a time, the specifications will be engrossed on parchment as formerly. This change will obviate the great delay which has attended the issuing of patents after sealing, but the papers do not go out looking so neatly. We hope the receipts of the Office will soon justify the extra expense which attended the printing.

*** 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.

2,814.—David Bissell, of Detroit, Mich., for Improvement in Machines for Turning Boot Legs :

I claim the racks, B and C, cylinder, H G G, ring, J, and catcher, F, when arranged and combined with the frame, A, and pinion, D, and constructed to operate as described and for the purposes set forth.

2,815.—John A. Bolton, of Leicester, England, for Improvement in Hot-Air Furnaces. Patented in England March 19, 1861 :

I claim, first, The arrangement of the flue conveying the outer air to the heating chamber, by bifurcating it at or about the said fire chamber, and by so continuing each branch flue as to follow up both sides of the fire hole and ash pit, and then re-unite in the heating chamber whence the heated air is delivered to a hot-air chamber, and from there delivered to the apartments, as shown and described.

Second, Forming the heating chamber and hot-air chamber in one compartment by the use of a divisional plate provided with a bottom plate, so that the air shall be gradually heated in the former and caused to come in contact with the fire plate previous to its entering the hot-air chamber, as described and shown.

2,816.—C. C. Bradley, of Brodhead, Wis., for Improvement in Doubletrees :

I claim the construction of a doubletree which dispenses entirely with singletrees, and the application of the central pulley as a substitute therefor. Also the method described of attaching the trace hooks to a movable slide with the slot therein, or substantially the same.

2,817.—John Broughton, of New York City, for Improved Cut-off Valve for Steam Engines :

I claim, first, regulating the velocity of a steam engine by combining the regulator with a positively operating valve gear when such regulator determines the lead of the valve, and the lead of the valve is made to determine the point in the stroke of the piston at which the steam is cut off.

Second, In combination with a lifter, K, having a certain movement in relation to the main valves, I claim the sliding bevel-faced toes, Q Q′, inclined tappets, a a′, and rods, I I′, or their equivalents, operating substantially in the manner explained to impart a positive movement to the cut-off valves, G G′.

2,818.—J. C. Brown, of Fond du Lac, Wis., for Improvement in Machines for Sawing Shingle Bolts :

I claim the use of the adjustable revolving table, or its equivalent, substantially as described, for sawing the blocks on end, whereby they may be divided into suitable bolts for shingles, as specified.

2,819.—W. D. Bush, of Fall River, Mass., for Improved Row Lock :

I claim recess, F3, and pin, a3, the spirally rifled socket, G4, constructed and operating as and for the purpose set forth.

2,820.—C. W. Cahoon, of Portland, Me., for Improvement in Lamps :

I claim, in combination with a lever and chimney fastenings, an adjustable fulcrum, substantially as described.

I also claim, in combination with a lever and chimney fastenings, the indentations, F F, for the purpose of preventing the chimney from going too far back, substantially as described.

2,821.—C. W. Cahoon, of Portland, Me., for Improvement in Lamps :

I claim, first, a lever with chimney fastenings having that part of it on which the chimney rests extended so as to form a deflector, substantially as described.

Second, I claim the combination of the lever, A, with the air chamber, D, when the air chamber is attached to the lever and is movable with it, substantially as described.

Third, I claim in combination with a lever for raising the chimney, the air-chamber, D, and screen, E, arranged substantially as described.

Fourth, I claim the ring, G, in combination with the lever, A, substantially as described.

Fifth, I claim the bar, H, having a stop, I, in combination with the cap, J, and lever, A, substantially as described.

Sixth, I claim the handle, L, in combination with the adjustable fulcrum, K, and the lever, A, substantially as described.

2,822.—Richard Colvin, of Baltimore, Md., for Improvement in Beehives :

I claim the divisions or partitions placed between the spaces designed to be occupied by combs in beehives, for the purpose of insuring straight and uniform combs, substantially as described, when either the partitions or comb frames, or both, are made capable of independent lateral movement.

2,823.—T. D. Davis, of Syracuse, N. Y., for Improvement in Mode of Attaching Carriage Shafts :

I claim a wrought or malleable shaft heel and arm constructed so as to secure and tighten the shafts and cross bar, substantially as shown and described.

2,824.—G. C. L. Degenhardt, of Tresckow, Pa., for Improved Apparatus for Purifying Acid Water for Steam Boilers :

I claim the combination of apparatus, substantially as described, to operate in the manner and for the purposes set forth.

2,825.—J. C. Dickey, of Saratoga Springs, N. Y., for Improvement in Machinery for Crushing or Pulverizing Quartz :

I claim, first, The employment of one or more of the hammers, I, in the wheel, B, for the purpose specified.

Second, I claim the employment of the sieve, D, in the hollow shaft of section, l, of wheel, B, for the purpose specified.

Third, I claim the arrangement and employment of the hopper, E for the purpose specified.

2,826.—G. H. Dodge, of Camden, N. J., for Improvement in Hinges :

I claim, first, The link, E, with its pins, e and e′, in combination with the boxes, C and D, or their equivalents and their elongated slots for the reception of the said pins, the whole being constructed and applied to the lids or door of pianos, cabinets, &c., substantially as and for the purpose set forth.

Second, I claim the projections, i and i′, of the link, E, when arranged in respect to the concave interior of the boxes, C and D, and to the recesses, j j, of the said boxes, substantially as set forth.

2,827.—H. C. Felthousen, of Buffalo, N. Y., for Improvement in Signal Lanterns :

I claim the arrangement of the movable and stationary vertical rods, D and E, and the movable and stationary tubes, G and H, and connecting piece, F, with the colored glass and frame, C, as a means of raising, lowering, and supporting the colored glass for change of signals, substantially as described.

I also claim the funnel, J, made air-tight at its apex and sides inverted and suspended over the top of the lamp chimney, in its arrangement with the cap, L, and outside guard, K, for the purposes and substantially as described.

2,828.—J. H. Foster, of Detroit, Mich., for Improved Apparatus for Steering Vessels by Water :

I claim the combination of the stationary transverse tubes, B B′, and rotary cylinder, C, with a shaftless screw, F, fixed therein and cogs, G, upon its periphery employed in the manner explained for working and steering vessels.

2,829.—Henry Frankfurth, of Utica, N. Y., for Improved Baby Jumper and Supporter :

I claim, first, The making of the baby walker and supporter adjustable as to its hight in order to suit the length of the child, or more or less to relieve its feet and limbs, as described.

Second, The gate and gateway, as described, by means of which the child may be introduced or removed horizontally, as described.

2,830.—Wilkenson Furnas, of Ononwa, Iowa, for Improvement in Plows :

I claim the arrangement of the pulley bars, N N, pulleys, M o, treadles, P, levers, J J, cords, c c, bars, F F, and racks, K K, with the swinging and rising plow, standards, G G, and the driver's seat, Q, all as shown and described.

[This invention relates to an improved plow of that class which are designed for cultivating growing plants in hills or drills, such as corn potatoes, &c. The object of the invention is to so arrange the plows that may be adjusted both laterally and vertically, as to regulate the depth of the fallow, as may be desired, and also the position or course of the furrows relatively with the plants as occasion may require.]

2,831.—G. W. Gardner, of Troy, N. Y., for Improvemen in Percussion Shells :

I claim so constructing percussion shells that the hammer or its equivalent may be held by the side of the cap, or inoperative until discharged from the gun, and then be placed upon the cap by the use of the fuse-plug, or its equivalent, and the combination of the cylinders and springs, substantially as set forth.

2,832.—Henry Gross, of Tiffin, Ohio, for Improvement in Revolving Firearms :

I claim the hammer, E, when constructed as described, which, on being raised or cocked, through the mechanism described, withdraws the cylinder from the breech of the barrel, intermittently revolves and releases it, and by means of its projecting part or cam, F, firmly locks the cylinder to the barrel at the moment of firing, as set forth.

2,833.—T. C. Hargraves, of Schenectady, N. Y., for Improvement in Broom Vise :

I claim the arrangement described of the bed plate, 1, with its side ribs, 3 3, cross plate, 5, jaw, 6, fingers, 21 23, folding jaw, 25, and lugs, 9, the sliding plate, 4, with its side ribs, 7, cross plate, 8, rack gear, 11, ratchet rack, 15, jaw, 18, fingers, 22 24, folding jaw, 26, the pinion lever, 13, and the pawl, 16, in combination with each other, substantially as set forth.

2,834.—Aaron Higley, of Sand Creek, Minn., for Improvement in Grain Separators :

I claim, first, The arrangement of the hopper, A, sieves, e f g h i j, imperforate plates, o v, and troughs, A′ B′ W X, with shoe, B, the whole combined and operating in the manner and for the purpose described.

Second, I claim the arrangement of the sieves in the shoe, B, with the endless apron, F, trunk, G, fan, I, sieves, K L M, in the shoe, J, and drawers, E O R, the whole combined and operating in the manner and for the purpose described.

Third, I claim the combination of the sliding gate or valve, a, screw bolt, b, and nut, c, for regulating the size of the seed aperture in the hopper, H, substantially as described.

[This invention consists in the peculiar construction and arrangement of sieves with an endless conveyer pan and seed drawers, whereby provision is made for separating the different kinds of grain in the most effective and thorough manner, and depositing the same in separate receptacles, free from all impurities, such as chess, cockle and tailings.]

2,835.—B. B. Hill, of Chicopee, Mass., for Improvement in Shaft Coupling :

I claim the employment of a tapering or conical bearing pin or bolt B, for the socket of the shaft iron, having an adjustable set screw, A

and set nut, E, in the manner substantially a s and for the purpose described.

2,836.—J. W. Hinman, of Omro, Wis., for Improvement in Buckles :

I claim a buckle constructed, combined and operating substantially as described.

2,837.—H. C. Hunt, of Amboy, Ill., for Improvement in Car Couplings :

I claim the arrangement of the spring, G, and hooked link, F, with the curved oscillating hook, B, vertically sliding catch, C, vibrating arm, d, and flaring draw head, A, the said parts being constructed and operating together in the manner shown and described.

[This invention relates to an improvement in that class of car couplings which are self-coupling, and consists in a novel arrangement of a hook, catch and a spring, in connection with a link.]

2,838.—P. Kane and W. Floyd, of South Perry, Ohio, for Improved Burglar Alarm :

We claim the combination of stud, I, spring, H, and case, A, substantially as described. whereby the alarm can be readily applied to any ordinary door lock.

We claim also the plunging trigger, F, in combination with the devices referred to, and with the alarm mechanism constructed, arranged and operating substantially in the manner and for the purpose set forth.

2,839.—Mark Lounsbury, of Seymour, Conn., for an Improvement in Fruit Gatherers :

I claim the slide bar, g, and links, f f, actuated by the cord, h, in combination with the knives, e e, and receptacle or bag, d, for the purposes and as set forth.

2,840.—D. McDaniel, of New Castle County, and E. A. Harvey, of Wilmington, Del., for an Improvement in Removing Acid from the surface of Iron :

We claim the improved process for removing acid from sheets and other article of iron described, to wit: Immersing the sheetsor articles of iron under a vacuum or partial vacuum, or immersing and boiling under a vacuum or partial vacuum the sheets or article of iron, from which the acid is to be removed or cleaned in a solution of soda, lime or caustic soda, or in some solution which will neutralize the acid previously applied to the iron.

We also claim urging or forcing, by means of liquid, steam or atmospheric pressure, the neutralizing solution of soda, lime, caustic soda, or other solution as will neutralize the acid previously applied to the iron into the pores or interstices in the iron.

2,841.—Lewis Miller, of Canton, Ohio, for an Improvement in Harvesting Machines :

I claim, in combination with a harvesting machine that has its finger bars hinged to the main frame, and whose reel is operated from the main driver wheels or axle, a toggle link connection between said driver wheel or axle and the reel shaft, so that the finger bar and its appliances may be free to rise and fall in conforming to the inequalities of the ground over which it is passing, and continue to be driven without cramping, substantially as described.

2,842.—Henry Mooers, of Toledo, Ohio, for an Improved Mode of Heating Molds :

I claim the heating, by means of steam, the chills or molds for hardening the tread of cast-iron wheels or wheel tire for railroad cars or carriages, in the mode substantially as described.

2,843.—Daniel Moore, of Brooklyn, N. Y., for an Improvement in Breech-Loading Firearms :

I claim, first, The breech blocks, d, sliding on the line of the barrel combined with the rectangular block, e, moving at right angles to said block, d, in the manner specified, so that the block, e, is drawn down for the block, d, to slide back and over said block, e, as set forth.

Second, I claim the lever, h, on the fulcrum, 4, with the arms, i and k, in combination with the blocks, d and e, so that the movements specified are given to said blocks by said lever, as set forth.

Third, I claim the semicircular-grooved piece, 3, to receive the flange of the cartridge in combination with the breech block, d, fitted and acting as set forth.

Fourth, I claim the spoon-shaped piece, l, on the lever, h, to receive the cartridge when entered or to loosen the metallic case from the groove, 3, as set forth.

2,844.—E. A. and Samuel Moore and David Mooney, of Findley, Ohio, for an Improvement in Cattle Pumps :

We claim the arrangement of the tilting platform, I, and bar or lever, J, loaded as shown, in combination with the force pump, partially or wholly submerged and provided with the jointed elevation tube, F, valves, C G, and solid or close piston, D, as and for the purpose set forth.

f

2,845.—G. W. Oakeley, of Reading, Pa., for an Improvement in Heaters :

I claim the flues, B B, arranged in tiers, one tier being inclined in a direction contrary to that of the adjacent tier, in combination with the inclined partitions, D L, the whole being arranged within a casing of any desired form, substantially as and for the purpose set forth.

2,846.—Oscar Paddock, of Watertown, N, Y., for an Improved Ice Cream Freezer :

I claim, first, In a freezing vessel designed to rotate its axis the stirring blades or studs arranged upon and around the said vessel, substantially as described, so that the ice in immediate vicinity of the said vessel shall be constantly stirred and the salt precipitated to the bottom of the reservoir, mixed with the ice, as set forth.

Second, Forming the pivot of the freezing vessel of a spherical or conical shape externaly, with an angular cavity internally, in combination with a cylindrical spindle having angular ends to fit the said cavity and crank, whereby rotation may be imparted to the vessel without fastening the spindle thereto.

Third, Combining with the spindle and freezing vessel constructed as described, a hollow spindle provided with scraping blades, the former having an angular head for holding the scrapers stationary within the vessel while it is being rotated, substantially as and for the purpose set forth.

Fourth, Providing the cover of the freezing vessel with adjustable flaps to clasp when necessary the solid spindle, so that the scraping blades may be removed when the ice shall have acquired a certain degree of consistency.

2,847.—W. B. Ready, of Sacramento, Cal., for an Improvement in Gang Plows :

I claim, first, The curved beams, A, when used in connection with a gang plow, or a series of plows, connected together by cross-bars, B B B′, constructed and operating as and for the purpose set forth.

Second, The arrangement of the arms, G, wheels I, and the lever, J, when attached to the right-hand arm, G, and connected to the central beam, A, as and for the purpose set forth.

[The object of this invention is to obtain a gang plow of simple construction, which will be of lighter draught than usual, and capable of being readily gaged to plow or form furrows of greater or less depth, as may be desired, and the plows also readily thrown up free from the ground when required, as in turning at the ends of furrows, and in transporting the machine from place to place.]

2,848.—C. G. Sargent, of Graniteville, Mass., for an Improvement in Machines for Cleaning Fibrous Materials :

I claim picking the fiber at the front and rear of the machine, in combination with two inrushing currents of air, substantially as described.

I also claim, in combination with the picking of the fiber at the front and rear of the machine, and the two inrushing currents of air for carrying the lighter impurities up into the machine, the two passages immediately below the picking points for the grosser impurities to fall into, substantially as described.

I also claim, in combination with the main cylinder, D, and the toothed cylinder, I, the guard cylinder, J, in connection with the open space leading into said cylinder, D, for the air to pass in, substantially as and for the purpose described.

I also claim, in combination with an exhaust fan arranged over the machine and the air passages leading to it from the front and rear of the machine, for carrying off the lighter impurities, and the passages below for the grosser impurities to fail into, the cylinders, J I M, for the double purpose of closing that part of the machine against the admission of air, and for separating and carrying out at different points or places the cleaned fiber, the dust, and the grosser impurities, without allowing them to mingle after they are once separated, substantially as described.

2,849—John Scheeper, of New York City, for an Improvement in Combined Carriage Lantern and Axle Lubricator :

First, I claim feeding a carriage lantern and axle bearing with oil from the same reservoir, substantially as described for the purpose set forth.

Second, The reservoir, E, screw cap, J, horizontal perforated tube, F, screw nuts, b c, tube, e, collar, C, and axle bearing, B, when combined, arranged and operating in the manner described,

[An engraving and description of this invention will appear in our next number.]

2,850.—S. J. Seely, of Brooklyn, N. Y., for an Improvement in Portable Body Battery :

I claim, first, The general arrangement of the portable battery, constructed and operated as shown and described.

Second, The use of the breast or body plate, A, in combination with the series of barrels, B, for the purposes set forth.

Third, The combination of the breast or body plate, A, with the breast plate, F, as shown, whereby the series of barrels, B, can be loaded readily from the breech by the wearer and operator of the battery, as described.

Fourth, The use of the arrangement of the apertures communicating from the first to the last of the series of barrels, B, as described, by which the whole of the series of barrels are fired by the explosion of a single percussion cap or wafer (avoiding the necessity of using a train or fuse to effect that purpose), as set forth.

2,851.—F. B. Stevens, of Weehawken, N. J., for an Improvement in Cut-Off Valve Motion :

First, I claim setting the tappets that work the eduction valves on the same shaft, and at or near the same angle of depression that the tappets of Stevens's cut off are set, so that the eduction valves can be lifted at the same speed that the induction valves are lifted by Stevens's cut-off.

Second, I claim the hinge pieces, E F G and H, hinged at the ends of the tappets, A B C and D, and raised and lowered by the small tappets, L M N and O, these small tappets being attached to the hollow-rock shaft, I, placed over the rock shaft, d, and worked by the eccentric motion that works the eduction valves in Stevens's cut-off, as commonly constructed.

2,852.—F. B. Stevens, of Weekawken, N. J., for an Improved Condenser for Steam Engines :

I claim, first, The combination of a surface or external condenser with a cooler ; so that a part of the steam is condensed by external condensation and a part by the injection of water withdrawn from the condenser and cooler after having been cooled there.

Second, The combination of a surface or external condenser placed between the side pipes and the ordinary condenser of a steam engine with a cooler for cooling the water from the hot well; this cooler being placed between the hot well and the ordinary condenser, so that the steam, after being partially condensed by the external condenser is then further condensed by means of the injection of the cooled water from the hot well into the ordinary condenser, the surface of both external condenser and cooler being cooled by the application of water.

2,853.—F. B. Stevens, of Weehawken, N. J., for an Improved Condenser for Steam Engines :

I claim, first, A condenser or cooler for steam engines, formed by a series of parallel rectangular passages, b b b, through which the steam to be condensed, or water to be cooled, passes, while the current of the cooling water is made to pass through the passages, a a a, on the reverse side of the surface, and in a current at right angles to the current of the steam to be condensed or water to be cooled; and forming these passages by means of the rectangular metallic plates, c c c, made separately, and bolted together by the bolts, e e e, or cast together as shown in figures V., VI., VII. and VIII. Also two or more of these condensers combined into one by being attached to each other by the screw bolts, O O O.

Second, Reversing the current of the water to be cooled by means of the cap pieces, r and s, so that it may be made to flow in succession through two or more of the rectangular passages, b b.

Third, The guiding plates, K K K, as a means of guiding the water into the rectangular passages, so that it may be equally distributed.

Fourth, The deflecting pieces, h h h, so arranged as to gently deflect the cooling water into the rectangular apertures, a a a.

Fifth, Two or more apertures, t t t, made through the side of the vessel or ship, in combination with the condenser or cooler, and also in the same combination with the sloping recesses, u u.

Sixth, In combination with the condenser or cooler, the pipe, H, turned upward as a device to render the condenser or cooler accessible without the intervention of a cock or valve ; also, the small pipe and cock, Y, connecting the pipe at or near the summit of the turn with the interior of the condenser.

2,854.—F. B. Stevens, of Weehawken, N. J., for Improvement in Cut-off:

I claim adding to Stevens's cut-off the shaft, A, and tappets, E and F, the lifters, Q and R, the hinge pieces, O and P.

Also, adding the right and left-handed screw, H, working the nuts, I and K, backward and forward, and elevating and depressing the tappets, E and F.

2,855.—Emil Tritten, of Philadelphia, Pa., for Improvement in Lamps :

I claim the sliding cap, C, formed of a lower conical part, a, surmounted by a deflector, b, said parts being perforated, and the cap connected with the wick-tube, B, by having the latter pass through the bottom, e, of the former, substantially as and for the purpose set forth.

I further claim having the bottom, e, of the cap, C, constructed of wood or other substance, which is a good non-conductor of heat, when said cap is used in combination with the wick-tube, B, and all arranged as and for the purpose specified.

[The object of this invention is to obtain a lamp of simple construction, for burning coal oils without a chimney ; one which may be readily adjusted for burning oils of different grades, and which will produce a brilliant illuminating flame, without emitting an offensive odor.]

2,856.—J. B. Turner, of Jacksonville. Ill., for Improvement in Cultivators :

I claim, first, In combination with a main frame, supported on and carried by a drum, B, on one side serving as a roller, and a wheel, C ; on the opposite side a hinged plow frame, D, controlled by said main frame, substantially as described.

I also claim the combination of the pivoted levers, E P, with a horizontally-hinged tongue, O, so that the driver, from his seat, may change the line of draft and the direction of the machine, substantially as set forth.

I claim the angularly-shaped brace, n, for holding the mold board to the brace at its upper portion, when it also admits of having the unobstructed space between the mold board and the brace, as at h, for the purpose, as described.

I also claim fastening the mold boards to the plow frame, by means of the cross braces, i j, brace, n, and staple, m, with its, key, in the manner and for the purpose described.

I also claim the removable extension piece, t, in combination with the mold board, for the purpose described.

[This invention has for its object the cultivation of crops in a mature state of growth, without injuring the same by any parts of the machine coming in contact with them ; and, also, constructing and arranging the frame that the same may be placed under the complete control of the operator.]

2,857.—Washington Whitney, of Baldwinsville, Mass., for Improved Clothes' Wringer :

I claim the described wringing machine, having its rolls, B and C drawn together by the spring, G, which is pivoted at one end to the frame, and is compressed by an attachment, g, to the upper, as set forth, for the purpose specified.

2,858.—W. A. Wood, of Hoosick Falls, N. Y., for Improvement in Harvesters :

I claim connecting a short finger bar to the bent bar, E, at or near the line of the axle, or center of the main driving wheel, in combination with the hinging of said bent bar to, or near to, the stubble side of the main frame by rods or braces, substantially in the manner and for the purpose described.

2,859.—J. A. Woodbury, of Boston, Mass., for Improvements in Projectiles for Smooth-bored Ordnance :

I claim, first, Channeling or grooving, in the manner explained, the surface of an elongated projectile, tapering toward both ends, for the purpose of producing the greatest rotative force with the least possible atmospheric resistance.

Second, The use of a sabot, spirally or obliquely winged or grooved so as to receive rotation by the action of the gases escaping in the act of firing in the described combination, with a projectile spirally winged or grooved in the opposite direction, so as to receive a corresponding rotation by the action of the atmosphere during its flight.

2,860.—Suspended.

2,861.—L. R. Carpenter (assignor to himself and S. K. Williams), of Lancaster, Ohio, for Improvement in Carriage Brakes :

I claim hanging or arranging the shaft that winds the chain and applies the brake, substantially as described, so that when the fore end of the pole or perch is depressed in descending a hill, the roller, S, will swing against the wheel or hub, and be turned, so as to wind the chain and apply the brake, and when the fore end of the pole is raised the wheel will swing from the hub and release the brake.

I also claim the cam, U, on the shaft, L, for the purpose specified, substantially as described.

2,862.—J. B. Clark (administrator of D. F. Smith, deceased, assignor to A. W. Smith), of Manchester, N. H., for Improvement in Fliers :

I claim the mode of regulating the pressure by means of the adjustable spiral spring, S, connected thereto, substantially as described, for the purposes set forth.

2,863.—W. E Hatfield (assignor to Reuben Raden and George Hall), of Newark, N. J., for Improvement in Machine for Sizing Hat Bodies :

I claim the combination of the plates, C and H, having either smooth or roughened surfaces, with the cisterns and crozing planks, the whole being constructed and operated substantially as and for the purpose specified.

2,864.—B. B. Hill (assignor to himself and H. R. Gardner), of Chicopee, Mass., for Marking Brand :

I claim a marking brand, a, case, c, open on one side to receive the letter, A, for the purpose of providing proper flanges, d, for holding the letters and bosses, K, for securing the cap, e, with the letters in place, substantially as and for the purpose described.

2,865.—S. G. Rice (assignor to himself and Hezekiah Dodge), of Albany, N. Y., for Improvement in Sash Fasteners :

I claim the rotary catch, B, in combination with the ratchet, R, and the stop lever, L, for the purposes set forth, and substantially as set forth in the specification.

2,866.—J. B. Williams, of Williamstown, N. J., assignor to himself and J. M. Moore, of Fisherville, N. J., for Improvement in Preserving Vessels :

I claim the cover, H, its annular flange, h, the annular projection, i, and gum elastic ring, I, in combination with the tapering mouth, a, of the vessel and the collar, b, together with the yoke, B, or its equivalent, the whole being arranged as set forth, for the purpose specified.

2,867.—Joseph Wood (assignor to himself and Edward W. Serrell), of Red Bank, N. J., for Improvement in the Mode of Oiling Journals :

I claim the manner specified of supplying oil or lubricating material to journals by the employment of the material described, in the manner and for the purposes set forth.

2,868.—Thomas Bracher, of New York City, for Improvement in Manufacturing Bonnets :

I claim the combination of a former, A, of the desired shape, and a stretcher or upper instrument, B, constructed and operated substantially as described, to draw and hold the material upon the former, while being shaped, whereby I am enabled to dispense with a heated upper die, and make bonnets, hats, &c., of different material and thicknesses upon the same former, substantially as set forth and specified.

RE-ISSUES.

135.—Edward Lynch, of Washington, D. C., for Improvement in Steam Engines. Patented April 12, 1859.

I claim, first, The arrangement of the several parts of the engine in their relation to each other and to the propeller shaft, as set forth.

Second, I claim constructing the connecting rod of one of the cranks or cross heads, in the manner described, so as to allow of its surrounding the propeller shaft, as described.

Third, I claim acting upon the condensing water and the water of condensation, or using the opposite ends of the same double-acting pump for the air pump, and for the circulating pump of a surface condenser ; that is, one end for the air pump and one for the circulating pump, substantially as described.

136.—Samuel Pierce, of Troy, N. Y., for Improvement in Cooking Stoves. Patented Dec. 6, 1845.—Re-issued April 12, 1847, and July 31, 1847, and extended.

I claim the extending of the front lower part of the oven under the fire grate, a′, by means of the said plate, b, substantially as and for the purposes described and set forth.

137.—Samuel Pierce, of Troy, N. Y., for Improvement in Cooking Stoves. Patented Dec. 6, 1845. Re-issued April 12, 1847, and July 31, 1847, and extended.

I claim, first, The arrangement of the parts by which the fire is supplied with heated air, by its passage through the apertures in the front plate or doors, and against the said plate, s, in front and down the front surface of which it must pass, on its passage to the under part of the said fire chamber, and through the fire grate, a′, into the fire, substantially as and for the purposes described and set forth.

I also claim, and desire to secure by Letters Patent, the making of the top of ovens or cooking stoves, of fire brick or other earthy substance, when this is combined with a stove in which the products of combustion from the fire chamber pass first over the top of the oven, substantially as described, whereby the heat in the oven is equalized, and the vapors or gases evolved in the oven are absorbed and carried off, as described.

139.—W O. Grover, of Jamaica Plain, and W. E. Baker, of Boston, Mass., assignors to Grover & Baker, Sewing Machine Company, for Improvement in Sewing Machines. Patented Feb. 11, 1851. Re-issued June 15, 1858.

First, We claim, in combination first, An eye-pointed needle, which descends and carries its thread through the material supported on a table. Second, A table which supports the material horizontally below the needle and above a thread carrier. Third, A thread carrier below the table, carrying a thread which is not passed through the material, operating together substandially as set forth, in a machine making the double-looped seam described.

Second, We claim in combination, first, a horizontal table or support. Second, A feeding apparatus. Third, A stitching apparatus, each having the distinguishing characteristics specified, and operating substantially as set forth, to make the double-looped seam described.

DESIGN.

139.—Elias Ingraham, of Bristol, Conn., Design for a Clock Case.

New Publications.

THE BRITISH REVIEWS AND BLACKWOOD. Published by Leonard Scott & Co., Gold Street.

Those who desire to be "posted up" in the current literature of Great Britain, cannot do without the *London Quarterly, Edinburgh, Westminster*, and *North British Reviews*, and *Blackwood's Magazine* The present issue of the *London Quarterly* contains an able essay on "Life, Enterprise, and Peril in Coal Mines," and another on "Newton as a Scientific Discoverer"—both interesting to men of scientific tastes.

PHYSICIANS POCKET MEMORANDUMS. Published by Dr. C. H. Cleveland, of Cincinnati, Ohio. Price $1.

This is a very convenient and useful publication, one that ought to be in the hands of every Allopathic physician. It contains much valuable information, besides a well-arranged diary for daily practice.

Notes and Queries

W. A. F., of N. Y.—The cement used for common stoves is made of fire clay. The clay used for making stone ware in potteries will answer equally as well. We cannot give you the information requested, respecting the steam engine.

R. D. R., of Mo.—You propose to establish a steam carriage route across the territorial plains, and ask our advice respecting it. It is impossible for us to give any advice upon such a subject. You must submit your schemes to capitalists who will feel interested enough in the experiment to have the plan thoroughly examined. At this great distance from the field of your proposed operations, and without knowledge of your plans, we cannot give you any reliable advice ; therefore we prefer to remain silent.

L. C., of N. J.—A chamber can be heated to 400° Fah. with super-heated steam. Willow wood for making the charcoal used in the powder manufacture in France, has been charred with super-heated steam, instead of being roasted in a retort placed in a furnace.

C. E. D. H., of Conn.—Hundreds, perhaps thousands of rotary engines have been constructed. The best illustrated history of them to be found in the world consists of the published volumes of the Scientific American. No less than 67 were illustrated and described in Vol. 4 of our first series. We have seen several very good small rotary engines.

S. K., of Ky.—You cannot go wrong in making india-rubber varnish if you feed in the shreds of the rubber as long as the naphtha will dissolve any. The operation should be conducted in a warm apartment. Vulcanized india rubber generally emits the odor of its sulphur, especially when slightly heated. We do not know where you can obtain works on the Chinese sugar cane. The articles on the "Chemistry of Iron" in our columns to which you refer, are original. We will accept your proposal in regard to prepayment of your second year's subscription.

J. V. P., of Mo.—There is nothing we like better than to receive articles either from scientific men or mechanics, in relation to any subject which they have made their special study. In writing on science, however, the ideas should be expressed in the simplest style and the fewest possible words. Your article on geology contains some ideas, but you use altogether too many words in expressing them.

M. G., of Pa.—Your alphabet for a telegraph to consist of a light alternately exhibited and obscured, might possibly be suited to some purposes, but it takes longer to make the letters than in some other systems. Thus you have to display and hide the light five times to make t, which is a very common letter.

N. M. G., of Ill.—Your description of your plan for driving machinery by the power of magnetism is not wholly intelligible to us. Are two of the magnets to revolve between the other two?

N., of N. Y.—Our engraving of the Hudson river ice boat was from a photograph, and the dimensions will consequently be in proportion to those given. The sails used are the lightest duck.

H. B. R., of Pa.—You ask why Beardslee's magneto-electric machine cannot be employed to generate a current of electricity and then this electricity be used to drive an electric machine which in its turn shall turn Beardslee's machine ; thus each driving the other and producing perpetual motion. The answer is the same that applies to all schemes for what is called perpetual motion. A portion of the power is consumed in friction and other resistances. In the magneto-electric machine, there is a large consumption of power in the resistance of the conductors ; and in your plan neither machine would drive the other.

W. B., of Md.—Daniell's pyrometer is regarded as better than Wedgewood's. You can doubtless obtain either of any of the dealers in philosophical instruments.

H. D., of N. Y.—We are not aware of any work being published which treats scientifically on the self-acting spinning mule to which you refer.

Money Received

At the Scientific American Office on account of Patent

Office business, during one week preceding Wednesday, Dec. 11. 1861 :—

H. and P., of Pa. $40 ; A McG., of N. Y., $25 ; W. D. L., of Mass., $15 ; H. W. P., of Wis., $20 ; E. and T. S. N., of Mass., $15 ; D. W. W., of Conn., $25 ; T. G., of N. Y., $10 ; A. R., of N. Y., $15 ; I. L., of N. Y., $15 ; S. E. and P., of Wis., $35 ; E. G., of Mass., $15 ; R. H., of Cal., $25 ; E. and A. B., of N. Y., $15 ; W. R., of N. Y., $45 ; J. S., of N. Y., $20 ; B. A. M., of Conn., $20 ; A. K. R., of Vt., $20 ; R. H. L., of Pa., $110 ; J. B. S., of N. Y., $30 ; A. B., of N. Y., $40 ; D. L. M., of N. J., $15 ; C. B. L., of Mass., $25 ; A. I., of Iowa, $15 ; J. J. H., of Ky., $32 ; T. and E., of Pa., $20 ; S. J. T., of N. Y., $15 ; W. R. N., of N. Y., $15 ; W. C. W., of Conn., $15 ; G. McN., of Pa., $15 ; S. and L. A. D. ; of R. I., $25 ; J. S. M., of Pa., $15 ; G. F., of N. Y., $100 ; C. W. S., of N. Y., $20 ; C. A., of N. Y., $20 ; M. D. B., of Ill, $20 ; W. H. J., of N. Y., $20 ; G. S. K., of Iowa, $20 ; T. C. B., of Vt., $28 ; D. W. S., of Mass., $25 ; A. G., of N. Y., $40 ; H. R., of Ill., $25 ; G. L. S., of N. Y., $15 ; M. B., of N. Y., $20 ; F. E. B., of N. J., $20 ; R. R., of N. Y., $250 : C. B. S., of Mass., $30 ; J. P. E., of Pa., $15 ; J. C. B., of N. Y., $10 M. S. and S., of N. Y., $25 ; R. and T., of N. Y., $250 ; W. F. K., of N. Y., $20 ; C. M., of N. Y., $20 ; S. A. B., of N. Y., $45 ; S. J. P., of Conn., $20 ; S. M., of Conn., $45 ; R. R., of N. Y., $20 ; R. H. S., of N. Y., $20.

Specifications and drawings and models belonging to

parties with the following initials have been forwarded to the Patent Office from Dec. 4, to Wednesday, Dec. 11, 1861 :—

W. F. K., of N. Y. ; A. B., of N. Y. ; R. H. L., of Pa., (two cases) ; J. B. S., of N. Y. ; D. W. S., of Mass. ; C. B. L., of Mass. ; A. McG., of N. Y. ; H. R., of Ill. ; R. H., of Cal. ; C. W. B., of Conn. ; M. S. and S., of N. Y. ; D. W. W., of Vt. ; T. C. B., of Vt. ; S. E. and P., of Mass. ; T. and E., of Pa. ; O. E. M., of Ill. ; S. and L. A. D., of R. I.

The Bamboo and Its Uses.

This is one of the most useful plants in the world, especially to the Chinese. They rear it from shoots and suckers. There are about sixty varieties of it, but the yellow species is the most common. The tender shoots are cultivated for food, and are, when four or five inches high, boiled, pickled, and comfited. The roots are carved into fantastic images of men, birds, monkeys, or cut into lantern-handles and canes or turned into oval sticks for worshippers. They are used for all purposes that poles can be applied to, in carrying, supporting, propelling, and measuring, by the carpenter, and the boatman; for the joists of houses and the ribs of sails, the shafts of spears, the tubes of aqueducts, and the handles and ribs of umbrellas and fans. The leaves are sewed upon cords to make rain cloaks, swept into heaps to form manure, and matted into thatches to cover houses. Cut into splits and slivers of various sizes, the wood is worked into baskets and trays of every form and fancy, twisted into cables, platted into awnings, and woven into mats for scenery of the theater, the roofs of boats, and the casing of goods. The shavings even, are picked into oakum, and mixed with those of ratan, to be stuffed into mattresses. The bamboo furnishes the bed for sleeping and the couch for reclining; the chop-sticks for eating, the pipe for smoking, and the flute for entertaining; a curtain to hang before the door, and a broom to sweep around it; together with screens, tools, stands, and sofas for various uses of convenience and luxury in the house. The mattress to lie upon, the chair to sit upon, the table to dine from, food to eat, and fuel to cook it with; the ferule to govern the scholar, and the book he studies, both originated here. The tapering barrels of the *sang*, or organ, and the dreaded instrument of the lictor, one to make harmony, and the other to strike dread; the skewer to pin the hair, and the hat to screen the head; the paper to write on, the pencil handle to write with, and the cup to hold the pencils; the rule to measure lengths, the cup to gage quantities, and the bucket to draw water; the bellows to blow the fire, and the bottle to retain the match; the bird-cage and crabnet, the fish-pole, the water-wheel and eaveduct; wheel-barrow and hand-cart, &c., are one and all furnished or completed by this magnificent grass, whose graceful beauty when growing is comparable to its varied usefulness when cut down.

THE ARMIES OF EUROPE, BY GEN. McCLELLAN.

If any one wishes to form an idea of what an extensive and complicated art war is, let him read McClellan's work on the "Armies of Europe." During the Crimean war, our Government sent a commission of three of the educated officers of our army to study the practical operations of the armies. The commission consisted of Colonel Delafield, of the Engineers, Major Mordecai, of the Ordnance, and George B. McClellan, of the Cavalry, now Commander-in-Chief of the armies of the United States. After their return they all made their reports, and a few copies were printed in the usual government style. Since McClellan's rapid advance in the army, and in his position before the country, that enterprising firm of publishers, J. B. Lippincott & Co., of Philadelphia, have persuaded him to permit them to publish his report in a more convenient form, and they have accordingly issued it in an octavo volume of about 500 pages.

The first 35 pages are devoted to technical criticism of the operations of the Crimean war. These display not only great knowledge of military science, but, what is more gratifying, comprehensive grasp of mind and natural sagacity, or common sense. We are only afraid that the multiplicity of considerations to be taken into account will prevent the leader of our armies from displaying that readiness to fight, which our reading of history has taught us is as valuable in the commander, as it is in the private soldier.

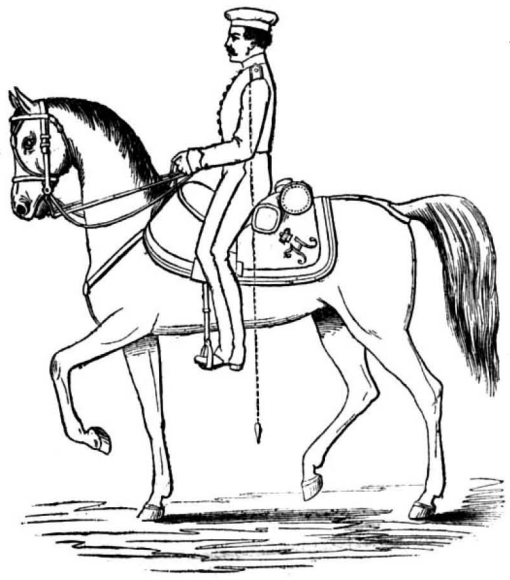
The body of the work is occupied with an elaborate description of the armies of Russia, and the last 200 pages are devoted to the author's own arm of the service, cavalry. The organization, arms, equipments, drills, maneuvres and pay of the cavalry of Russia, France, England, Sardinia and the United States are described in minute detail. An appendix of 100 pages embraces a series of regulations for the field service of cavalry in time of war. The following are the reasons assigned for giving so much space to the study of Russian armies:—

The vast experience of the Russians in wars, conducted alike upon the grandest and most limited scale—at one time carried on by great masses on the level and unobstructed plains of Europe, at another by small detachments in the rugged mountains of Caucasus and Asia Minor, or on the frontiers of Tartary and China; the great perfection to which military science has been carried in the schools and special corps; the intelligence, skill and courage they have so often evinced, both in attack and defence,—all these considerations render a detailed study of the Russian system of war both profitable and interesting.

As a specimen of the minuteness of detail which characterizes the work, we give the following extract in relation to sitting upon a horse; it is taken from the chapter relating to cavalry instruction in the Russian army:

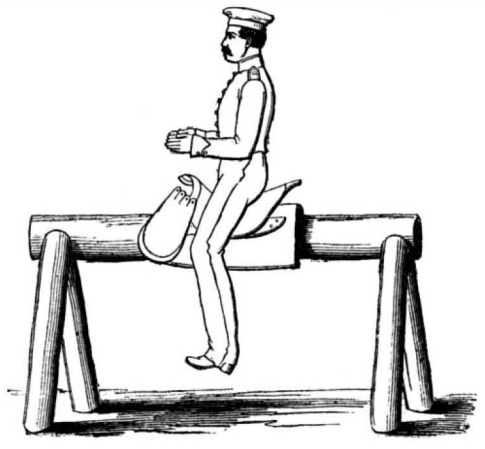
The body of the rider is divided into three parts, of which two are movable and one immovable: one of

Fig. 1.



the first consists of all the upper part of the body down to the waist, the other of the lower part of the legs, from the knee down; the immovable portion is from the waist to the knees, Fig. 1. The cavalry soldier should sit square on the middle of the saddle, the upper part of the body presenting a free and unconstrained appearance, the chest not much thrown for-

Fig. 2.



ward, the ribs resting freely on the hips, the waist and loins not stiffened, and thus not exposed to tension or effort from the motions of the horse; the upper part of the body should lean slightly to the rear, rather than forward; the thighs, inclining a little forward, lie flat and firmly on the saddle, covering the surcingle, of which only a small part behind the knee, should be seen; the lower part of the leg, hanging vertically from the knees, touches the horse, but without the slightest pressure; the toes are pointed up without constraint, and on the same line with the knees, for, if the toes are turned outward, it not only causes the horse to be unnecessarily pricked by the spurs (especially when marching in line), but the firmness of the seat is lost; the heels should be seven-eighths of an inch below the toes, and the stirrups so adjusted, that when the rider raises himself on them, there may be the breadth of four fingers between the crotch and the saddle; to make this adjustment, when the recruit has acquired a firm and correct seat he should, without changing that seat, push the bottom of the stirrup to the hollow of the foot, and then, with the foot horizontal, feel a slight support from the stirrup; when this is accomplished he replaces the foot properly in the stirrup, and the heel will then be seven-eighths of an inch below the toes.

To give the recruit a correct seat, the instructor, having caused him to mount, seizes the lower part of his leg, and stretches it straight toward the fore-quarters of the horse, so as to bring the buttocks of the rider square on the saddle; then, resting one hand on the man's knee, he seizes the lower part of the leg with the other, and carries back the thigh and knee so as to bring the crotch square on the saddle, the thighs covering the surcingle, the lower part of the leg, from the knee down, also over the surcingle, and sees that the recruit does not sit too much on his crotch, but has his buttocks well under him. He then explains to the recruit that the firmness of the seat consists in this: that the rider grasps the horse with his legs; that both thighs press equally upon the saddle, in conformity with the movements of the body; and that the general movements of the body and thighs must conform to those of the horse. To spare the horses, and explain more readily to the recruit the principles of the seat, he should at first sit upon a wooden horse, on which a saddle is secured, Fig. 2; on this he should learn to carry the thighs back, without leaning the body forward; at the same time he is taught how to hold the feet, without allowing him to place them in the stirrups, for this is one of the most essential conditions for a good seat.

FROM THE STEAM PRESS OF JOHN A. GRAY.