RECENTLY PATENTED INVENTIONS.

Engineering.

ROTARY ENGINE.—Lewis C. Huson, Elmira, N. Y. In this engine the piston is formed in sections having their inner edges constructed to loosely interlock with each other, whereby the sections are connected together and yet may move to a limited extent independently, the valves allowing for operating the engine in either direction.

ROTARY ENGINE.—The same inventor has likewise patented a compound engine having three separated chambers, each with a piston head, and all the heads fixed on the same shaft, live steam being supplied to two of the chambers, and the exhaust therefrom discharging into the third chamber, the invention also covering a novel construction of the drum to increase the bearing surface for the steam without diminishing the guide surface of the piston.

SAFETY VALVE. — Francis X. Vien, Brooklyn, N. Y. This valve is mounted to slide vertically, a pin bearing in the center of the valve and a weighted lever pressing on the pin, the valve having downward projections for guiding it in its seat, and the invention also covering novel details and combinations of parts.

BOILER CLEANER.—William T. Haney, Childersburg, Ala. This cleaner consists of a brush having a block or body formed on its upper side with a beveled or inclined surface, arranged to be acted upon by the water as the brush is reciprocated, to force the brush against the boiler surface, it being intended to be operated while the boiler is being used.

WATER ELEVATOR.—William O. Lentz, Mauch Chunk, Pa. This invention covers novel constructions and combinations of parts for pumping water from shafts or slopes in mines in which an air pump arranged above is used in connection with a series of successive lifting columns or pipes fitted with suitable valves and connected with the pump.

BURNER.—James Gibbons, Jersey City, N. J. This is a device adapted to burn fluid fuels, coal or water gases, wherein the air supply to the burner is superheated and the volume of air may be regulated to a nicety prior to its commingling with the fluid fuel in the mixing tube, and passing thence with the fuel to the point of ignition to produce an intensely hot flame.

Mechanical.

MASON'S FLOAT. — George Kautz, Albany, N. Y. This is a float of which the handle may be easily and quickly attached or disengaged at pleasure, the parts being so made that the blade will be held firmly by the handle without the use of nails, so that the blade may be worn completely out and the handle then used with another float.

PATTERN WHEEL. — James Keeton, Brooklyn, N. Y. This is a wheel for warp knitting machines used in making gloves, mitts, and like articles, and the invention covers a novel construction of the wheel and means for holding and adjusting the blocks, whereby they may be independently set in or out relatively to the center of the wheel, to change the pattern as required.

NUT LOCK.—Thomas W. Patten, Baltimore, Md. This device consists of a screw-threaded nut having an eccentric depression in one side, combined with a washer having an eccentric boss projecting laterally therefrom, and having on its inner periphery transverse teeth adapted to engage transversely the threads of a bolt.

Agricultural.

POTATO DIGGER.—Hiram M. Shaw, Genoa, N. Y. As this machine is drawn forward, a fork is oscillated vertically by mechanism driven from the sulky wheel, and the potatoes and earth dislodged by the hoe are passed on to the fork, where they are thoroughly separated and the potatoes left on the top of the ground, where they can be conveniently gathered.

Miscellaneous.

PRINTER'S BRUSH.—Joseph C. Israel, New York City. This brush has a liquid-containing vessel or compartment arranged in its top or back with a valve designed to allow small quantities of the liquid to be delivered to the bristles through the bristle-holding apertures, being especially adapted for use in cleaning printers' forms with benzine.

DUPLICATING TABLET.—William H. Pardee, Columbia, Dakota Ter. Two books are secured to one back by independent fastenings, with their leaves alternating with each other, a carbon paper being secured to the back and adapted to be folded in between the leaves, whereby salesmen and others may keep a record in duplicate of checks and memoranda made out.

TEMPORARY BINDER.—The same inventor has patented a temporary binder for holding leaves or tablets or for filing bills, the cover having two studs combined with a rock shaft having curved arms adapted to act in conjunction with the studs in holding the paper on the cover, a second cover being connected with the first by a link, and having recesses to receive the curved arms.

STOVE OR RANGE.—Henry E. Janes, New York City. According to this invention a grating is located at each side of the grate between the upper oven plate and the top of the stove, with a concavity in its rear edge to embrace the pipes of the water back, whereby coal and cinders will be effectually prevented from passing from the grate to the flues.

SASH HOLDER. — Henry A. Flatman and James Seed, Southbrook, New Zealand. Combined with the casing is a friction piece, a lever pivoted to the casing supporting the friction piece, which is also engaged by a spring, the device being applicable to window sash and sliding blind sash, and forming a clamp to prevent rattling.

FENCE MACHINE. — John Sornson, Brayton, Iowa. This device comprises a body portion, with arms hinged at intervals upon one face of the body, the arms having a transverse groove in opposite sides near their free end, and a clamping fork extending across the grooves, making a simple and effective means for wiring in pickets or planks to make a fence.

MOVABLE DAM. — Addison M. Scott, Charleston, West Va. This invention covers an improved construction of dams which are composed of a series of wickets or shutters, which, when erect, form the dam, being then braced by a prop, movable as the dam is raised or lowered, the improvement relating especially to the "heurter" and the down-stream "slide."

LIQUID HOLDING VESSEL.—Stewart R. Mace, Moulton, Iowa. This is a pivoted can with a hollow handle and upwardly projecting spout, with its end in alignment with the spout, there being a valve for closing the spout and another between the handle and can, whereby the can may be readily manipulated and its entire contents emptied without danger of spilling.

INSULATOR.—Warren C. Brown, Tarrytown, N. Y. This insulator is formed of two halves, each having a semicircular groove, one half having also a lug and the other a recess for causing the grooves to register when clamped upon a wire, which may be done without the use of binding wires, the insulator to be made of glass, vulcanite, or other suitable material.

COCOANUT COMPOUND. — Leopold Schepp, New York City. This is a compound in which granulated dried cocoanut is mixed with granulated sugar, granulated tapioca, granulated baked corn, and other ingredients, in specified proportions, to make an article ready for use as a pie-filling or other purpose, but mainly for cocoanut tapioca puddings.

COCOANUT COMPOUND. — This is another food compound by the same inventor, having cocoanut, sugar, starch, gelatine, flavoring extract, and other materials, and being more especially adapted for use as a cocoanut cream pudding, the compounds being both designed to be put up in small sized air and water tight packages in convenient form for family and hotel use.

LINIMENT. — David Bates, Bonham, Texas. This liniment is made of linseed oil, turpentine, sulphuric acid, oil of wintergreen, tincture of button snake root, and other ingredients, to form an antiseptic compound for the treatment of all kinds of wounds, lame joints, etc., and is also designed to act as an insecticide.

SCIENTIFIC AMERICAN

BUILDING EDITION.

MARCH NUMBER.—(No. 41.)

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1. Elegant plate in colors showing elevation in perspective and plans of an attractive residence costing five thousand dollars, sheet of details.
2. Plate in colors of a cottage for three thousand dollars, with plans, elevations, sheet of details, etc.
3. Perspective and plans of a villa at Paris-Auteuil.
4. Moving a house thirteen miles by water. From Wheeler's Mills, on the Housatonic River, above Stratford, Conn., to West Stratford, Conn. Full page of engravings showing the various stages of the operation, also floor plans of the building.
5. A beautiful residence lately built on Reynolds Terrace, Orange, N. J., from designs by architect John E. Baker, of Newark, N. J. Perspective and floor plans.
6. A villa near New York. Cost eight thousand dollars. Plans and perspective.
7. A Queen Anne cottage for three thousand five hundred dollars, lately erected at Richmond Hill, N. Y. Floor plans and perspective.
8. A beautiful "Old English" house, lately erected at Richmond Hill, N. Y. Perspective and floor plans.
9. An attractive cottage lately erected at East Orange, N. J., at a cost of six thousand dollars. Plans and perspective.
10. A residence at Bridgeport, Conn. Cost four thousand four hundred dollars. Perspective and plans.
11. A house for eighteen hundred dollars, recently built at Rutherford, N. J. Floor plans and elevations.
12. A cottage for two thousand one hundred dollars. Plans and perspective.
13. Engraving and plans for a cottage costing two thousand three hundred dollars.
14. A residence for five thousand dollars, lately erected at Rutherford, N. J. Plans and perspective.
15. Miscellaneous Contents: A lien law for gravestones.—How to save ceilings when cracked, sagging, and ready to fall.—The Willer sliding blinds, illustrated.—Improved woodworking machine, illustrated.—An improved reversible ratchet brace, illustrated.—Canton, Ohio.—An improved dumb waiter, illustrated.—Water pressure regulators.

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Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn.

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(447) H. W. C. asks (1) whether the wire on the eight light dynamo is single or double would. A. Double covered. 2. Whether the rings of armature will make any difference if the hole is 1⅜ inches instead of 1¼. I have the rings with 1⅜ hole, and find that it is lots of work to turn them out. A. It will make no difference.

(448) Subscriber asks: 1. Would annealed steel wire do for the armature core? A. No. 2. Can the motion of the motor be changed by reversing the current? If not, how can it be reversed? A. No. You must shift the brushes. 3. Can more power be developed if two of such motors be coupled to one or the same shaft, and the current be run through both? A. Probably not with the same current.

(449) G. C. asks for the best method of eating copper wire from silver work without injuring the silver. A. Immerse in muriatic acid and add to it a little nitric acid. Or heat in chloride of copper solution. In using first method be careful to use as little nitric acid as possible, with a good excess of muriatic all through the operation.

(450) B. F. M. asks (1) whether the dynamo described in SUPPLEMENT, No. 161, can in any way be run as a motor. If so, how can it be done? A. The dynamo referred to works well as a motor, but it would work better if two or three layers of the winding of the field magnet were omitted. 2. Can the stumps of electric light carbons which have been used be utilized in making a battery? A. Yes. See SCIENTIFIC AMERICAN, Dec. 17, 1887, and Oct. 27, 1888.

(451) Advance.—We advise you to consult Herring's Dynamo Electric Machinery for the information you desire.

(452) A Tyro asks if dynamo described SUPPLEMENT, No. 600, can be used as a motor, and if so, of what power with a current of say 110 or 220 volts. A. The dynamo referred to will develop about one horse power.

(453) A. F. W. asks for the best and cheapest way to amalgamate zinc, used in Bunsen battery. A. Place a very little mercury and some dilute sulphuric acid on a plate. Wet the zincs with acid and rub them with the mercury, using a piece of galvanized iron to pick it up. Or you may get a little mercury to adhere to one zinc and then may spread it by rubbing one plate against the other.

(454) L. D. Le N.—It is impossible to identify a plant from merely a strip of cuticle taken from the stem. It will be necessary for you to send the flowers and leaves of the plant, properly pressed and dried, and inclosed between sheets of cardboard to prevent breakage during transmission.

(455) M. H. N. asks: How can I etch my name on a lantern globe? Also, what acid is used for etching on steel or iron? A. Paint all around the letters of your name with black varnish, and protect the rest of the glass with paper. Let fall from a funnel a small stream of emery, about No. 50, upon the letters of the name. When sufficiently cut, clean off the varnish with turpentine. Also see query 456. Use weak nitric acid to etch steel and iron.

(456) H. E. B. asks: 1. How much water would waste from a boiler carrying 100 lb. of steam, through a hole in the boiler of 1-16 inch in diameter? Also through a hole of 1-32 inch in diameter in one hour's time? A. Provided the holes were straight and round, the discharge would be 45 gallons per hour from the 1-16 inch hole, and 11 gallons per hour from the 1-32 inch hole. 2. About what per cent of power is utilized in that class of small water motors that run by having a stream of water (under pressure) play against the cups on the rim of the wheel? There are several in a neighboring town, run by water from the city water works. A. 55 to 60 per cent for wheels with open buckets. With jacketed buckets running in a case, or with concave buckets or cups, the power realized may rise to 75 per cent. 3. Supposing the water wheels were made hollow, and from projecting arms the water was ejected backward from the way the wheel was running, and so run by reaction, would it not give just as much power as does the present style of wheels that run by direct action, same as the wheels in my second question? A. In the reaction wheels as high as 80 per cent has been claimed. There is a mechanical difficulty in connecting the supply through the shaft that interferes with their usefulness. 4. In the electric blowpipe described in SCIENTIFIC AMERICAN of February 2, if the other end of the magnet was presented to the arc, would it repel the arc same as it does in that figure? A. Both poles are repellent to the electric arc. 5. Of what does the arc consist? Of fine particles of carbon? A. Fine particles of carbon are carried between the points by the electric current.

(457) D. E. W. asks: 1. Is Brown & Sharpe's wire gauge the same as the American wire guage? A. Yes. 2. In the simple electric motor will it hurt the working of it if I paint the coils on the field magnet and armature? What kind of paint shall I use? A. No. Use shellac varnish, with any pigment to suit. 3. By the word "abut" do you mean to overlap or simply touch? A. To touch at the ends. 4. If the armature ring is wound with No. 18 wire, should the field magnet be wound with No. 16 or 18? A. No. 16. 5. What is a shunt? A. A branch circuit. 6. In a Leclanche battery of what are the pieces on each side of the carbon plate composed? A. Black oxide of manganese and a small quantity of shellac. Another formula gives the following: Oxide of manganese 40 parts, carbon 52 parts, gum lac 5 parts, bisulphate of potash 3 parts, compressed at 300 atmospheres at 212° F. 7. Would the whole carbon surface of a Leclanche battery be enough for one cell of the bichromate plunge battery? A. Yes; but it is not in the right form. 8. Could you give me simple instructions for making a storage battery for experimental work? A. Consult the SUPPLEMENT.

(458) F. W. T. asks how to go to work to make a vacuum, and what machinery would be necessary and where obtained. A. You can produce a partial vacuum by driving the air out of a vessel by means of steam, then condensing the steam; also by means of an aspirator or air pump. If you want a high vacuum, you must use a Sprengel or Geissler air pump. You will find the names of dealers in vacuum machinery in our advertising columns.

(459) H. H. A. writes: 1. Is it advisable or possible to use two different styles of batteries on an electric bell circuit, for instance, the Leclanche and Gassner's dry battery? A. It is not generally done, but the combination mentioned might answer. 2. Which is the best battery for ringing bells? A. For open circuit work the Leclanche or some form of salammoniac battery is generally employed. For closed circuit a bichromate couple is most economical.

(460) E. B. K. writes: Are hens' eggs manufactured in any artificial way, and sold in the market, so as to represent the genuine article? A. No; but dried eggs are sold for use in cooking.

(461) W. C. asks: Can you recommend any method for taking out the lead from the grooves of a badly fouled rifle? Have tried coal oil and turpentine. Is there no chemical which will dissolve the lead and not injure the rifle barrel? A. Clean the inside of the barrel with a strong solution of caustic soda, wash with hot water, and close one end with a pine plug. Pour into the barrel 2 or 3 ounces mercury, plug the end, lay the barrel level, and occasionally turn it over, so that the mercury may come in contact with all parts. In a

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few hours it will be ready to clean in the usual way with swab and good petroleum oil, or cylinder oil if it can be obtained.

(462) J. M. S. asks by what process the shades of an ordinary student's lamp can be dyed in red, blue, and green. A. Give the shades a thin coat of oil paint of transparent quality, such as carmine, Prussian blue, gamboge, etc. If there is trouble in applying the paint, first go over the glass with a solution of egg albumen in water, and paint when perfectly dry. Or dissolve gelatine in water, color with aniline colors dissolved in alcohol, and paint with this. The latter will sooner or latter fade, and will possibly flake off under the effects of heat.

(463) J. A. S. asks: Will any amount of German silver resistance wire in a circuit annihilate the force of current? To your knowledge, is there any electric lamp in which the light may be gauged like an oil lamp? A. A resistance coil of German silver or other wire will reduce the force of an electric current, but at the expense of energy. No practicable lamp variable in intensity is on the market. The only method to reach such a result would be in some way to alter the amount of filament heated.

(464) C. F. H. asks (1) how to clean ivory keys of a piano that have grown a little yellow. A. You might try sponging them with hydrogen binoxide. Possibly gentle rubbing with whiting and water would improve them. 2. A good polish for the outside case. A. Rub with the palm of the hand moistened with water and sweet oil. See answer to query No. 197. 3. Also a good receipt for good bass violin resin. A. See answer to query 297.

(465) J. F. S. says: I have a boat 25 feet long, 4 feet 11 inches wide, 20 inches draught. What would be a good sized engine to put in it? Which would give the better satisfaction—coal or oil fuel? What heating surface do I require for an engine 3½×4 to give good satisfaction? Has a coil boiler any advantage over a porcupine? A. Your boat requires a 3 horse power engine. The size of your engine is right, and will require 42 square feet of heating surface for satisfactory work. Oil fuel as applied by the Shipman Engine Company is a very satisfactory arrangement. We do not know of any advantage of a coil boiler over the "porcupine" form for a boat.

(466) P. H. R. asks: 1. Is there any better material than common white glue for putting together a violin? A. Use glue. 2. What is the best material for finishing and polishing the same? A. Stain with alcoholic solution of gamboge, give the violin twelve or fifteen coats of varnish, and finish if desired by polishing with a little oil and pumice, followed by dry tripoli and a silk cloth. The varnish must dry several weeks before polishing.

(467) R. W. P. writes: 1. What is the candle power of a common Argand lamp? A. 12 to 20 candles. 2. Will 2 two-quart Bunsen cells run an 8 candle power incandescent lamp, and if not, how many will? A. No. Six or eight will be required. 3. Are there Edison 8 candle power incandescent lamps manufactured? A. Yes.

(468) Machinist writes: Will you kindly through your paper give the rule for finding dimensions of safety valve for boiler, that is, proper size, the boiler should have? A. By the regulations of the United States Board of Supervising Inspectors, safety valves for marine boilers shall have an area of not less than one square inch to two square feet of the grate surface in the boiler. The practice among engineers varies somewhat for stationary boilers, some assigning one square inch area of valve opening to 25 square feet of heating surface. This is a good rule, but as the trade sizes of safety valves are of fixed areas, it is always safe, when the computation falls between any trade size, to adopt the next size larger.

(469) H. L. S. asks (1) for a good recipe for a mixture to be used for soap bubbles; a cheap enough one if possible, so that it could be used in large quantities for a soap bubble party. A. Cut up Castile soap into fine shavings, place one part in a clean bottle with 40 parts of rain water, and let it stand for a day with repeated shakings. Let it settle a few hours and pour off the clear solution; if necessary, filter through flannel. 2. Also is it dangerous to blow bubbles filled with hydrogen in the vicinity of electric lights? A. No.

(470) P. C. M. writes: Will you please give receipt for making a stencil paint—color, black? Something to be applied to a painted surface and to receive a coat of varnish as a finishing coat. A. Make the stencil paint with lamp black and turpentine and add a little varnish, only enough to prevent the stencil mark from spreading when the articles are varnished.

(471) W. W. M. asks: 1. Will the simple electric motor in SUPPLEMENT, No. 641, answer for a dynamo? The direction of the current seems to be the same. A. Yes. Use finer wire on the armature, and make the field magnet of cast iron. 2. Will soft iron do for the field magnet of a dynamo, or must it be cast iron? A. Cast iron is preferable. 3. Will the commutator and drum armature used in the motor do in constructing the eight light dynamo? It is so much easier made, especially the commutator. A. Yes. 4. If so, will it be better to have 24 coils and 24 screws in the armature and commutator than 12, as in the motor? A. Yes. You can economize space by widening the brushes and arranging the screws zigzag.

(472) F. F. Z. asks for a good receipt for aquarium putty. A. Mix 15 parts Burgundy pitch with 2 to 4 parts gutta percha in shreds. 2. What is used to polish cuffs? A. A heavy highly polished iron. A little spermaceti or paraffine may be mixed with the starch. 3. What would an electric plant with a gas or water motor cost, enough to light up a store and 6 rooms, say 15 or 20 Edison's incandescent lamps, and what would the cost be a month to operate same? A. We cannot undertake to supply such estimates. Address some electric manufacturing company. The cost of running would depend on the price of gas or of water power.

(473) J. D. M. writes: Can you tell me how to analyze mixed paints? Is there any work that will give me the desired information, both qualitatively and quantitatively? A. Quite troublesome problems in chemical analysis often arise in the analysis of paints. A good knowledge of analytical chemistry is required, which books alone will not give. We can supply all desired works, such as Shepherd's Chemistry, $1.50, or books on paints, such as Condit's Painting and Painters' Materials, $2.25, free by mail at the regular prices.

(474) E. J. O. writes: I have made an induction coil 4 inches long with a No. 18 primary wire, and the secondary of Nos. 34 and 36 wire. It gives a powerful shock with one cell battery, but is felt stronger in one hand than in the other. Would like to remedy this trouble. If not too much trouble, will you please tell me what is the matter? Did I do right in using two sizes wire in the secondary? Also made a larger, using 1¼ pounds No. 36 wire, according to directions in SUPPLEMENT, No. 160. Although the coil would give with one cell Grenet battery a quarter inch spark, the shock could be taken much easier than that from the little coil when its spark was less than one sixteenth of an inch. Moreover, when sliding the core in the larger coil the strength of the current would gradually increase until the core was about half way in, when, on pushing the core in still further, the current became weaker. Will you also please inform me what was wrong in this case? A. It is possible your trouble may be in your hands rather than the coil. One hand may be more sensitive than the other, or one hand may have been dry and the other moist. Although one size of secondary wire is preferable to two sizes, the difference will not be noticeable in your small coil. Possibly you do not use current enough or perhaps your core short circuits the primary coil.

(475) J. W. P. writes: I have completed the dynamo described in SUPPLEMENT, No. 600, but have made it two inches longer. The current started with one Bunsen cell, it seems to give a strong current. It melts 13 inches of No. 32 iron wire. Had no lamps to try its power. I would like to ask a few questions through Notes and Queries. 1. How shall I connect it up to get the best result for arc or incandescent lamps? A. Add two more layers of wire to the field magnet and connect it up as a shunt machine with a variable resistance in the circuit of the field magnet. 2. How are the wires on field magnets numbered? Do Nos. 1 and 5 represent the outer and inner ends of the first or of the last coil? A. Nos. 1 and 5 represent the beginning and end of the first coil, Nos. 2 and 6 the beginning and end of the second coil, and so on. 3. How many amperes and how many volts ought it develop if run at say 2,300? It has 15½ pounds of No. 18 wire on field and 3 pounds of No. 20 on armature. A. A current of about 10 amperes with a pressure of about 75 volts. 4. What number and length wire is used in making the Wood ammeter and voltmeter described in SUPPLEMENT, No. 628? A. We have no information other than that published.

(476) F. J. K. asks: 1. What preparation and how made (or in what proportions) should be used for the inside of the egg chamber of an incubator (made of yellow pine), that will be proof against moisture and heat, to prevent the wood opening and swelling? A. Two or three coats of shellac varnish will keep moisture from penetrating the case of an incubator. 2. What is the best non-conductor that can be used between the two cases of an incubator? A. For an insulator use cotton wool or powdered charcoal. 3. What can be used to bring out the grain of yellow pine and at the same time oil and harden it, and how done? A. Shellac varnish one coat and oil with boiled linseed oil or varnish with clear copal. 4. Will moisture be prevented from forming between the glasses one inch apart if they are put in air tight? A. Put the glasses in place in cold dry air, and, if tight, they will not show moisture. See answer 203.

(477) F. W. writes: Astronomers claim that the moon's surface is subject to a degree of heat corresponding to about 500° of Fah. scale, when exposed to the sun's rays, and that it cools down to 250° below zero when not so exposed. How can that be, when it is also claimed that the moon is without an atmosphere? How then about the eternal snows on Mont Blanc and other high mountains, a fact accounted for by a rarefied atmosphere? A. The sun shines on any spot on the surface of the moon for about 14¾ consecutive days, and during the long lunar night, in length equal to the day, the radiation is very great. The absence of aqueous vapor from the moon is one great cause of the difference, which is fairly computed, as stated in astronomy, from the known effects of solar heat by day and radiation by night, as observed at high altitudes, on the earth, at which points there is little air and aqueous vapor between the ground and the sun.

(478) G. A. B. writes: I have a dried antelope hide. It is quite stiff and somewhat offensive in smell. What shall I do to make it soft and pliable, suitable for a rug or a cushion, and how deodorize it? A. To tan skins with hair on: Soak the dry skin from 12 to 16 hours in water, then scrape off all flesh and return to fresh water for 8 hours longer. Wash in warm water with enough sal soda to make the water feel slippery to the fingers. Wash in warm soap water, and rinse through two or three waters. Make a solution of 2 gallons water, 2 pounds Glauber's salt, 1 pound alum, 1 pound salt, ½ ounce sulphate zinc, 1 pound terra japonica, by heating over a slow fire. Immerse the skin in the cold solution and handle by pulling and stretching for three to four days, then rinse through three clean waters, wring as dry as possible, and hang up to dry. When nearly dry, work the skin to soften it by the hands or on a bench, and stretch on a board or table.

(479) L. D. C. writes: 1. Which is the most reliable and (if possible) simple continuously self-registering thermometer? I understand that metallic thermometers, as generally constructed, are not sensitive enough to register slight variations of temperature—1° to 2° Fah. A. We think that you will find a registering thermometer by a first class maker, such as Negretti & Zambra or Green, is accurate to fractions of a degree. 2. There is a device for photographing the thermometer indication, which consists of a piece of sensitive paper, moved behind a thermometer by clockwork, and acted upon by the rays of light admitted over the column of the thermometer. But the question arises: Can the aperture admitting the light to the sensitive paper be adjusted easily in such a way as to prevent the light from passing on the sides of the column? A. The column can easily be photographed, the spaces at the side of the column can be easily masked, and the entering rays parallelized so as to avoid parallax errors. 3. Which is the best sensitive paper to be used in connection with the above device, and how prepared? A. Gelatino-bromide paper would be excellent. 4. What is the most reliable and recent text book on physics? A. Danieli's Physics, $3.50, or Ganot's Physics, $5.00, which we can send by mail at price named.

(480) A. writes: Please give a receipt for taking out writing, something that will not injure the paper; also is there not a chemical that would restore the original if applied? A. An excellent method is to use heavy blotting paper soaked in oxalic acid and dried. Slightly moisten the writing and press this on it, repeating the moistening and application of the paper until the ink disappears. Afterward moisten and dry with plain blotting paper. The ink cannot be restored if thoroughly erased. Moistening with an infusion of nutgalls may restore it to some extent if any iron oxide is left on the paper.

(481) B. F. S. writes: If any of your readers have tried to run dynamo with a windmill in connection with a secondary battery, will they kindly give results? I wish to light a private residence with incandescent lights, by wind power if practicable. A. By attaching to the dynamo an automatic regulator or cut-out, which will open the circuit when the speed of the dynamo diminishes beyond the prescribed limit, it is possible to charge secondary batteries by power derived from a windmill. Another plan would be to pump water with the windmill into an elevated tank, and run the dynamo with a water motor. 2. Do you consider the eight light dynamo described in SUPPLEMENT, No. 600, competent to do regular business? A. The dynamo is perfectly competent. 3. Which way would be the better one to wind it? A. Wind as directed.

(482) A. B. F. writes: In setting poles for electric light or telephone, what is the best preparation to prevent them from rotting in the ground? At what season of the year is it best to cut poles for above purposes? A. Soaking the ends of the poles in a strong solution say of 20 pounds sulphate of iron to 100 pounds water for 24 hours is probably the cheapest and most effective process for preserving wood that is to be placed underground. A tank of wood of sufficient width and depth to allow the ends of the poles to be immersed to the proper distance when raised at an angle, and of a length to accommodate as many poles as will furnish the necessary supply for the progress of the work, is all the appliance needed, save the solution. Creosoting is better, but requires expensive apparatus for its application. December and January are the best months to cut telegraph poles.

(483) J. A. B. asks: 1. What kind of paint is used in decorating glassware, and what amount of heat is required to bake it on? A. Mineral paints composed of various oxides, such as iron, cobalt, or manganese oxides, are used. A full red heat is needed to bake them. 2. How to silver glass (hollow tubes). A. Make an alloy of equal parts of lead, tin, and bismuth, add the latter last, skim off the dross, and add to 1½ parts of alloy 5 parts of mercury; stir well. This amalgam, carefully introduced into a clean tube and slowly moved about, is said to give a good coating. Or you may use an ammoniacal solution of silver, 1 ounce nitrate to 1 pint distilled water and ammonia enough to redissolve the precipitate first formed on its addition; then add ¼ ounce honey. Fill the tube with this and boil it for 10 to 30 minutes. 3. How to etch on glass? A. Coat with melted beeswax, draw the design through the wax, and expose to the vapors of hydrofluoric acid generated in a lead pan from a mixture of fluorspar and sulphuric acid. Also see query 444.

(484) W. F. W. asks: 1. When a secondary battery of 20 cells is fully charged, for how many days, for four hours each day, will it supply a current for one 16 candle power incandescent lamp? A. It depends on the size of cell. One typical cell gives 350 ampere hours. A fifty volt lamp would require rather less than 1¼ amperes of current, so that the battery in series would last 250 hours or for about two month as you use it. 2. How many hours will it require to charge such a battery with a dynamo giving a current equal to 10 Bunsen cells? A. The data are insufficient. You can charge it at about 38 amperes and 2½ volts in ten hours; for less amperage in proportionately more time. 3. Will the light be just as brilliant when the battery is nearly exhausted as at first? A. Yes; up to near the end. 4. How can one determine when such a battery is fully charged? A. By the specific gravity of the solution and by gas coming off, or by means of a current meter.

(485) W. P. A. writes: I have just had a discussion with a party who holds that a locomotive running at the rate of forty miles an hour will require less force to keep up that speed than it would to keep its speed if running only one mile an hour. I contend that the force required would be the same, if it were not for the increased atmospheric friction that would have to be overcome by the faster locomotive. A. The journal friction due to variable locomotive or train speed, within certain limits, is nearly a constant. At velocities of the bearing surfaces of about 15 feet per second, M. Poiree found that friction seemed to decrease slightly with increase of velocity. Train resistance at increasing speeds is made up not only of air resistance against the cars, but every moving surface that goes to make up a train, including engine and tender, wheels and axles, as well as all reciprocating parts, partake of the air resistance to motion. The inequalities of track, imperfections of wheel tread, and vibration in all parts of engine and train add to resistance as the speed increases.

(486) J. B. writes: Could you give me any particulars as to how the marbled appearance is given to the wrought iron gray enameled hollow ware, such as used for domestic purposes? A. The vessels are coated by dipping with a finely ground silicious frit mixed to the consistency of cream, with water. After this has dried perfectly, they are fired for a few minutes until the coating melts. The iron of the vessel rusts a little during the drying and this oxide dissolves in the enamel and produces the mottled effect which extends through the coating.

(487) A. E. S. writes: 1. I have made an induction coil and it does not work satifactorily. Will you please be so kind as to tell me what the trouble is? A. For induction coil and construction and management of same, we refer you to our SUPPLEMENT, Nos. 160 and 569. 2. How long will a 16 candle power incandescent lamp last? How many hours? A. About 400 hours. 3. For what purpose are secondary batteries used, and of what manufacture are the best? A. Storage batteries are used principally for lighting, and also for driving motors. The Julien, the Plante, or the Electric Accumulator Company's batteries are all good.

(488) J. A. G. asks for (1) a waterproof non-heating substance for coating leather, that will allow common glue to adhere firmly. A. Glue itself on leather becomes waterproof. Coat the leather with glue size, adding, if you wish, one-tenth the weight of the dry glue of bichromate of potash to the solution, not exposing it to the light until applied. 2. A solution or means of cleansing old paint brush stumps, by steam or otherwise. A. Benzine, turpentine, or caustic potash. The latter must be weak, or it will attack the bristles.

(489) E. J. F. writes: 1. Will a plunge battery with six carbons 6×9 do to excite the field magnet for the hand power dynamo described in SUPPLEMENT, No. 161? A. Yes. 2. Do you connect the zinc to the carbon, or zinc to zinc and carbon to carbon? A. Zinc to carbon.

(490) M. A. C. writes: Can you tell me how I can color or dye cow horns? How shall I treat them to bend or shape them? A. Immerse in warm soap and water for a few hours, and then dye as you would any other material. To bend, subject them to boiling water and bend while hot.

(491) F. E. H. writes: 1. I have a medical battery which I work by a bichromate battery. My battery is uncovered, and the strength seems to evaporate. Is it necessary to have my battery covered? A. No. You need new solution, and probably should amalgamate your zincs. 2. When you make an induction coil for a medical battery, and wind it with two sizes of wire, do you connect the fine and coarse wires? A. No. Each coil is separate. See our SUPPLEMENT, No. 569, for full description of a medical induction coil.

(492) Amateur writes: 1. What is quickest method of manipulating wall papers previous to applying the AsH_3 test? I have been dissolving them in strong H_2SO_4, but think there is a neater way. A. Treat the paper with any strong mineral acid and filter after dilution, or dissolve in hot strong hydrochloric acid, adding from time to time a very little potassium chlorate until a clear solution is obtained. 2. Flashing point of illuminating oils. How obtained? A. Heat a dish containing a sample of the oil on a water bath, suspend a thermometer with its bulb immersed in the oil; sweep a very minute flame over the surface every few minutes until a flash is perceived, note the temperature. 3. Having a quantity of soluble glass which I wish to make into a cement, will glue, gelatine, or white shellac thicken the same? How should they be first treated? A. Use it alone or mix with hydraulic cement. 4. Is there a yellow soft solder? A. None that we know of except mercurial solders. 5. In making a thin emulsion of wax and spermaceti, what is best to use? A. Thinning with turpentine may answer; the solution may be emulsified with gum tragacanth and water.

(493) P. J. W. asks: 1. If there is any substance that he can mix with plaster of Paris so that it will adhere to stone and china ware, without cracking when it dries. A. Mix the plaster of Paris with strong solution of alum. 2. How plaster letters are put on pasteboard boxes? A. Probably some composition of glue and plaster would answer. You will find other mixtures among our queries.

(494) D. J. W. writes: Will you please inform me, through the columns of the SCIENTIFIC AMERICAN, how to test a steam boiler with a force pump and water? How many pounds pressure should a boiler stand, tested in this manner, to be pronounced safe? What kind of gauge should be used, and will an ordinary steam gauge answer? Does it make any difference about the size of boiler in regard to steam pressure, that is, will a small steam boiler with 50 lb. pressure be under any greater strain than a larger one with the same pressure? If a boiler burst while being tested with water, will the result be the same as if bursted by steam? Explain the difference fully. Will a 4½ or 5 H. P. engine have power enough to run a small pony wood planer? The planer has three knives about 24 inches long. If this engine is not large enough, what size cylinder will be? A. Steam boilers should be tested cold or nearly cold to 50 per cent more pressure than the steam pressure intended to be carried. Attach the testing pump connection to the feed pipe, if possible between the feed valve and the check valve. The pressure gauge attached to the boiler will serve for testing if no other can be had. The gauge dial should read to more than 50 per cent addition to the regular pressure to be carried. Close the steam valve and other outlets, pump the boiler full of water, allowing the air to escape through the safety valve. Then set the safety valve weight to the required test pressure by its figures, or a little more if the figures on the lever do not coincide with the test pressure. Then pump up the pressure until the required amount is reached by the gauge, and if the safety valve is set at just the required pressure, see if it agrees with the gauge reading. If the safety valve is set at the next notch higher than the required pressure, pump the pressure up until a comparison can be made. Then examine every part of the boiler for leaks or apparent weakness, particularly around stays, tubes, and seams that may be exposed to rust. Then draw off excess of water. The pressure in a boiler increases the strain upon the shell in proportion to the increase in size. Boilers, as generally made, are good for 50 lb. steam pressure up to five feet in dia-

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meter. For higher pressure an extra thickness of iron or steel is used, and the horizontal seams double riveted. The failure of a boiler under test pressure when full of water is harmless to surroundings, as there is no magazine of expanding energy to increase the explosive force beyond the instant of rupture, from the fact that cold water is a solid or non-compressible body, totally different from hot water at the temperature due to the pressure, which is ready to burst into a thousand volumes at the moment of rupture.

(495) W. A. asks: 1. What animals are the hides taken from of which belt lacing is made? A. Belt lacing is made principally from Calcutta hides, which are small and thin. Also made from hides of young cattle of the U. S. or South America. 2. Is mesmerism an accepted science? A. Mesmerism is not an accepted science. 3. What material can be used to clean windows of rolling mills that are coated with smoke and gas? We have tried turpentine, naphtha, coal oil, soft soap, etc. A. Try a strong solution of caustic soda to clean the glass, and polish with chalk. 4. I put some sleigh bells in a cleaning cylinder with some dog chains, putting in an unusual amount of leather scraps, almost filling the cylinder, but upon taking them out, the whole thirty were broken. Please tell me the cause. A. Sleigh bells are almost as brittle as glass, and often crack in ordinary use. They break in the tumbler by striking the iron shell as the mass rolls over. 5. The windows in my shop have 10 in. by 13 in. glass in them; there is a part of a particular pane that casts a perfect shadow; we can see through it as well as any other. Can you explain this result? A. By close examination the window glass will be found to have an uneven thickness, which influences the parallelism of the light rays, so as to concentrate the light in some parts and leaving other parts dark, on the principle of a lens.

(496) G. M. writes: 1. Would there be any demand for a loud-speaking telephone, one that could be heard in a large room as loud as a person would speak in a natural tone of voice? A. A practical telephone of this kind would be valuable. 2. Has any such telephone ever been devised? A. Loud-speaking telephones have been made, but they are not as loud as the human voice in ordinary conversation. 3. Why is it that some telephones will reproduce musical tones better than ordinary speaking tones? There must be some reason for it? A. Speaking tones are far more complex and irregular than musical notes, and are more difficultly reproduced. 4. If the theory of conservation of force is correct, and also that electricity is a mode of motion, how do scientists harmonize the two theories as exemplified in the permanent magnet, for they argue that magnetism is caused by electric currents, but to produce an electric current, there must first be motion or energy; but after once magnetized in a piece of steel, we have motion forever, or perpetual motion; but they say there is no such thing as perpetual motion. A. The theory of the conservation of force has long been abandoned as untenable, and in its place the doctrine of the conservation of energy has been formulated. In the permanent magnet, we have a perpetual or long-existing center of force, but not of energy. A magnet cannot drive a machine; if it could, then perpetual motion might be possible. But this never has and never will be done.

(497) C. E. S. writes: 1. I have a lot of electric light carbons; some of them are lighter and more brittle than others, and some are of higher resistance. Will one be as efficient as another for use in batteries, or which would be best? A. Other things being equal, the harder and better conducting the carbons are, the better the results will be in their use in batteries. 2. Why is it that I cannot make a perfect casting in a plaster of Paris mould, using brass type metal or lead? Perfect vent holes and moulds allowed it to dry perfectly before use. A. Plaster of Paris "sets" by combining with and retaining water. This it evolves as steam when heated. This interferes with its use as a material for moulds. It should answer for fusible metals, but will hardly do for brass, etc. See SUPPLEMENT, No. 17, for how to mould in plaster of Paris.

(498) S. H. writes: 1. Is there any cheap material to put into spirits of turpentine so as to give it a pleasant smell? Am not particular to the kind of smell, only I do not wish it to smell of turpentine at all, or at least very little. A lot of people, when they are having their houses painted inside, complain of the smell of turpentine. I thought there might be something put into it so as to give it a perfume. A. We can recommend no efficient treatment. 2. Can you recommend anything to make benzine perfectly odorless, say by the addition of any other liquid? A. Benzine is purified by treatment with bichromate of potash and sulphuric acid.

(499) B. B. B. asks: 1. Is fine clay dust (made in mining coal) explosive? A. Not unless it contains organic matter. Coal dust is the agent in producing mine explosions—not clay dust. 2. If so, what per cent of dust in the air is necessary to make it explosive? A. The exact percentage of coal dust is not known. It often acts to aggravate gas explosions rather than as a primary cause. 3. Is there any mechanical device to ascertain the per cent of dust contained in the air in mines? A. Collect a bottle full of air and let the dust settle. By knowing the volume of the bottle and weight of dust, you have the necessary data.

(500) G. H. R. L. writes: 1. Would a mechanical arrangement that, being once started, and would continue to move until it wore out, have any claim to perpetual motion? A. Not necessarily. 2. Is there any such arrangement? 3. Please describe, and who was inventor? A. We know of none. 4. Please explain best way to cure pork in our hot climate in summer time. Would it be advisable to cut it into small chunks? A. Use strong brine and keep the barrels covered. We can give no special instructions.

(501) H. A. B., Ithaca., writes: Will you kindly inform on the inclosed question in optics, which I cannot solve satisfactorily from anything that I have at hand? A spherical lens will not give a perfect focus, but requires correction for spherical aberration, and also for chromatic aberration. A perfect parabolic lens, of any good glass, will give a perfect focus. Now, will such a lens require correction for chromatic aberration, and if so, why? A. The form or curve of a lens controls only the direction of monochromatic light to a common focus, so that a parabolic lens will bring any of the colored rays composing white light, as blue, red, yellow, etc., to a perfect focus; but as white light is composed of a number of colors, all having different refrangibilities, the glass acts upon the different constituents of light according to their wave lengths, and so separates the different colors into as many different images focalized along the optical center at distances due to the refractive index of each color. These superimposed images, so close together, produce to the eye a common confused image, as observed in the image of all single lenses. To correct this, the discovery of the different dispersive powers of various kinds of glass enabled a correction to be made, as in the achromatic object glass. See Glazebrook on Optics, which we can mail for $2.25. Also, see SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 581, 582, 583, On Astronomical Telescopes and their Object Glasses.

(502) R. E. G. — Study and practice must be combined to make you an electrical engineer. If a college course cannot be taken, a position with an electric company should be secured. For books we recommend and can supply you with Thompson's Dynamo-Electric Machinery, $5; Thompson's Elementary Electricity and Magnetism, $1.25; Electricity in the Service of Man, by Wormell, $6; Practical Electricity, by Ayrton, $2.50; Atkinson's Electric Lighting, $1.50.

(503) C. A. B.—We recommend Locomotive Engine Running and Management, by Sinclair, $2. Also Roper's Hand Book of the Locomotive, $2.50. These will give you full information on the subject you desire.

(504) W. E. P. asks for a recipe by which mercury is made adhesive to glass. A. If a perfectly clean surface of melted alloy is brought into contact with perfectly clean glass, it will generally adhere thereto on solidifying. Mercury is poured upon tinfoil, and alloying with the tin forms an amalgam or alloy of tin and mercury. Perfectly clean glass is caused to slide over the amalgam with its forward edge below the surface. The amalgam, if not too liquid, adheres. Consult any encyclopedia, under looking-glass, to see the process described in more detail. Pure mercury will not adhere to any extent, because it is liquid.

(505) J. C. C. writes: Is there a cement that will adhere to metal, harden quickly, and stand a heat of 240° F. without softening? A. Use fusible solder; we know of no really reliable cement except white lead and linseed oil, or silicate of soda compositions. Good white lead ground in oil might answer.

Enquiries to be Answered.

The following enquiries have been sent in by some of our subscribers, and doubtless others of our readers will take pleasure in answering them. The *number* of the enquiry should head the reply.

(506) T. H. S. asks: Can any of your readers inform me how I can remove from an old wooden tavern sign a coat of paint put on it say fifty years ago, so as to leave the original picture painted on it over 100 years ago intact?

(507) C. H. asks: Through what cheap process (preferably a solution) may sheet tin be subjected to give it the appearance of being a composition of metals, such as zinc, brass or copper, and iron, so that the chemical used will have no detrimental effect on the tin?

Replies to Enquiries.

The following replies relate to enquiries recently published in SCIENTIFIC AMERICAN, and to the numbers therein given:

(41) To Consume Stumps by Fire.—Crude petroleum, with a little saltpeter added, will render stumps combustible. The petroleum costs about two cents a gallon, the proportion of saltpeter I can't now give. Test or judgment must settle it. Bore a ring of inch holes equidistant between the bark and the center of stump to within a few inches of the bottom, fill the holes and keep them filled up as fast as it is absorbed by the wood. Dig the soil from around the stump some distance down. A temporary cover should be put over the stump to keep off the rain. Six weeks of dry weather will suffice.—T. H.

(191) F. A. L. S. wishes to know how to Restore Oil Paintings that are Cracked.—See paper on deterioration and restoration of oil paintings by R. Liebreich, M.R.S., in SUPPLEMENT, Nos. 149 and 151.

(203) A. T. D.—To Prevent Double Windows from Condensing Moisture and Frost.—In Russia, where all dwelling houses are provided with double windows, the sweating of the glass panes is successfully prevented through the use of a small quantity of sulphuric acid placed in a flat pan or cup between the two windows.—A. TENNER.

(253) M. S.—Resin for Electrophorus.—Make the die of electrophorus of equal parts resin, shellac, and Venice turpentine, and there will be no trouble in electrifying it. The turpentine is not necessary, but will prevent cracking.

(318) E. E. P. — Plastic Composition used for Wall Decorating.—Boil 1 lb. glue in gallon of water, add 2 lb. whiting; 2 lb. plaster Paris; 1 lb. white lead (such as comes in kegs mixed in oil). If above is too thin, add more whiting; if too thick, more water. The more white lead you use the slower it dries. House paint can be added to color, or same can be painted after it has set. Then varnished, gilded, or otherwise ornamented. Use an old whiskbroom to apply. Designs can be impressed with sharp stick or finger. The above mixture ought to dry in twenty-four hours.

(329) D. T. M.—If the hardness of the water is due to bicarbonate of lime, add sufficient lime water to convert the bicarbonate into the very sparingly soluble carbonate. This is the Clark process, for a description of which see SUPPLEMENT, No. 270. For softening magnesia-hard water, see SUPPLEMENT, No. 187.

(363) G. W.—Area of Smoke Stacks.—The formula for chimneys for boilers is area $= \frac{\text{H. P.}}{1{\cdot}45 \times \sqrt{h}}$ in square feet; h=height. A common practice, for iron smoke stacks for medium sized boilers, is to allow 25 square inches of chimney area for each square foot of grate surface. See Nystrom's Mechanics for a valuable table of heights, areas, and horse power of chimneys, $3.50, which we can mail. E. D. L. sends rule: Multiply the h. p. by 112 and divide the product by the square root of the height of chimney for the area in square inches.

(365) S. S. S.—Bass-relief Signs.—Use papier mache alone or mixed with a small quantity of plaster of Paris. Wood pulp may also be used with the plaster. The plaster mache must be used quickly after mixing. It sets quickly and holds the relief cast in shape, and can be cast much faster than the clear papier mache.

(366) G. T.—Domes on Boilers.—From practical experience with steam boilers, I find that a boiler with a dome has a big advantage over one that has none, providing the boilers are of the same style, from the following reasons: The dome serves to carry steam at such an elevation above water line that a much drier steam is obtained, also prevents, to a great extent, the jerking over of water in case of either priming or foaming. There are boilers, however, so constructed, that it is not necessary to have a dome on them.—A. C. D.—

(367) I. P. W.—Street Railway Cable.—The pulling strain on the cable will be about 1,600 pounds, to which should be added the additional friction of grips, in the grooves, for curves and extra roughness of track. This indicates only about 43 horse power on the cable, but the machinery and engine for operating the cable will absorb as much more power, or say 90 horse for a clear straight track under favorable conditions. The possibilities may carry the power to three times the above cable strain.

☞ Books or other publications referred to above can, in most cases, be promptly obtained through the SCIENTIFIC AMERICAN office, Munn & Co., 361 Broadway, New York.

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February 26, 1889,

AND EACH BEARING THAT DATE.

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