

## ENGINEERING INVENTIONS.

A propelling apparatus for vessels has been patented by Mr. Alonzo Cardoso de los Rios, of New Orleans, La. This invention relates to screw propellers for vessels, the propellers being made with a comparatively long axis and spiral leaves, and being either cylindrical or conical; a special description of forefront of the vessel is also provided for.

A railway switch signal has been patented by Messrs. Joseph W. Alexander, of Frazerville, Quebec, and Marshall Wheelhouse, of Campbellton, New Brunswick, Canada. This invention covers improved means for carrying and operating three-throw switches by one lever with interlocking devices, which automatically lock the signals in position and unlock them for shifting.

A steering gear for traction engines has been patented by Mr. Albert P. Broomell, of York, Pa. This invention consists in certain combinations of bevel gears and friction driving devices connected with the motor shaft and the reversing shaft, by which motion is transmitted to the steering devices, whereby great efficiency and smoothness of action is obtained, and the machinery is free from much or all liability to breakage.

A steam engine has been patented by Mr. William Golding, of New Orleans, La. The invention consists mainly in grouping engines into pairs, connected with progressively arranged cranks on two independent shafts geared with and rotating a main driving or combined engine shaft, so the initial and diminishing pressures of the steam, working expansively, are made to produce a uniform effect from the order in which the greater and lesser pressures follow each other in the several cylinders.

## MECHANICAL INVENTIONS.

A locomotive frame forging die has been patented by Mr. Thomas Morris, of Danville, N. Y. This invention relates to a holding die or bed adapted to hold the leg and brace forgings of locomotive frames while welding upon said forgings the top connecting bar.

A saw mill feed mechanism has been patented by Mr. Edwin T. Gardner, of Rocky Mount, N. C. This invention covers a peculiar construction and arrangement of parts to facilitate running the saw log carriage back and forth, and for regulating its speed at will.

## AGRICULTURAL INVENTIONS.

A fertilizer pulverizer and distributor has been patented by Mr. Charles F. Dinkle, of Carlisle, Pa. It is designed to attach the pulverizer to machines used for planting seeds, the attachment to be so made that the fertilizer will pass from the pulverizer into and go with the seed discharged from the planter.

A fertilizer distributor has been patented by Mr. Benjamin F. Archer, of Marietta, Miss. This invention covers a novel construction of wheeled distributors, the axle carrying a distributing toothed roller, the hopper having two compartments, there being a hinged grating in the upper one, and there being also a spring scraper, with other novel features.

A check row corn planter has been patented by Messrs. Valentine Weher and John Friedman, of Princeville, Ill. The wheels and axle and the seed dropping slide are connected by a trip wheel with arms and rollers operating a vibrating double cam, with other special details, to facilitate planting in accurate check row.

## MISCELLANEOUS INVENTIONS.

An improved gate has been patented by Mr. Adelbert D. Mack, of Franklin, O. The invention covers a novel construction of sliding and swinging gate, in which the weight of the gate can be taken from the swinging crane when the gate is open or closed.

An improved saw has been patented by Mr. Harvey W. Peace, of Brooklyn, N. Y. The invention provides for such a form of making saws that the blade can be readily detached from the handle, thus facilitating the interchange of blades.

A holder for ornamental and fly paper has been patented by Mr. Vurlin G. Tansey, of Louisville, Neb. The invention consists in a frame, with a series of spring frames, and with a series of cords extending from the outer rod of the frame to the inner plate, from which cords the paper is suspended.

A collar button has been patented by Mr. George Kremetz, of Newark, N. J. The invention provides for making a collar button with a hollow head and stem, and formed and shaped out of a continuous plate of sheet metal, being simple in construction, strong, and durable.

A soda water apparatus has been patented by Mr. Achille Bertelli, of San Francisco, Cal. The invention consists in an apparatus for generating carbonic acid gas adapted to be placed directly on a fountain, or that can be coupled with a series of fountains for charging them.

A miter box has been patented by Mr. Joseph Cashin, of Washington, D. C. This miter box is so constructed that with a hand saw, without the addition of an extra back, it may be used for cutting any depth desired, and the device may be adjusted to any thickness of saw.

An adjustable keel block has been patented by Messrs. Frederick C. Lang and John F. Tietjen, of Rondout, N. Y. The invention covers a peculiar arrangement of inclines or wedges, so that vessels may be more firmly supported in dry docks, whether or not the keels of vessels are more or less out of line.

An automatic electric circuit closing device has been patented by Mr. Charles T. Ross, of New York city. The device is more especially intended for use in connection with fire alarms, and is arranged for normally breaking the circuit, but adapted to close the circuit automatically, at a given temperature.

A sash cord fastener has been patented by Mr. S. Howland Russell, of New York city. This invention covers a cord fastening with a plate perforated to receive the fastening screw, and with two or more points having inclined inner sides, so the cord may be compressed between the points and around the fastening screw.

A holder for use in carving meat has been patented by Messrs. Louis Cbevalier and Leon Graillet, of Paris, France. The holder is composed of a sheath in a suitable handle, with jaws grooved on their inner faces, and blades acting as springs, so that the bone of a cutlet, or meat in other form, may be grasped and held when removing the meat therefrom.

A bottling machine has been patented by Mr. John C. Blair, of Louisville, Miss. The invention covers special peculiarities of construction, by means of which a very simple and efficient machine is obtained, the precise amount of liquid for each bottle being easily gauged, and the filled bottles removed with great facility.

An eraser case has been patented by Mr. Louis Krob, of Zanesville, O. The case has two slides, on one of which is an eraser, and the other has an abrading surface for cleaning the eraser; when used the slide is withdrawn from the casing, and is reversed and passed back, so the casing serves as a handle for the eraser.

A screen frame has been patented by Mr. George Phillips, of Tilford, Ill. The end bars of the frame have longitudinal grooves in the side surfaces, combined with which are side bars, with hook plates or clips on the ends, the hooks passing into the grooves in the end bars, the whole making a frame which can be readily adjusted in height and width.

A deodorizing and antiseptic water closet cover has been patented by Mr. Frederick H. Hubbard, of Brooklyn, N. Y. The cover is made in box form, with a non-corrosive interior vessel having fine perforations, so the liquid contents of the interior vessel will be allowed to drip when the cover is closed, and will not drip when the cover is open.

A tile machine has been patented by Mr. Warner Lewis, of Stone Bluffs, Ind. The invention covers a special construction and arrangement of cylinders, case, die plates, and core, alike applicable for the use of plungers or pistons instead of augers for forcing out the clay, and such provision is made that the union of two streams of clay on the sides of the forming core is greatly facilitated.

A picture case for tombstones has been patented by Messrs. Harvey A. Holloman and William R. Green, of Kingston, Texas. The invention relates to the general construction of the case, and the method of securing it in the tombstone, the outer surface of the case standing flush with the outer surface of the stone, and so the case cannot be removed without breaking the stone.

An improved gate has been patented by Mr. Mark W. Foster, of Minneapolis, Minn. It is so contrived that a carriage wheel, coming in contact with the end of a horizontally swinging lever, and pushing it along the ground, is made to raise and swing the gate on a lever, or cause it to roll back along a track, the gate being suspended at the middle from the said lever or track.

## Business and Personal.

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## Notes &amp; Queries

## HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

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Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identification.

(1) R. P. C. asks if there is any process by which iron and glass plates may be firmly welded together, that is, the two flat surfaces; for example: could a glass surface or plate be placed upon a plow shovel, or laid upon any iron surface in that manner? A. Plow shares or any iron surfaces can be faced with glass or enamel by pulverizing the material and mixing with water and a little clay or borax to make it adhere. Then heat in a furnace until the glass is melted and adheres to the iron. A thin coat would stick. Plates of glass could be warped to the shape of the plow share and melted upon it. The difference in contraction between the iron and the glass upon cooling would crack the glass off from the iron and destroy its value. We cannot see any advantage of glass over hardened steel, considering its brittle nature.

(2) W. S. B.—We can add little to what you are doing, except to arrange your stuff to bend as hot as possible. A jet of steam upon the piece while bending will help, where you are taxing the bending qualities of the wood to its utmost.

(3) F. P. asks: Would it require more power to run an engine placed 400 feet from the boiler, than one within 10 feet? A. The loss by placing the engine 400 feet from the boiler, would be that of condensation in the steam pipe, which would depend upon the protection of the pipe. The power of the engine in either case would be the same if the pressure maintained at the engine is the same.

(4) C. A. P.—We suggest you exhaust into a surface condenser immersed in the water of the pump with a non-return valve. This will cause a back pressure on the steam piston, which will require a little higher pressure of steam to do the work; or if you add an air pump to take off the water of condensation, it will require a less pressure of steam.

(5) J. D. B. writes: I have a small engine and boiler. Cylinder has 2 inches bore, 3 inches stroke. Is it strong enough to drive a boat 18 feet long, about 3 feet 6 inches wide at its widest place. Has side wheels with five paddles in each; boiler pressure, 60 pounds. A. No; your engine would be useless to drive side wheels. It could be applied to a screw propeller to better advantage if you have sufficient boiler; but even then the speed of the boat would be slow.

(6) L. P. B. asks how to get the essence of Portugal, or how to manufacture it. Also the essence

of canella. A. The scarcely ripe fruit of the sweet variety of orange is made to yield an oil from the rind by means of the "sponge" process, which is the same as used in extracting the oil from lemon, and is practically nothing but expression. The varieties of apparatus used differ somewhat in various places. An essential oil erroneously called "white cinnamon" is obtained by the aqueous distillation of the bark of canella alba. These articles may be procured through any wholesale druggist. Information regarding the details of the processes may be obtained by consulting Spens' Encyclopædia of the Industrial Arts, or else either Piesse's or Christiani's works on perfumery.

(7) M. E. B. H. writes: 1. In a bale of my stove pipe iron, I find from three to five sheets nicely polished on one side while the rest of it is rough; why are they there, and is it polished on purpose? A. There are several grades of stove pipe iron, and the inference is that some of the better quality has become mixed in (possibly to make up the proper amount) with that of an inferior quality. 2. How is candy made with objects formed in the center in bright colors, such as flags or letters? A. The figure inside is first formed of suitable design and in appropriate colors, and the whole mass then covered with a transparent coating of some saccharine compound. 3. What is the process of brazing, and how is lead pipe formed? A. Brazing is synonymous with hard brazing, the alloy used generally consisting of equal parts of copper and zinc, and the flux used is borax. The manufacture of lead pipe is described in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 416. 4. How is calico printed or stamped so as not to blur the different lines? A. By means of stencil plates. 5. What process do tinners use to remove finger marks from tinware and give it a bright, clean look after finishing? A. By immersion in acid.

(8) F. W. C. writes: I want a formula for making and using the composition which is used to take a mould from an undercut object say in plaster, which will be insoluble in an electrolyte solution of sulphate of copper. A. We believe the following is about what you want: 12 pounds of glue are steeped for several hours in as much water as will moisten it thoroughly; this is put into a metallic vessel, which is placed in hot bath of boiling water. When the glue falls into a fluid state, 3 pounds of molasses are added, and the whole is well mixed by stirring. The article to be moulded is now placed in a cylindrical vessel sufficiently deep, so that it is an inch or so higher than the object. The inside of this vessel is then oiled, and a piece of stout paper is pasted in the bottom of the object to prevent the fluid from going inside, and if it is composed of plaster, and is put inside to prevent it from floating. It is next completely drenched in oil and placed upright in the vessel. This done, the melted mixture of glue and molasses is poured in till the article is submerged to the depth of an inch. The whole must stand for at least twenty-four hours till it is perfectly cool throughout. The original is then removed. A mixture of wax and resin with occasionally a little snet is melted and allowed to stand till it is on the point of setting, when it is poured into the mould and left to cool. In order to prevent its dissolving in the battery mixture the copper must be dispersed very rapidly at first, and thus it becomes protected from the action of the solution.

(9) W. H. P. writes: Quite a controversy has arisen on the placing of two 60 inch return tubular boilers. They are to be placed side by side divided by a wall, thus making separate furnaces under each, etc. The blowoff pipes are separate, no mud drum being used. They are connected on top from 36 inch by 36 inch domes, by 5/8 inch pipe leading to a T near center, thence through one pipe to engine. Is there any danger of these boilers robbing each other of water? And if so, will you kindly give me the best and most effective remedy for the same? Will all boilers, large or small, or both, be affected in same way when similarly placed? A. In setting gang boilers the only precaution necessary to prevent unequal water level by unequal firing is to make all water connections separate for each boiler. No two boilers should be connected with one mud drum. The old style of connecting gang boilers with a common mud drum and a common steam drum was considered good practice when the steam connections were very large between the boilers and the steam drum, with the steam pipe taken from the drum, so that the pressure in each boiler was equalized. 2. Will a 3 inch pipe leading from top of shell of one boiler into top of shell of the other have any effect? And if so, what? Would they not rob as quickly through this with unequal fire, if not more so, as without it? A. A 3 inch direct connection between steam spaces of each boiler independent of the steam outlet might equalize the water level, but we do not approve of the practice that requires any such contrivance. Make the feed pipe to each boiler from the main feed pipe to contain a valve and a check valve, and use this valve to regulate the feed of the boilers. It is not always necessary to feed one at a time; you may feed half a dozen, shutting down the valves on those that are feeding too fast. Also keep the blow off for each boiler separated by a cock between the boiler and the main blow off pipe. It is good practice to put a valve upon each side side of the check valve, for obvious reasons.

(10) S. C. M. writes: 1. I want a receipt for coloring wood purple and black, for small rollers. A. Pour 2 quarts boiling water over 1 ounce powdered extract of logwood. Brush the wood several times with this decoction, and when dry give a coat of pearl ash solution 1 drachm to a quart; lay it on evenly, and the result will be a purple color. For black: wash with a concentrated aqueous solution of extract of logwood several times; then with a solution of acetate of iron of 14° Baume, which is repeated until a deep black is produced. 2. I also want a process by which hard maple can be filled with something harder than itself, that will make it wear well. A. Try a filling composed of equal parts by weight of whiting, plaster of Paris, pumice stone, and litharge, to which may be added a little French yellow asphaltum, Vandyke brown, and terra di Siena. Mix with 1 part japan, 2 of boiled oil, and 4 of turpentine. Grind fine in a mill.

Lay the filling on with a brush, rub it in well, let it set 20 minutes, then rub off clean. Let it harden some time, rub smooth, and if required repeat the process. When the filling is all right, finish with linseed oil, applying with a brush, wipe off, and rub to a polish with fine cotton, and finish with any fine fabric. 3. Also a process for giving wood rollers a high polish, quickly, while in the lathe. A. Dissolve sandarac 1 ounce in spirit of wine  $\frac{1}{2}$  pint; next shave beeswax 1 ounce and dissolve it in sufficient quantity of spirits of turpentine to make it into a paste; add the former mixture by degrees to it, then with a woolen cloth apply it to the work while it is in motion in the lathe, and with a soft linen rag polish it. It will appear as if highly varnished.

(11) J. C. R. writes: 1. I am building a steam launch 40 feet long by 12 feet beam; what description of boiler for strength, durability, and economy, and would take up the least room, is the most advisable for me to put into her, and what may it cost? A. A horizontal cylindrical boiler with cylindrical furnace, two return tubes above and alongside of the furnace. 2. What is the best description of engine and propeller (say two or four blades) to give her say a speed of 12 knots per hour, and correspond with the boiler in all particulars, as well as taking up the least room, also its cost? A. The ordinary vertical inverted engine, non-condensing, if economy of fuel is not much object; if it is, then use a surface condensing engine, either simple or compound. A twin screw, three blades, will be best. You must have ample power and a good, easy model to get 12 knots per hour. Price of engine and appurtenances, about \$850. Of engine and boiler, propeller and shaft, with all appurtenances and connections, about \$1,800.

(12) O. H. McK. asks: 1. How can I polish small Norway iron hooks about 1 inch in length? A. You can polish small hooks by tumbling in a keg revolving upon a shaft. Use sharp sand mixed with the hooks, and finish with saw dust. 2. I have several thousand very soft cast iron tubes about 8 inches in length,  $\frac{3}{4}$  inch hole, and closed at one end; they have grease in them, and I want to know how to get them perfectly clean. Can you tell me of some wash or other means to clean them without rusting them? Would a wash of sal soda and water rust them? A. Boil the pieces in water with a little soda and lime, say one ounce of each to a pail of water. Take the work from the water boiling hot, and dry immediately by placing upon a hot plate or in a warm place. 3. How can I caseharden small Norway iron rivets about  $\frac{3}{4}$  inch long and  $\frac{1}{4}$  inch diameter? A. Caseharden the rivets by packing in an iron box (sheet iron will do) with charcoal and powdered prussiate of potash, or bone charcoal or scraps of leather cut fine. Heat for an hour at a full red, and pour out rivets and dust into a tub of water. You cannot wait to separate the rivets from the packing. They will cool too fast, and interfere with the hardening.

(13) S. J. W. writes: I see by your issue of March 21, my question (51) was not satisfactory in regard to power of screw. The lever will be 12 inches; power applied at end of lever, 75 pounds; screw one-eighth pitch, point tapered to angle of 30 degrees working between two pins to suit angle of screw point. What pressure would they exert in separating any amount of weight, in other words, what weight will they lift? I think the power is equivalent to a screw 32 to the inch in the way it is applied, if the rule holds good in all cases. Am I right? With a traveler of 75 inches for lever, the pins only move one thirty-second. The rule I believe is, as pitch of screw to circumference, so is power applied to weight raised. A. Your rule is right. Multiply weight or pressure applied to the end of the lever, by the distance traveled in one revolution of the lever, and divide by the pitch of the screw, distances and pitch of screw to be in inches or fraction of an inch, but this will give the theoretical result. A very large deduction must be made for friction, say 35 to 40 per cent.

(14) E. S. B. asks: If by electrical action I deposit all the lead from a solution of the plumbate of potash, will the remaining potash solution still retain the power of disintegrating, and through use of a continued current of electricity again deposit the new lead ingredient added to constitute the plumbate of potash? A. The potash is not affected under the circumstances; potassium hydroxide is formed.

(15) J. W. P. asks the formula usually used in America for calculating the power of stationary and marine boilers, and also the safe working pressure of the same, for iron and steel plates. A. There is no generally received rule. From 12 to 16 feet of heating surface is usually allowed per horse power. The smaller surface to the plainest, simplest, and well proportioned boiler. The only accepted standard is 30 pounds of water evaporated per horse power per hour.

(16) P. F. Manufacturing Co. asks the best process to japan wire. A. Japan wire by drawing it through the varnish, holding it in the varnish by passing the wire through a hole or slot in a piece of iron pushed under the surface of the varnish, also a scraper or brush to draw off excess of varnish or make the varnish thin enough to just cover the wire in quantity. Hang the wire in an oven heated to 250°, supposing the wire may be 1 foot or 10 feet long, as you give no detail of what you wish to do, or as to what is the shape of the wire.

(17) F. A. L. asks how he should construct a rain water cistern in gravelly soil. A. Build the cistern with hard burned bricks and Portland cement, backed with a grout of Portland cement and clean sand. Plaster the inside with a thin coat of clear Portland cement.

(18) C. K. asks the theory of the working of an aspirator, and why does it refuse to work in very cold water; and have you a receipt for marking bags and bales? A. Aspirators work by the transfer of the high velocity of the steam to its equivalent weight in water by its instantaneous condensation in contact with water. The water inducing the recondensation partaking of the velocity of the steam re-enters the boiler not only against its own pressure, but will feed a boiler of much higher pressure. We do not know

that it will not work in very cold water. It may require a different adjustment for extremes of temperature in the feed water. Lampblack and turpentine is generally used for marking bales and boxes.

(19) J. MCF. writes: 1. In SUPPLEMENT, No. 247, you give bacteria process of vinegar making; I want to know how many and what size of air holes are sufficient for 200 liter vat. A. The air holes are for the purpose of promoting the acetification, which is the oxidation of the vinegar, and therefore we would recommend you to use quite a number, and preferably a large number of small ones, rather than fewer larger ones. 2. Will the mixture of alcohol, water, etc., acetify without mycoderma acetif first being sown on the surface? If not, how or where can this be obtained for the first mixture? A. No. The mycoderma are obtained from fermented vinegar. 3. What is the vaporizing process of vinegar making, in which alcohol is vaporized in such a way as to produce a superior article of vinegar quickly? A. The vaporizing process consists in treating the alcohol with a standard liquor and allowing it to flow over shavings, while the air coming in contact with the vinegar hastens the operation. 4. What is water lac? A. We presume reference is made to the water lac varnish, which is a mixture of 5 ounces of pale shellac, borax 1 ounce, water 1 pint. Digest at nearly the boiling point until dissolved, then strain. 5. Is there any method of taking a positive picture which is entirely complete directly in the photo camera either on paper, glass, or other surface? If not, what is the quickest method of securing positive pictures? A. See Mr. J. B. Obernetter's paper on this subject in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 293.

(20) S. R. C. asks what he can use to clean wood type, where the black and colored inks have become hard and dry on the sides and face of the type. Benzine or turpentine has no effect on the hard dry ink. A. Wood types should be cleaned as soon as the forms come from the press. When the forms are allowed to stand a few days, it is very difficult to remove the ink. We sometimes use oil to soften the ink, and then remove it with benzine or turpentine.

(21) J. R. S. asks how to make pewter, look like silver by a wash. A. The best thing to do in order to produce a brilliant surface would be to tin the spoons. This is accomplished by dipping, and the process is fully described under the head of Electro Metallurgy, in SCIENTIFIC AMERICAN SUPPLEMENT, No. 310. We think that you can silver the articles by mixing one part silver chloride with 3 parts pearl ash,  $\frac{1}{2}$  parts common salt, and 1 part whiting. Rub this mixture on the surface of the metal by means of a piece of soft leather or cork, moistened with water and dipped into the powder. It is likewise possible to coat certain metals with nickel by first boiling the article in a solution of zinc chloride containing metallic zinc, and then adding a soluble nickel salt.

(22) J. D. asks: How can the length of wire used in a cable, having for data the number of the wire, the number of strands, and the number of twists per unit of measure of each, be obtained? A. For the length of a wire in a strand, add to a given length as many times the circumference of the strand as there are twists in the given length, for the outside wires; and proportionately for the inner row. The center wire is supposed to be straight. Proceed in the same way for the strands. The excess of wire in each strand added to the excess of the strands over the length of the cable will give the whole length of wire used.

(23) J. W. C.—The aurora has been made a special study by physicists and spectroscopists for several years. Its true solution has not yet been reached, owing to the variable and complex spectra caused by the interference of the atmosphere and its moisture. Its primary element, however, is supposed to be electricity. The floating cobwebs in the air are supposed to be an overproduct of the spinnerets of spiders, although there is room for observation as to their fungoid origin. The fine ashly dust may have a volcanic origin, and be connected with the phenomena of the red sunsets during the past season. It has been gathered in other places.

(24) W. G. B. asks: (1). What power engine should it require to raise one ton 40 feet high in one minute on ordinary platform elevator, making reasonable allowance for friction and power consumed in running winding machine? Weight of elevator platform is balanced by counter weight, all but about two hundred pounds. Winder is of the common worm gear type, run by belt from counter shaft, with 32 inch winding drum. A short counter shaft with two pulleys on it, one to receive belt direct from engine, the other to match winder pulleys, is all the gearing there is between engine and winder. A. For unbalanced weight of 2,440 pounds, 40 feet per minute, 3 horse power, making allowance for friction, etc., of the arrangement you describe; we advise to double this power, or say 6 horse power. 2. With the above rig, what weight should a four horse power engine be expected to hoist 40 feet high in a minute and three-quarters, what weight in two minutes, making reasonable allowance as before for friction and power consumed in running the winding gear? A. An actual 4 horse power engine should raise, allowing as before one-half for friction, etc., 40 feet in 1  $\frac{1}{4}$  min.—32 feet per minute, 2,091 pounds. For any other velocity the weight will be decreased as speed is increased; say 64 feet per minute (double velocity), the weight will be one-half—1,046 pounds.

(25) F. J. F. writes: 1. In answering a correspondent a few weeks since, how to remove impurities from lead, you mention substances rich in oxygen. Now, in my business I use antalloy—stereotyper's metal—but it is too granular, too hard. Now, will the antimony, etc., liberated by the nitrates, etc., be in a condition to be recovered, so as to use again, should my metal get too soft? In what quantity must the nitrates, etc., be added? A. The process referred to is not suitable for alloys. The stereotype metal, having the composition of tin 1 part, antimony 1 part, lead 4 parts, is recommended by Spon. 2. Also, please inform me how to make a strong, quick drying glue size? A. For a quick drying size, we would recommend you to

use a good glue and add alcohol to the preparation resulting from having dissolved small pieces of glue in water. Cork tight, and set aside for several days, and when completely in solution it will be found a most excellent article.

(26) F. A. L. asks for a work published on the manufacture of perfumes. A. A Comprehensive Treatise on Perfumery, with Thorough Practical Instructions, and Careful Formula, by R. S. Christiani, 8vo, 1878, price \$5.00. Art of Perfumery and the Method of Obtaining the Odors of Plants; the Growth, and General Flower Farm System of Raising Fragrant Herbs, with Instructions for the Manufacture of Perfumes, Scented Powders, etc., 4th London edition, 8vo, 1875, cost \$5.50. The above are the two most important publications on the subject.

(27) M. McL. asks how patent leather can be prevented from cracking, especially patent leather boots. A. To prevent patent leather from cracking, always heat the leather over the flame of a candle before inserting the foot in the shoe. Heat renders patent leather soft and pliable, so it is advisable to wear overshoes over patent leathers in very cold weather. There is also an excellent cream paste sold in London, and called Metropolitan varnish, which keeps patent leather in excellent condition. We believe it cannot be bought in this market, however.

(28) D. S. F. writes: There is a traveling man here purporting to nickel plate spoons, knives, forks, etc. He has a gasoline lamp, and above the lamp he has a cylindrical tube about 2  $\frac{1}{2}$  inches diameter and about 10 inches deep; in this tube he has his dipping metal, which is kept fused by the heat of the gasoline lamp. He dips his article to be coated first in muriate of zinc, then in oil, and also in water. Will you tell me the metal or metals he uses in his tube, or what kind of metal or amalgams will answer in this way for coating the spoons, etc., or any other simple process without the use of a battery? A. We presume you refer to Stolba's process, which is as follows: Into the plating vessel—which may be of porcelain, but preferably of copper—is placed a concentrated solution of zinc chloride, which is then diluted with from one to two volumes of water, and heated to boiling. If any precipitate separates, it is to be redissolved by adding a few drops of hydrochloric acid. As much powdered zinc as can be taken on the point of a knife is thrown in, by which the vessel becomes covered internally with a coating of zinc. The nickel salt, either the chloride or the sulphate, is then added until the liquid is distinctly green; and the articles to be plated, previously thoroughly cleaned, are introduced, together with some zinc fragments. The boiling is continued for fifteen minutes, when the coating of nickel is completed, and the process is finished. The articles are well washed with water and cleaned with chalk.

(29) N. F. W. writes: I am going to make a steam tricycle, and would like to ask, through the means of your valuable paper, if an engine with two cylinders, 1 inch bore and 2 inches stroke, with from 80 to 100 pounds of steam and making 700 revolutions a minute, be sufficient to obtain a speed of from six to eight miles? A. Engine 1  $\frac{1}{2}$  inches by 3 inches preferred. It has the most power, and will have less weight in proportion to power. 2. Would one cylinder 1  $\frac{1}{2}$  inches bore and 3 inches stroke be better? A. On smooth level roads should make eight miles per hour if the power is properly applied. 3. What size boiler would I need, and how large the wheels? A. Boiler should have 30 to 35 feet heating surface.

(30) C. G. L. asks: 1. In the SCIENTIFIC AMERICAN of December 9, 1882, you gave a cut of a propeller boat. 1. Can such a boat be made to run ten miles an hour? A. Not by the power of one man. 2. Is it any harder work to run one than to row? A. Yes. 3. Can greater speed be obtained with a screw than an armed propeller, 1 foot in diameter, with four arms, screw 1 foot long? A. Yes.

(31) C. H. L. writes: 1. I have a self-feeding (of coal) steam boiler for heating, with a 30 inch circular grate. To obtain the benefit of the addition of a small supply of gas to the fuel, how shall I proceed? If I put a single jet close under the grate in the center, I fear only a small portion of coal will be benefited; and if I put in a dozen jets, economy will not be attained. A. We fear the jet could not be safely applied in your case. To get the benefit of the gas jet, the grate should be entirely free of ashes and clinkers, which is not the case with heating boilers, as they are generally run for many hours without clearing out ashes. 2. Should not the gas be mixed with air before it escapes from the burner? A. The jet will get its supply of air without any special provision. 3. If I should let the gas into the ash pit, about 6 inches below the grate, in a 30 inch ring, pierced with 4 holes, would not an explosion be the result? A. Any experiment should be made with great care; any collection of gas in the ash pit, occasioned by a "clogged" grate or insufficient draught, would be likely to lead to an explosion.

(32) J. M. M. asks how to make or mix the acid used to etch on steel plates for printing. Also, what is meant by nitric acid 15° B? A. Iodine 1 ounce, iron filings  $\frac{1}{4}$  drachm, water 4 ounces. Digest till the iron is dissolved, or else pyrolytic acid 4 parts by measure, alcohol 1 part. Mix, and add 1 part double nitric acid (sp. grav. 1.28). Apply it from 1  $\frac{1}{2}$  to 15 minutes. Dilute nitric acid is frequently all that is used; 15° B. means 15° on the Baume scale of hydrometer.

(33) B. T. S. asks: What is "flexible sandstone"? Too hard to cut with a knife, yet pliable between finger and thumb, same as piece of rubber. A. The mineralogical name of the article is itacolomite; its composition is expressed in the term flexible sandstone. The quality of flexibility is due to the arrangement of the grains of sand.

(34) G. J. Van D. writes: 1. In the SCIENTIFIC AMERICAN, April 5, answer 43, you say: "Add about half an ounce of bisulphate of mercury to every 5 pounds of solution." What is the result accomplished by this addition? A. The mercury salt is added in order to keep the zincs thoroughly amalgamated. By its use a surplus of mercury is always provided for. 2.

What is the best alloy to cast small figures, etc., for electrotyping, to make bronze ornaments? One that will run sharp in plastic moulds and melt at a low temperature, i. e., over a gas stove? A. We would recommend the use of type metal as suitable for your purpose.

(35) C. C. B.—In order to prepare carmine, 1 pound of cochineal is boiled with 4 drachms of potassium carbonate in 7  $\frac{1}{2}$  gallons of water for fifteen minutes. Remove from the fire, stir in 8 drachms powdered alum, and allow to settle for twenty to thirty minutes. Pour the liquid into another vessel, and mix in a strained solution of 4 drachms isinglass in 1 pint of water; when a skin has formed upon the surface, remove from the fire, stir rapidly, and allow to settle for one-half hour, when the deposited carmine is carefully collected, drained, and dried.

(36) P. J. N.—The following is a crimson stain that is frequently used for musical instruments: Ground Brazil wood 1 pound, water 3 quarts, cochineal  $\frac{1}{2}$  ounce; boil the Brazil wood with water for an hour, strain, and the cochineal, boil gently for half an hour, when it will be fit for use. This is first applied, and then the varnish, consisting of rectified spirits of wine,  $\frac{1}{2}$  gallon; add 6 ounces gum sandarac, 3 ounces gum mastic, and  $\frac{1}{2}$  pint turpentine varnish; put the above in a tin can by the stove, frequently shaking till well dissolved; strain, and keep for use. If you find it harder than you wish, thin with more turpentine varnish.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

D. W.—1. Pyrite, or iron sulphide. 2. Calcite, crystallized calcium carbonate. 3. Is a compact sandstone. There is no stilbite or chabazite among the specimens received.

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May 6, 1884,

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