A Novel Gunboat.

A boat named the *Staunch*, built for the Admiralty upon the proposition and plans of Mr. Rendel, of the firm of Sir W. Armstrong and Co, has just been tried off the Tyne. A correspondent gives us the following account: "This vessel, though wholly insignificant in appearance and cost, represents some very novel principles. She is only 79 feet long and 25 feet beam; her draft of water when loaded of 6 feet, and her displacement 150 tuns. She has twin screws driven by two pairs of condensing engines of 25 horse-power (nominal) combined, giving her a mean speed of 7½ knots. Such being her dimensions and power it is hard to suppose that she can be in the least degree formidable. She carries, however, as heavy a rifled gun as any in the navy, and to all appearance carries it most efficiently. The gun, a 12½ tun 9 inch Armstrong, is mounted in the fore part of the boat in a line with the keel, and fires through a bulwark or screen over the bow, which is cut down and plated something like that of a monitor. Thus placed, it is easily worked in a rolling sea, and its change of position by recoil does not appreciably affect the trim of the vessel. At the same time, to provide for heavy weather, it is made capable of being lowered into the hold, so as to relieve the little vessel of its deck load, and enable it to carry the weight as cargo. Machinery is also employed for the purpose of working the gun, by which means more than half of the ordinary gun's crew can be dispensed with. It is in these mechanical arrangements that much of the interest of this vessel lies. The operation of lifting and lowering is performed by simple but powerful machinery. During the trials the gun, with its carriage and slide, and the platform carrying them—weighing in all 22 tuns—was raised and lowered in a rough sea, with the boat rolling 11° each way, in from six to eight minutes. When the gun is lowered the gun well is closed and the deck left perfectly clear, but in a few minutes the gun can be again brought up ready for action. During the trials the 12½-tun gun was easily handled by six men, and fired with extra charges of 56½ lbs. of power and 285 lbs. shot. It must be observed that very little, if any, training is requisite with the gun of the *Staunch*. The vessel is so small as to be a sort of floating gun carriage. Her twin screws enable her to turn rapidly in her own length. Her helmsman is placed just behind the gun. The gun, therefore, can be laid by rudder right and left with far more ease and speed than any gun of similar weight otherwise mounted. During the recent trials, with the engines driving reverse ways, the vessel made the full circle in her own length in 2¾ minutes. With both engines going full ahead she made by the helm a complete circle of seventy-five yards diameter in 2¼ minutes. The *Staunch* is wholly unarmored. Her strength and security lie in her great gun and her diminutiveness. And she must be considered as one of a flotilla of similar vessels. Sixty such could be built at the price of a single armor-clad frigate, and ten of them, acting from different points, doubling in their own length, escaping into shallows, sheltering under forts, would drive off or render a good account of any hostile vessel venturing to attack our harbors. Primarily they are intended for harbor defence; but the power of lowering the gun and carrying it as cargo, would afford great security for these vessels at sea, and enable them to be sent from harbor to harbor with safety. The *Staunch* is now to be sent round to Portsmouth, where she is to be attached as experimental gunboat to the gunnery ship *Excellent*."—*Pall Mall Gazette.*

Trial and Loss of a Self-Propelling Vessel.

A San Francisco letter in the N. Y. *World*, says that a Mr. Robinson has from time to time, in the papers, put forward an invention which he claimed was to be almost self-propelling, without the use of steam power. The peculiar features of the new aquatic craft was, that two or three boats hitched together, one behind the other, by the action of the waves the series of boats was to obtain propulsive power. An experimental craft was built at an expense of about $8,000. Considerable curiosity was felt in the community as to the success or non-success of the new notion, and many went to view the craft during construction. If it succeeded, a revolution was to be worked in navigation. Sails and steam would be superseded. On the ocean and great lakes the rougher the sea the faster the boat would travel.

The inventor was sanguine that his new craft would travel the water by its innate propulsive power, independent of steam or other expensive motor, enjoying the tempest and glorying in the storm. The craft was completed, and the day for the trial trip appointed. So confident was the inventor of success that he took on board stores for a ten day's voyage. At ebb-tide the new (to be) sovereign of the seas put off from the wharf to which she had been fast since her construction had been completed, and started out on her voyage. There were on board four persons: the inventor, Captain Young (a pilot), and two sailors. She was hardly clear of the wharf when she swung around broadside to the tide and commenced a series of movements not very promising of success to the undertaking. She would not obey the helm at all, but lurched continually, in an uncomfortable manner for those on board; first one wheel house would be submerged, then the other. The new craft made excellent time, proceeding end wise like a crab, but the wheels seemed to have no effect whatever on speed or direction. The wheels, depending upon the water they were passing through for motion, would turn any light machinery on board the boat, but would not move the boat ahead an inch. The craft would simply move with the water, not through it. The inventor was still sanguine that, with regular waves, the boat would be an assured success. All he required was regular waves. Once outside among them, things would change; the rougher it became the better. The boat went on like a raft until it got outside the heads, then over the bar into rough water, and no sooner was it in rough water than the whole contrivance was turned over. The party on board sought the water for safety, and clambered into a boat which had been taken in tow in case of accident. The pilot boat *Caleb Curtis* picked up the unfortunate navigators. The steam tug *Rescue* came alongside the *Curtis*, and offered to tow the refractory craft up to San Francisco for $500, but Mr. Robinson did not seem disposed to give so much, so the unfortunate craft went on toward the resting sun, keel upward. Mr. Robinson is reduced to poverty by the result of his ill-starred experiment.

Earth Circuit in Telegraphy.

The failure of the earth circuit of a short telegraphic line in the Pewabic copper mine, Lake Superior, is interesting from a practical point of view. The wire used was a one-sixteenth inch copper wire, wound in the same manner as waterproof fuse, the wire taking the place of the powder. To the surprise of all, no signals could be transmitted through the line. The end of the wire underground was put into a hole drilled into the rock and tamped in; a bed of earth was then made, and lastly a pool of water tried, but all to no effect. Above ground the line worked well enough.

Though the earth, generally speaking, will conduct electricity, some substances, of which any specific portion of the earth may be composed, will not conduct it; for example, dry sand and dry freestone rock will not, and quartz rock will not any more than glass; dry earth will not, as is recognized by all telegraph constructors, who bury the earth plates deep in damp earth. In this case an attempt was made to form an earth circuit in non-conducting material. The end of the wire in the mine was tamped into the solid rock, probably quartz, which would be about the same as tamping it into a glass bottle, filled with earth or water. The chances of electric communication would be still less, if the wire was not perfectly insulated in its whole length. The remedy would be to make a return circuit of insulated wire.—*Mechanics' Magazine.*

Mirrors Without Mercury.

The ordinary method of preparing looking glasses is with an amalgam of tin and mercury: four parts of tin to one of mercury.

In the invention, reported by M. Salvetat to the Society of Encouragement, in Paris, neither mercury nor tin is used at all. The tinfoil is replaced by platina, not applied in leaf form, of course, but chemically, in a metallic and brilliant powder. The operation is perfectly simple. The glass, having been carefully cleaned and polished, is covered, by means of a brush, with a mixture of chloride of platina, essence of lavender, and a dissolvent composed of litharge and borate of lead. When dry, the glass is placed in mufflers, when the essence, being volatilized, leaves a deposit of platina dust firmly united to the glass. While two or three weeks are necessary for the manufacture of ordinary mirrors, the new process only requires a few hours.

Insect Fabricators of Iron.

It is well known that some insects are skilful spinners, but it was not known that some of them fabricated iron. A Swedish naturalist, M. de Sjogreen, has published a curious memoir on this subject. The insects in question are almost microscopic; they live beneath certain trees, especially in the province of Smaland, and they spin, like silk worms, a kind of ferruginous cocoons, which constitute the mineral known under the name of "lake ore," and which is composed of from 20 to 60 per cent of oxide of iron mixed with oxide of manganese, 10 per cent of chloric, and some centimeters of phosphoric acid. The deposits of this mineral may be 200 meters long, from 5 to 10 meters wide, and from 8 to 30 inches thick.—*Rev. de Thérap. Med. Chirurg.*

MANUFACTURING MINING, AND RAILROAD ITEMS.

A report by the superintendent of the geological survey of India, shows that the British territories cannot be considered as either largely or widely supplied with coal. He ascertained that extensive fields existed, but they were not distributed generally over the districts of the Indian Empire. In the opinion of the superintendent, the very best coal from India only touches the average quality of English coal, and, moreover, the former is not capable of more than two thirds, in most cases not more than one half, the duty of the English coal.

The distance between London and Paris is now traversed daily by the South, Eastern and Northern of France railways, in less than ten hours. Two express trains leave the Paris terminus of the Northern of France system daily for England. More than 200,000 passengers passed over this route in 1867.

Among other sequences of the passage by the State Legislature of the Erie bill, is the prompt finishing of the Albany and Susquehanna railroad, now destined to become virtually a branch of the Erie road, running from Binghampton to Albany. The bill just passed requires the money received from the recent issues of bonds to be expended on the road, and as a consequence of this provision, and the late terrible tragedy caused by a broken iron rail, the entire Delaware division of the road is to be relaid with a double track of steel rails.

The London *Colliery Guardian*, speaking of the presence of phosphorous in the Cleveland iron, which so seriously reduces its market value, and renders it necessary to bring iron from other districts to mix with it in the puddling furnaces—calls for some method of removing this sulphur, showing that if extracted, even in its lowest priced form—as a manurial ingredient—it would be worth at least $330 per tun. There is, therefore, a tolerable good margin for working expenses, while the iron now worth $12 per tun, and containing one per cent of phosphorus, would, if freed from this element, be worth at least as much as hematite iron, or say 13.50 per tun.

Engineer Roebling thinks that railroad draw bridges are a nuisance, which can readily be done away with. He would substitute high bridges, even with steep approaches, a stationary engine and a wire rope being provided to assist the trains over the rise. In other words, treat the bridge like an inclined plane, and draws will be unnecessary.

A new railroad project is exciting the wide-awake capitalists of Pittsburgh, Pa. It is proposed to build a road from Pittsburgh to Newbern, N. C., along the Monongahela river to its source in West Virginia; thence by Greenbrier Mountain and river to the junction of the latter with New River, and thence to Newbern. The road would penetrate a rich mineral region, and would bring large quantities of iron ore to Pittsburgh

The Metallic Cartridge Company, of East Bridgeport, Conn., have a contract from the government of Brazil for 6,000,000 cartridges. They have now supplied two thirds of the order, and after shipping the remainder the company will immediately begin the manufacture of 7,500,000 for the Russian government. The daily product of the works at present is 150,000 to 170,000 cartridges.

The Allentown Rolling Mill is one of the largest establishments of the kind in Pennsylvania. It is for the production of railroad iron exclusively, and turns out four hundred tuns of rails per week. The daily work is two hundred and sixty-six rails, thirty feet long and weighing fifty-six pounds to the yard, or five hundred and sixty pounds each.

The rails of the Union Pacific railroad are now being laid on the descending slope of the Rocky Mountains, the summit of the Black Hills, the highest point of the system being crossed on the 16th ult. According to Blickendorff's survey, the railroad crosses the mountains at this point at an elevation of 8,242 feet, being, as we have before had occasion to state, the highest point reached by any railroad in the world.

Professor Chapman, of Toronto, writes that he has discovered gold on Lake Superior, the metal existing in certain specimens of galena and copper pyrites, occurring together in well defined veins in the region of Black Bay. Surface specimens entirely destitute of "free" or visible gold, show a value of nearly $21 per tun, irrespective of the large amount of lead and copper present in the ore. The rocks are identical, in general age, with the gold bearing rocks of Nova Scotia.

All the conductors on the New York and New Haven railroad have made their appearance in new uniforms, furnished by the company. The largest part of the road lying in Connecticut, the law of this State, requiring railway officials to be thus distinguished, does not affect this company, and hence their action in this matter is the more to be commended. In this connection we note that our Legislature has empowered railroad conductors with the authority of special policemen, the better to preserve order on the railway trains. We hope they will use their authority by arresting some of the numerous pickpockets who infest the trains out of New York.

The Mount Washington Railway, in the White Mountains, was completed last fall one mile and thirty rods of the three miles up the mountain. For the next mile the tracks are covered with snow two feet deep. The number of hands will be increased in three weeks from fourteen to fifty. The present estimate of the cost is $100,000, though the figures may add differently at the completion of the work on the 1st of September. The road is built on what is known as the "Marsh" plan, illustrated in Vol. X., No. 10.

Recent American and Foreign Patents.

Under this heading we shall publish weekly notes of some of the most recent home and foreign patents.

MACHINE FOR MEASURING CLOTH.—George R. McIntire, Houghton, Mich In this invention the cloth is placed between two rollers, which are rotated by its motion, and the revolutions of which are recorded by a registering apparatus.

WATER WHEEL BUCKET.—Jacob Clark, Clarksville, Pa.—In this invention the bucket has two curves, one of which receives the direct impulse of the water as it enters the bucket, the other receiving an indirect or "reacting" impulse, as the water leaves the bucket.

SHINGLE MACHINE.—Smith Head, Halifax, Pa.—This invention has two carriages and two sets of saws, and cuts a shingle at each forward or backward motion of either carriage. It has a new apparatus for adjusting the bolts to the saws, and a new edging apparatus.

CORN PLOW, PLANTER, AND CULTIVATOR.—Isaiah B. Arthur, Sidonsburgh, Pa.—This invention combines a new arrangement of the plows' cultivator guards, and covering roller, with a new and greatly simplified method of operating the seed distributor.

CRYSTAL FOUNTAIN.—J. C. Johnson, Louisville, Ky.—In this invention the water is mingled with air in the apparatus, and is found in the form of beads or spray from the fountain, forming a beautiful jet for scenic and ornamental purposes.

SAFETY TRUCK.—S. Y. Bradstreet, Monticello, Iowa.—This invention has for its object the prevention of railroad cars from bouncing off of the track, and consists in the employment of an auxiliary truck of peculiar construction, which guides the main trucks, and which cannot by any ordinary obstructions be thrown off of the rails.

NAILS.—F. Davidson, Richmond, Va.—This invention relates to a machine for making cut nails, and it consists in a peculiar construction and arrangement of parts, whereby a very simple and efficient machine for the purpose is obtained.

LOCK.—H. H. Elwell, South Norwalk, Conn,—This invention relates to a lock of that class which are provided with a reversible slide catch so arranged that it may be adjusted to suit either a right or left hand door—that is to say, be capable of being applied to a door which swings in either direction. The object of the invention is to obtain a lock of the kind specified, which will be simple in construction, and which will not be liable to get out of repair, and require but a simple manipulation to adjust the slide catch as circumstances may require in applying the lock to the door.

SAWING MACHINE.—Thomas Jenkyn, Thetford Centre, Vt.—This invention consists in a novel arrangement of circular saws and rotary cutters, in connection with frames and tables, whereby a machine is capable of performing various kinds of work, such as slitting boards, planks, or other stuff, cross-cut sawing, the cutting of shoulders or tenons, grooving or beading, and chamfering or cornicing.

CLOTHES WRINGER.—M. Pierce, Winona, Minn.—This invention relates to a simple arrangement of parts, which is a great improvement on ordinary designs.

CAR BRAKE.—L. J. Smith, Hamilton, Ohio, and D. S. Knight, New York city.—This invention relates to a combined railroad car brake and starter, the device being so arranged that when the brake is applied the starter will be wound up, so that when the brake is again released the cars to which the device is applied will receive a start, thus overcoming the inertia of the car, whether the same is at rest or in motion.

MACHINE FOR BENDING RINGS.—Wm. H. Peckham, New York city.—This invention relates to a machine for bending metal bars into perfect and correct rings, of any suitable diameter, and it is particularly intended for jeweller's use, to form finger rings, bracelets, and other suitable articles, and may, if desired, be used with equal advantage for shrinking tires and other large and heavy rings.

LARD PRESS.—Solomon S. Avis, Pens Grove, N. J.—The object of this invention is to furnish a cheap, simple, and effective lard press for household use.

FLUID METER.—Charles E. Moore Elizabethport N. J.—This invention consists of a measuring cup affixed to a lever beam, properly weighted, by means of which the quantity of spirits filling the cup is both weighted and measured. The cup being filled is decanted automatically by its own weight, at which instant the spent pipe is cleansed by a proper mechanism, and the supply cut off until the cup returns to its first position, when the spirit is again permitted to flow. The trimmings of the lever are connected with suitable registering mechanism, and the whole apparatus contained in a locked case of sheet metal, having a dial plate in front for the registering pointers.

GATHERING TURPENTINE.—A. Pudigon, Charleston, S. C.—This invention relates more particularly to the gathering of crude turpentine from the pine tree, but may be employed for the collection of all resinous gums of a kindred character, which exude from wounds in trees.

MAKING ROOFING.—James H. Cole, Adrian, Mich.—This invention is designed as an improvement upon the device recently patented by Edmund Richardson and James H. Cole, for a process for making roofing and machines for the same, and consists in supporting the rolling instrument employed in said process, by an arm which reaches to and travels upon ways overhead, so that the operator can travel alongside of the instrument and direct the same.

QUARTZ CRUSHER AND PULVERIZER.—Benj. Babbitt, New York city.—This invention relates to a device for crushing and pulverizing quartz, and it consists of a series of crushers arranged on the toggle principle, and provided at one end with elastic or yielding bearings, whereby the crushers are allowed to yield or give in case of coming in contact with any hard, foreign substance, such as spikes, or other metal articles, and the crushers prevented from being injured or broken thereby. The invention further consists in a novel construction of pressure rollers for pulverizing the crushed quartz, whereby the rollers are allowed to yield, or give, to admit of any hard foreign substance escaping between them without injuring the rollers or subjecting the same to any undue strain.

TOILET ATTACHMENT FOR BUREAUS.—Henry W. Eastman, Baltimore, Md.—This invention is a neat and ornamental attachment for bureaus which serves the purpose of a support for holding and adjusting the mirror, while it furnishes a convenient receptacle for combs, brushes, perfumery, etc., etc.

BALE TIE.—J. H. Gosch, Cheraw, S. C.—This invention relates to that class of bale ties in which the ends of the hoop are secured in a single slotted plate and consists in so forming the slots and tongues of the plate that the hoop can be more easily attached and fastened than by any other tie, and that when once fastened it cannot be untied, and will not be liable to fracture.

FRUIT AND GRAIN DRYER.—Solon L. Cheyney, Wooster, Ohio.—In this invention the fruit is dried in an oven by means of a current of hot air caused to flow over it from a heater beneath. The peculiar construction of the apparatus, by which the current is properly directed and its heat utilized to the fullest extent, constitutes the main feature of the invention.

DRAY SADDLE.—John O'Mahoney, Savannah, Ga.—This invention consists in a novel construction of the saddle whereby it may be made to conform to the shape of the back of the horse, and a very durable saddle of the kind specified obtained, and one which will not chafe or injure the horse in the least.

TIRE SHRINKER.—John Macy, Pine P. O., Oregon.—This invention relates to a device for shrinking tires, and it consists in the employment or use of a fixed bed provided with a fixed and an adjustable flange in connection with a fixed and an adjustable clamp, whereby tires of different widths may be contracted or shrunk with the greatest facility and in a perfect manner.

SCOOP AND SCREEN.—Augustus Thayer, Albany, N. Y.—This invention relates to a combined scoop and screen, whereby the device by a very simple adjustment may be used in either capacity, as desired.

HELIOMETER.—Conrad Friedrich L. Risch. Huntingburg, Ind.—This invention relates to an apparatus of very simple construction for observing and ascertaining the effects of the sun's rays upon the earth. By the use of this invention the exact degree of latitude at which an observation is made can be ascertained. Also by the aid of a suitable guide book, the date at which the observation is made, as well as the time of day, and the angle formed by the rays of the sun at noon of each day upon the level or water line.

FLEXIBLE GAS TUBING.—E. L. Perry, New York city.—This invention consists in outer flexible tubes of vulcanized rubber provided with one or more interior tubes of strong paper, the latter joined together by gum, glue, or other suitable substance which will make an impervious seam, the rubber tube being rolled up around the paper tube and the edges joined together in the usual manner, enveloping the said paper tube and serving as a protection to it, the latter being impervious to gas preventing the escape of the same.

DRYING APPARATUS.—F. I. Norton, Fremont, Ohio.—This invention consists in an arrangement of steam pipes within a suitable building, whereby the steam is conveyed around the interior of said building in any desired manner on the floor of the same by pipes, the said conveying pipes being provided with vertically projecting pipes having small orifices in their tops through which a very small jet of steam is allowed to escape, the hubs or other article to be dried being set on the said vertical pipes so that they discharge the steam into the holes through the same.

ANIMAL TRAP.—William J. Woodside, Zanesville, Ohio.—This invention has for its object to furnish an improved self-setting trap, simple in construction, not liable to get out of order, and effective in operation, instantly killing the animal that springs the trap.

SPRING BED BOTTOM.—Charles Walker, Chester, Vt.—This invention has for the object to furnish a neat, simple, durable, convenient and elastic bed bottom, and one which can be easily and quickly put up or taken down.

PAN FOR CONCENTRATING SULPHURIC ACID.—P. Marcelin and J. Saunders, Greenpoint, N. Y.—This invention consists in providing the pans with elongated, downward-extending spouts which reach from the upper part of that pan to which they are attached, to close above the bottom of the next pan below, so as to carry the lighter, impure contents of the upper pan to the bottom of the lower pan, and to thus create a complete circulation.

ROLLS FOR COTTON AND WOOLEN MACHINERY.—Francis Cragne and Geo. G. Cragne, Lewiston, Me.—This invention relates to an improvement in machinery for the manufacture of cotton and woolen goods, whereby an important saving in the expense is secured.

OSCILLATING OR VARIABLE ECCENTRIC MOTION.—Timothy Keeler and Geo. S. Avery, Danbury, Conn.—This invention relates to an improvement in applying the eccentric motion to various purposes, whereby the uses to which the eccentric motion is adapted are greatly increased.

FEATHER DUSTER.—M. A. Goodenough, New York city.—The object of this invention is to so construct a feather duster that the center of the brush shall be filled up with feathers of a less expensive quality than those used for the outside of the brush, and still make the brush elastic, more durable and useful than the ordinary kind.

FELLY DOWEL PIN.—O. D. Tyler, Gibson, Pa.—This invention relates to an improvement in dowel pins for fellies of wheels, and consists in forming it of a metal tube or thimble.

BASE OF ARTIFICIAL TEETH, ETC.—John A. McClelland, Louisville, Ky.—This invention relates to the composition and preparation of a new and improved material for the base of artificial teeth, and for other purposes in the arts.

ANIMAL POWER.—Jos. J. Adgate, Liberty, N. Y.—This invention relates to an improvement in machinery for utilizing the power of horses and other animals, whereby the same is more simple in construction and more effective in operation.

EXCAVATING VEHICLE.—James P. Smith, Cherry Hill, Pa.—This invention relates to a vehicle or self-loading wagon which may be used for excavating the earth in the process of grading, or in moving earth from one place to another.

DISINTEGRATOR FOR GOLD MINING PURPOSES.—Jerome B. Cox, San Francisco, Cal.—This invention relates to a method of separating gold from the cement or other material with which such metal may be combined.

MEDICAL COMPOUND.—John Bender, Lonaconing, Md.—This invention and discovery has reference to a composition formed of various ingredients known to the medical faculty, and which composition or compound is intended as a "tonic elixir," or cure for certain diseases, as dyspepsia and diseases of the stomach and bowels.

PLOW LANDSIDE.—Jerome Bacon, Medina, Wis.—This invention has reference to an improvement in plows, and especially to the manner of constructing the landside, whereby it is made adjustable and rendered much more durable than the ordinary kind.

DOUBLE SHOVEL PLOW.—Andrew J. Craig, Ashmore, Ill.—This invention has for its object to furnish an improved double-shovel plow, so constructed as to be easily adjusted to run at a greater or less depth in the ground, or so that one plow may run deep while the other runs shallow, and to which the whiffletree or doubletree may be readily and quickly attached.

BRACE FOR CARRIAGE AND OTHER SPRINGS.—L. C. Miller, Humphrey, N. Y.—This invention has for its object to furnish an improved brace for springs for carriages, railroad cars, locomotives, spring seats, and wherever elliptic or half-elliptic springs are used, which shall be so constructed that it will hold the spring always perpendicular to the plane of the wagon, and which will protect the springs from any wrench or twist.

DISTILLING APPARATUS.—Jane Riley, Cincinnati, Ohio.—This invention relates to a new apparatus, to be put upon a still, for condensing and separating the various grades of spirits, and consists chiefly in such a construction of the condenser and water distributor that, without the use of a worm, and without requiring large quantities of water, the desired results may be quickly obtained.

PAN FOR CONCENTRATING SULPHURIC ACID.—Paul Marcelin and Joseph Saunders, Greenpoint, N. Y.—This invention relates to a new pan to be used in furnaces for concentrating sulphuric acid, and consists in arranging a partition across the pan, which reaches nearly to the bottom of the same, and which causes the lower settled portions of the acid to flow out of the pan.

CHANGEABLE COMBINATION LOCK.—Wm. D. Field, Providence, R. I.—This invention relates to a new changeable combination lock, which is so arranged that it can be applied to doors, and that it can be changed without inconvenience by simply removing the inner plate.

FOLDING BEDSTED OR CRIB.—R. S. Titcomb, Gloversville, N. Y.—This invention has for its object to improve the construction of the improved bedstead or crib, patented by the same inventor Dec. 17, 1867, so as to make it more strong, durable, and convenient.

PLOW.—Wm. Gallagher, Sbullsburg, Wis.—This invention has for its object to furnish an improved sulky plow or plows, which shall be simple in construction, strong and durable, and which will do more and better work with a less outlay of power than any of the plows now in common use.

ANIMAL TRAP.—A. J. Adams and Boyd P. Quincy, Portland, Oregon.—This invention consists in providing the extremities of a circular or spring with hooks, and extending them apart by means of a device for mounting them as set.

WEEDING HOE.—Andrew Coleman, Red Bank, N. J.—This invention relates to a new and improved form for pointed weeding hoes, and consists in forming the plate for the hoe of corrugated sections, formed by striking up a pointed plate by means of dies, to the form shown, which is a succession of pointed arches, each having a V-shaped section.

MAGIC LANTERN.—L. J. Marcy, Newport, R. I.—This invention relates to the construction of the body or box of magic and signal lanterns, and consists of forming the same with an inner and outer shell with an air space between, whereby the body of the lantern may be made much smaller than were heretofore made, without becoming unduly heated. Other devices, perfecting the whole, render this an improvement on the magic lantern, as heretofore made.

Answers to Correspondents.

CORRESPONDENTS who expect to receive answers to their letters must, in all cases, sign their names. We have a right to know those who seek information from us; besides, as sometimes happens, we may prefer to address the correspondent by mail.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however, when paid for as advertisements at $1 00 a line, under the head of "Business and Personal."

☞ *All reference to back numbers should be by volume and page.*

J. A. D., of Mo.—We know of no sure antidote for the sulphur of coal when used in iron working. It is said, however, that a solution of salt or salammoniac sprinkled on the coal before use, greatly mitigates the evil.

M. C., of Ga.—Soluble glass may be made by fusing ordinary glass with about one tenth of dry carbonate of soda. Both materials should be powdered and intimately mixed before putting them in the crucible. Soluble glass is an article of commerce and you can purchase it of excellent quality.

J. R. S., of N. Y.—Kane's Chemistry is right and you are wrong, for chloride of silver is soluble in ammonia. It dissolves more readily in cyanide of potassium and hyposulphite of soda. A good way to reduce the silver from the chloride is to place lumps of zinc in a thin paste of the chloride and water. The action is much more rapid when the paste is acidulated with sulpburic acid.

S. G. T., of O.—The source of carbolic acid is coal tar. The acid is separated from the distillate of the tar by means of treatment successively with caustic soda and sulphuric acid.

O. S., of N. Y.—There are great practical difficulties in the electro-deposition of iron and nickel, and no process is yet known which is satisfactory. Nickel is chiefly used as an ingredient of German silver.

S. S. C., of Ga.—You can get fine and rare chemicals of Luhme & Co., Lafayette Place, and of many other dealers in New York city.

P. S., of Minn.—Shellac dissolved in alcohol, with or without the admixture of lampblack, is the varnish used on wooden patterns.

E. E., of Ind., asks how to prevent the action of the sulphur contained in his forge coal on iron and steel in welding. The metal runs or drops before it gets to a welding heat. He ought not to attempt the welding of iron with "green" bituminous coal. If he cannot procure charcoal he should coke his coal before using it for this purpose.

E. G. P., of Iowa.—The question who was the original discoverer of chloroform or chloric ether as an anæsthetic has been sufficiently discussed. The subject is dead.

M. P. P., of Mass.—That your tin can when filled with steam and suddenly collapsing by injecting cold water, assumed a hexagonal shape, was simply because in six places the tin happened to be strongest; when you repeat the experiment with tin cans made of various samples of tin you surely will collapse them to a great variety of shapes. It has nothing to do with the hexagonal shape of the snow crystals, which are thus simply because water belongs to a certain system of crystallization; why it does belong to this system and to no other we know about as much as why sulphur is yellow and vermillion red; recent researches, however, indicate that the form of crystallization is intimately connected with the chemical composition or the arrangement and attractive power of the atoms of a body.

R. A. M., of Conn.—The present method of hardening the surface of malleable iron is to make the object red hot, then strew equally on the surface powdered ferrocyanide of potassium (yellow prussiate of potash) and plunge it quickly in cold water. The old method is to take horn, hair, dried blood, salammoniac, or other nitrogenized substances, and pack them with the objects to be hardened in a sheet-iron case or box make this box with contents red hot, open it then quickly and throw all in cold water. This is the genuine original case hardening, but has now been abandoned for the use of the ferrocyanide which is manufactured from the above-mentioned nitrogenized substances. The paragraph page 231, relative to converting cast iron into steel, needs correction. Cast iron has an excess of carbon and is converted into steel by the Bessemer process which robs it of a part of this carbon, by blowing air through it, from which it probably also absorbs some nitrogen in its stead. Puddling robs cast iron of all carbon and transforms it into malleable iron.

James Duncan, of Pioneer City, Idaho, is a miner and is willing to pay five hundred dollars for a recipe which will enable him to get the gold out of sulphurets, a specimen of which he sends us, without roasting, etc. It seems to us that this is not a case where recipes will prove useful unless to extract V's from our correspondents' pocket.

G. T., of Pa.—"Is there any metal composition similar in nature to brass, but cheaper, color immaterial?" Common type metal is hard but not tough. Copper, zinc, and lead will make an alloy suitable to your demands, but as copper is costly you must obtain the quality of cheapness by using less of it and more of the others. A few trials will give you the right proportions.

H. W., of Pa.—"The best composition for strengthening the fiber of wood, making it more difficult to split." Kyanized wood is tough, and wood impregnated with copperas becomes harder and more indestructible.

I. B. F., of R. I., is not satisfied with our simple "yes," given page 247, on his question if "in a common pump the water is raised by the muscular force of the operator." He thinks this does not agree with the teachings of the philosophical books who say that it is raised by the pressure of the atmosphere; to this we also answer, yes; but in order to give the atmosphere standing on the surface of the water in the well an opportunity to press the water upward in the tube, the muscular force of the operator must by means of upliiting the piston remove the pressure of the atmosphere on the water inside the tube, therefore it is directly the atmosphere which lifts the water but, of course, indirectly the muscular exertion of the operator, who destroys the equilibrium in the atmospheric pressure outside and inside the tube by applying a lifting power equal to the weight of the column of water under the piston,

Dr. W. F. Q., of Del.—Your theory of the agency of electricity in attracting or repelling atoms of matter is not new, but neither your paper nor the treatises of others who have written on the subject furnish proof of the theory or solve the problem.

A. G. B., of Ind., wishes the opinions of practical carriage makers and users as to the proper diameter of axles for light vehicles running over sandy or muddy roads. Some say the smaller the arm the less the friction; others, the contrary.

W., of N. Y., asks the components of axle grease. Water, 1 gal.; tallow, 3 lbs.; palm oil, 6 lbs.; soda, ½ lb. Heat to 210 Fah., and stir until cool. Tallow, 8 lbs.; palm oil, 10 lbs., and plumbago, 1 lb., make a good lubricator for wagon axles.

S. P. H., of L. I.—This correspondent asks for a description of the process of galvanizing iron. We believe we have answered a similar question before, but as we have had lately several applications for the information we will reply again. Sheet iron, when cleansed by means of sulphuric or hydrochloric acid diluted with water, may be dipped in a bath of melted zinc covered with powdered salammoniac, when a thin film of zinc will adhere to the surface. A better and more effectual way is to employ a melted amalgam of 202 parts by weight of mercury and 1·3 of zinc. The iron should be cleaned as before.

C. W., of Ohio.—Partly worn files may be renewed in a degree by standing the files, tang down, in a jar of dilute nitric and sulphuric acid, letting them stand over night.

E. G. P., of Iowa, says that Dr. Samuel Guthrie, of Sackett's Harbor, N. Y., manufactured percussion powder in pill form as early as 1818, and it was used to some extent in the navy for firing cannon. We are aware that Dr. Guthrie's experiments are recorded in the *American Journal of Science* for January, 1832, but Rev. Mr. Forsyth, in 1807, patented a fulminating powder composed of chlorate of potash, sulphur, and charcoal.

B. F. W., of N. Y.—"Why cannot the electric light be used for street lamps and locomotive head lights?" We know of no reason why it may not be adapted to the lighting of streets, but the motion and jar of a locomotive would seem to be an almost insuperable obstacle to its adoption for railway trains.

W. H. P., of Iowa, referring to our reply to "E. O. McC.," on page 231, current volume, says: "It is well known that friction will induce magnetism in steel rods or bars when they are in a position at right angles to the west and east current of electricity. Of course, when upright, they are at right angles with such current, and also when in a horizontal position north and south. When horizontal, east and west, friction will not produce magnetism.

Business and Personal.

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