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Improved Candle Molds.

The object of the invention here illustrated is to obtain a candle molding apparatus by means of which the candles may be withdrawn from the molds with great facility, and without disfiguring their tips. It is especially designed for paraffine or any similar friable substance. It consists essentially of a movable trough to be pressed down upon the tops of the molds, closing water-tight around their upper ends, so that by raising the trough the candles are withdrawn from the molds attached to the solid mass of material in the trough; and of movable india rubber cushions for closing the tips at the lower ends of the molds.

The candle molds are arranged in two parallel rows, represented in Figs. 1 and 2 of the engravings. Upon a suitable frame, A A, is placed a metallic plate, C, perforated with holes leading into the candle molds, E E E E E. Upon the plate, C, is placed a sheet of india rubber, F, also pierced with holes corresponding to those in the plate. The movable trough, H, has short tubes, *e e*, leading from its bottom to the holes in the india rubber sheet, the tubes being a trifle larger than the holes in the sheet. These tubes are pressed forcibly down upon the sheet, F, by means of keys, *f f*, at the ends of the trough, so that none of the material may leak through upon the upper surface of the sheet. The sheet of india rubber is covered by a metallic plate, G, perforated by holes corresponding to those in the sheet, but sufficiently large to admit the tubes, *e*.

The tips at the lower ends of the molds are closed by india rubber cushions, *j j*, resting upon metallic springs, J J. These springs are attached to the frame by means of pivots, *i i*, one pivot securing two springs as clearly shown in Fig. 3. By this arrangement the orifices in the tips can be opened and closed by simply swinging the springs latterly upon the pivots.

To cast the candles, the trough, H, is secured in place and pressed firmly down upon the india rubber sheet, by driving the keys, *f f*; the wicks, K, are adjusted; the orifices in the tips are closed by turning the india rubber cushions, *j j*, under them; and the molten material is poured in. As soon as the material has cooled the cushions are removed from the tips, and the trough is raised by a lever or other suitable means, drawing the candles from the molds in one mass with the material in the trough, H. The candles are then severed from the mass, the latter is removed from the trough, and the operation is repeated.

By this apparatus the candles are cast with great facility and in great perfection; the disfiguring of the tips which so frequently occurs when the orifices are stopped with wooden plugs being completely avoided.

Patents for this invention have been procured in this country and England through the Scientific American Patent Agency, the American patent bearing date, Dec. 13, 1859. Further information in relation to it may be obtained by addressing either of the inventors, Henry Ryder and Horatio Leonard, at New Bedford, Mass.

Fig. 1

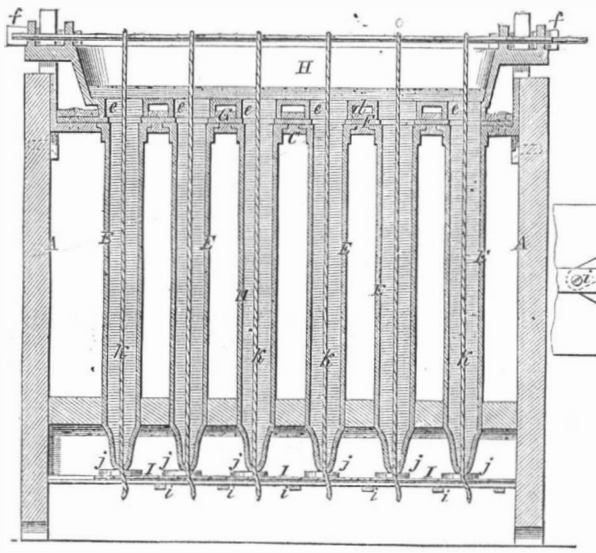


Fig. 2

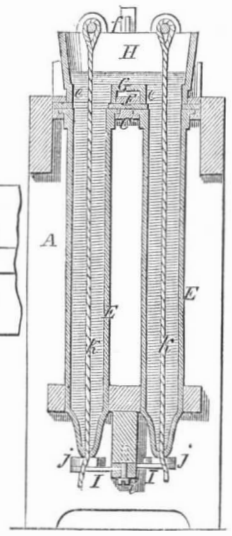
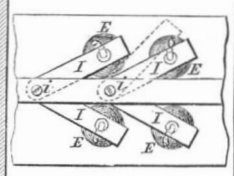


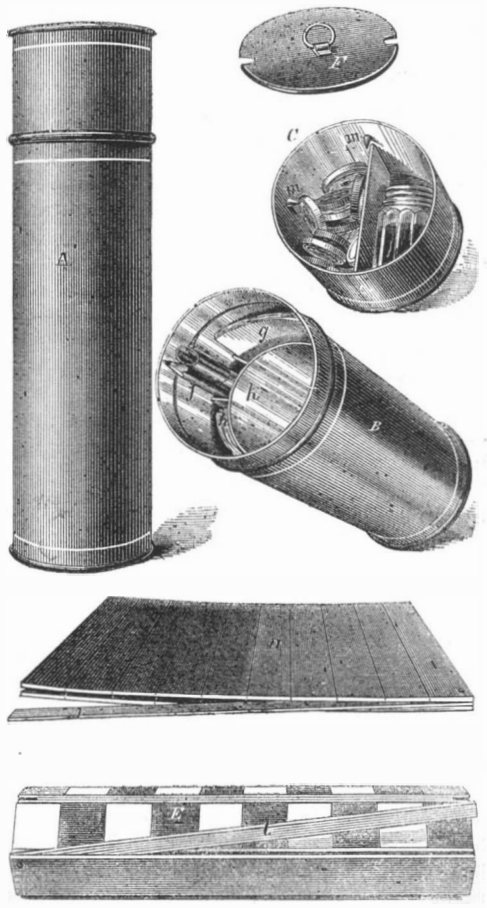
Fig. 3



RYDER AND LEONARD'S CANDLE MOLDS.

COMBINED WRITING CASE AND CHECKER BOARD.

The accompanying engravings illustrate a portable writing apparatus designed for the use of our soldiers—an apparatus combining amusement and utility that would hardly be thought of for the private soldiers of any other army in the the world. Within a light tin cylinder, nine inches in length and less than three in diameter, is contained a writing table, paper, ink, pen, pencil, postage stamps and envelopes, besides a checker or chess board and set of men.



A represents the cylinder closed; B, the cylinder open; C, the cover; D, the writing table spread; E, the table rolled up ready to be placed in the cylinder, and F, a tin disk for holding the inkstand and checkermen in the cover.

Looking into the open end of the cylinder, B, are seen the paper, *g*, the envelopes, *h*, the penholder, *i*, and the pencil, *j*. The axis of the cylinder, B, is occupied by a smaller cylinder, *k*, for receiving the writing table when the table is rolled up in the form represented at E. As the paper and envelopes occupy the annular space between the two cylinders, they are preserved from being wrinkled, and are kept in a smooth condition.

The table, D, is formed of thin slats of wood with a piece of cloth pasted upon one side to hold them together; the cloth forming hinges between the slats so that the table may be rolled into the form represented at E. To hold the table in flat form when it is unrolled, two strips of brass, *l l*, are pivoted at its corners in such manner that they may be pressed into the grooves in the ends of the slats as shown.

One side of the table is painted for a checkerboard, and the men are placed in the cover, C, which also contains the inkstand and postage stamps. These articles are retained in the cover by the disk, F, which catches under the projecting pins, *m m*; notches being cut in the edges of the disk to admit its entrance below the pins, when a slight turn causes it to be caught and held by the pins.

This compact and convenient apparatus is as well adapted to the use of travelers as of soldiers.

The patent for this invention was granted, through the Scientific American Patent Agency, January, 14, 1862, and further information in relation to it may be obtained by addressing the inventor, H. C. Small, at East Lemington, Maine.

NEW STEAM SHIPS.—The *China*, a splendid new iron screw steamer, built for the Cunard Company, was to leave Liverpool for New York on the 15th ult. This is the first screw steamer used as a regular passenger vessel by the Cunard line. The *Scotia*, the new iron paddle steamer for the same company, and the largest merchant steamer afloat, is said to be finished at Glasgow, and will soon make her first trip across the Atlantic.

THE London *Engineer* says that the Bessemer process has been successfully applied to the production of armor plates, for which the metal can be made of any required toughness. The present price of rolled iron armour slabs is £35 per tun. Bessemer plates ought not to cost half this.

NOTES ON MILITARY AND NAVAL AFFAIRS.

THE SITUATION.

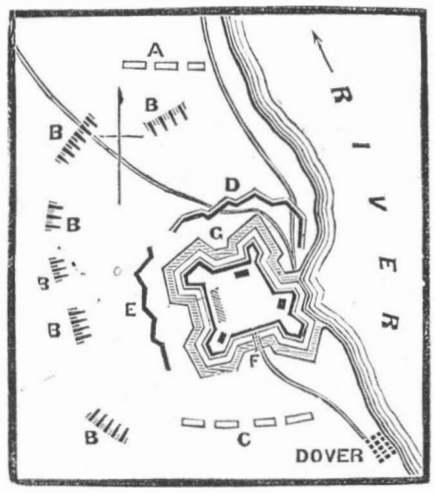
After the reduction of Fort Henry, on the Tennessee river, some of our gunboats proceeded up the river as far as Florence in the northern part of Alabama. They were joyously received all along the route, and Tennessee papers give gloomy prospects for the future of the Southern Confederacy in that section. The Memphis *Avalanche*, a journal dyed in gall and bitterness, says the people apprehend an immediate advance of the Northmen, and evince their joy in every village and neighborhood. The Unionists are making demonstrations in many of the northern counties, and even at Memphis there were exhibitions of joy on the arrival of the news from Beech Grove. Armed bodies of Johnson's and Maynard's followers are prowling about in all directions through the mountains.

We announced in our last number with a great deal of satisfaction the triumphant success of General Burnside's Expedition upon the coast of North Carolina. The General's official report of the affair does not materially alter the facts as we have already presented them. Elizabeth City, Edenton, Plymouth and Hartford, all places of considerable importance, are held by the United States forces, and it is reported later that General Burnside has moved on to Suffolk, Va., which isolates Norfolk, cutting off all railroad connection with that place.

GREAT BATTLE AND SURRENDER OF FORT DONELSON.

The fall of Fort Henry was another heavy blow at the Confederates, but the most powerful one yet dealt at the monster was struck by our forces under command of General Grant, in the successful attack on Fort Donelson, on the Cumberland. It was indeed a stunner, and must have sent a terrible shock throughout all rebeldom. On Sunday night the sharp cry of the newsboy, announced the "extra" containing news of the fall of that stronghold. The facts were painfully meager, and all loyal hearts retired that night with a feeling of uncertainty about the result, and when Monday morning came, the anxiety was materially hightened by the information that the flag of the Union was floating over only a portion of the enemy's works. About twelve o'clock on Monday, the 17th, news came under flag of truce from Norfolk, that Fort Donelson had surrendered to General Grant, including Generals A. Sidney Johnston, Simon B. Buckner, Gideon J. Pillow, and John B. Floyd, besides 15,000 soldiers. This news quickened the loyal pulse, and men, women and children, were seized with a sort of delighted panic. Some wag rushed up to the Police office and urged the Superintendent to issue an order at oncethat all persons found in the streets sober after 2 o'clock P. M., should be arrested. Still the source from whence the news came was not quite satisfactory, but a little more patient waiting brought news from headquarters that the Fort had surrendered with nearly its whole army, including Generals Johnson and Buckner, but the news that Floyd had again stolen away as a thief in the night, taking some 5,000 troops with him, seemed to put a damper on the victory. All seemed to feel that the seizure of this villain was equal to one great victory. Alas! he escaped, but there is some comfort in the announcement that his beaten and discomfited confederates denounced him as a coward and a traitor. Floyd's prospects from now onward are by no means flattering. He basely betrayed his country while an officer in its service, and for him there is now left naught but remorse and shame. The grave cannot cover his treachery, any more than it has the memory of Benedict Arnold.

The fight began at Fort Donelson, on Thursday the 14th Feb. In the meantime, Bowling Green, that stronghold of the rebel army in Kentucky, was in process of evacuation, and a large portion of its forces were sent down by railroad to reinforce that position. It is estimated that the confederate force was 30,000 strongly intrenched. The works of the Fort—a diagram of which is herewith published—including the batteries and rifle pits, covered several acres, and extended some five miles on the outside, and had been constructed with great care, and furnished with a powerful armament. The battle raged with great fury on both sides until Saturday night, under the expectation that it was to be renewed on the following morning, but at daylight General Buckner met our advancing troops with a white flag, and surrendered unconditionally. Never was there a surrender anything like this on our continent. Burgoyne gave up less than six thousand men, and Cornwallis but little over seven thousand. In fact, we should have to read long in European history before we should find a capitulation on a scale like this. The rebels lost forty-eight field pieces, seventeen cannon, twenty thousand stand of arms, beside an immense quantity of commissary stores, &c. There was great loss of life on both sides, the full particulars of which, it will require some time to ascertain. It is reported as the probable loss of the Union forces, 400 killed, and 800 wounded. The Union forces numbered 50,000 and were commanded in three divisions by Generals Grant, McClernand, and Smith.



REFERENCES TO THE PLAN.—A—General Smith. B—Union Field Batteries. C—General McClernand. D—Rebel Redonbts. E—Rebel Rifle Pits. F—Draw Bridge. G—Ditch around the Fort.

The troops engaged were principally from Illinois, though Indiana, Iowa, Ohio, and Missouri, furnished gallant soldiers who had an important hand in the battle. The iron-plated gunboats under command of the gallant Commodore Foote, stormed the fort vigorously. We allude in another place to their performance during the action.

General U. S. Grant, the senior officer in command is a graduate of West Point, and served with gallantry in the Mexican war. He left the army in days when it had nothing to do, and has recently resided in Galena, Illinois. Immediately on the outbreak of the rebellion, he offered his services to the Government, and was made a Brigadier General. The value of these services are well attested by the success which has attended our forces in the capture of Forts Henry and Donelson. His pungent reply to General Buckner, who had written a note to him proposing an armistice, shows the character of the man. It is as follows :—

SIR—Yours of this date, proposing an armistice and the appointment of commissioners to settle on the terms of capitulation, is just received.

No terms except unconditional and immediate surrender can be accepted.

I propose to move immediately on your works.

I am very respectfully, your obedient servant,

U. S. GRANT,
Brigadier General Commanding.

In view of the gallant conduct of General Grant, the President sent in his name to the Senate for promotion to the rank of Major General. Every man seems to have done his duty nobly. All honor to the brave officers and soldiers for their loyal defense of the flag.

General Simon B. Buckner is a native of Kentucky, and was educated at West Point at the public expense. He is only 38 years of age, but has seen service, having been engaged in the battles of Contreras, Cherubusco, and Molino del Rey, in Mexico. He appeared in Washington last summer and pretended to be loyal. General Scott believed in him, but he was only spying out the camp for the benefit of Jeff. Davis, and on his return home very soon turned up a traitor. We regard him as a very bad fellow, and hope his days of treason are about done.

It appears that General A. Sidney Johnson was not in the fight, but another of similar name, General Bushrod Johnson of Kentucky. Who this General Bushrod Johnson is, we do not know. He bears an honored name in disgrace. We suppose he is a sort of mushroom General, who wears all the toggery of the order, and has but little under it. Bushrod has dropped before glory had a chance to overtake him.

Gen. C. F. Smith is a meritorious graduate of West Point, and has commanded at Paducah, Ky., since its occupation by the Federal forces.

Gen. John A. McClernand is a well-known democratic politician of Illinois and was many years in Congress where he was always respected for his ability and conservative patriotism. His course in the present crisis, fully sustains his former patriotic purposes as a legislator.

The army under General Buell is concentrating for an attack on Nashville, which is speedily expected, and General Halleck will give his attention to Columbus. Large reïnforcements are going to Kentucky to both wings of the army. It is estimated that over 30,000 additional troops are now moving in that direction. Telegraphic communication is now established between General McClellan at his headquarters, and Generals Halleck and Buell. These distinguished officers are operating in the strictest harmony.

Some of our journals of the "On to Richmond!" order are doing their utmost to create disorganization in the command of the forces, but the good sense of the people will see through it.

The rumor of the fall of Savannah, into the hands of the Federal forces, we cannot credit, but that an attack was about to be made on that city, there is no doubt. Com. Dupont writes to the Department that he expected to achieve a victory soon.

FIGHT ON THE UPPER POTOMAC.

Brig. Gen. Lander, a brave and capable officer, is in command of the Federal forces at Cumberland on the Upper Potomac and was recently wounded at the battle of Balls Bluff. On Thursday night the 13th inst. he led his troops on a forced march surprising and breaking up a Secession camp at Blooming Gap on the Baltimore and Ohio Railroad. He captured 17 officers and 45 privates, also 225 beef cattle. Gen. Lander in his official report to Gen. McClellan, says that "Major Frothingham is entitled to great credit for building, under my direction, in four hours, in the dead of night, complete bridge across the Great Cacapon, at an unfrequented mountain road. Two columns, of 2,000 men each, marched 32 miles, and one column 43 miles, since four P. M. yesterday, beside bridging the river. The papers taken, and my own reconnoissance to the south, prove the country clear, and that Jackson and Loring are at Winchester. We made a move and occupied the Blooming Gap and Point Mill, on the belief, by information obtained from deserters, that Gen. Casson's brigade was there. Gen. Dumming has just arrived at New Creek from Moorfield, 40 miles south of Romney."

Since the battle of Mill Springs, Gen. Schoepf's division in Kentucky is reported to have actually built forty miles of corduroy road, in order to approach Monticello, where Crittenden is getting together the remains of his dispersed army. The depth of mud in the ordinary roads made it impossible to advance without making a road as our troops proceed. Such energy deserves and guarantees success.

A sheet iron breastplate was found among the personal effects of Gen. George B. Crittenden, in Zollicoffer's camp at Mill Springs. It was sent to Governor Morton, of Indiana, by Lieut. Colonel Kise, of the Tenth Indiana.

MATTERS IN MISSOURI.

General Price has been driven out of Springfield, Mo., by the Federal forces under Generals Curtis and Siegel. General Halleck telegraphed to General McClellan on the 18th, as follows :—"The flag of the Union is now floating in Arkansas. General Curtis has driven Price out of Missouri, and is several miles across the Arkansas line, cutting up Price's rear, and hourly capturing prisoners and stores. The army of the southwest is doing its duty nobly.

Mr. Holt, who is now in St. Louis investigating matters there in connection with the contracts made under Gen. Fremont, wept for joy when he heard the news of the Donelson victory. Gen. Halleck, in a brief address to the people of St. Louis alluding to the capture of Donelson, said :—"I promised, when I came here, with your aid, to drive the enemy of our flag from your State. This has been done, and they are now virtually out of Kentucky, and soon will be out of Tennessee.''

THE Niagara wire suspension bridge has a span of 820 feet, and weighs 1,000 tuns.

Interesting Experiments with Heavy Mortars at Cairo

In respect to the efficiency of the mortar boats constructed at St. Louis there have been many doubts in the minds of well-meaning persons, including a number of army and navy officers. They have been thought clumsy, insufficient in their bulwarks, incapable of bearing the heavy mortars designed for them, and beyond all question incapable of resisting the terrible concussion which would attend the firing of a 13-inch shell.

A correspondent writing from Cairo to the St. Louis *Democrat* says that all these opinions and prognostications have been overthrown by experiments made under the superintendence of Capt. Constable, and before a committee of three, composed of himself, Capt. Kilty, of the gunboat *Mound City*, and Capt. Dove, of the gunboat *Louisville*.

One of the mortar boats, No. 35, was taken in tow this morning by three steamtugs and conveyed to a point a few hundred yards below Fort Holt on the Kentucky shore. The huge mortar had previously been placed on board, and fixed upon one of Rodman's mortar carriages or beds. Everything having been got in readiness, Capt. Constable fired a small charge of four pounds of powder for the purpose of "scaling" the mortar. The first experiment with a shell then followed, with a charge of eleven pounds of powder. The suspense was relieved by the sudden shooting up from the water's line of a white column of spray far down the Mississippi, and, as it was estimated, two miles and a half away from us. The mortar boat was scarcely moved by the explosion, and the mortar carriage recoiled but two or three inches. This was very encouraging.

Experiment number three was made with the full charge of twenty-three pounds of powder. The time of the flight of the ball was thirty-one seconds, and the distance three and a half miles. The recoil of the gun carriage was about two feet, and the effect of concussion upon the loose wooden work of the boat was the same as in the previous shot.

Experiment number four gave results similar to number three, Capt. Paulding, of the gunboat *St. Louis*, discharging the gun in the place of Capt. Constable. Capt. Paulding describes the concussion as very stunning and painful, and thinks it could not be endured within the bulwarks of the mortar boat by any man for more than eight or ten consecutive shots.

The mortar boats are about sixty feet long, and about twenty-five feet wide, surrounded on all sides by iron plate bulwarks, six or seven feet high. The mortar itself weighs 17,210 pounds; has a bore easily admitting a 13-inch shell, and from the edge of the bore to the outer rim is seventeen inches. The mortar bed weighs 4,500 pounds, and from the experiment made, is pronounced by Capt. Constable to be the most admirable mortar carriage yet invented.

Say twenty of these mortar boats drop down to within easy reach of Columbus, and at the same time be out of reach of the best rifled cannon the rebels may bring to bear—so small, indeed, at a distance of three and a half or four miles, as scarcely to be discernible on the surface of the water. Say, further, that each of these boats will fire, at a very low estimate, four shells an hour. Then twenty of them would discharge eighty shells an hour, with perfect impunity, and at this rate for one night of ten hours eight hundred of these terrific missiles may be thrown into the rebel camp and fortifications. Can they endure it?

Manufacturing News.

The Troy Cotton Mill, Fall River, Mass., which has been running half time for several months, lately commenced running three-quarters time, employing the operatives from 7 A. M. to 4.30 P. M. each day in the week.

The Dwight Company of Chicopee, Mass., are still running their mill half time, and have cotton enough on hand to run until the first of July next.

Haliday & Co., at South Coventry, Conn., are preparing to start up their works again for the manufacture of patent windmills for pumping water.

The Detroit (Mich.) *Tribune* gives an account of the extensive steam forge of Ford & Philbrick, showing that it is one of the most complete establishments of the kind on the Lakes. This forge contains two steam hammers and one stationary engine. The largest hammer weighs 2,500 pounds, and will forge a shaft 20 inches in diameter; the small hammer weighs 1,000 pounds, and is principally used for forging railroad car axles and small shipwork, locomotive frames, piston and connecting rods, &c. Lake Superior iron and a mixture of scrap iron are used in this forge.

The cotton mill of Messrs. Geo. C. Ballou & Son, in Woonsocket, R. I., which has been idle for several months for repairs and improvements, has recommenced operations.

Remington's firearms manufactory is situated at Ilion, Herkimer Co., N. Y. It has grown to its present magnitude as the result of forty years' labor of father and sons. It is now turning out about a hundred and fifty arms a day, and by a new addition, just receiving, its machinery will add a hundred a day to its capacity. The machinery is kept in constant operation, except on Sundays, by relays of hands. The Utica *Herald* says that a branch is to be established in that city which will also produce a hundred weapons a day. The entire production will thus be about three hundred and fifty pistols, rifles and carbines daily.

The Fort Pitt Works, Pittsburgh, Pa., have made arrangements for turning out twelve mortars per week, each weighing eight and a half tuns. Large numbers of heavy Dahlgrens and Columbiads, and an immense quantity of shells, are also being manufactured at this establishment.

The Eagleville Arms Company, Mansfield, Conn., having recently received large contracts for guns, will soon start their works in that place.

The Collins Company, at Collinsville, are now turning out 100 swords daily.

The Cold Spring Foundry at West Point, N. Y. has furnished upward of 600 Parrott rifled guns to the government.

A Philadelphia paper says:—"The works of the Bethlehem Iron Campany are approaching their completion. The engine and machinery of the furnace are put in, the stack is being lined, and everything is in such a stage of forwardness that we may look to see the furnace in blast early in spring."

The whole number of gas works on this continent and their capital are thus stated:

	Number.	*Capital.*
United States	420	$51,620,940
British Colonies	23	2,112,040
Cuba and South America	22	6,350,000
Total	465	$60,082,980

This is an increase in this country since July 16, 1850, of thirty-nine gas works, and of capital £3,649,725. The whole amount of capital employed in the rebel States is $5,631,890, against $45,989,050 in the loyal.

Flax Culture in Illinois.

A correspondent of the *Prairie Farmer* gives his experience with flax last year—the first experience which he had with raising it in Illinois—although he had grown it for several years previously in Ohio. He says:—In April I plowed my ground and sowed my flax in May, half a bushel to the acre, as follows: one and one-half bushel to three acres, on second sod, and the balance one-half bushel on one acre of old ground, which was very mellow, having been planted in potatoes the previous year. From the one acre of old ground I harvested 16½ bushels of good seed, and from the three acres of sod 30 bushels, making 46½ bushels as my whole crop One-half bushel of seed is sufficient for one acre of ground.

I think flax growing profitable for seed alone, and if we had machinery for working up the fiber there would be a great additional profit. The following is my account with the crop:—

EXPENSE OF CULTURE.

Plowing four acres at 75 cents per acre	$3 00
Harrowing and sowing	3 00
Cutting	2 00
Trashing and cleaning	5 00
Call seed $1 per bushel	2 00
Total	$15 00
Value of 46½ bushels at $1	46 50
Profit on four acres of ground	$31 50

The ground upon which this was sown was a black loam, plowed as before stated, and harrowed once before and once after sowing, with a fine-tooth harrow. The crop was cut with a common grain cradle, though a reaper will work well in it. Upon the whole I conclude that flax can be grown upon the prairies of Illinois with success.

I will state that the whole crop has been loaned in this neighborhood to be sown next spring.

New Iron Plated War Steamer.

In addition to the Ericsson's iron case battery which is now rapidly approaching completion we are able to announce that an iron mailed war steamer built by Maxson, Fish & Co., at Mystic, Conn., was launched on Friday the 14th inst. Its dimensions are: Length of keel, 180 feet; over all, 200 feet; breadth of beam, 36 feet on the gun deck, 27 on the upper deck; depth of hold, 12 feet. Her draught will be 12 feet. Her floors are fifteen inches thick, of solid oak; and the hull throughout is as strong as wood and iron will make it. Her engines are Ericsson's patent, from Delamater's New York, and of 800-horse power. The diameter of the screw propeller is 11½ feet.

The armor envelopes the vessel completely, to two feet below the water line. It is composed of longitudinal iron bars, 3¼ inches thick, showing 4 inches face and bolted every 8 inches with three-quarter inch bolts which pass completely through the vessel, and are secured on the inside with screw nuts 1½ inches square.

The iron bars are dove-tailed together in such an ingenious manner that not a bolt is visible upon the exterior surface, and, after painting, a close examination will be necessary, to detect the armor. Above the ports the thickness decreases to two inches, and upon the upper deck, and about the bow and stern, the plating consists of sheet iron one inch in thickness.

Such is the peculiar construction of the vessel, however, with her beautiful rounded stern, sharp bow and convex sides, that this thickness will be amply sufficient to sustain the shock of the heaviest projectiles without injury. The iron used—which is manufactured at Troy, New York—is of the very best description, perfectly malleable and of fine texture.

She will be rigged as a brigantine (the standing rigging of wire rope), and carry eighteen guns of heavy caliber, four of which will be pivoted. So says the New London *Chronicle*.

Since the above was in type we have received the following letter from the builders:—

MESSRS. EDITORS:—Your letter was received too late for reply by last night's mail. The description you allude to in the *Chronicle* is in the main correct. The dimensions of the ship are as follows:—Length on load line, 180 feet; length on deck, 190 feet; extreme breadth, 37 feet; depth of hold, 12.6 feet, with a light spar deck over the batteries. Her frame is of white oak and white chesnut, keel, keelson, plank, &c., of white oak. All of the materials used are of the best quality, selected under naval superintendence. The fastenings below load line are of copper; above, of locust and iron. The armor, which extends to four feet below the water line, is 3¼ inches in thickness, consisting of bars about 6 inches wide and 24 feet long; above the port sides the thickness is reduced to 2 inches, and the deck is covered with ½-inch iron plates; the bow and stern are also clad with iron plates. The model above water was shaped to lower the center of gravity and also to deflect the shot when fired at short ranges. The iron plating is the invention of Messrs. Corning, Winslow & Co., of Troy, and was all rolled at their establishment. The armor was described in your paper some weeks ago. The interior of the vessel is arranged as is usual for vessels of her class in the navy, only differing in slight details. Her armament is to consist of four 9-inch Dahlgren guns and two rifled 48-pounders. The cylinders are 48-inch by 3-feet stroke; boilers, 11 feet shell and 16 feet long; dimensions of spars as follows: mainmast, 67 feet; maintopmast, 44 feet; foremast, 60 feet; foretopmast, 29 feet; foretop-gallantmast, 29 feet; main boom, 55 feet; gaff, 36 feet; fore guard, 55 feet; foretopsail, 39 feet; bowsprit, 8½ feet inside, 17 feet outside.

This vessel was built under the contract of C. S. Bushnell & Co. with the Navy Department, and was designed by Samuel H. Pook, Esq., an experienced naval architect of Boston, who has also superintended the construction, on the part of the government, and to whose credit whatever success the ship may attain will be mainly due. The ship was launched on the 14th, and her draft, with nearly all her armor on, is 7 feet forward and 8 feet 11 inches aft. It is intended to have her ready for trial in three weeks.

MAXSON, FISH & CO.

Mystic, Conn., Feb. 18, 1862.

THE CHEMISTRY OF COAL.

Number V.

NAPHTHA.

Of all the substances which mingle together to form coal tar, the one most extensively known is naphtha. This is itself a mixture of hydrocarbons, of which the most abundant and valuable is benzole. Naphtha is formed of the most volatile of hydrocarbons in coal tar, and consequently is readily separated from others by distillation. If the coal tar is heated in a retort, the naphtha is evaporated, and when again condensed, is obtained in a separate state from the others.

Of the hydrocarbons which unite to constitute naphtha, three have been separated and examined. These are benzole, $C_{12}\,H_6$, toluol, $C_{14}\,H_8$ and cumol, $C_{18}\,H_{12}$. They are all light, volatile, inflammable oils, and, mixed together as naphtha, are coming into use for many purposes in the arts. Naphtha will dissolve india rubber and other gums, as well as resins and fats. Its power of dissolving resins adapts it for use in the preparation of varnishes, and its power of dissolving fats brings it into use as a detergent for cleaning cloth from spots of grease, wax, &c.

The most valuable component of naphtha is benzole, as it is from this that the new dies, Solferino, Magenta, &c., are made. The chemical changes involved in converting benzole into these dyes are few and simple, and we will explain them next week.

Local Anæsthesia.

The Paris Correspondent of the London *Lancet* says:—Dr. Fournier has addressed to the Academy of Sciences a paper on the subject of local anæsthesia, and details a new process for its production, which is called "chloracetization." His method for producing local insensibility to pain is that of exposing the part to be acted on to the fumes of a mixture of acetic acid and chloroform. "If," he says, "in a room, the temperature of which is upward of 63° Fah., the mouth of a thin glass bottle, half filled with a mixture composed of equal parts of pure crystallizable acid and chloroform, be exactly applied to a clean and healthy skin, not deprived of its epidermis, and if this phial be constantly maintained at the temperature of the hand, complete anæsthesia of the part included by the orifice of the bottle will be attained.' M. Fournier proposes to utilize this discovery for surgical purposes by directing the vapors of the chloro-acetic compound upon the parts to be rendered insensible to pain by means of a retort, the rest of the limb being protected by diachylon plaster from the benumbing action of the anodyne emanations; and suggests the employment of his method in those cases where general anæsthesia may be deemed admissible."

Actual Horse Power of High-Pressure Engines.

The actual power of an engine is ascertained by the indicator. The friction of a locomotive engine when unloaded is found by experiment to be about 1 lb. per square inch on the surface of the pistons, and the additional friction caused by any additional resistance is estimated at about .14 of that resistance; but it will be sufficiently near approximation to the power consumed by friction in high-pressure engines, if we make a deduction of a pound and a half from the pressure on that account. The Rule, therefore, for the actual horse power of a high-pressure engine will stand thus:—Square the diameter of the cylinder in inches, multiply by the pressure of the steam in the cylinder yer square inch less 1½ lbs., and by the speed of the piston in feet per minute, and divided by 42,017; the quotient is the actual horse power.—*Bourne.*

How to Play Billiards.

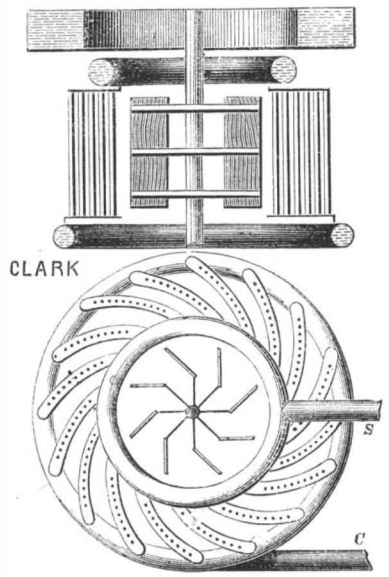
Michael Phelan, the celebrated billiard table manufacturer and billiard player, of this city, has just issued the fourth edition of his invaluable work on billiard playing, which should be in the hands of all amateurs and lovers of the game. The work contains clear and explicit instructions to the young player accompanied with numerous engravings to illustrate the effect of various strokes in ordinary playing, besides diagrams of fancy shots as made by such professional players as Phelan, Berger and others. It is neatly printed and copiously illustrated. Appleton & Co. are the publishers. Address Phelan & Collender, billiard table manufacturers, 63 Crosby street, New York city. Price, $1.

SURFACE CONDENSERS FOR STEAM ENGINES.

Number VIII.

On this principle, indeed, as long ago as 1822, previous to the experiments of Mr. Hall, Mr. Clark patented a very ingenious though somewhat complicated condenser, represented in Fig. 21. The steam is condensed in small tubes fixed into larger ones which radiate from a center, over which water, in the

Fig. 21.



form of a shower, is made to fall; the rapidity of the condensing water is accelerated by means of a fan placed in the center. I am not aware if this condenser was ever applied practically; but it would, no doubt, be a very efficient one, although, of course, subject to the same rapid deterioration from oxidation as others made on this principle.

Fig. 22.

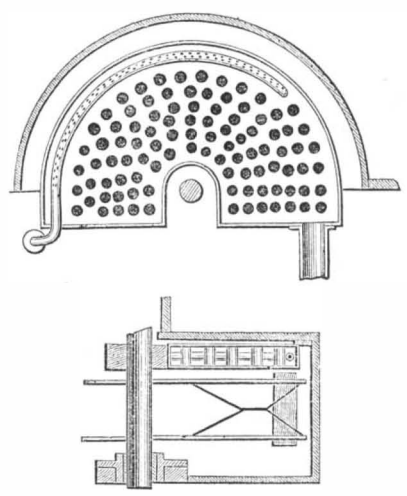
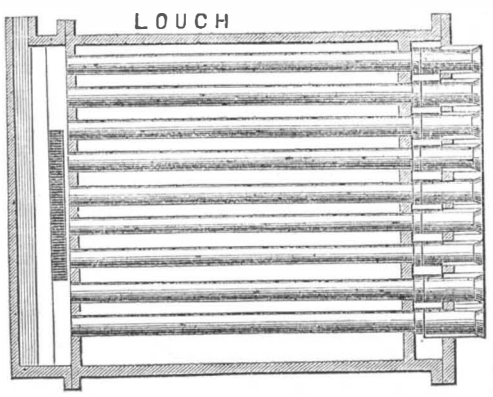


Fig. 22 represents Samuel & Nicholson's condenser, which is applicable to paddle-wheel engines. The steam is admitted through a perforated pipe, into a case provided with a number of tubes, the outer surface of which is kept wet by the water thrown up by

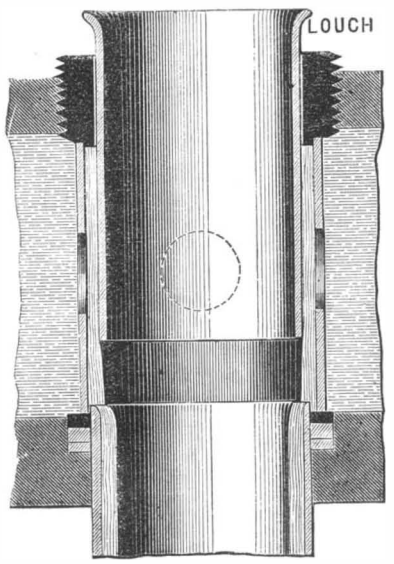
Fig. 23.



the paddles, thus dispensing with circulating pumps. This plan of condenser, without tubes, has been used to some extent in the British navy, for distilling water for the use of the vessels. As an engine condenser in its position is objectionable.

Figs. 23 and 24 represent Mr. Louth's condenser. It consists of a number of tubes, through which the condensing water is made to flow in a circular film, instead of being wholly filled. This film is produced by inserting into the upper end of the condensing tubes short pieces of tube, slightly smaller in diameter, thus leaving an annular space between the two, and making the water to flow in a hollow column. A current of air, forming a communication through an opening, A, with the boiler chimney is also made to pass through the tubes. Condensation on this principle is conducted partly by evaporation and partly by surface contact. Very little scale can form on the surface of this condenser. It is said by Mr. Louth to be more rapid in the condensing action than if the tubes were flowing full of water. These tubes can easily be cleaned, and they may be plugged when the engine is at work to repair a split tube. The screwed tube, Fig. 24, which passes through the cover gives the

Fig. 24.



necessary pressure to the packing. The steam is admitted to the outside of the tubes by one branch connection, and the condensation water is drawn off by the other branch. The condensing water obtains access to the tubes through perforations in the intermediate or packing tube, and is withdrawn from the lower portion of the condenser by the circulating pump.

Another class of surface condensers consists of those which employ cold air as the condensing agent instead of water. James Watt patented an air condenser for locomotives, but it was never put into practice.

Craddock's air condenser consists of a number of very small tubes, which are caused to revolve rapidly in the open atmosphere. A few of such condensers are in use in England, but they are said to be troublesome and expensive.

Perkins's air condenser consists of a large number of very small vertical tubes, partially open at the top, and the steam is admitted to the bottom and condensed by the cool air. This condenser is not used to form a vacuum, but simply to obtain the condensed steam as pure water to feed the boiler.

Another method of condensation consists in cooling the injection water of an ordinary condenser, to be used over again for the same purpose, thus allowing only fresh water to be used in the condenser and boiler. This has been effected by passing water through tubes contained in cases open to the sea. Such condensers are most applicable to steam vessels. The steamer *Vanderbilt* has been fitted with one of these. They were first proposed by Symington, one of the earliest steamboat inventors.

THE PLAN OF CREATION.

A LECTURE BY PROFESSOR AGASSIZ.

[Reported for the Scientific American.]

The interest in the lectures of Prof. Agassiz continues unabated. On the evening of the 16th ult., not only was the Academy of Music completely filled, with many persons standing in the aisles, but large numbers left, unable to obtain admission. It so happened that the news of the capture of Fort Donelson came just in time to enable the lecturer to announce the event to the audience. After the applause had subsided, he said :—

Allow me to add my voice to that of the national joy at this great success. And this collection of people also enables me to rejoice at the evidence of interest in intellectual culture, and to entertain the hope that this nation will soon take the lead in science and literature, and have its thoughts turned to other channels than war.

It is my purpose in these lectures to show that at least the animal and vegetable part of creation is formed in accordance with a plan. There are two ways in which Providence may have formed these creatures—either by establishing certain laws or forces which should produce the organized beings, or by a special act of creation for the production of each individual or race. In either case the evidence of design is just as conclusive proof of the existence of a designor. We perceive that articles made by a machine are the result of intelligence, though the intelligence was employed only in devising the machine, which then goes on doing its work without the possession of intelligence itself.

Within a few years a theory has been widely disseminated by some learned, but, I may say, fanciful men, which supposes that very few animals were created, and that from these all others have descended—the various genera and species resulting from the different circumstances under which the progeny was born and reared. As this theory has been somewhat extensively accepted, before proceeding with my demonstration, I will show its fallacy.

As the newer rocks rest upon the older they cover much more of the earth's surface, and have consequently been much more thoroughly examined. It is not strange, therefore, that a larger number of species have been found in the newer rocks. And if we compare living species with those in the old fossiliferous rocks, the contrast in the numbers will be still greater. We come constantly in contact with the living animals, while we know of extinct species only by that portion of their remains which have been buried in the earth and which we have exhumed. Furthermore, we have a knowledge of living animals in all parts of the earth, but only a portion of Europe and a portion of North America have been explored for extinct species. From these facts it is very natural that we should be acquainted with a greater number of living species, and of those in the newer rocks, than of those which existed in the remote ages when the older formations were being deposited.

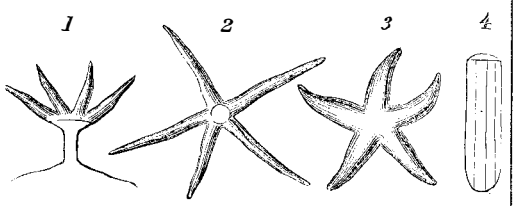
But if we compare the living species in any given area, with those in an equal area in the older rocks, we shall find that the number of species has been as great ever since the commencement of animal life upon our globe as it is at the present time.

[The lecturer then cited numerous cases in Italy, Germany, the State of New York and other places to show that the number of fossil species in a given area is as great as that of the species now in existence ; arguing from this against the truth of Darwin's theory, which supposes that all existing species come from a few individuals.]

He then said, I will now return to the order in which animal life has been brought forth on the globe, and the relation of this order to the structure of existing species. I will place here at the head of columns the names of the four orders into which the animal kingdom is divided by naturalists, and at the left of the lines the names of the principal classes of rocks in the order of their ages. As I stated last week all of the classes of the three lower orders are represented in all the formations, but the order of vertebrates is represented only in its lowest class—the fishes. Now I will proceed to the main purpose of my lecture, which is to show the relation between the times at which the several species made their appearance on the earth, and the complexity of their organizations. It would require months to state all the facts which prove this relation in regard to all the classes, and I must, therefore, select one or two. I will select those with which we are most familiar. First, let us take the class of the echinoderms in the

	Radiates.	Moluscs.	Articulates.	Vertebrates.			
Recent							Mammals.
Pleocine						Birds.	
Meocine					Reptiles.		
Eocine							
Cretaceous							
Jurassic							
Permian							
Carboniferous							
Devonian							
Silurian					Fishes.		
Unstratified							

order of the radiates. There are at present living upon the globe four families of this class which I will represent upon the black board. Lowest in the scale are the crinoids (1 in the cut). These have radiating arms only from the upper surface, and are attached by a stem immovably to the rocks or bottom of the sea in which they live, without any power of locomotion. Next comes this family with long radiating arms (2 in the cut), next the starfish (No. 3) and lastly the holothurids (No. 4).



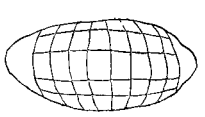
This may be a little tedious, but if you will read Shakespeare, you must learn the English language, and if you would read the thought of God you must be willing to learn half a dozen of the characters in which that thought is written. For, there is no way in which the thought the Creator as Creator can be read but in his works.

These animals rise in complexity of structure, and in the scale of being in the order in which they are numbered.

Of the crinoids, which are lowest in the scale, there is but one species now known. It is found near Porto Rico in the Caribbean Sea. But in the oldest fossiliferous rocks the remains of crinoids are found in immense numbers. As we approach our own days in the geological history the species of echinoderms which prevail are those of more complex structure, till we come to our own day, when the starfishes are the most numerous ; the numbers of the highest class, the holothurids, beginning to diminish again.

Now comes this singular coincidence, one of the proofs of a unity of predetermined plan in creation. When the starfish of our day is first born he is a crinoid. The little starfish is a perfect miniature of the large crinoid which was the first creation of the family of the echinoderms. Nature builds up the individual now in accordance with the same plan by which she has brought forth the class through the long geological ages.

I will give another illustration of this law. I will take the class of the crustacea in the order of the articulates. You are familiar with two families of these, the lobster and the crab. On a close examination there is no difficulty in deciding that the crab is of a higher order than the lobster. The nerves in the lobster are scattered along the sides, while in the crab they are centered about the head, and in other respects the crab has a higher organization. In the oldest fossiliferous rocks of this State we find, in immense numbers, the remains of a crustacean of this form,



the body consisting of three lobes, from which it is called a trilobite. At each end there is a shield of this form, and the middle lobe of the body is divided both across and longitudinally, in this manner. In certain parts of Germany rocks come to the surface much newer than the rocks of this State which contain the trilobites, and these German rocks are filled with the remains of animals like the lobster. At the present time there are but very few species of lobsters, while the species of crabs are very numerous.

As with the radiates, so with the articulates, the species first created were of comparatively simple structure, and those that were created afterward were of a higher and more complex organization. The same law holds too in regard to the development of the individual. If we examine the egg of the crab when the germ first begins to show signs of life, we find the germ bearing no resemblance to a crab. It is a miniature trilobite. We have the same shields at the ends, the same transverse and longitudinal divisions. A diagram of the one would be a good representation of the other.

When the young crab is first hatched, it is in form neither a trilobite nor a crab, but a perfect lobster. It has the same long tail, the same feelers, and is in appearance a complete lobster. But as it grows, its form changes to that of the crab.

The same law prevails in the order of vertebrates. The lowest class of vertebrates is unquestionably the fishes, and this is the class that was created first. In all the rocks below the carboniferous, we find the remains of no vertebrated animals except fishes. The class next above the fishes in the order of vertebrates is the class of reptiles, and this is the class that made its appearance next in the order of creation. Next above the reptiles in the scale of being is the class of birds, and these were created next after the fishes. Above the birds in complexity of structure are the mammals, and these were framed last in the work of creation. Highest of all mammals is man, and it is only in the recent rocks that human remains are discovered.

The individuals of the vertebrates are now developed in the same order in which the whole creation of vertebrates have come forth upon earth. If we examine the egg of a bird when life begins to be manifested in it, we shall find the embryo reminding us of a fish. It has the same elongated cylindrical body, and bears a close resemblance to a fish. Later it is developed into the form of a reptile, and finally comes forth a featherless bird.

The higher classes of radiates and articulates are superior to those below them only in certain respects. But the upper classes of vertebrates are superior to those below them in all respects—in their nervous system, in their circulation, in their breathing, in their limbs and in their posture and aspect. The fish moves through the water by undulations of its body. A portion of the reptiles do the same, but others are raised upon legs, while the mammals are more perfect walkers. The fish and the reptiles have a slow circulation and are cold blooded ; the birds and the mammals are warm blooded with a vigorous circulation. The fish breathe the water through gills ; the birds and mammals breathe air by means of lungs. The fish has the spinal column in a horizontal position, the reptile somewhat inclined, the bird more and the mammal most.

Man is the last comer upon earth, and in all respects he is superior to all others of the animal creation. His circulating respiratory and nervous systems are more complex and intricate in their organization. His hand is not a mere instrument of locomotion, but is the means of expressing his deepest and warmest emotions. With it he grasps the hand of his friend, and embraces the objects of his tenderest affections. His attitude is superior to any of theirs. His aspect is forward and upward. Forward and Upward ! The words that should form the motto of our lives. Forward in intellectual culture ; upward in moral excellence. Forward in a knowledge of the works, and upward in approach to the character of the great Creator in whose likeness we are made.

"The Telegraph to India Company" have given notice that the Alexandria and Suez land line will be restored to working order early in March. It is further stated that the cost of a message between any part of England and any of the following places at which the company have agents will not exceed £3 for a single message—viz., Aden, Bombay, Galle, Madras, Calcutta, Penang, Singapore, Hong Kong, Shanghai, King George's Sound, Melbourne, Sydney, Mauritius, and Reunion.

Correspondence

The Motion of Rockets.

MESSRS. EDITORS :—The illustration given by your Cincinnati correspondent T. W. B., in the SCIENTIFIC AMERICAN, February 8th, of "a cylinder containing steam, or other gas, surrounded by compressed air, &c.," is not strictly applicable to the *modus operandi* in question. If we could suppose the shell of the rocket to be perfectly tight, without any vent at the choke, and that the projectile motion thereof commences by an explosion, whereby the vent is burst open, and the inflamed gas liberated, we should have a case, wherein the said illustration might be applied in explanation of the first, or initial impulse, given to the projectile ; but it will not hold good any further ; it will not elucidate the cause of motion of the rocket, when the choke is open, as is the case invariably, whilst the same is in motion. The inference or conclusion drawn by T. W. B., from the illustration given is, "that in a vacuum the action would be perfect ;" that is we suppose this conclusion to mean, that the force acting against the closed end of the cylinder, in this case, would be the greatest possible, and consequently that a rocket would fly with the greatest force and velocity in a vacuum.

Without wishing to make, as suggested, an intricate question of this matter, but simply to elicit the truth in reference to the subject, let us suppose, for instance, that the cylinder of T. W. B. to be the boiler of a steam engine, having a safety valve, steam gage, and other appliances convenient and suitable for the purposes of our proposed experiments. Let a regular and uniform fire be now kept up under this boiler, so that the quantity of steam formed therein, may be constantly blowing off, at the safety valve, into the atmosphere, while the steam gage during the time, indicates a uniform pressure in the boiler of any given intensity, say 30 lbs to the square inch. Now while this operation is continued, let us suppose by some contrivance we are enabled to connect the safety valve pipe with a vacuum. Assume this connection to be made and let T. W. B. now cast his eyes on the steam gage, and then tell us whether it indicates a greater or a less internal pressure in the boiler. According to the illustration he has given, as the steam is now flowing from the boiler into a vacuum, its action should be the most perfect and the internal pressure greatly increased. Is it not plain, however, that as steam or any other elastic fluid, flows into a vacuum more rapidly than it does into the atmosphere, that the internal pressure of the boiler in this instance will be considerably reduced. The velocity of the efflux of steam of two atmospheres' pressure into a vacuum is about 1,978 feet per second. The velocity of the same into the atmosphere would be about 1,400 feet per second ; so that it would pass off through the safety valve nearly 600 feet per second faster into the vacuum than into the atmosphere. Hence, by the supposition, the supply being the same in both cases, when the steam escapes into the vacuum it will pass off from the boiler more rapidly, and of course the intensity of the pressure therein will be reduced. This reduction would also be in proportion to the area of the aperture by which the steam flows from the boiler. Now, if we suppose the ignited composition of a rocket to form within its shell an inflammable gas of any given intensity, is it not obvious that said gas would flow into a vacuum much more rapidly than into the atmosphere ? and consequently, as we have shown with the steam boiler, that the internal pressure or force acting to propel the same would be less in the vacuum than in a full medium.

A scientific writer on this subject, in commenting on the hypothesis enunciated by Desagulier (which is the same as that entertained by your correspondent T. W. B.), illustrates the action of the flame of gas within the rocket as follows : "Take a strong piece of whalebone and bend it in the form of a bow, by means of a bit of thread, or silk, fastened to each extremity ; then if this bow be suspended by its middle, and two pieces of board, or two books, be set up on their edges, each touching one end of the bow, and the string by which it is bent be cut, both books will, from the elastic nature of the whalebone, be thrown down with considerable force. Now repeat the experiment, but set up only one book, bearing the other end of the bow entirely free ; then cut the string as before, and it will be found that for the want of the reaction of the other book, no effect, or very little, is produced on the standing book. This we consider to be a very similar case to the action of the gas, on the rocket when shut and opened as supposed by Desagulier ; and if so it shows very distinctly the inaccuracy of his hypothesis."

CHARLES POTTS
Trenton, N. J., Feb. 10, 1862. Civil Engineer.

Colburn's Hot-Air Evaporator.

MESSRS. EDITORS :—Could the public at large, and especially the mechanical portion, be led to more fully canvass the merits of your valuable paper it would not only always prove a mental but often a pecuniary benefit. A case in point. Some time since my attention was directed, in reading an account of inventions in your journal, to the need of supplying the hot, dry air of furnaces with moisture. From the hints advanced I set my wits to work to supply moisture by some other method than was usually employed—not from the furnace but directly from the registers. How far I have succeeded may be gathered from the fact that, after experimenting, I, finally, through your agency, obtained a patent for an evaporator, which has not only, by its extensive introduction, served the valuable purpose to those heating their houses by furnaces, in rendering the usual hot, dry air innoxous to health, and less damaging to houses and furniture, but has proved of considerable pecuniary benefit. I have already disposed of my invention for the States of Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut and Wisconsin, and also for the cities of Troy, Buffalo, Erie, Cleveland, Detroit and Chicago ; also, a half interest in New York. G. F. J. COLBURN.

Newark, N. J.

[That the air of rooms heated by stoves or furnaces will cause the doors and furniture to shrink and crack is universally observed, and our most experienced physicians say that the effect on the lungs and other organs of the inhabitants is not less marked.

There can be no doubt that the principal cause of the injury resulting from stoves and furnaces is the dryness of the air. Warm air will hold more moisture than cold. Prof. Henry ascertained that a cubic foot of air at zero will absorb less than half a grain of water, and at 100° it will absorb more than 25 grains. Hence cold winter air, though it has but little moisture in it, is not drying, as it may have all the moisture that it will contain. But if it is heated, its capacity for water increases, and it becomes exceedingly drying—taking water from the wood of doors or furniture, or from the skins, tongues or lungs of people if it comes in contact with them.

To remove its drying powers it should be supplied with the moisture which it so eagerly craves. The arrangements in general use are entirely inadequate for the purpose, and we are glad to see that Dr. Colburn's apparatus is coming into so extensive use. We have tried it ourselves, and find that it makes a manifest improvement in the air, rendering the air of a furnace-heated room more agreeable to the feelings and doubtless less injurious to health.—EDS.

Freewill Offering of Patentees.

MESSRS. MUNN & CO.—I am thankful to you genttlemen for the dispatch and zeal with which you have always conducted my cases entrusted to your care, and you may rest assured that I avail myself of every opportunity to recommend you to my friends who have business to transact at the Patent Office. I have, in several instances, advised my friends to apply to you for assistance, after having had their cases rejected at the Patent Office, and they have been universally gratified at your success in obtaining for them a grant of Letters Patent after other agents had given the case up as hopeless.

Very respectfully,
JOSEPH LOFENDAHL.

Boston, Mass.

MESSRS. MUNN & CO.—I received your letter announcing the granting of my application for a patent. I have recommended your agency to two parties in Salem about to apply for patents, and one of them has, I believe, already availed himself of it. Another is fully satisfied that you saved him the price of an English patent by the preliminary examination made, through your agency, on his invention. I shall always take pleasure in recommending an agency so prompt and efficient as yours has been in my case. I am yours, gratefully,
J. A. BASSETT.

Salem, Mass., Feb. 13, 1862.

MESSRS. MUNN & CO.—The skill and energy with which you have done the business command my most hearty thanks. I have taken your paper for ten years. Last spring I lost my employment and feared I might have to stop it, but thought I would not until I was obliged to. What the result has been you know. I saw a call in your paper of November 30, 1861, for a number of new inventions. I selected one and marked it out, and through your agency a patent has been allowed me. You have made the tie which binds me to you and your paper stronger than ever, for which my gratitude to you is unbounded.

Yours, &c., CHARLES GOLDTHWAIT.
South Weymouth, Mass., Feb. 10, 1862.

Volcanoes and Whirlpools in the Sea.

It is stated in the late news from Europe that during the recent eruption of Mount Vesuvius eleven craters were in active operation, emitting sulphurous vapors. The first appearance of the eruption is thus described by a correspondent of the London *Athenæum* :—"When I first saw the eruption I was walking with a friend, and happening to look over the inclination of a mountain which cut the sea and the distant prospect, I saw what appeared to me to be a vast pine, and yet I said, rubbing my eyes, I do not remember one on that spot ; it cannot be a pine, it must be smoke from Vesuvius ; and so it was ; and at this, the commencement of the eruption, we could see the mighty mass from the roots, which were fixed in the base of the mountain, growing up with wonderful rapidity to a gigantic tree which touched the very heavens, and then spread its branches south and east and west, until the coast, sea, every thing, was hidden from view."

A whirlpool, some three hundred and sixty feet in diameter, has been formed in the sea near Torre del Greco, by the late eruption of Vesuvius. The sounding gave twenty-three fathoms of water, and the plummet brought up sand and sulphur. From a part of the circumference, a tail, so to call it, about sixty feet in width, runs away in the direction of Sorranto, and is of a beautiful light green color. All the water here was tepid, had a strong sulphuric smell, and many fish have been destroyed.

It has been supposed by many persons that the eruptions of this volcano are caused by the sea finding access to vast deposits of pyrites under the mountain. The whirlpool seems to favor this theory.

European Armies and Navies.

The following, according to the *Almanack de Gotha*, was the state of the disposable land and sea forces of the Great Powers of Europe in 1861 :—

France : Army on war footing, 767,770 men, 130,000 horses ; peace footing, 414,000 men, 72,850 horses. Navy, 600 vessels afloat, building, and under transformation, carrying together 13,353 guns. Out of that number there are 373 steamers, of which 56 are iron-cased. The crews of the fleet, who on a peace footing amount to 38,373 men, may in case of war be increased to 60,000. The seamen forming part of the maritime inscription are 170,000 in number. The effective strength of the marines is 22,400 men in peace, and 26,879 in war. Custom-house officers or coastguard, 25,591 men.—Great Britain : Army, 212,773 men, 21,904 horses. Navy, 893 vessels, carrying 16,411 guns. The crews number 78,200 men, of whom 18,000 are marines, and 8,550 coastguard men.—Russia : Army, 577,859 men regular troops, and 136 regiments of cavalry, 31 battalions, and 31 batteries of irregulars. Navy, 313 vessels, of which 242 are steamers, carrying together 3,851 guns. The Russian government has also 474 vessels acting as guardships at different places and for transports.—Austria : Army, 587,695 men. Navy, 53 steamers, 79 sailing vessels, carrying together 895 guns.—Prussia : Army, peace footing, 212,649 men ; war footing 622,366 men. Navy, 34 vessels, of which 26 are steamers.—Italy : Official effective strength of the army on the 10th of June, 1861, 327,290 men, divided into 68 regiments of infantry, 26 battalions of bersaglieri, 17 regiments of cavalry, 9 of artillery, 2 of engineers, and 3 waggon trains. Navy, 106 vessels, carrying 1,036 guns, and 18,000 men.

New Method of Giving Chloroform.

The *British Medical Journal* says :—At a recent meeting of the Obsterical Society, Dr. Simpson described a plan of administering chloroform which he has now adopted in preference to that at present in use here. The present mode is to fold up a handkerchief and pour into the hollow a quantity of chloroform, and then hold it at some distance from the face, so as to admit of atmospheric air being inhaled along with the vapor. The new plan is to lay a single layer of handkerchief over the face, and let the chloroform fall on it drop by drop. The advantages are these : 1. That there is less danger to the patient from the small quantity applied at a time. 2. That anæsthesia is more speedily produced. 3. That the quantity of chloroform required is less. Various gentlemen who had made trial of the plan confirmed the value of this process ; and Dr. Young, in particular, stated that he had kept a patient narcotized for ten hours with two ounces and a half of chloroform.

HISTORY OF THE HELIOGRAPHIC ART IN EUROPE AND AMERICA.

BY M. A. ROOT.

(Concluded from our last number.)

It will fall next in the order of this historic summary to give some account of several variations of heliography on paper, which closely followed and may be supposed to have been suggested by Talbot's discovery. I have space merely to name these, with their discoverers, leaving to the reader to seek their description elsewhere.

1. The Chrysotype process was communicated to the Royal Society, June, 1842, by Sir John Herschel.

2. The Cyanotype was also a discovery of Herschel's. He describes several varieties of this process, which it is hardly worth the while to introduce here.

3. The Chromotype was, substantially, a discovery of the French *savans*, Pontin and Becquerel. Under this specific name, however, it appears to have been first announced to the British Association, in 1843, by Robert Hunt.

4. The Catalissotype was communicated, in 1844, to the British Association by Dr. Thos. Woods, of Dublin.

5. The Amphitype is another of Herschel's discoveries. Its name, "double sketch," is derived from the fact that two pictures are produced by the same action of light, with different subsequent manipulations.

6. The Anthotype seems to have been a joint production of Herschel, Chevrieul and Robert Hunt. Its nature is defined by its etymology, "flower sketch," the juices of various flowers, bruised and treated with small portions of alcohol, being used for washing the paper instead of mineral solutions.

7. The Gaudinotype takes its name from its French discoverer, Gaudin.

8. The Energiatype was a discovery of Robert Hunt and made public through the Atheneum. I suppose it was thus named from the sensitiveness of its impressible surface and the consequent energy with which the sunbeam acts upon it.

9. Thermography means, etymologically, "heat sketching." The process—a very curious one—was discovered by Moser, of Koningsberg, in Prussian Poland.

The above variations of the Talbotype are not known to be much used, or ever to have been, by professional heliographers. They have, however, subserved a good purpose by enlarging our knowledge of the materials, the agencies and the methods of operation pertaining to the general art.

10. The waxed-paper process has been and still is much more in vogue than either of the above. Its invention is generally ascribed to Le Gray; though some hold that its first announcement to the public was due to Fabre. A peculiarity of this process is, that the first step is to saturate the paper with pure white wax. A great advantage of paper thus prepared is, that it may be used some time after excitement, and that even the hottest weather does not impair its capacity for use. For this reason it is very serviceable to excursionists and travelers. This process has been very successfully practiced by several eminent photographers, among whom Mr. Fenton has been one of the most successful.

11. Sir John Herschel is said to have first suggested glass plates for heliographic uses. M. Niepce de St. Victor, nephew of Niepce de St. Victor, nephew of Niepce, the associate of Daguerre, published in 1848 a mode devised by himself, for applying Albumen to such plates. Blanquart Everard followed, and albumen, gelatine, serum and other substances were successively recommended for application to glass. Albumen, however, employed according to Le Gray's directions, is found to answer better than any other of these. The methods of Mayall and Negretti are also good.

12. Collodion, at present, is put by general consent at the head of all heliographic agents. It is prepared from gun cotton. Gun cotton, according to an English authority was discovered by Schönbein, a German professor in the Swiss University of Berne, in 1841. He made it by dissolving cotton in a mixture of nitric and sulphuric acids. The German's claim has been somewhat contested, but the matter is unimportant. Collodion—a name taken from the Greek and signifying "to adhere"—is made by dissolving gun cotton in ether mixed with alcohol. The best authorities make Dr. Parker Maynard, of Boston, Mass., the discoverer of it, early in 1848. The first use of it was its application to wounds, in place of the ordinary bandages. An attempt was made, in Philadelphia, in 1848, to use collodion for heliographic purposes, by Frederic Langenheim, at the suggestion of Dr. Chas. S. Rand, of the same city. The attempt failed, and Frederic Scott Archer, of England, is generally accredited as having first used it successfully. He published his process in 1851. Collodion soon came into general use, and numerous variations, greater or less, from his method, became common, to which we shall briefly refer.

The applications of collodion may be ranged under two principal heads. First, the ambrotype, a positive picture made upon a collodion covered plate of glass, upon which is laid a second plate and hermetically fixed thereon by some adhesive substance, so that neither air nor water can reach the impression. Hence the title, derived from the Greek *Ambrotos*, immortal, imperishable. Second, a negative picture is impressed upon a plate, and from this are printed indefinite numbers of positives upon prepared paper. The latter species of picture is at present in most general vogue.

In the waxed-paper process we saw that by means of the wax, papers already excited might be kept for some time before being placed in the camera, and yet answer an equally good purpose, as if used immediately after excitation. This property in prepared heliographic surfaces would obviously be a great convenience for travelers and excursionists, who might desire to take views under circumstances that made it difficult or impossible to sensitize these surfaces at the moment. As it was equally desirable to impart the same property to collodion surfaces, several attempts have been made to this end. Three of these, which have been successful I will briefly mention here:—

1. Messrs. Spiller and Crookes effected this purpose by nitrate of magnesia—a collodion plate sensitized as usual, being dipped in a bath of which that substance forms one of the ingredients.

2. Shadbolt's honey process, in which a sirup, made with pure honey and distilled water in equal parts, takes the place of the nitrate of magnesia in the above process.

3. H. Pollock's glycerized collodion process, wherein glycerine, an ingredient of several neutral fats and oils, subserves the purpose of nitrate of magnesia and of honey in the two processes above named.

4. Dr. Taupenot's collodio-albumen process, which consists in first coating a plate with collodion and exciting it, and then putting upon this a coating of albumen and exciting it; after which the plate is ready for the camera. This two-fold coating serves the two purposes of keeping the plates sensitive for a considerable time, and of increasing the rapidity of their action. This is thought by some to transcend all other processes in the quality of its results.

5. Gutta percha, as a sensitized medium, as a substitute for glass, &c. It is not settled whether the discovery of the heliographic capabilities of this substance is due to Mr. Archer or Rev. J. B. Reade.

It is used in three ways. First, you coat a glass plate with gutta percha; upon this you put a collodion coating and produce a picture in the ordinary way, and the gutta-percha basis being then detached from the glass, you have a substitute for the latter, which is as tough as leather, while flexible and portable. Second, you may iodize a sheet of gutta percha, and take pictures upon it without using collodion at all. Third, you can employ a mixture of gutta percha and collodion in the same way. Fourth, you prepare a glass plate with collodion, and conduct the process in the usual mode. The picture being completed, you pour over it the gutta percha solution. The latter being cold, the united films are separated from the glass in a single sheet.

The ivorytype is an invention of Mr. Mayall, of Regent street, London. These pictures are taken upon an artificial ivory, a compound of barytes and vegetable albumen. A plate made of this substance is treated substantially as you treat the paper in producing the Talbotype; and the result, especially if touched up with a skillful pencil, is a picture exhibiting all the delicate beauties of the finest miniature painting upon ivory.

The dry collodion process is commonly regarded as the invention of Fothergill, but has been varied more or less by Muller, Neville, Norris, Mayall and many others, so that we shall not attempt to decide whose process is the best. Probably some may prefer one and some another. What is common to most is to coat the first thinly with albumen, which being dried slowly, a coating of collodion is then put on, and the plate is treated in the same manner as in the wet process. Muller varies the process of the others, by first collodionizing and sensitizing the plate, and then pouring on a mixture of two liquids—the first composed of white of egg, creosote and distilled water, and the second of honey, animal charcoal and water. The advantage of the dry collodion process is, that the plates may be used long after being first prepared.

Cultivation of Clover.

The Canadian *Agriculturist* says:—Although clover is generally a more certain crop on this side of the Atlantic than in the old countries of Europe, still even here of late years it has become somewhat precarious on land that has been long under tillage in the ordinary way; and either special manures, or rest—that is, repeating the crop at longer intervals,—must be given, in order to bring about the former state of productiveness. Much injury is often done the cultivated grasses as well as grains, by the foul state in which the former are often sown. Clean seed is a matter of the utmost importance. Farmers in general are quite unaware of the extent of the mischief which they thus suffer. In a single pint of red clover as many as 1,600 seeds of plantation have been found; and in a pint of white clover have been detected by careful observation by means of the microscope, 11,200 small seeds of various kinds of weeds! It thus becomes easy to account for the dirty state into which much of our pasture as well as arable land has fallen.

When land is not what is called "clover sick," that is from exhaustion not capable of producing a healthy crop at all, the produce of clover may frequently be increased by top-dressings of manure containing potash, gypsum, and super-phosphate of lime; but the high price of salts of potash, and the uncertainty of the action of manures upon the crop, render the application of artificial manures for clover a practice of doubtful economy. On land termed "clover sick, some of the ordinary manures, whether "artificial" or natural, can be much relied upon to secure a crop. So far as our present knowledge goes, the only means of ensuring a good crop of red clover is to allow some years to elapse before repeating the crop upon the same land.

CORN GRIDDLE CAKES.—Almost every one is interested in knowing how to make corn cakes most palatable since so much of it will be used in these straightened times. The following is said to be an excellent receipt:—Scald at night half the quantity of meal you are going to use, mix the other with cold water, having it the consistency of thick batter; add a little salt; and set it to rise; it will need no yeast. In the morning the cakes will be light and crisp. Skimmings, where meat has been boiled, is best for frying them with. Fry slowly.

PRIZE CORN BREAD RECIPE.—The prize of $10 offered by Orange Judd, the publisher of the *American Agriculturist*, for the best corn bread loaf, was awarded to Mrs. James O'Brien, of Carrick, Pa. The recipe for making the bread is as follows:—To two quarts of meal add one pint of bread sponge; water sufficient to wet the whole; add half a pint of flour and a tablespoonful of salt; let it rise; then knead well for the second time, and place the dough in the oven, and allow it to bake an hour and a half.

A VERY good substitute for tracing paper may be manufactured with ordinary paper by the help of a little benzole. A sheet of ordinary Bath post, moistened with this oil, renders the material perfectly transparent; the tracing may then be effected, and within a short time the volatile fluid has evaporated and left the paper perfectly opaque and clear as before. The drawing sustains no detriment by the operation.

WOMAN SUPERIOR TO MAN.—When Agassiz received his degree of doctor in medicine at Munich, he maintained the superiority of woman in a Latin dissertation upon the thesis, "*femina humana superior mari.*"

Improved Tile-Laying Machine.

The accompanying engraving illustrates a machine for digging ditches and laying down tiles in them at one operation, invented by B. P. Foster and Wm. H. Chaffee, of Flint, Michigan. Its construction and operation will be understood by examining the cut.

1 1 is the frame of the machine; 2 2′ 2″ are the buckets composing an endless chain. The first of these buckets 2 is armed with teeth at the edge which comes in contact with the ground; the next succeeding bucket 2′ has its teeth so placed as to follow the interstices between the teeth of the bucket 2, which precedes it. These two buckets having passed over the ground, and having with their teeth thoroughly broken it up, the scraper on bucket 2″ follows them, and takes whatever of the loose dirt the others have left. This chain of buckets is hung on two sprocket wheels, 3 3, the lower one being hung on a shaft 4, which has its supports in the lower end of the hanger 5, the upper shaft 7 being hung in the adjustable frame 6. This frame is made adjustable for the purpose of regulating the depth to which the ditch shall be dug; as the endless chain is supported by it, the depth to which the said chain digs is determined by the hight at which the frame 6 is secured. This adjustment is also used when the machine first begins to dig the ditch, the buckets being allowed to descend gradually till they have reached the required depth. This adjustment is accomplished by means of the windless, 8, and the ropes or chains, 9, which wind on it, the said windless being turned by means of the crank, and prevented from running back by a ratchet wheel and pawl. The swinging frame 5 is secured in adjustment and supported in the desired angular position by means of the brace 28 attached at one end to said swinging frame or hanger 5, and at the other secured by a pin to the frame 6, in such a position as to secure the proper action of the parts under the circumstances of the particular case in which it may be used for the time being, said brace 28 being provided with several holes at intervals, as shown, to allow the proper or desired adjustment.

In the rear end of the machine is a reel 13, on which a roll of cloth is wound. This cloth is allowed to unwind as the machine advances, covering the tiles and protecting the joints from the entrance of the loose dirt. By the time the cloth will have rotted, the dirt will have become so compact as to leave no danger of inconvenience from that source. The tiles are laid on a slide or guide 14, represented in detail in figure 3, on which they slide down and take their position in the ditch; the lower part 15 of the guide, being just large enough for the tile to slip over it easily, will hold them in their places laterally, while the pressure exerted by those above will force them together longitudinally. This guide is fastened to the brackets on the under side of the machine, which are shown at 31.

The machine is driven ahead by means of a feeding apparatus connecting with the main driving shaft 7, and acting on ropes secured to the ground at each end by means of stakes, and passing once around a windlass attached to the machine. 16 is the band or cord leading from the pulley 17 on the main shaft 7, and drives the intermediate pulley, 18, which, by means of the belt or cord 19, drives the pulley 20 on the shaft 21. On the said shaft 21 are two gear wheels or pinions which mesh into the wheels 23. These two wheels 23 are upon the shaft 24′, which serves as the forward axle of the machine, and around which the ropes 24 24 are passed in a groove on pulleys provided for that purpose. At the forward end of the machine are two vertical circular knives or cutters 27 which cut the sod on each side of the proper width for the ditch, so that the horizontal cutter 28 may remove the strip and throw it to one side, leaving the earth bare, ready for the operation of the diggers. Should it be desirable to make a ditch simply, the spout or conveyer shown in figure 2 is put on in the place of the spout 29, which is otherwise used, and which is shown attached to the machine.

The machine is designed to have a platform on each side of it for the men to stand upon to operate the cranks. It may run upon a truck to overcome the inequalities of the ground, and keep the ditch on a regular grade.

As there is but little soil moved by this machine, it takes but little power to work it. The inventors think that two men with a boy to feed, on the tiles, can ditch one hundred rods per day, and do the work in a very perfect manner.

The patent for this invention was granted Oct. 15, 1861, and further information in relation to it may be obtained by addressing Wm. H. Chaffee, who is owner of the patent, at Flint, Mich.

Fig. 1

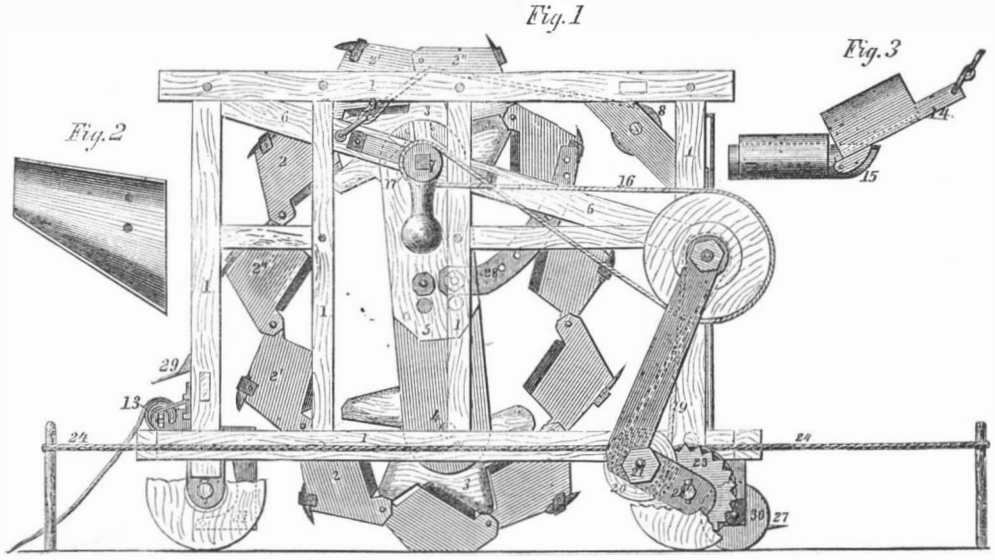


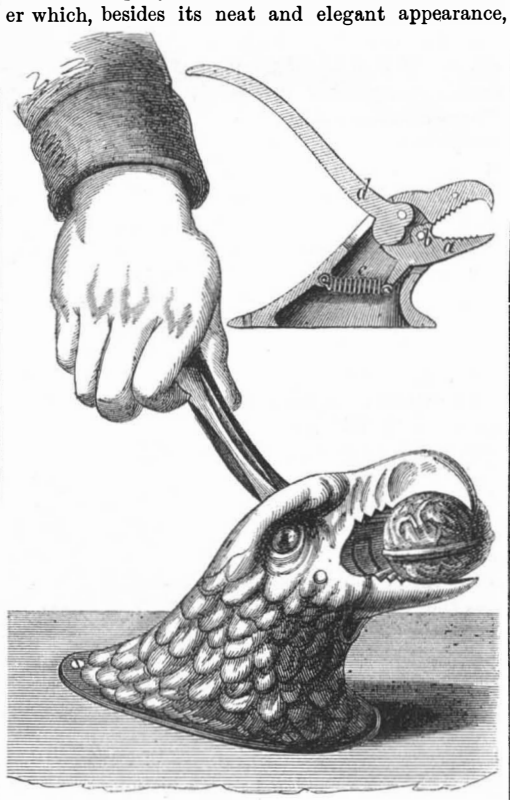
Fig. 2

Fig. 3

FOSTER AND CHAFFEE'S DITCHING AND TILE-LAYING MACHINE.

SMITH'S PATENT NUT CRACKER.

The accompanying engraving represents a nut cracker which, besides its neat and elegant appearance,



possesses extraordinary power. It is made of hollow cast iron in the form of a bird's head, the lower bill forming the movable or pivoted lever.

The construction is represented in Fig. 2. The bill, *a*, is pivoted at *b*, as shown, and is actuated by a cam on the long lever, *d*. It will be seen that this multiplies the power many fold, giving a very short motion to the bill for a long motion to the lever, *d*. The bill is drawn back and the jaws opened by the spiral spring, *c*.

The form of the jaws enables nuts of any size to be grasped between them, and their peculiar configuration prevents shells from falling into the joint to obstruct their motion. They are serrated upon their inner surfaces to prevent the nuts from slipping. This nut cracker stands securely upon its broad base, and is portable, not being required to be secured to the table, or it may be readily secured by a single screw if it is to be constantly used in one position.

This invention is secured by two patents, one for the mechanical construction and one for the design, both procured through the Scientific American Patent Agency, and further information in relation to it may be obtained by addressing the inventor, S. J. Smith, at 18 Pell street, New York.

Salt and Horse's Feet.

Lucius A. White, Superintendent of the horses of the Avenue A stage line has testified before the Commissioners of Health in this city that out of 136 horses used last winter from 20 to 30 were laid up with frozen feet when the streets were salted. Some of them became perfectly useless, and the feet of one fell off. No salt has been used on the road this winter, and all the horses have been in good condition. Thomas Murphy, superintendent of the horses on the Hudson River Railroad testified that during last winter he had over 70 lame horses, caused by the use of salt on the road. Fifteen died, four had to be killed, and the feet of three fell off. No salt being used this winter, the horses have been in good condition. This practical testimony is quite contrary in ts character to that published in the Scientific American of two weeks since, as given by physicians in Philadelphia, and is in exact accordance with the settled principles of science, as pointed out by us in an editorial on page 41 Vol. II. (new series) of our journal.

The French Ocean Mail Steamers.

It is understood that the Messageries Imperiales Company have just concluded a contract with an English firm for the construction, for £1,000,000 sterling, of eight first-class iron steam vessels for packet service, three to be built on the Clyde and five in ports of France, under the superintendence of the firm. The first English built one is to be completed within 19 months, and the others at successive intervals of two months from the expiration of that term. With respect to the company's operations in connection with India, the three vessels intended for that service are now lying in the harbor of Marseilles completely ready for sea, in regard to equipment and furniture. They are the *Imperatrice*, the *Donau*, and the *Camboge*, all screw vessels of 2,300 tuns burden each, and 500-horse power, and fitted entirely for first-class passengers and their servants. These ships are to leave Marseilles for Calcutta within two months from the present date, and are intended to run between that port and Suez.

Catalogue of Steam Pumps.

We have before us an illustrated catalogue of steam pumps, manufactured by Messrs. Guild, Garrison & Co., of Williamsburgh, New York. It contains well-executed engravings, dimensions, capacity and price of five different varieties which are used for feeding boilers, cleaning mines, draining, supplying locomotive, sugar houses and manufactories. One form is especially designed for evaporation on a large scale, as in the manufacture of sugar, camphene, coal oil, &c. Another form is designed for lifting large quantities of water to slight elevations, with but little attention, and cannot be choked by dirt and sand. This firm work for reputation as well as for money, and furnish a good machine in every respect.

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VOL. VI. NO. 9.....[NEW SERIES.].....*Eighteenth Year.*

NEW YORK, SATURDAY, MARCH 1, 1862.

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

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

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

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

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

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THE PROPOSED NEW IRON GUNBOATS.

The bill which lately passed the Senate appropriating ten millions of dollars for the building of twenty new iron-clad gunboats has been amended and passed in the House of Representives, raising the appropriation to fifteen million of dollars, and the number of vessels to thirty. The Secretary of the Navy has stated that ten of these gunboats can be built within the space of six months and Mr. Hale, chairman of the Naval Committee in the Senate, stated that Capt. Ericsson had proposed to build four of these boats at a cost of $225,000 each, and the contract, if made with him, would be fulfilled, as he had already built one which had been constructed and launched within one day of the time specified by the agreement. It was also stated that these vessels were intended for reducing "harbors of the enemy," but the Navy Department "did not intend to conform to any particular plan for building the boats, but would be guided by experience gained during the progress of the work." The cost for each has been estimated to range from $360,000 to $580,000.

The construction of iron-clad gunboats of very light draft, combined with impenetrable hulls, for the purpose stated, is undoubtedly an experimental question with our nautical men. Perhaps no other course can therefore be pursued than to commence building them without adopting a positive plan, and then work up by experiment until a perfect model is obtained. The leading objection to such a course is the great and indefinite expense to which the government may be ultimately subjected. All experience in shipbuilding has been conclusive as to one result, namely, that when original plans have been changed and great alterations in construction made, the cost has prodigiously exceeded all previous estimates. It would be a very injudicious movement, we think, to give out contracts for thirty such vessels, all subject to great alterations.

By such a lavish appropriation as this Congress seems intent upon making amends for past apathy with regard to vital naval interests. Had the advice of the SCIENTIFIC AMERICAN been taken, as given on page 265, Vol. IV. (new series), we would now have had iron-clad vessels in the service capable of defying all the batteries on the Southern coast and New Orleans—the greatest exporting city on the continent next to New York—would have been as truly in possession of the Union forces as Port Royal. After describing the condition of the American Navy in April, 1861, the article alluded to concluded thus:—"No time is to be lost in commencing a ship in proof. Such a vessel would have steamed into Charleston harbor any day and kept up a permanent communication with Fort Sumter, regardless of the fire of the batteries, if they had rained shot and shell upon her, and that without carrying a single gun." Since that period the navy has been vastly increased, but not with a single iron-clad vessel capable of defying casemated forts and also possessing the qualities of a good sea boat.

The new iron-clad brigantine built at Mystic, Connecticut, was launched on the 14th inst, and the Ericsson iron-clad propeller is nearly completed at Green Point. The imperfect designs of the proposed new iron-clad gunboats represent them being duplicates of the Ericsson. Such vessels may prove very efficient as shell-proof floating batteries and answer a most excellent purpose, but we also want a number of iron-clad steamers for the navy possessing qualities not only serviceable for reducing forts, attacking and defending harbors, but which will render them efficient as good sea boats and cruisers when this war is concluded, otherwise they will soon become useless hulks. The attention, therefore, of our naval authorities should be especially directed to the construction of iron-clad vessels of as light draft as possible, of "sea-going qualities" and great steaming power, so as to combine high speed with great strength. Without possessing a high speed a steam frigate is almost useless at the present day, as the vessel which has the highest speed can choose her own distance.

There is also another important point to which special attention should be directed, namely, the qualifications of the persons to whom the contracts for building these vessels shall be given. We trust they will be awarded to responsible parties, who are engaged in the business and who have an established reputation for integrity and the production of good workmanship. Public confidence in the faithful application of such a large sum as fifteen millions of dollars will be completely shaken if the building of such vessels shall be entrusted, through favoriteism, to persons of doubtful reputation, and who have little experience in naval engineering.

IMPROVEMENT IN CANDLES.—Steep the cotton wick in water in which has been dissolved a considerable quantity of nitrate of patassa—chlorate of potassa answers still better, but it is too expensive for common practice—by this means a purer flame and superior light are secured, a more perfect combustion is insured, and snuffing is rendered nearly as superfluous as in wax candles. The wicks must be thoroughly dried before the tallow is put to them.

AGASSIZ AS A LECTURER.

Professor Agassiz, though of French descent, is himself a Swiss. He was born May 28, 1807, in the parish of Mottier, in the Pays de Vaud. Having received a very thorough education, his life has been devoted to the study of science. After winning the highest reputation throughout Europe, and securing the friendship of the most learned men, including Cuvier and Humboldt, he came to this country in 1846. He had two objects in view in visiting the United States; one the study of the geology and natural history of the country under the patronage of the King of Prussia; and the other the delivery of a course of lectures in Boston at the invitation of John A. Lowell.

He expected to return to Europe in eighteen months or two years, but in 1847, he met with Professor Bache, the Superintendent of the Coast Survey, and this event changed the whole course of Agassiz's life. Professor Bache invited him to avail himself of the facilities presented by the operations of the coast survey for the further prosecution of his researches. The offer was so liberal and of such vast importance, in a scientific point of view, that at first Agassiz could hardly credit his good fortune; and upon being assured that he might, without difficulty, visit at will every point of the coast in the well-equipped coast survey vessels, from Maine to Texas, and along the whole western coast, he exclaimed that this would decide him to remain to the end of his days in the United States. In the spring of 1848 Agassiz entered upon his duties as Professor of Zoology and Geology in the Laurence Scientific School at Cambridge. Besides his university lectures, he has delivered courses of lectures in different parts of the country, while studying its natural history.

Professor Agassiz is a stout man, with an enormous head, the high and broad forehead corresponding well with the comprehensive and vigorous intellect. As a lecturer he exhibits the methodical arrangement, and the lucid and simple presentation of his subject always characteristic of great men. He speaks with a marked foreign accent, but with a distinctness of articulation which causes, not only every word, but every syllable to be heard in all parts of so large a building as the Academy of Music in Brooklyn.

There is one thing in the style of Professor Agassiz which is a little surprising; we allude to his use, to so large an extent, of Saxon words, in preference to those of Greek and Latin origin. This preference is manifested by all great writers who have learned the English language as their mother tongue, but it is unusual to meet with it in foreigners, especially with classical scholars; because it is so much more difficult for them to learn the words of purely English origin than it is to learn those coming from the Greek and Latin. For instance, when a classical scholar meets with the word *inclined*, he knows its meaning from its manifest derivation, but if he comes across the word *slanting*, he must look for its meaning in the dictionary.

It is therefore somewhat surprising to see a foreigner manifesting the preference for old English words which is shown by Agassiz. This is probably attributable to the circumstance that Agassiz's reading of English has been confined principally to the works of the great writers of the language, who always discover that they can express their ideas with more strength, and especially more clearness, in the short and pithy words of the Saxon tongue, than they can in the sonorous polysyllables coming from the Greek and Latin.

The style of Agassiz would be improved for popular lecturing if he could draw still more largely from "the pure well of English undefiled." For instance, in the lecture of which a report was published in the SCIENTIFIC AMERICAN last week, if he had used the word, melted, in place of "a state of igneous fusion," he would have been understood by a larger portion of his audience.

FALL IN THE PRICE OF COTTON.—Within a few days since the news of the successes of the Union army in Tennessee has been received, cotton has fallen considerably in price. On Saturday the 15th, it ranged from 28 to 30 cents for middling and good-middling. On the 18th it ranged from 23 to 28 for the same qualities. No less than 1316 bales were received from Liverpool last week.

THE INVENTOR AND THE NATIONAL CRISIS.

In the depths of the troubles into which the most formidable rebellion upon record has plunged the country—amid the moral, social and physical sufferings which have of late days been brought home to every American household—there are few more discernible evidences of national hope than those afforded by the constancy and courage with which the Genius of Invention has pursued her laborious and beneficent mission among us. We are aware that inventive talent abounds in the United States. We know to what an extent the world at large is indebted to our country for the innumerable improvements in all the every-day requirements of life. These achievements, however, were the work of peaceful and unexcited times. What must awaken admiration in every reflective mind is the fact that amid the distraction of that worst of all national scourges—a civil war—such a number of men could devote themselves to invention—could have calmly kept their souls, and given themselves up so effectually to the practical application of scientific and mechanical principles in the discovery and development of such a mass of the most delicate and complicated machinery. Indeed in this respect, all things considered, we can hardly doubt that 1861 will be regarded as the *annus mirabilis* of modern times. In other nations war times will permit the popular mind to entertain but a single idea, and we have excellent authority that in ancient times even laws were silent in the midst of wars—

Inter arma silent leges.

But in making up his account of the events of the present times the historian faithfully performing his duty, and consulting the Scientific American, must do justice to our inventors and give them a prominent place in the national record. He must tell how American inventors preserved amid national disaster, the fierce conflict begotten of fraternal misunderstandings—the musterings and marchings of armies upon a scale unparalleled in modern times—how amid all these unprecedented circumstances so unfavorable to the calm pursuits of Science and her handmaids, American inventors preserved the balance of their mental forces, and not only sustained their old prestige in continuing to offer to the world's treasury so many novel inventions to subserve all the utilities of life, but have also contributed, with almost the roar of battle in their ears, the most effective agencies to preserve the country from destruction.

For ourselves we can say that both philosophically and with a view to the utilities of daily life, we regard the inventor as a man to whom honor and reward are largely due. To no class of the men who labor for the public good is mankind so much indebted. The votary of literature or of abstruse science may and does deserve our best sympathies; but the silent, thoughtful, persevering and courageous mind struggling, as it were, within the toils of invention, battling with numerous difficulties, perhaps borne down with poverty, as many a fine inventive genius has been, wrestling with some grand idea, to develop which he has given days and nights of study, anxiety and labor, and which may ultimately prove a blessing to the human race—such a man not only deserves our respect, but stands in a position to command our homage.

We cannot look upon all that the inventor has done in the past as the be-all and end-all of invention. On the contrary, we regard the past achievements of invention as a forerunner of what can be accomplished in the future. Solomon, in his day, said there was nothing new under the sun. Had the sage lived in our day, we believe he would be inclined to modify his opinion, and admit that there were more things in heaven and earth than were dreamt of in his philosophy. Every new triumph in science and art serves to open up others to the vision of the true and faithful laborer, and the inventor's achievements partake of the same fruitful and creative nature. They point to new fields of labor where fresh triumphs can be won.

Of this fact the weekly issue of this journal bears ample testimony, especially since the commencement of the present year. The new year has opened auspiciously, and as it advances new and fertile fields of invention will develope themselves, and brighter prospects of rewards will burst upon our inventors.

We would, at the same time, advise our inventors, that notwithstanding the unhappy circumstances in which our country has been—let us hope temporarily—placed, they should continue their labors without abatement, hopeful and heartful as ever. Those who have not been hitherto over successful should gird up their loins for a year's struggle is before them in which they may win fame and fortune. While to the veterans who have long since won their spurs in the field of invention, we would say, "go in once more and show the young ones how to win."

OUR IRON-CLAD RIVER BOATS IN BATTLE.

We have now some reliable information respecting the efficiency of iron plates of moderate thickness in resisting shot during an engagement. The fleet of gunboats covered with 2½ inch rolled iron plates constructed for the purpose of attacking forts and batteries on the Western rivers, has been in action, and the results are favorable to the sagacity which projected these vessels. Some of them were entirely new boats, built for the purpose of war, with the boilers and machinery under the waterline, while others were simply old river boats covered with plates in such a manner as to have deck and machinery boxed in. Their frames are timber very strongly braced, and the plating is angled from the waterline to make the shot glance off.

Fort Henry was defended with thirty-five guns, namely, one 128-pounder, one 24-pounder and five 6-pounders, rifled; and two 42-pounders, ten 32-pounders, one 24 pounder, two 12-pounders and three 6-pounders, smooth bores. It was attacked by four of the iron-clad vessels, three of which were built purposely for the war, but the fourth—the *Essex*—was an old vessel plated around the boilers and machinery, but with its bow unprotected. At six hundred yards distance this vessel received eleven shots, most of which struck the plates and were deflected, doing no injury, but one from the 128-pounder entered a larboard port, passed through the boilers and scattered destruction around. The other three steamers were repeatedly hit at three hundred yards distance, but no material injury was done to them, and had the boilers of the *Essex* been placed below the waterline she would not have been disabled.

In the attack on Fort Donelson we have still more useful information respecting these iron-clad boats. Commodore A. H. Foote made the attack on this fort on the 14th of February with four iron-clad boats, namely, the *St. Louis*, *Louisville*, *Pittsburgh* and *Carondelet*, and two unplated ones—the *Tyler* and *Conestoga*. The two latter kept at long range and were soon disabled, and it may truly be said they were worse than useless. On the other hand, the four iron-clad boats advanced within four hundred yards of the fort, and engaged it for an hour and a quarter under a terrific fire of twenty guns (seventeen of large caliber) from the fort, while the vessels could only use twelve guns. The wheel of the *St. Louis* and the tiller of the *Louisville*, were shot away and these vessels became unmanagable and drifted down the river; the other two were greatly damaged between wind and water and also withdrew. There were 54 killed on board of the vessels, when they were compelled to give up the contest.

Although the gunboat attack on this fort was repulsed, it unquestionably proved the efficiency of the iron plating. The two unplated vessels had to take up a position at such a distance that they could do no harm to the enemy, and a shell from the *Tyler* was actually the cause of disabling the *Louisville*, as it burst over its tiller gear, and destroyed it. The four plated vessels proved to be proof against shells, as we understand from reports, and these are really the most destructive war missiles. Without the plating they would all have been sunk in ten minutes by engaging the fort at such short range. We therefore conclude that the iron plating has been practically successful in affording very great security in actual warfare.

AGASSIZ ON THE EXISTENCE OF GOD.

Agassiz's work on fossil fishes is in five volumes, with a folio atlas containing 400 plates. About 1,000 species are described and figured in the natural size, and about 700 more are mentioned. In this great work the chapter on classification closes in these words:—"An invisible thread, in all ages, runs through this immense diversity, exhibiting, as a general result, the fact that there is a continual progress in development, ending in man, the four classes of vertebrates presenting the intermediate steps, and the invertebrates the constant accessory accompaniment. Have we not here the manifestation of a mind as powerful as prolific? the acts of an intelligence as sublime as provident? the marks of goodness as infinite as wise? the most palpable demonstration of the existence of a personal God, author of all things, ruler of the universe, and dispenser of all good? This, at least, is what I read in the works of creation."

HOURS OF STUDY.

A very remarkable pamphlet has recently made its appearance in England, containing statements of facts that ought to command the attention of the civilized world. The pamphlet is written by E. Chadwick, Esq., C. B., and published pursuant to an address of the House of Lords. The subject of this pamphlet is education, and it is devoted to the discussion of three matters—the organization of schools, the hours of study, and physical training. Our attention has been arrested by Mr. Chadwick's statement of facts in connection with the second of these three subjects—the hours of study:—

"Struck by the frightful disproportion between the powers of childish attention and the length of school hours, he has directed questions to many distinguished teachers. Mr. Donaldson, head master of the Training College of Glasgow, states that the limits of voluntary and intelligent attention are, with children of from 5 to 7 years of age, about 15 minutes; from 7 to 10 years of age, about 20 minutes; from 10 to 12 years of age, about 55 minutes; from 12 to 16 or 18 years of age, about 30 minutes;" and continues, "I have repeatedly obtained a bright voluntary attention from each of these classes, for 5 or 10 or 15 minutes more, but I observed it was always at the expense of the succeeding lesson."

The Rev. J. A. Morrison, Rector of the same College, speaking on the same subject, says:—

"I will undertake to teach one hundred children, in three hours a day, as much as they can by possibility receive; and I hold it to be an axiom in education, that no lesson has been given until it has been received; as soon, therefore, as the receiving power of the children is exhausted, anything given is useless; nay, injurious, inasmuch as you thereby weaken instead of strengthening the receiving power. This ought to be a first principle in education. I doubt it is seldom acted on."

The truth of these pregnant remarks is made more and more evident by the testimony of all competent witnesses. We respectfully submit to all school commissioners, teachers and parents who may read these statements, that they are not of a character to be glanced at and tossed aside, but are worthy of being thought of and acted upon. From Carlyle's pictures of German schools, and from all descriptions of the English schools, there is no doubt that in both those countries there is a lamentable want of understanding on the part of scholars of the subjects which they attempt to learn. The matter is still worse in France and Austria, and it is the prominent vice which pervades the whole American system of education.

Our failure to secure an understanding of the things which we try to teach is, doubtless, in part owing to the fact that we endeavor to teach too much in a given time, but it is also in part attributable to the circumstances that we waste more than three-fourths of the time trying to impart ideas when the mind of the pupil is not in a condition to receive them.

This journal has heretofore advocated the practice of having recesses in schools of ten or fifteen minutes every hour, but, from the experience of the oldest and ablest teachers in Great Britain, it seems that the recesses ought to be granted even to the oldest scholars, as often as once in half an hour. A teacher might as well expend his efforts upon carved wooden images of children as upon scholars after their minds are tired out.

Seventeen private soldiers of the French army, in Bonaparte's time, by their bravery and talents, raised themselves to the following distinguished stations:—Two became kings, two princes, nine dukes, two field marshals and two generals.

CARTRIDGES---THEIR HISTORY.

No satisfactory account has come down to us as to when and where cartridges were first employed. Probably they are as old as the invention of gunpowder. Until recently the most common cartridges used for muskets were simple covers of paper, containing the powder and were wrapped around the bullets. Those for cannon generally are formed of bags of red flannel containing the powder. A very great variety of cartridges have been invented and used, and having quite a number of inquiries made lately respecting those formed of compressed powder, we have prepared a brief description of various kinds which have been patented and used at home and abroad.

In England a patent was granted in 1807 to John Dickenson for common cartridge paper formed of two-fifths woolen and three-fifths linen rages. The object of this cartridge paper was to prevent sparks of fire being retained in the gun after the discharge. The common woolen bag is liable to stick to the bore of a gun when burning. This is the cause of frequent premature explosions when loading. In 1827 J. Lenour patented a cartridge case made of wire gauze. It was chiefly intended for shot guns—small arms. In 1831 A. Demondion invented a cartridge case composed of a metallic tube containing detonating powder projecting from its base. It was inserted into the breech end of a breech-loading rifle, and was exploded by a hammer striking it. In the same year the Marquis of Clanricarde invented a cartridge composed of several sections of a cylinder united to form one metallic cylinder. These were for breech loaders, and when fired they scattered so as to act like grape shot. In 1839 Baron Heurteloup, of France, invented a continual primer, which was contained in a tube and fed forward by a wheel actuated from the lock. He used a muslin envelope for the ball and cartridge case. In 1847 John Mollett (England) patented combustible paper for cartridges made by treating it with nitric and sulphuric acids, or those and zulodine. This was the first use of gun cotton paper for cartridges. The some inventor charged his cartridges with two parts fulminating mercury and one of common powder. No residue was left in the barrel of the rifle. In 1850 G. Simpson and J. A. Elmslie formed cartridges of tinfoil. Cartridges filled with percussion powder composed of chlorate of potash 3 parts; sulphuret of antimony 3 and sulphur 1, were used for the Prussian needle gun by J. W. Schlesinger. In 1852 Robert Adams (England) obtained a patent for making cartridges of thin sheet copper charged with powder, and attached to the bullet and wad. Such cases are now in very common use for breech-loading rifles, and are really good for this purpose. In the same year J. Needham obtained a patent for such cartridge cases of soft metal charged with percussion powder at the base, which was ignited by striking it with a needle. The cartridge case expanded and rendered the joint at the breech of the rifle gas tight. This was claimed as an improvement over Adams's cartridge. On May 18th, of the same year, W. W. Marston and F. Goodall, of New York patened a cartridge formed of a pasteboard case, with a wad of perforated leather at the rear. Each wad was driven out by the succeeding charge, and cleaned the barrel. These cartridges were used for the breech-loading rifle illustrated on page 129, Vol. VIII. (old series) of the Scientific American. In 1853 Mariano Rieva patented a metallic cartridge case in the form of an acorn with the fulminating powder placed at the pointed end. This was struck with a hammer working at right angles to the axis of the barrel. In the same year J. J. Kerr patented cartridge cases for cannon made of tin covered with woolen flock. 1854 C. W. Lancaster used a perforated wad for the cartridges used with his rifled guns. In 1854 L. W. Greener made cartridge cases of an alloy of zinc, lead and bismuth—a fusible metal. In August of the same year Smith & Wesson, of Norwich, Conn., obtained a patent for a cartridge having a seat plate of metal and percussion priming at its rear. This cartridge is illustrated on page 8, Vol. V. (new series) of the Scientific American. In 1855 F. Prince (England) repatented the employment of guncotton made with sulphuric and nitric acids for cartridges. In the same year waterproof cartridges made of paper coated with india rubber and varnish were patented by H. G. Bursell. W. Beales also patented oiled paper and cloth for cartridges, so as to render them waterproof and capable of lubricating the barrel. Paper coated with gutta percha or india rubber dissolved in rectified spirits was patented in 1855 for cartridges by E. Davis. In the same year Capt. J. Norton patented a cartridge made with a paper case charged at the back end with a little guncotton which discharged without bursting the paper. J. J. Imbs (France) obtained a patent in 1855 for cartridge cases made of compressed floss, or waste silk, said to be proof against damp. M. Minié (France) obtained a patent in the same year for making a bullet with a recess in the rear end, in which the powder was packed and covered with a disk of gutta percha. The bullet and cartridge were thus combined in one. In this year Samuel Colt and W. T. Ely patented a combined cartridge and bullet. The bullet was cast with a rebate in the rear, and the powder case was made of sheet foil secured by waterproof cement and pressure to the bullet, and the whole then coated with grease. Gilbert Smith, of Buttermilk Falls, N. Y., secured a patent in 1857 for cartridge cases made of vulcanized india-rubber cloth. Its object was to expand and close the joint of a breech-loading rifle. In 1859 Dr. Maynard, of Washington, patented a cartridge case made of a brass cup and a steel disk in the rear. The method of packing cartridges for Colt's firearms—between two small blocks—so that they may be most safely conveyed to any distance, was patented by E. K. Root, of Hartford (partner in the Colt Company), January, 1859. A patent was granted to J. H. Brown, of Romsey, England, Oct. 15, 1859, for cartridges formed of compressed powder, without a case. It was patented in the United States, August 20, 1861. The claim is published on page 156, Vol. V. (new series) of the Scientific American. A gun cartridge containing two distinct charges—the one to start the projectile before the other is ignited was patented by J. W. Cochrane, of New York, January, 1860. In July of the same year B. B. Hotchkiss, of Sharon, Conn., patented a metallic cartridge case with a strong front end to be blown out with the discharge. On the same date C. Sharp, of Philadelphia, patented the packing of hollow metallic cartridge cases with detonating powder by means of a wad. In September, 1860, E. Allen, of Worcester, Mass., secured a patent for making metallic cartridge cones with a lip for the reception of the fulminating powder. On May 21, 1861, a patent was granted to Robert Bartholomew, U. S. A., for a compressed cartridge of powder, the latter being composed of nitrate of potassa 75 parts, charcoal 12, sulphur 10, chlorate of postassa 3. These ingredients (in powder) are incorporated with collodion, &c., and finally coated with collodion. In the same year B. C. English, of Hartford, Conn., obtained a patent for a metallic bushing applied to the india rubber cartridge case of G. Smith—an improvement for breech-loading rifles. A. K. Johnston, of Connecticut, and L. Dow., of Topeka, Kansas, also obtained a patent, in the same year, for making a cartridge having an envelope of guncotton, or paper treated with an oxygenizing salt and by a waterproof coating. Also R. White, of Iowa, secured a patent for fastening a percussion cap or pellet to the cartridge case. A most ingenious application of such cartridge cases is illustrated on page 136, Vol. V. (new series) of the Scientific American. W. M. Storm patented a spiral fillet of gut for cartridge case, Oct. 29, 1861.

Only two solid compressed cartridges having no cases have been patented; the one by Mr. Brown, of England, and the other by R. Bartholomew. From the foregoing descriptive history it is noticeable that almost every substance has been applied to form the cases of cartridges, paper, plain and guncottonized, silk, wool, cloth, tin, zinc, copper and alloys in profusion.

By the report, for 1861, of the Chief Engineer—U. F. Harris—of the Chicago Fire Department we learn that there are eight steam fire engines in that city. Each engine has a hose cart drawn by horse, carrying 650 feet of hose. There are ten men to each company who are on duty all the time, and sleep in the engine house. There were 170 fires in Chicago last year; the loss but $167,410.

W. Fairbairn, by his experiments with English iron, found that with a strain of 12,320 pounds per square inch, on cast-iron, and 28,000 pounds on wrought iron, the sets and elongations are nearly equal to each other.

Strength of Boiler Iron.

The iron of boilers like the iron of machines or structures is capable of withstanding a tensile strain of from 50,000 to 60,000 lbs. upon every square inch of section, but it will only bear a third of this strain without permanent derangement of structure, and it does not appear expedient in any boiler to let the strain exceed 4,000 lbs. upon the square inch of sectional area of metal, and 3,000 lbs. on the square inch of section, is a preferable proportion. The question of the strength of boilers was investigated very elaborately a few years ago, by a Committee of the Franklin Institute, in Philadelphia, and it was found that the tenacity of boiler plate increased with the temperature up to 550°, at which point the tenacity began to diminish. At 32° the cohesive force of a square inch of section was 56,000 lbs.; at 570° it was 66,500 lbs.; at 720°, 55,000 lbs.; at 1,050°, 32,000 lbs.; at 1,240°, 22,000 lbs; and at 1,317°, 9,000 lbs. Copper follows a different law and appears to be diminished in strength by every addition to the temperature. At 32° the cohesion of copper was found to be 32,800 lbs. per square inch of section, which exceeds the cohesive force at any higher temperature, and the square of the diminution of strength seems to keep pace with the cube of the increased temperature. Strips of iron cut in the direction of the fiber were found to be about 6 per cent stronger than when cut across the grain. Repeated piling and welding was found to increase the tenacity of the iron, but the result of welding together different kinds of iron was not found to be favorable. The accidental overheating of a boiler was found to reduce the ultimate or maximum strength of the plates from 65,000 lbs. to 45,000 lbs. per square inch of section, and riveting the plates was found to occasion a diminution in their strength, to the extent of one-third. In some boilers, which are worked with a pressure of 80 lbs. upon the square inch, the thickness of the plates is only $\frac{5}{16}$ths of an inch, while the barrel of the boiler is 39 inches in diameter. It will require a length of 3.2 inches of the boiler when the plates are $\frac{5}{16}$ths thick to make up a sectional area of one square inch, and the separating force will be 39 times 3.2 multiplied by 80, which makes the separating force 9.984 lbs. sustained by two square inches of sectional area—one on each side; or the strain is 4,992 lbs. per square inch of sectional area, which is a greater strain than is advisable. The accession of strength derived from the boiler ends is not here taken into account, but neither is the weakening effect counted that is caused by the rivets which certainly would not be less in amount. The proper thickness for cylindrical boilers or other cylindrical vessels, exposed to an internal pressure, may be found by the following rule:—Multiply 2.54 times the internal diamater of the cylinder in inches by the greatest pressure within the cylinder per circular inch, and divide by the tensile force that the metal will bear without permanent derangement of structure, which for malleable iron is 17,800 lbs., per square inch of section; the result is the thickness in inches. Where the sides of the boiler are flat, instead of being cylindrical, a sufficient number of stays must be introduced to withstand the pressure, and it is expedient not to let the strain upon these stays be more than 3,000 lbs. per square inch of section, as the strength of internal stays in boilers is generally soon diminished by corrosion. It is expedient also that the stays should be small and numerous rather than large and few in number, as when large stays are employed it is difficult to keep them tight at the ends, and oxidation of the shell follows from leakage at the end of the stays. A strain at all approaching that upon locomotive boilers would be very unsafe in the case of marine boilers, on account of the corrosion, both internal and external, to which marine boilers are subject. All boilers should be proved when new to three or four times the pressure they are intended to bear, and they should be proved occasionally by the hand pump when in use, to detect any weakness which corrosion may have occasioned.

If horses' hoofs were frequentty smeared with a composition of beeswax and good beef tallow, they would be protected in a great measure from the evils arising from salted snow-slush in the streets.

The Britannia tubular bridge has a double railway track, a span of 460 feet, and weighs 3,000 tuns.

NOTES ON FOREIGN INVENTIONS AND DISCOVERIES.

Enameling Articles of brass and German silver :—Fancy enameled metallic work has only been produced on articles of gold and copper. Silver, brass and German silver are not adapted in their nature for withstanding the heat to which the fused enamel is subjected, hence enamel will not adhere to such metals. Mr. Samuel Fearne, of Birmingham, England, has obtained a patent for enameling articles of brass and German silver, which is described in substance as follows in Newton's London *Journal of Arts and Sciences* :—The invention consists in coating with copper the surface of the article of brass or German silver to be enameled, or that portion of the surface of the article to which the enamel is to be applied, whereby the fused enamel will be enabled to attach itself firmly. In producing designs in enamel on metallic surfaces, that portion of the surface which is to be enameled is generally sunk or depressed, and the enamel fused in the portions of the surface. By afterward grinding or polishing, the surfaces of the enamel and the unenameled or metallic parts are made flat or flush with one another. The sunken designs may be produced either by engraving or etching with acid, or by transferring a design, printed from a copper plate, stone, glass, steel, zinc, or other printing surface ; the design being printed in some material not affected by acid, and afterward biting by acid, to the necessary depth, those parts of the design which are required to be enameled. Or the designs may be produced by embossing or impressing the surface of the articles, by means of dies, or rollers, or other tools. After the sunken or depressed design has been produced a film or layer of copper is deposited upon the whole surface of the article, or upon those parts only which are to be enameled ; by the ordinary process of electrical deposition. The enameling of the coated parts is then effected in the ordinary way. The enameled surface is next ground or polished, and the enameled article is afterward finished, by silvering, bronzing, or lacquering the surface of the unenameled or metallic parts of the article, in the usual way. When the form of the article is such that all parts of it can be readily reached by any of the ordinary polishing processes, it is unnecessary to stop out any portion of the surface, by means of varnish, prior to the deposition of the copper on the said article, that is to say, the whole surface of the article may be coppered. After the enamel has been fused in the sunken parts, the whole surface of the article is ground or polished, by which grinding or polishing the copper on the unenameled parts of the article is removed, and the enameled and metallic parts made flush with one another. The unenameled or metallic surface of the article is afterward finished by silvering, bronzing, or lacquering.

Revolving Steam Boilers.—D. F. Grimaldi, of Teramo, Italy, has constructed a steam boiler formed of a series of tubes set in a cylinder, which is made to rotate in the furnace. The trunnions of the boiler are hollow, and the water is fed through them, so that they are kept comparatively cool.

Renovating Old Cannon.—J. Snider, Jr., has obtained a patent for rendering worn-out cast-iron serviceable again as follows :—He first rebores the cannon so as to rectify any inaccuracies arising from wear. In this bore is then fitted and fastened a steel cylinder which may be either rifled or smooth and it forms the bore of gun.

RECENT AMERICAN INVENTIONS.

Veneer Cutting.—This invention consists, firstly, in giving the bolt from which the veneers are cut a peculiar motion so that the bolt will be presented to the knife, which is stationary, with a rolling and drawing cut, and the veneers cut therefrom in a suitable and even manner with a moderate application of power ; secondly, in a peculiar feeding device for adjusting the knife to its work at the commencement of each cut, whereby the thickness of the veneers may be graduated as desired with the greatest nicety, and the knife also withdrawn from the bolt during the return movement of the latter so that the edge of the knife will be preserved and much friction avoided ; and, thirdly, in a novel and improved arrangement of dogs for securing the bolt to its bed, whereby the dogging of the bolt may be expeditiously performed and all irregularities of the bolt compensated for by a self-adjusting feature of the dogs. Invented by Loring P. Hawes, of New York city.

Rotary Engines.—Two patents, the claims of which will be found in this week's list of claims, have been granted for improvements in rotary engines by John B. Root, and a third for other improvements in such engines by J. Clayton and A. Campbell, all of which have been assigned to Root's Rotary Steam Engine Company of New York city, which is manufacturing engines under these and other patents of Mr. Root. The improvements relate more particularly to that description of rotary engine whose inner rotating drum to which the pistons are attached is arranged eccentrically within the stationary cylinder. The improvements consist in contrivances for directing the pistons in their movements ; in means of packing the pistons, drum and abutments ; in means of warming the cylinder uniformly to prevent unequal expansion ; and in means of reversing the engine ; and all of the improvements tend to make a very simple and, we believe, a very durable and effective rotary engine.

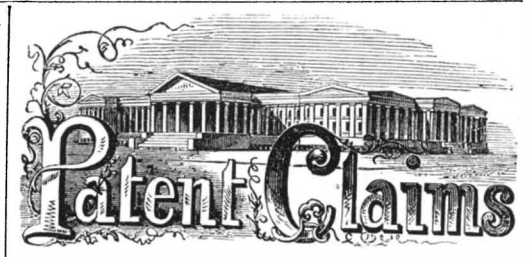
Enamel for Leather.—The manufacture of enameled leather, commonly known as "patent leather," has, up to this day, been kept a profound secret by the French and German manufacturers, and notwithstanding the fact that a large number of manufacturers in this country have tried to imitate the French enamel, they have not succeeded in producing an article of the same beauty and durability in hot and cold weather, and the French patent leather has still the preference in the market. Mr. C. W. Held, of Brooklyn, N. Y., has now discovered an enamel which, when properly spread on the leather, will not crack in the cold nor loose its luster in the heat, and which in every respect equals the best French or German patent leather.

Lamp.—This invention relates to an improved lamp for burning coal oils without a glass chimney, and consists in having the wick of the lamp fitted in a tube of glass, porcelain, or other material which is a good non-conductor of heat, by which the oil is prevented from volatilizing too rapidly, or in greater proportion than the supply of oxygen requires, thereby ensuring perfect conbustion and consequently a good illuminating flame. The inventor is Thomas J. Barron, of Brooklyn, N. Y.

Carriages.—This invention is particularly designated for light carriages, though it is equally applicable to all kinds of four-wheeled vehicles which are hung upon eliptic springs. The object of the invention is to allow the carriage or other vehicle to which it is applied to turn in a small compass, and it consists in an arrangement for turning the hind axle of the carriage by and simultaneously with the front axle and in opposite direction. Patented to Nathaniel Adams, of Cornwall, New York.

Tuck and Plait Creasers.—This apparatus is designed for creasing cloth in the proper lines of the folding of tucks and plates, either to be sewed by hand or by a sewing machine, and in either case may be entirely separate from the sewing machine, though it may be attached thereto when desirable. The invention consists in the employment, in combination with a guide, of two roliers or other surfaces, one of which presents an edge and the other a groove, and between which, and in contact with the guide, the cloth or other material to be tucked or plaited is drawn for the purpose of being creased in the proper lines to fold the material to form the tucks or plates. It also consists in a certain mode of applying and supporting one of the said surfaces, in combination with the other parts of the apparatus, whereby the tucked or plaited or merely creased portion of the material is separated from that which has not been creased ; and it further consists in a guard applied so as to prevent the material from getting in an improper direction between the creasing surfaces. Invented and patented by W. L. Fish, of Newark, N. J.

Implement for Cutting the Snouts of Swine.—The object of this invention, by Reuben Hurd, of Spring Hill, Ill., is to obtain a simple and efficient improvement for cutting the noses or snouts of swine, so as to prevent them from rooting, and thereby supersede the ordinary practice of "ringing," for effecting the same result. The invention consists in the employment or use of a cutter and block attached to the end of levers which cross each other and are connected by a fulcrum pin similar to the levers of a pair of scissors, all being so arranged as to effect the desired purpose.



ISSUED FROM THE UNITED STATES PATENT OFFICE

FOR THE WEEK ENDING FEBRUARY 11, 1862.

Reported Officially for the Scientific American.

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

34,342.—Nathanial Adams, of Cornwall, N. Y., for Improvement in Running Gear Carriages :

I claim the arrangement of the arm, c, perch, f, and pivot, e, with the independently-pivoted axles, A B, as shown and described, for the purpose set forth.

34,343.—C. M. Alexander, of Washington, D. C., for Improvement in Bridle-Bit Attachments :

I claim the arrangement of the looped wires, L L, passing through the springs, when used in combination with the shank, A, strap, F, and bridle rein, H, as and for the purpose specified.

34,344.—J. L. Baldwin, of Newark, N. J., for Improvement in Molds for Making Daguerreotype Cases :

First, I claim the combination with the upper portion of the die, C, frame or block, A, and lower parts of the die or mold, of the plunger, D, substantially as described.

Second, The combination with the parts, C and D, of the key, g, so as to accomplish the purpose set forth.

Third, Constructing the part, C, with two thread portions or screws of equal pitch, one of which fits into the block, A, and the other of which forms the screw upon the work, substantially as and for the purpose set forth.

34,345.—J. S. and T. B. Atterbury and James Reddick, of Pittsburgh, Pa., for Improvement in the Manufacture of Hollow Glassware :

We claim, first, The manufacture of lamp pegs or bowls, and other descriptions of hollow glassware, with the ornamental designs or figures, intermediate the inner and outer plain surfaces of the glass, of which the articles are composed, substantially in the manner described.

Second, We claim the performance within a sectional mold, such as we have shown, of the pressing and blowing processes, successively in the production of one and the same hollow article of glassware, substantially as and for the purposes set forth.

34,346.—Samuel Bentz, of Carroll Co., Md., for Improved Hulling Machine :

First, I claim the employment of a conveyer trough, substantially as described, with flights, as specified, for moistening the grain, and in combination with the conveyer, the regulated water discharge, as and for the purposes set forth.

Second, I claim the employment of an unbranner, for removing the husk or bran from edible grain in a moist state, consisting of a horizontal cylinder with inclined revolving wings, constructed substantially as and for the purposes set forth.

Third, I claim, in combination with a moistening apparatus and unbranner, the drying apparatus, through which the grain is passed to be dried.

Fourth, I claim the construction of the drying apparatus, with its partitions, &c., by which the air is compelled to commingle with the grain, either alone or in company with the detached bran or husk, as specified.

Fifth, I claim polishing the grain after it has been dried, by passing it through an unbranning apparatus, as described.

Sixth, I claim removing the bran, either in a moist or dry state, from one or all the points, while passing through the apparatus, by means of exhaust apparatus, applied substantially as and for the purpose set forth.

Seventh, I claim regulating and controlling the current of air through the dyer, by means of the exhaust, as and for the purposes described.

Eighth, I also claim the apparatus for cooling the grain, constructed and arranged as set forth.

34,347.—John Buser, of New York City, for Improvement in Bottling Apparatus :

First, I claim the revolving holder, k, with the receptacles, 9, for the bottles, in combination with the crosshead, m, and parts attached, for filling and corking said bottles, as presented by the said revolving holder, k, as set forth.

Second, I claim the arrangement of the sliding bar, i, talon, 7, spring, 6, and lever, h, when combined with the revolving holder, k, for giving motion to the said holder, and presenting the bottles to be filled in unison with the other movements of the machine, as specified.

Third, I claim the lever, p, in combination with the cross heads, m and c, and acting in the manner specified, to turn the yoke, 10, over the cork, as the cross head, m, is raised, as specified.

Fourth, I claim the vessel, r, spout, s, and tipping dipper, t, in combination with the revolving holder, k, and corking apparatus, for supplying sirup or other liquid to the bottles in said holder, k, immediately prior to the corking, as set forth.

34,348.—N. W. Clark, of Clarkston, Mich., for Improvement in Apparatus for the Manufacture of Salt :

First, I claim, in combination with the salt block, a heating reservoir, in and through which there is a constant flow of water, substantially as described.

I also claim, in combination with a steam boiler, placed over the furnace of the salt block, a heating reservoir, F, placed over and projecting beyond said boiler, for the purpose of utilizing the otherwise wasted heat from and around the boiler, substantially as described.

I also claim projecting the sides or ends of the pans over the sides or main flue of the salt block, for the purpose of affording a table on which the salt drawn or scraped from the pans may drain, and allow the drainings to run back into the pans, substantially as described.

I also claim making the salt pans of metal and of wood, so arranged and combined as that while the saline water shall lie upon both, the metal only shall be exposed to the fire or heated products of combustion, substantially as and for the purpose described.

I also claim so arranging the flow-offs from one pan to the next adjacent one throughout the series, as that the metal portions of the pans shall be always covered by the saline water in them, and thus prevent corrosion of the pans, and consequent destruction, as well as avoiding the staining of the water or discoloring of the salt, as set forth and explained.

34,349.—S. A. Clemens, of Rockford, Ill., for Improvement in Hemp Breakers :

I claim, first, The method of breaking flax or other fibrous substances by a beater, constructed substantially as described, which oscillates upon an axis on one side of its center, and has its breaking edges on the other side, extending at unequal distances from the axis, when combined with two bars, the breaking edges of which are in correspondence with those of the beater, substantially as described and for the purposes specified.

Second, I also claim a whipper, vibrating either upon an independent axis on one side or upon an axis common to it and the beater, when combined with a beater or pair of feed rollers, substantially as described and for the purpose specified.

Third, I also claim an air pipe, j', with its discharging spout so arranged as to direct an artificial current of air across the machine, above the whipper, in connection with the latter, substantially as described and for the purpose specified.

Fourth, I also claim an annular-grooved receiving roller, d, resting over or upon an endless apron, and in connection with a pair of plain pressure feed rollers, substantially as described and for the purpose specified.

34,350.—Isaac Crandal, of Middlefield, N. Y., for Improvement in Pleasure Wagons :

I claim forming the body, A, of the vehicle, of two elastic parts a a

attached, one part to the back axle, c, and the other by a king bolt, b, to a spring, E, which is fitted or suspended between the back parts of the thills, F, the latter being attached permanently to the front axle, G, and all arranged as and for the purpose set forth.

[The object of this invention is to construct pleasure wagons or light-wheel vehicles in such a manner that they will be strong and durable, extremely light, of easy draft, and the expense of construction materially reduced below that of ordinary vehicles.]

34,351.—R. A. Daniels, of Wayne, Ohio, for Improvement in Fasteners for Hames:

I claim the employment of the hook, A, and catch, C, in combination with the notched bar, F, and hook, D, as shown, for the purpose set forth and described.

34,352.—Rudolph Dirks, of Philadelphia, Pa., for Improvement in Sash Springs:

I claim the spring, G, composed of one piece of wire, bent, attached to the sash, and arranged in respect to the grooves of the frame, as and for the purpose set forth.

34,353.—W. H. Doane, of Chicago, Ill., for Improvement in Bedplate of Stave Machines:

I claim a stave machine bedplate, A, with a gutter, B, and incline scarf notches, a a, in combination with a loosely-fitted wood or yielding strip, D, and an adjusting bar, C, with inclined scarf notches, c, on its under side, substantially in the manner and for the purpose described.

34,354.—O. D. Eckerson and C. Watson, of Middleburgh, N. Y., for Improvement in Water Elevators:

I claim the combination of the pin, s, with the flanged drum, F, groove, u, and cavities, V, when arranged to operate in the manner and for the purpose described.

[This invention consists in the manner of fastening the cord or strap by which the bucket is suspended, to be drawn on the windlass or crank shaft.]

34,355.—Thaddeus Fairbanks, of St. Johnsbury, Vt., for Improvement in Weighing Apparatus:

I claim the combination and arrangement of the rotary check, and its latching mechanism, with the scale beam and its loop, in manner and so as to operate, substantially as specified.

34,356.—J. Fasig, of West Salem, Ohio, for Improvement in Hay Knives:

I claim the friction roller, E, in combination with the blade, A, constructed and operating as and for the purpose set forth.

Second, I claim the auxiliary handle, c, in combination with the rods, B, blade, A, and roller, E, constructed, arranged and operating as described.

34,357.—W. L. Fish, of Newark, N. J., for Improvement in Guides for Creasing Tucks and Plaits Preparatory to Sewing:

I claim the combination of the rollers, B D, with the adjustable E, and roller, c, as and for the purpose shown and described.

34,358.—Thaddeus Fowler, of Richmond Valley, N. Y., for Improved Deck-Ballast Boxes for Vessels:

I claim the shaft, f, pinion, g, and handle, i, in combination with the caster wheel, c, as and for the purposes specified.

34,359.—R. C. Glyde, of Pittsburgh, Pa., for Improvement in Vessels for Transportation of Carbon and other Oils:

I claim the use, for the transportation of oil in bulk, of boats divided by partitions into separate compartments, substantially in the manner described.

Also the use, for the transportation of oil in bulk, of boats divided into compartments covered over with the deck heads, in the manner substantially as described.

34,360.—J. W. Griffiths, of Brooklyn, N. Y., for Improvement in Ship Building:

I claim the projecting bilge strakes or keelsons on the outside of ships and other navigable vessels, forming rectangular channel ways, substantially as and for the purposes described.

34,361.—R. H. Hall, of Owego, N. Y., for Improvement in Axles for Wheel Vehicles:

I claim the combination with axle, A a, of the upper casings, b b, ower casing, c, strip, d, central threaded bolts, f f, keys, g g, and bands, C D, all constructed, arranged and applied in the manner and for the purposes shown and explained.

[This invention consists in a novel and improved mode of applying a metal covering to the arms of wooden axles, so that the same may be rendered durable and an economical axle obtained.]

34,362.—N. S. Harryman, of Frankfort, Ind., for Improvement in Cultivators:

I claim the combination of the several parts, constructed and operating as described, to wit: The bar, G, pivoted to the top of the rear standards, the frame, F, and standards, E E, with the draft frame, all substantially as shown.

34,363.—Isaac Hayden, of Lawrence, Mass., for Improvement in Machinery for Cleaning Cotton:

I claim connecting two or more of a series of machines for working cotton and other fibrous substances by means of trunks provided with woven screens and cells, substantially as described, so as to make each machine supply or feed the next machine to it through said trunk, substantially in the manner set forth.

I claim in machinery or apparatus for cleaning cotton or other fibrous substances, a trough or trunk, which is so bent or curved as to carry one part of said trunk over or under or by the side of the other part of the trunk, so as to obtain a greater length of trunk and a greater area of screening surface than could otherwise be effected in a room of a given size.

34,364.—W. L. Hawkens, of Lock Haven, Pa., for Improvement in Stump Extractors:

First, I claim a suspended or yielding frame, C, having upon its opposite sides rack bars, D, the steps, 1 2 3, &c., of which not only recede from each other, but also increase in length or hight as they rise, substantially as and for the purpose set forth.

I also claim, in combination with a lever that is work in said rack bars, the spring-adjusting fulcra so connected together as to mutually tend to hold each other to the steps, substantially as described.

I also claim, in combination with the rack bars and lever, and their operative appliances, the slots or grooves, c, in said bars, and the guide pins in said lever, for controlling the lever as it rises or descends, substantially as described.

34,365.—L. P. Hawes, of New York City, for Improvement in Machines for Cutting Veneers:

First, I claim the combination of the adjustable-slotted plates, k, slides, i, and eccentric, I, with the bar, C, bed, L, and knife, V, as shown and described.

Second, The arrangement of the screw, X, connected with the carriage, T, and provided with the circular plate, Y, having the arms, a' d', attached, the former being provided with the segment rack, b', and the latter fitted between the stops, e' e', in connection with the ratchet, A', also fitted on screw, X, and the arm, g', having the pawl, h', attached, and fitted on a collar of plate, Y, all being arranged in relation with each other and operated from the shaft, Z, substantially as and for the purpose set forth.

Third, The arrangement, as shown and described, of the screws, N Q, with the nuts, O R, and dogs, P S, for the purpose of dogging the bolt to the bed, L.

34,366.—C. W. Held, of Brooklyn, N. Y., for Improved Enamel for Leather:

I claim a lacquer for enameling leather, &c., composed of the named ngredients, mixed together in about the proportion set forth.

34,367.—Julius Hotchkiss, of Middletown, Conn., for Improvement in Skin Cartridge:

I claim, in making a cartridge, so disposing the fillet or gut of which it is composed that the fibers of one portion of the gut shall transversely or spirally cross the fibers of another portion of the gut, substantially as described.

34,368.—Reuben Hurd, of Spring Hill, Ill., for Improved Device for Cutting the Noses of Swine to Prevent them from Rooting:

I claim an implement or device formed of the levers, A B, provided respectively with the cutter, C, and block, D, arranged to operate as and for the purpose set forth.

34,369.—F. G. Johnson, of Brooklyn, N. Y., for Improvement in Velocipede Ice Boats:

First, I claim the combination of the runners, L L M, and the spurred wheel, E, attached to and combined with a suitable body, to be used as an ice velocipede, to be propelled by the feet or hands, substantially in the manner set forth.

Second, The springs, g g, or their equivalents, in combination with the shaft, F F, and spurred wheel, E, substantially in the manner and for the purposes described.

Third, The disks, a a a a, combined with the periphery of the wheel, E, and the spurs, e e, substantially in the manner and for the purposes set forth.

Fourth, The peculiar arrangement of the suspension rods, j j j j, and the connecting rods, c c c c, with the treadles, h h h h, by which a person is enabled to sit on the seat, S, and exert great force upon the wheel, E, for the purposes described.

34,370.—Moses Marshall, of Lowell, Mass., for Improvement in Machines for Pegging Boots and Shoes:

I claim the intermittent automatic peg feed, operating as the plunger descends, in combination with the spliting knife operating as the plunger ascends, substantially in the manner and for the purposes described.

Second, I claim a spliting knife so constructed and arranged as to split off the pegand force it under the peg driver while the latter is up.

Third, I claim the bar, q, operating as described in combination with the pawls, b.

34,371.—J. R. Mason, of Elgin, Ill., for Improvement in Plows:

I claim constructing the main brace, f, with a landside termination, d, and the cup, v, and ream socket, v2, in combination with the landside, B, cutter blade, C, and its base-enlarged axle, g, the whole arranged and operating in the manner and for the purpose set forth.

34,372.—Gordon McNeil, of Chestnut Hill, Pa., for Improved Clothes Dryer:

First, I claim the combination of the bars, A A', extension bars, D D', strips, B C, and thumb screws, d, when arranged to operate in the manner and for the purpose set forth.

Second, The manner of arranging the drying bars, E, in the bars, A A', so as to spread apart at their outer ends, in combination with the set screws, c, for securing the same, substantially as described.

34,373.—Jacob Reese, of Pittsburgh, Pa., for an Improvement in Oil Tanks:

I claim constructing tanks, or other vessels for holding coal and carbon oil or other light oils, with an outer casing around the sides of the oil vessel, so as to leave a space between the casing and the oil receptacle for the purpose of surrounding it with water, substantially in the manner and for the purposes set forth.

Also so constructing the outer casing of oil tanks having double sides, forming a water space around the tank, as that the upper edge of the outer casing shall be higher than the level of the top of the main tank, for the purpose of allowing the oil leaking through the walls of the tank to return itself thereto in the manner described.

34,374.—Orrin Newton, of Pittsburgh, Pa., for Improvement in Dies for Manufacturing Brass Kettles:

I claim the use, in the manufacture of brass kettles and other articles of hollow ware from sheet metal, of plungers, around which the metal is worked, so constructed as to contract when the plunger is withdrawn in combination with annular dies, for the purpose of drawing out the metallic sheets into the required shape, substantially in the manner and for the purposes set forth.

Also the combination of a conical center piece, c, and corresponding side pieces, e e e' e', and bottom piece, g, to form a plunger for drawing or pressing sheet metal in or through dies, so that the diameter of the plunger will contract to allow of its being easily withdrawn from the metal on which it is operating or from the dies into or through which it was forced, substantially as described.

34,375.—J. B. Root, of Battle Creek, Mich., for Improved Rotary Engine:

I claim, first, The packing ring, G h G h, constructed with offsets and applied and arranged within the cylinder heads and in combination with the drum. c, piston packing, e e, and cylinder abutment, g, substantially as and for the purpose specified.

Second, The combination with a packing ring, G, abutment piece, g, or other packing piece of V-form, or having beveled edges, as described, of triangulor or wedge-shaped packing pieces, n n, or t t, a follower, p or k, and springs, r or l, the whole arranged and operating substantially as specified.

Third, The packing pieces, s s, applied in combination with the segment pieces, d d, and with proper provision for the admission of steam behind them, substantially as and for the purpose specified.

34,376.—J. B. Root, of Battle Creek, Mich., for an Improved Rotary Engine:

I claim the combination of the rings, a a, attached to the pistons, and the hubs, c c, projecting inward from the cylinder heads in positions eccentric to the shaft and piston drum, but concentric with the cylinder, substantially as specified.

Second, the cylinder heads, B B, constructed with rebates and fitted to the cylinder and to rebates in rings, G G, or flanges secured to or formed on or in the cylinder, substantially as and for the purpose described.

Third, The steam jacket, H H', with its two compartments communicating with the cylinder ports, l l', its partition, k, passages, m m, and valve, I, all constructed and arranged and operating substantially as set forth.

Fourth, The two ports, n n', and valves, p p', combined with the cylinder aud steam jacket, H H', substantially as and for the puspose described.

Fifth, The linings, b b, applied in combination with the rings, a a, of the pistons and the hubs, c c, of the cylinder heads, substantially as and for the purpose specified.

34,377.—A. F. Smith, of Norwich, Conn., for Improvement in Trucks for Locomotives:

I claim the employment, in a locomotive engine, of a truck or pilot wheels fited with the pendant links, o o, to allow of lateral motion to the engine as specified, whereby the drivers of said engine are allowed to remain correctly on the track, in consequence of the lateral motion of the truck, allowed for by said pendant links, when running on a curve, as set forth.

34,378.—Edward Spencer, of St. Louis, Mo., for Improvement in Railroad Ticket Stamp:

I claim combining the rollers, e e, the die, d, and the ribbon, f, with the jaws of the pincers, substantially in the manner described for the purpose specified.

34,379.—W. O. Strong, of Detroit, Mich., for Improved Device for Distributing Grain in Elevator Bins:

I claim the even distribution of grain in bins by means of the pipe, F F, made either telescopic or fixed, and the truncated cones, G G G, or their equivalents, arranged substantially in the manner and for the purpose set forth.

34,380.—L. U. Stuart, of Brooklyn, N. Y., for Improvement in Bellows:

I claim the arrangement of a reservoir, C, or its equivalent, with a movable part, c, in combination with an ordinary bellows, A, and connecting with the same by an air trunk, D, or its equivalent, as described, and so arranged that the force or power of the said movable part, c, is transmitted to the bellows and made to act upon the same as an additional pressure.

34,381.—S. T. Thomas, of Laconia, N. H., for Improvement in Fancy Looms:

I claim, first, The mode of partially overcoming the momentum of the lay by means of the inclined plane bent lever, 22, brake and flange, or their equivalents, previous to the final arrest of the dagger by a fixed stop.

Second, I claim the mode of elevating the shuttle-box levers by means of the slide wedges traversing in single or double guides and operated by the draw wires and series of connected levers, combined with the series of star cams and ratchet, acting on one or both sides of the loom as set forth.

Third, I claim the combined action of two or more wedges or inclined planes, one above the other, for elevating the shuttle box, by means of which the extreme distance traversed by the box is about equal to the sum of the hight of the large ends of the wedges.

Fourth, I claim the arresting or governing of the feed or take-up motion that operates the cloth beam, by means of the action of the reed and flighter, the cloth beam and flighter being connected by the lever, 315, slide 313, pawl, 314, and ratchet, 431, or their equivalents, as described.

34,382.—W. H. Thompson, of Cleveland, Ohio, for Improvement in Railroad Switch:

I claim the stand, A, signal post, I, slotted arm, M, placed beneath the base, A, and stud, N, upon the switch bar, B, when these several parts are arranged, constructed and operated as and for the purpose set forth.

34,383.—James Vincent and Samuel Leslie, of Quasqueton, Iowa, for Improvement in Churns:

I claim the double comb breaker, F H, and cap, E, with the vessel, J, and revolving platform, B, combined and operating in the manner substantially as described.

[This invention consists in a simple arrangement of revolving table and a chucking mechanism in a frame of peculiar construction, whereby the process of churning is performed in a common waterpail or other similar vessel by the centrifugal action of the cream.]

34,384.—Milan Waterbury, of Polo, Illinois, for Improvement in Car Coupling:

I claim so combining the hooks or catches, E E, with the spring buffers, C C, as that whilst they move longitudinally with the buffers, they may have a lateral motion independent of them, substantially as and for the purpose described.

34,385.—I. S. Williams, of Philadelphia, Pa., for Improvement in Camp Stoves:

I claim the outer casing, A, the inner casing, D, the latter being composed of two pieces hinged to each other, as set forth, in combination with the cover, E, its upper flange, i, and lower flange, e, the whole being constructed and arranged as set forth for the purpose specified.

Second, The shelf, G, and the plates, N and H', with their hooked ends, and projections, m, the whole being constructed and arranged for suspension to the flange, i, of the cover, as and for the purpose set forth.

34,386.—R. P. Wilson, of Cleveland, Ohio, for Improved Washing Machine:

I claim the semi-spherical protuberances, D, and corrugated convex rubber, C, with the air-tight cylinder or barrel, A, arranged to revolve in the direction of its length, when combined, arranged and operating in the manner described.

[This improvement relates to that class of washing machines in which the washing is effected by the clothes or articles to be washed being alternately precipitated from one end of a barrel mounted upon trunnions to the opposite end, as it revolves, and the invention consists in an arrangement by which the clothes or articles are alternately subjected to a rubbing and pounding action as the barrel is revolved, thus effecting the desired result without injury to the clothes in an easy and expeditious manner.]

34,387.—B. W. Wooster, of Albany, N. Y., for Improvement in Handles for Coffins:

I claim the combination of the handle, H, and its loop, E, constructed as described, with the ornamental plate, P, for the purpose set forth.

34,388.—D. T. Yeakel, of Lafayette, Ind., for Improvement in Breech-Loading Ordnance:

I claim the combination and arrangement of the hinged screw cap, E, shaft, D, hoop, e, ratchet, h, stop, L, and breech, A, constructed and operated substantially as described.

34,389.—S. R. Andres, of Troy, N. Y., and Samuel Andres and McDonough Bucklin, of New York City, for Improvement in Articles of Food made of Sweet Potatoes:

We claim desiccated cooked sweet potatoes, as a new article of manufacture, made as described or in any equivalent way.

34,390.—T. J. Barron, of Brooklyn, N. Y., assignor to Jas. Horner, of New York City, for Improvement in Lamps:

I claim the employment or use in a lamp for burning coal oils or other similar hydrocarbons, of a wick tube, D, constructed of glass or burnt clay as and for the purpose specified.

I further claim having the tube, D, constructed with a contracted orifice, a, as and for the purpose set forth.

34,391.—W. H. Buckland, of Glamorgan Co., Great Britain, assignor to Emory Rider, of New York City, for Improved Mode of Preparing Peat. Ante-dated September 30, 1859:

I claim separating the decomposed from the fibrous or undecomposed portions of the peat by straining or keeping back the latter while the decomposed portions of the peat are forced through the perforated sides of the straining vessel or receptacle, substantially in the manner and for the purpose specified.

[By this invention peat can be prepared in such a manner that the same forms a desirable fuel, and the cost of preparing it is trifling.]

34,392.—D. H. Chamberlain, of West Roxbury, Mass., assignor to himself and John Hartshorn, of Boston, Mass., for Improved Apparatus for Generating Vapor:

I claim, in combination with a reservoir for containing the fluid and a generator for evaporating it, the endless belt, D, and tubes, L, for conveying the fluid to the generator, substantially as described.

Second, I claim the generator, B, with its partitions, b, in combination with the cylinder, C, and its covered plates, g, substantially as set forth.

Third, I claim the reservoir, G, in combination with the cylinder, K, substantially as specified.

34,393.—James Clayton and Abraham Campbell, of Brooklyn, N. Y., assignors to Root's Rotary Steam Engine Co., of New York City, for Improved Rotary Engine:

We claim, first, The hollow expanding metallic packing composed of rings or segments, G G' G* G'*, or strips, P P', constructed substantially as described and applied between the cylinder heads and their packing rings behind the abutments or in any other part of a rotary engine to operate substantially as set forth.

Second, The arrangement of the orifices in the segments, G G' G* G'*, with respect to the steam spaces of the cylinder, substantially as described and for the purpose set forth.

Third, The arrangement of the two hollow expanding pieces, p p', for packing the abutment, one having communication with the cylinder on one, and the other on the other side of the abutment bearing, substantially as specified.

Fourth, The employment, in combination with three or more pistons, and a steam jacket surrounding the cylinder, of two eduction ports, n n', fitted with separate valves, N N', and a third eduction port, l, under the reversing valve, the latter port to continue the eduction after the port, n, or n', is closed, substantially as herein specified.

34,394.—John Critcherson (assignor to himself and G. P. Towle), of Boston, Mass., for Improved Roller for Clothes Wringer:

I claim as a new article of manufacture, a roller for clothes wringers consisting of disks of felt, C, with interposed disks of thin metal, d, arranged on a polygonal shaft, A, and secured thereon in a compressed form by collars, B b, the whole operating in the manner and for the purpose substantially as described.

[This improvement relates to that class of clothes wringers which consist of the flexible or yielding rollers, between which, under pressure and in motion, the clothes or other articles to be wrung are passed and thereby deprived of the moisture.]

34,395.—C. A. Cummings and F. M. Swallow, of Worcester, Mass., for Improved Clothes Wringer:

We claim making the rollers self-adjustable by means of the straps and spring, when constructed and operating in the manner and for the purposes as set forth and described.

34,396.—L. S. Fairchild, of Cleveland, Ohio, assignor to himself, Alonzo Hazen, A. M. Hazen, of Cleveland, Ohio, and A. J. Whiting, of Perry, Ohio, for Improvement in Shingle Machines:

I claim the intermittent screws, O and P, gears, M and N, cam, R, dog, S, aad cam, E', when arranged and operating substantially in the manner and for the purpose set forth.

I also claim the lever, V, spring, J′, segment gear, U, in combination with the dog, S, and cam, E′, and spring, I′, in the manner and for the purpose described.

34,397.—J. Lofoendahl (assignor to himself and N. P. Lindergreen), of Boston, Mass., for Improvement in Spool-holding Devices:

I claim the construction o ithe bracelet or wristband, A, and hooks, B C, either or both, to form a new and useful implement or device for the purpose set forth.

[This invention consists in attaching one or more hooks to a bracelet or wristband for the purpose of holding the balls or spools of yarn, the bracelet or wristband being placed on the arm of the person knitting, and the ball or spool suspended to the bracelet or wristband by the hook or hooks, so that the yarn may freely unwind from the ball or spool during the process of knitting.]

34,398.—J. W. Wheeler (assignor to H. H. Wheeler), of Cleveland, Ohio, for Improvement in Water Elevators:

I claim a wheel or pulley having a V-shaped channel upon its periphery to receive the chain or rope, the inclined sides, A, of said channel being corrugated laterally and the bottom, C, open, as and for the purpose described.

RE-ISSUES.

1,273.—Moses Marshall, of Lowell, Mass., for Improvement in Pegging Machines. Patented November 5, 1861:

I claim a feeding point so arranged and operated as to enter the hole previously made by the awl and move the machine along, for the purpose set forth.

1,274.—D. B. Rogers, of Allegheny, Pa., for Improvement in Cultivator Teeth. Patented November 1, 1845. Re-issued September 20, 1859, and Extended:

First, I claim making cultivator teeth entire of thin plate steel, the shank or upper part being bent or curved round in front, substantially as described and for the purposes set forth, irrespective of the mode of attaching the tooth to the beam.

Second, Attaching cultivator teeth to the cultivator frame by inserting the upper end of the shank (curved round in front for that purpose), into a suitable hole in the beam, and driving a key or wedge into the cavity of the tooth, thereby pressing the shank against the sides and front of the hole in the beam and thus securing it in its place.

1,275.—C. T. James, of Providence, R.I., for Improvement in Projectiles. Patented February 26, 1856. Re-issued December 11, 1860:

I claim combining with the body of the projectile an expansible packing, substantially as described, and capable of being expanded outwardly against the bore of the cannon, and into the grooves thereof if rifled, by the force of the exploded charge acting inside of such packings, substantially as described.

I also claim connecting the expansible packing with the body of the projectile by clips, which will not prevent the required expansion, and which will insure the rotation of the body of the projectile with such packing as described.

I also claim making the outer surface of the packing of projectiles, intended to be forced into contact with the bore of the cannon and into the grooves thereof, of fibrous, textile, or equivalent non-metallic substance, substantially as described.

DESIGNS.

1,524.—John Eiberweiser and Edward Kettle, of Cincinnati, Ohio, for Design for Stove.

1,525.—H. G. Thompson, of New York City, assignor to the Hartford Carpet Co., for thirteen Designs for a Carpet Pattern.

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

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

The Examination of Inventions.

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

Preliminary Examinations at the Patent Office.

The advice we render gratuitously upon examining an invention does not extend to a search at the Patent Office, to see if a like invention has been presented there, but is an opinion based upon what knowledge we may acquire of a similar invention from the records in our Home Office. But for a fee of $5, accompanied with a model or drawing and description, we have a special search made at the United States Patent Office, and a report setting forth the prospects of obtaining a Patent &c., made up and mailed to the Inventor, with a pamphlet, giving instructions for further proceedings. These preliminary examinations are made through our Branch Office, corner of F and Seventh-streets, Washington, by experienced and competent persons. More than 5,000 such examinations have been made through this office during the past three years. Address MUNN & CO., No. 37 Park-row, N. Y.

How to Make an Application for a Patent.

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

Caveats.

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

Foreign Patents.

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

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

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

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.

Money Received

At the Scientific American Office on account of Patent Office business, during one week preceding Wednesday, Feb. 19, 1862:—

J. B. Van D., of N. Y., $20; J. G. L., of Del., $40; B. and B., of Pa., $20; D. F. M., of Conn., $40; G. W. P., of N. Y., $45; W. L. G., of N. Y., $45; L. C. P., of Conn., $45; P. J., of N. J., $25; J. A. L., of N. Y., $15; O. W. S., of Me., $15; J. E. S., of N. Y., $15; J. H. C., of Pa., $25; H. and B., of Mich., $10; R. H., of N. Y., $15; C. and F., of Iowa, $15; P. H., of France, $245; A. J. A., of Wis., $40; R. G., of N. Y., $15; L. F. L., of Ill., $15; J. W. K., of Mich., $15: W. T. G., of N. J., $15; R. M. G., of Me., $25; C. W. S., of Me., $20; C. B. S., of Mass., $20; J. P., of N. Y., $20; F. H. C., of N. J., $20; E. M. and J. E. M., of N. Y., $45; G. O. T., of Mass., $60; J. S., of Pa., $43; W. N., Conn., $22; W. O. H., of Pa., $40; A. McF., of Wis., $25; I. S., of N. Y., $22; C. N., of N. H., $25; J. H. V., of Mass., $15; W. H. H., of Conn., $30; C. R., of Pa., $15; C. J. A., of N. H., $12; W. McK., Pa., $15; S. B. O., of Cal., $15; O. S., of O., $20; G. N. C., of Conn., $15; H. T. P., of Conn., $15; A. K. R., of Vt., $15; E. M. J., of N. Y., $20; J. A. B., of Mass., $20; J. A. W., of O., $20; G. M. Z., of O., $20; G. W. R., of Ind., $20; F. W. S., of Pa., $20; J. H., of N. Y., $25; J. H. G., of Mass., $15; R. J., of O., $25; S. A., of ——, ——; A. J., of N. Y., $15; C. C., of Pa., $20; J. B., of N. Y., $15; A. J., of Iowa, $15; J. H. I., of Ill., $55; E. J. W., of N. Y., $25; J. S. F., of Ill., $25; F. and S., of Wis., $15; K. H. E., of Vt., $25; S. A. B., of R. I., $25; J. N. B., of N. Y., $15; J. J. A., of Mich., $15; J. Z., of Ill., $15; J. M. of Cal., $18; M. L. and V., of N. Y., $15; J. McG., of N. Y., $15; E. C., of Ky., $100; V. L., of N. Y., $10; B. and Van D., of N. Y., $30; C. C. C., of Mich., $15; J. L. L., of Pa., $25; C. E., of Germany; $160; G. P. and W., of Ill., $20; H. S. and R., of Vt., $43; G. W., of N. Y., $45; A. McN., of N. J., $25; L. J. and E. D. G., of N. Y., $25; M. and T., of N. J., $25; W. H. D., of N. Y., $30; S. A., of Me., $15.

Specifications and drawings and models belonging to parties with the following initials have been forwarded to the Patent Office from Feb. 12, to Wednesday Feb. 19, 1862:—

H. S. and R., of Vt.; D. F. M., of Conn.; J. G. L., of Del.; H. J., of Conn.; P. J., of N. J.; A. McN., of N. J.; A. McF., of Wis.; L. J. and E. D. G., of N. Y.; R. J., of O.; J. H., of N. Y.; J. H. C., of Pa.; C. N., of N. H.; W. H. H., of Conn.; J. S., of N. J.; C. J. A., of N. H.; J. S., of N. Y.; K. H. E., of Vt.; O. S., of O.; S. A. B., of R. I.; R. W. G., of Me.; J. S. F., of Ill.; J. H. I., of Ill.; M. and T., of N. J.; J. P., of N. Y.; A. J. A., of Wis.; E. J. W., of N. J., C. C., of Pa.; W H. D., of N. Y.; G. F. J. C., of N. J.; L. and D., of London; B. and Van D., of N. Y.; W. N., of Conn.; C. E. S., of Wis.; L. F., of Germany.

Notes and Queries

E. L., of N. Y.—H. L. Lloyd & Co., map publishers, No. 25 Howard street, have issued by far the best map of the United States we have yet seen.

L. R. R., of Pa.—We are not advised of any efforts on the part of the Canadian Parliament to modify the patent laws of the provinces.

E. A. D., of Mass.—Gumshellac dissolved in alcohol makes a water-proof glue sufficiently adhesive we should think for paper.

J. F. A., of New Brunswick.—Hydraulic cement is the proper substance for plastering your water vat. It must be wet in small quantities and put on immediately. If suffered to stand half an hour after it is wet before being applied, it is spoiled.

J. B., of N. J.—You can bleach leaves by hanging them in a barrel and burning a little sulphur in the barrel. The product of the combustion of sulphur is sulphurous acid which is a powerful bleaching agent, and a gas.

F. E., of Mass.—It was asserted that saltpeter confined in one of the stores in New York was the cause of several explosions during a large fire, but experiments have failed to confirm such assertions.

R. H. J., of Ill.—Operators on telegraph lines frequently communicate with one another by touch without a sounding magnet. No visitors are now permitted to stand in the vicinity of the sounding magnet in the telegraph offices.

L. C. C., of Mass.—The gun powder engine to which you refer is not patented. We do not think such an engine is suitable for propelling your air ship.

A. J. K., of Ill.—We do not know where you can obtain a hollow iron wire tube about ⅛th of an inch in diameter.

H. B., of C. W.—Aniline colors are not suitable for coloring glass by being melted in a crucible for blowing.

L. E. H., of Conn.—About the time the article to which you refer about perpetual motion, appeared in the *Journal of Commerce*, we published the article in full in the SCIENTIFIC AMERICAN. We refer you to the back volumes of the paper.

G. H. W., of N. Y.—On page 198, Vol. IV. of the SCIENTIFIC AMERICAN, you will find the regulation about the admission of engineers into our navy.

R. J., of Ill.—You will find tables of the weight of round and square rolled iron on page 184 of "Nystrom's Mechanic's Pocket Book," published by J. B. Lippincott & Co., Philadelphia. Muntz metal is composed of 6 parts copper and 4 of zinc.

S. C., of N. Y.—Porcelain is gilded by painting finely comminuted gold on to the surface mixed with a fusible frit. It is then allowed to dry and is put into a potters kiln and fused. Messrs. Haughtwout, Broadway, this city, ornament their own porcelain.

A. E. J., of Conn.—The silicate of potash renders wood hard and impervious to moisture, if it is washed with dilute muriate acid after the silicate has become dry.

S. O. C., of N. Y.—The composition for rockets consists of one pound of gunpowder to two ounces of soft charcoal in powder and one and a half ounces of saltpeter. For the largest rockets add some sulphur and iron filings. Mix these ingredients dry. The composition may be varied and you can use just such a quantity of it as will answer for the size of the rocket you require.

V. P. F., of Vt.—It has been proposed to us several times to propel a vessel by a steam jet acting upon the water through a tube at the stern, but the mode is not good, on account of the condensation of so much steam without producing mechanical propelling action in the vessel. A jet of water has been applied in this manner without success. This was Rumsey's mode of propelling vessels and was used upon the first steamboat in America.

E. & R., of ——. —Zinc is manufactured by the Lehigh Zinc Co., Bethlehem, Pa., to whom we refer you for particulars.

C. S., of Ohio.—You will find a full account of the Bessemer process in the back volumes of the SCIENTIFIC AMERICAN to which we refer you. Unless you can show good reason for your delay, in applying for a patent on your improvement in the manufacture of iron, the office might refuse to allow your claim on the ground of abandonment. It will not do for an inventor to look on and see another develop and put into public use an improvement and then come forward after the delay of two or three years and make claim to it. This practice will not do.

C. T., of Phila.—Horn is softened by boiling it in water. It becomes so pliable that it may be molded under pressure into almost any form. In order to render horn smooth it should be scraped when it is soft after being boiled. It may be scraped so thin as to become almost transparent. The nitrate of silver is employed to stain it black and nitric acid colors it yellow.

W., of N. Y.—The lens having the highest magnifying power is the double convex, and its power is in proportion to its convexity.

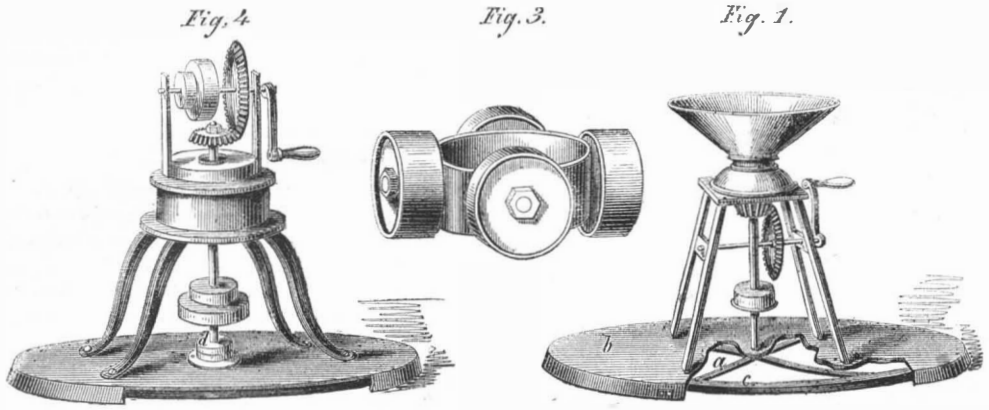
J. G. W., of N. Y.—The application of several charges in the barrel of a musket, to be discharged in succession, one after another is not new, as a patent was granted in 1825 to J. Mould, London, for thus constructing fire-arms.

SPECIAL NOTICE—FOREIGN PATENT.—The population of Great Britain, is 30,000,000; of France, 35,000,000; Belgium, 5,000,000; Austria, 40,000,000; Prussia, 20,000,000; and Russia, 60,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. Nearly all of the patents secured in foreign countries by Americans are obtained through our agency. Address Munn & Co., 37 Park row, New York. Circulars about foreign patents furnished free.

Improved Mode of Hanging Flywheels.

The accompanying engravings illustrate an improved mode of hanging flywheels, which is quite novel, and possesses some important advantages over the plans in general use. The wheel is placed in the base plate of the machine on a vertical shaft, and the shaft may either run in a step in the usual way, or it may be supported by a collar running on friction rollers.

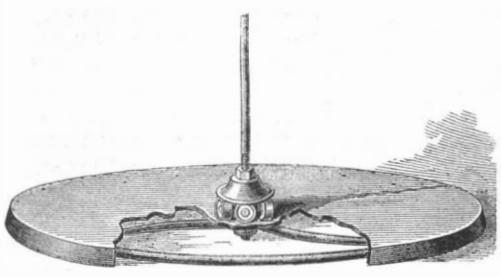
Fig. 1 of the engravings represents the wheel as applied to a grinding mill, with the shaft resting in a step in the cross bar, *a*, which crosses the base plate of the machine beneath the wheel. The base, *b*, is a large circular disk as shown, supported by a narrow rim, thus affording a space in which the flywheel, *c*, s placed.



BRYANT'S NOVEL MODE OF HANGING FLYWHEELS.

Fig. 2 represents the shaft of the wheel supported by a collar running on friction rollers, the wheel in this case being secured to the extreme lower end of the shaft. The rollers are attached to a ring as represented on an enlarged scale in Fig. 3; the shaft passing through the axis of the ring, and the rollers running upon the upper surface of the base plate. In this case the rollers and ring are inclosed in a tight box, *d*, as shown in fig. 4, here the wheel is represented as applied to a rice and coffee huller.

Fig. 2



Among the advantages of this mode of appling flywheels are the following :—

1st. Wheels may be used of any desirable diameter, and as the efficiency of a flywheel depends as much upon its diameter as upon its weight, wheels of equal efficiency may be used much lighter than those of the usual form.

2d. The shaft running on a step, or on rollers, there is very little friction.

3d. The flywheel is entirely out of the way where it does not incommode the operator nor endanger his limbs.

4th. While a flywheel suspended in the usual manner upon the side of a mill causes the mill to be top heavy, and in case of any wabbling in the wheel resulting from inaccuracy in its hanging, tends to shake the mill, this flywheel by being placed in the broad base gives remarkable steadiness to the machine.

A patent for this invention has been applied for and will soon be issued. Further information in relation to it may be obtained by addressing the inventor, J. Bryant, M. D., Brooklyn, N. Y. [See advertisement on another page].

Shoe Strings for Soldiers.—A correspondent assures us that the strings furnished with army shoes are of the most wretched quality. The most suitable shoe strings are those made of tanned calf skin. Most of the cotton shoe strings sold at present are rotten.

Ether and Chloroform.

We find the following letter from C. B. Foster, M. D., in the *Dental Cosmos* :—

In the last number of the *Dental Cosmos*, allusion is made to the fact that while chloroform is preferred in Europe as an anæsthetic, it is regarded in our own country as more fraught with danger than ether; and the question is asked, whether "this apprehension is well grounded ?"

Having employed both agents somewhat extensively since their first introduction, I would state, as the result of my experience, that chloroform is the most to be relied on for the production of complete anæsthesia. Its action upon some organisms, however, is so prompt that great caution is always required. In some cases five or six inhalations will produce entire insensibility. Its effects also appear to be accumulative, patients often being more unconscious some minutes after than at the moment of its withdrawal. Under its influence, at times, the circulatory and respiratory functions are interrupted to an alarming and dangerous, if not to a fatal extent. Ether is less prompt and persistent, and is not liable to exert so unfavorable an influence upon the action of the heart and lungs. In the hands of most persons it is undoubtedly less dangerous than chloroform.

Like most medicinal agents, ether and chloroform act differently on different persons. Upon some ether does not operate as an anæsthetic; in such cases chloroform will generally accomplish the object. When not acquainted with the susceptibilities of the patient, it is not well to administer chloroform, except as a last resort, when ether has failed to produce the desired effect. The injurious effects of chloroform, to which reference has been made, may be avoided almost wholly, if care be taken to admit a good supply of atmospheric air. By attention to this, the patient may be brought under its influence so gradually that the operator will be enabled to withdraw it upon the first manifestation of unfavorable symtoms.

Diseases of Watchmakers.

Dr. Perron, of Besançon, where there are more than 3,000 persons engaged in the manufacture of watches in his paper adverts to the mischief which accrues from the constant manipulation of copper. His conclusions are as follows :—1. The molecular absorption of the salts and oxides of copper give rise to gastric irritation, diarrhea, fever, &c.—in fact, to the symptoms of poisoning all but in degree. 2. Successive slow poisonings of this kind deranges the health of the workman, and powerfully predisposes him to phthisis (a disease of frequent occurrence among the Besançon watchmakers). 3. They require him to take corporeal exercise, carried even to fatigue, and justify the frequent employment of evacuants and sudorifics. 4. Manipulations of copper or other metals should be interdicted to thin and excitable persons of a dry, bilious temperament, and who have any congenital or acquired disposition to phthisis. 5. This affection is best prevented by the use of succulent aliments, and tonic drinks, the thorough ventilation of the workshops, great cleanliness, frequent tepid bath, wearing the moustache.

Making Tea.—Water for making tea should be used the moment it boils. The reason assigned is that if it is boiled some time, all the gas that is in it escapes with the steam, and it will then not make tea of the best flavor. Clear, pure, soft water is best.

Horse Railroads and Snow.

In Boston, where the snow lies all winter, the city railroads are compelled to keep their tracks covered with snow for the accommodation of sleighs, and when the snow gets a certain depth they have to abandon their cars and use sleighs. This is getting to be such a serious annoyance to the great body of the people who use the horse cars, that the newspapers are loud in their condemnation of the arrangement. The *Traveler* states that 50,000 persons were incommoded by the stoppage of the cars for one day. It says :—

It is now conceded that those roads are a great public convenience and afford a very safe mode of traveling; that they promote the growth of commercial cities. Europe is fast introducing this American Improvement. City ordinances which contravene the general legislation of the State, which forbid the companies that have invested capital for public accommodation to keep their tracks open, which authorize the removal of their rails in case they perform their usual and prescribed duties, deserve the closest scrutiny and raise new issues.

FROM THE STEAM PRESS OF JOHN A. GRAY.