ENGINEERING INVENTION.

A locomotive truck has been patented by Mr. Alonzo C. Packer, of Pittsburg, Pa. This invention provides a center plate supported by springs, the latter held by hangers movably mounted on the main truck frame, the range of movement of the hangers being defined by adjustably mounted stop blocks, the construction being adapted to afford the freedom of movement necessary in car trucks in passing curves.

AGRICULTURAL INVENTIONS.

A hand planter has been patented by Mr. Seth Hackett, of Bronson, Mich. Combined with a handle and ground penetrating and opening points, with a spring-pressed pivoted jaw, is a hopper and seed-dropping disk, with other novel features, whereby the requisite quantity of seed may be deposited in each hill.

A grain or hay stacker has been patented by Mr. Donald McRae, of Umatilla County, Oregon (P. O. address, Walla Walla, Washington Ter.) It is a portable stacker whose main feature is a lever pivoted on an upright, and adapted to be swung both vertically and laterally for the purpose of transferring grain, hay, or straw, etc., from a wagon to a stack.

MISCELLANEOUS INVENTIONS.

A folding paper box has been patented by Mr. David J. Rex, of Pittsburg, Pa. It is formed of a single piece of paper of the requisite thickness, the intention being to reduce the waste to a minimum in the making of a class of boxes which are sold by weight, and especially designed to hold tacks.

A horse detacher has been patented by Mr. George T. Parker, of Glasgow, Ky. Combined with the ferrule having the trace stud is a double-armed stud for forcing the trace off the trace stud, there being a retracting spring operating between the arms of the slide, and a tripper, with other novel features.

A horse detacher has been patented by Mr. William B. Walker, of Nevada, Mo. The bolts to secure the traces and breeching straps are normally held by springs, which are connected to draw lines adapted to be operated by the driver to retract the bolts and release the traces and breeching in case horse or horses attached to a vehicle should run away.

A folding hat and coat rack has been patented by Mr. Gayger D. Tolman, of Shawano, Wis. It has a shelf formed of wire, upon which hats may be placed, side frames hinged thereto, with loops to attach them to nails or other supports, and hooks pivoted to the rear and sides of the shelf, the several parts being made of wire and adapted to be folded up together.

A faucet has been patented by Mr. Edwin P. J. Freeman, of Roslyn, N. Y. It is a hollow metal tap screw-threaded on its outer and inner surfaces, to be screwed permanently into a barrel, with a screw-threaded stopper or plug screwed into the inner end of the tap, and an outer faucet to be screwed in provided with a rod or blade for screwing back the plug.

A lightning escape for wire fences has been patented by Mr. Allin Cockrell, of Lamar, Mo. The fence is constructed with a number of sections, in each of which a single strand of wire is extended back and forward between posts, and has its terminals grounded, so that a stroke of lightning will only affect a portion of the fence.

An auger handle has been patented by Mr. Harry Naylor, of Oil City, Pa. It is formed with a cylinder having openings, in the line of which project a fixed notched cross piece and a rocker clamp adapted to move lengthwise of the handle, thereby holding any sized bit in a straight position, while the shank does not touch the cylinder.

A candy machine has been patented by Mr. George Tschinkel, of Brooklyn, N. Y. It has an endless apron with form plates, in connection with a funnel having apertures in its bottom, a bar sliding in ways, with adjustable rods and plungers, and other novel features, whereby candy may be rapidly and conveniently formed into any desired shape.

A wrench has been patented by Mr. Richard L. Mabrey, of Doniphan, Mo. The head ends of the wrench bars have V-shaped transverse notches on their inner faces, to gripe the nut or other object to be turned, and to the lower wrench bar is pivoted a pawl to overlap and engage the upper arm, and hold the bars in any desired adjustment to properly gripe the nut or bolt.

A windmill has been patented by Mr. Joseph S. Marshall, of Clear Water, Kansas. This invention covers a novel construction and combination of parts designed to afford a windmill which may be manufactured at a low cost, and wherein the parts are so connected that the bolts will not be apt to become loose when the woodwork of the mill is exposed to the action of the elements.

A waterproof composition for floors, walls, etc., has been patented by Mr. Charles V. Mittge, of Brooklyn, N. Y. It is made of cement, cream of tartar, pulverized ivory, quicksilver, pulverized isinglass, marble dust, and other materials, in specified proportions and manner described, and designed to make a hard surface capable of receiving a very high polish.

A sawing machine has been patented by Mr. George McCormick, of Washington, D. C. It has a rectangular frame, carried on rollers at its four bottom corners, in which is a sliding frame to support and carry the saw either in horizontal or vertical position, the machine to be operated by two or four men, and being designed for sawing down trees and cutting the felled timber into pieces.

A boot or shoe stretcher has been patented by Mr. John Donovan, of Boston, Mass. This invention covers an improvement on a former patented invention of the same inventor, and provides for a more convenient adjustment of the toe pieces laterally and of the heel piece longitudinally when the stretcher is in place in the boot or shoe, and for the ready interchangeability of toe pieces of various sizes.

A nut machine has been patented by Mr. Alfred Marland, of Pittsburg, Pa. This invention covers a novel construction of machine that first hammers the iron or steel to the desired shape, then slightly presses the blank, to remedy any defects left by the hammering, and punches the eye of the nut while under pressure, without waste of the material other than that in the core.

A pump attachment has been patented by Mr. Thomas Diffley, of Rosemount, Minn. It is to prevent the water in pumps from freezing, a vent tube being secured in the pump tube, about eight feet below the curb, and a valve being arranged in a simple and firm manner in connection therewith, with other novel features, by means of which the escape of water from the pump tube may be easily regulated at the top of the well.

Business and Personal.

The charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

PRINCIPLES OF THE ECONOMIC PHILOSOPHY OF SOCIETY, GOVERNMENT, AND INDUSTRY. Van Buren Denslow, LL.D. Cassell & Co.: New York. 1888. Pp. xxx, 782. Price $3.50.

Within the limits of our space we cannot attempt to review this exhaustive work. Wealth, values and prices, poverty, capital, profit and loss, the land and labor questions, money, and the relations of the State to all these, are considered and treated in great detail. The work is written by a protectionist, who devotes one chapter more directly to free trade, and shows with great clearness the basis for his belief in the doctrine of protecting home industry. The last chapter on state action in relation to special industries is of peculiar interest. In it various leading industries, their progress and development, are considered, both with reference to England and America. This chapter is a complete *resume* of the author's doctrines, and in it the illustrations of the same are presented with much force. In addition to a very full table of contents and general index, a "personal index" is given, in which the references are restricted to proper names alone.

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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.
Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.
Scientific American Supplements referred to may be had at the office. Price 10 cents each.
Books referred to promptly supplied on receipt of price.
Minerals sent for examination should be distinctly marked or labeled.

(1) B. B. A. writes: Having a horned toad in our possession (from California), and not knowing its diet, we are at a loss to know what to give it to eat. A. Its natural food is insects. In captivity it eats very little, and can subsist a long time without any nourishment.

(2) W. E. M. asks if the electromotive force generated by an armature moving in a constant magnetic field will be doubled if the speed of armature be doubled. A. Every dynamo has what is known as its critical speed. Below this it develops very little electrical energy, above it the development increases very rapidly with increase of speed. We can supply you by mail with Silvanus Thompson's "Dynamo-Electric Machinery," price $5, also Carl Herring's "Dynamo-Electric Machinery," price $2.50. These are both excellent works, and are fully up to date.

(3) S. A. S. asks: Does the use of link motion affect the lead of a slide valve or change it to any extent in shifting the link? A. The lead is and is not affected by the movement of the link. Much controversy would be saved by disputants by a positive definition of the subject of dispute. There are two kinds of link motion. One in which the link is stationary with a moving slide or block, carrying the end of the valve rod with it. This makes an unvarying lead. The other form has the valve rod and link block in a fixed line, the link being attached to the shifting bar. This is called the shifting link, and its operation causes a variable lead. This you will find fully illustrated and demonstrated in Edwards' "American Locomotive Engines," $2.00, which we can mail for the price.

(4) E. J. L.—The magnesium light is not adapted for use in enlarging, as the smoke given off obscures the light. If you use the improved gelatino-bromide paper, you can produce an enlargement in a few seconds by the aid of an ordinary kerosene light.

(5) A. T. asks for the formula for vanilla extract. A. Cut 2½ oz. vanilla beans; pour 1¼ quarts 90 per cent spirit over them, digest for some time and filter. Keep in hermetically sealed bottles. This gives the essence of vanilla. The residue may be treated with water, afterward to be decanted, which gives vanilla water.

(6) G. E. S. asks if the friction between steel and rhodium would be great enough to be objectionable, if used in a watch? A. The frictional relation of rhodium as asked is probably unknown, as it has only been made in small quantities and is more expensive than iridium. It is very difficult to manage, and is hard to cut and drill. Rhodium, like iridium, can be highly polished. For experimental purposes in the line of your inquiry, we recommend iridium, because it is a commercial metal largely used in pen making, takes a high polish, and is extremely hard.

(7) G. J. K. asks: 1. Will the power of the motor described in No. 11, March 17, be diminished by wrapping the armature with No. 20 wire, and can I then run it as a motor or dynamo at will? A. Not if the driving current is of proper character for such winding. 2. How is a spark coil made with power enough to light two or three burners? A. Wind four or five pounds of No. 22 wire around a bundle of iron wires, the bundle may be made of No. 16–20 wire, ¾ inch diameter and 7 inches long. We refer you for water motors to our SUPPLEMENTS, in which several are described.

(8) R. F. A. asks: 1. What will remove iron rust from a marble gravestone, caused by some preparation used to clean it? A. Use a solution of 1 part of nitric acid in 25 of water, and carefully applied to spots only, then rinse with water and ammonia. 2. What preparation (a liquid) is used in instruments employed to cure a cold by inhalation? A. Carbolic acid and iodine. 3. Will an electric battery run an induction coil to good advantage? A. Yes.

(9) A. C. McG. asks: 1. What force will a plunge battery of six cells, each cell containing two carbons and one zinc, 4½ x 6, give? A. It would give about 12 watts in an external circuit of resistance equal to its own. This resistance would vary according to the arrangement of the cells. 2. How long would it run two three candle incandescent lamps? A. It would not run them very brightly—with large cups it

might last three or four hours. 3. Would the same run the simple electric motor described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 641? A. Yes. 4. How long would it run the motor? A. Three or four hours or longer. 5. How many six candle lamps will it run, and for what length of time? A. It would run one six-candle lamp about the same time, etc., as two three-candle lamps.

(10) A. O. writes: When a vessel is making a circle, where does she pivot? Some claim that the bow remains stationary and the stern does all the swinging, while others claim that both bow and stern swing, perhaps not equally—that the pivoting point comes nearer amidships. A. A vessel freely swinging under a previous momentum turns upon her center of gravity. The action of the rudder in turning a vessel under a previous momentum carries the pivoting point forward according to the intensity of its action. If under motion by side wheels, the pivoting point is carried back of the center of gravity by the action of the strong current from the wheels, while a propeller turns on a point far forward of the center, and if confined at the bow will quickly move around the bow as a center.

(11) R. K.—Three to five pounds pressure is sufficient for steam cooking of vegetables where the steam is in contact. Less pressure is often used in this way for light cooking. You can make a strong plank tub, well hooped and stayed in a frame that also holds the cover down, that will stand a half to 1 pound pressure per square inch. As you do not give the required size of the chest or box, we cannot further advise.

(12) F. M. D.—You cannot glue a piece of wood to iron that will stay for any length of time. The expansion and contraction of the wood by variations in the moisture of the atmosphere will soon pull the wood from the iron. The best way is to drill a few holes in the iron plate, and screw the board fast from beneath the iron plate.

(13) A. H. F. asks the horse power of an engine having 2½ inches stroke, diameter of piston being 1½ inches, at 50 pounds pressure, intended for running light canoe. Also necessary size of boiler and propeller. A. At 240 revolutions per minute, your engine will indicate ¼ horse power. You will need a boiler containing 5 square feet heating surface. A vertical tubular or a Shipman boiler is suitable for an atomizing burner. A screw wheel 10 inches in diameter with three blades will be suitable.

(14) M. asks: Is mineral water made of marble dust, acid, sirup, etc., injurious to the stomach? A. It is not generally considered so if not taken in excess. 2. What are the properties of quassia chips? How would you make a decoction of it, using one pound of chips? A. The properties of the quassia are those of the simple bitters, and as a medicine it is adapted to cure of dyspepsia and the debilitated state of the digestive organs which sometimes succeeds acute disease. Its preparations are officinal, and therefore we would refer you to the U. S. Pharmacopœia for their manufacture, as detailed descriptions are there given.

(15) L. B.—Yellow brass varies very much in its composition. A good dipping brass may be made with 6 ounces zinc to 1 pound of copper. A crisp, easily turned brass that takes a bright yellow dip is made with 8 ounces zinc to 1 pound copper. The best brass for fine finish and color should have 4 ounces zinc to 1 pound copper.

(16) J. A. H. asks the component parts of a cement that will mend terra cotta pipe so it will resist moisture. A. We know of nothing better than pure Portland cement. If a stronger and harder cement is required, a little water glass or soluble silica is mixed with the cement and quickly used, as it soon sets.

(17) C. B. A.—Consult Arlot's "Complete Guide for Coach Painters," which we mail for $1.25.

(18) C. R. S. asks: 1. Is tricopherous, as a head wash for dandruff, injurious or not? A. Barry's tricopherous is not injurious, and is composed of castor oil ½ pint, 95 per cent alcohol ½ pint, tincture cantharides ½ ounce, oil of bergamot 2 drachms. Color pink with a little alkanet root. 2. What is a good cure for dandruff or method of cleaning scalp? A. To remove dandruff dissolve a thimbleful of refined borax in a teacupful of water; first brush the head well, then wet a brush and apply the mixture to the head. Do this everyday for a week, then less frequently.

(19) W. D. S. asks a process for cleaning oily waste so that it can be used again. A. We know of no better process than to boil the waste in a solution of sal soda strong enough to take up the oil and convert it into a soap, when the waste can be rinsed in clean water, wrung out, and dried.

(20) G. S. asks: 1. In making the simple electric motor into a dynamo, how many layers deep and how many convolutions of No. 20 cotton-covered wire do I want to use in winding the armature? A. Use 8 layers of No. 20 wire on your armature. 2. How do I want to connect it with the wires of the lamps, and what kind of a lamp do I want to use, and where can I get them? A. Connect the wires with the brushes, as in the case of the motor. Use Edison incandescent lamps of 5 or 6 candle power each. You can procure them from any dealer in electrical supplies. By a little experiment you can readily ascertain the best method of connecting up the lamps. 3. Whatspeed do I want to run the dynamo? A. You will have to determine by experiment. 4. Will the current be dangerous? A. No. 5. Will the field magnet have to be turned smooth in the inside for the armature run in? A. It should be bored out. 6. Can I paint the field magnet? A. Yes. 7. Can I use brass or iron boxes for the shaft instead of Babbitt, as I would like to have set screws to take up the wear? A. Yes.

(21) J. J. P. asks: 1. Would the armature of iron wire for the eight-light dynamo be as good as the one built up of iron washers? A. The difference would be slightly in favor of iron rings, if they were made of thin soft iron and separated by rings of tissue paper. The reason of the superiority lies in the fact that an armature core constructed of such rings would have no interspaces. 2. Would it not be better to leave off wooden sleeve and construct armature direct upon the shaft, and hold it in place by the notched end pieces screwed on to thread cut in shaft? A. There is no objection to your method of supporting the armature ring. We do not know that it would have any advantage in the small motor or dynamo.

(22) H. S. C. writes: 1. In the construction of the simple electric motor described in your issue of March 17, we have made the field magnet of Russian iron, as directed, but find trouble in making the strips lie closely together. Will a little space between the strips injure the efficiency of the motor? A. The spaces between the layers of the field magnets should be as small as possible. The spaces between the strips will impair the efficiency of the motor. 2. Also, will the field magnet be affected, if wound with iron wire to keep the strips together? A. We do not think it will materially affect the working of the motor to wind the field magnet with iron wire as you propose. 3. Cannot the armature ring be made of Russian iron like the field magnet? A. An armature core made of iron strips would be more or less affected by induction. 4. Also will you kindly give me a recipe for making asphaltum] varnish? A. Dissolve the asphaltum in turpentine.

(23) B. W. E. writes: We have a fine cut glass cologne decanter in which the stopper is firmly set, and all efforts to remove it have thus far proved fruitless. Can you suggest any way, as it seems a pity to break the decanter? Would also like to ask what results the great Lick telescope would give if used as a terrestrial glass? A. To remove the stopper fasten firmly both ends of a strong cord six feet long, so that it will hang nearly straight and horizontal. Wind it around the neck of the bottle, and keeping it very tight move the bottle back and forth. This will soon heat the neck, and then the stopper will come out. As a terrestrial glass the Lick telescope would doubtless give very remarkable results, owing to its high magnifying powers and large aperture.

(24) R. H. H. asks: Is there any method of computing the best size and length of wire in the secondary coil of an induction coil, the size and length of the wire in primary coil being known? A. There is no regular proportion. Such data are largely empirical, but electricians are approaching the development of reliable formulæ.

(25) C. V. writes: To-day I witnessed a man trying to find a vein of water by the aid of a crotch of alder wood. Every time he struck a vein or pretended to have, the crotch would bend over, and at times would even twist right off. Could you give me any information what causes the stick to bend over? A. The motion of the fingers, hands, or wrists effects the bending. Water has nothing to do with it.

(26) G. L. B. asks how the sulphide of phenyl is prepared, and if it is an article of commerce. A. By dry distillation of sodium benzole sulphonate. It is hardly an article of commerce.

(27) W. L. M. asks for a receipt for printing badges with gold leaf with hot type. A. The ribbon is dusted with resin, gold leaf is spread over it, and the letters are impressed with a hot iron or brass type. The resin melts and causes the leaf to adhere.

(28) W. H. W.—We have little confidence in any receipt for restoring burnt steel. By burning, the relation of the elements and the granulation become changed, and no ordinary application upon the surface will restore the internal structure. Better send it to the scrap heap or use it for some inferior purpose. If you desire to try and restore it, proceed as follows: Bring the steel to a red heat, sprinkle with a mixture of 8 parts red chromate of potassium, 4 parts saltpeter, 4 parts resin, thoroughly pulverized and mixed, and work the steel well under the hammer. For welding cast steel, use 10 parts borax, 3 parts sal ammoniac, 3 parts ferrocyanide potassium, ⅛ part of resin, well pulverized and mixed. Heat to drive off the water of crystallization of the borax, and again pulverize. Heat the steel to red and sprinkle with the mixture, then heat to full yellow and weld.

(29) O. R. asks: 1. What kind of cement would be best for building a pit in which to dissolve bones in sulphuric acid? A. Build the acid pit with trap rock, red sandstone, or very hard burned bricks and Portland cement. Plaster with Portland cement wet with water glass applied quickly, as it soon sets. Then for further acid-proofing apply a coat of paraffine melted to the surface by applying hot irons or a pan of hot coal close to it. If you wish to omit the water glass, an application of a paraffine coat directly upon the Portland cement, and combining it well with the cement by heat, may answer your purpose. 2. Is there any solution that will prevent the effects of sulphuric acid on cotton overalls? A. Rub paraffine all over the surface and melt it in with a hot iron as in ironing.

(30) W. H. P. asks a cheap process for bronzing small iron castings. Have tried shellac, but it went on uneven. A. Brown japan varnish thinned with turpentine to give the desired color makes a smooth and pretty finish for small castings. Tumble the castings in sawdust wet with sulphate of copper solution. Rinse in hot water, dry, and dip in a very thin shellac varnish. The goods should be hot (about 212°) when varnished with shellac. A little gum dragon blood improves the shellac varnish. The great trouble with amateurs comes from the use of too thick varnish.

(31) W. S. R. asks what kind of small appliances to get to melt brass in small quantity, say one pound or half pound quantities, for making small castings, and what is the best substance to use for moulds for making small, fine castings. A. You will need a black lead crucible of a size to hold the half pound or pound of metal, and a small pair of jeweler's tongs to handle the crucible. Any cylinder stove with a good chimney draught will answer the purpose of a furnace. Set the crucible about 4 in. above the grate, and fill up around with coal (stove size). Let the fire burn up for a few minutes and feed in the brass in small pieces, or such as will drop into the crucible, with the tongs. Place a large piece of charcoal over the crucible, give the fire its best draught, and the metal will soon melt. Mould your work in fine moulding sand, such as used by brass founders. You can obtain what you need at a foundry. If possible, go to a brass foundry and inspect the operation of moulding and casting before making the trial. To post you in all the particulars, get the "Brass Founder's Manual," by Graham, which we can mail to you for $1.00.

(32) T. J. V.—For a good and lasting roof paint, that will not run in summer or crack in winter, take equal parts by measure of any two earth colors, as pulverized slate, pulverized mica schist, or any of the cheap dry paints commonly used for painting barns and fences, to suit your taste as to color, and add half the bulk of the two kinds of paint in pulverized resin. Thoroughly mix and add an equal bulk of pure coal tar, which you may obtain through the paint trade. Boil and stir until the resin is thoroughly melted and the whole mixed to a uniform fluid mass. The quantity of coal tar may be varied to facilitate application with a brush.

(33) Dr. H. S. asks for the definition of the word myoma. A. Myoma is a term applied by Professor Virchow to a variety of sarcoma (or flesh tumor) which is mixed with striped muscular fiber. It is very fatal if not promptly excised.

(34) C. H. S.— One of the fundamental propositions of geometry proves that the areas of polygons increase with the number of their sides for given perimeters. Hence a circle, which is a polygon of an infinite number of sides, has the greatest possible area within its perimeter. Your scheme of raising water to a height of 200 feet with compressed air is not practicable. It will take 90 pounds pressure, or 13 cubic feet of air compressed to 1 cubic foot, to sustain the column. It will then take an equal bulk of compressed air to lift a given bulk of water without friction. The compression of the air to so great a pressure is the stumbling block to this kind of work. For table of compression of air, see SCIENTIFIC AMERICAN SUPPLEMENT, No. 279, and for the theory of compression, SCIENTIFIC AMERICAN SUPPLEMENT, No. 323, both most interesting and valuable papers.

(35) H. S.—The plant was so decayed and mouldy when it arrived as to render recognition impossible.

(36) C. H. E. asks a receipt for making a cold tinning solution for brightening articles made of tinned wire that have become dimmed. A. For this process the articles must be thoroughly cleaned by boiling in alkali, washing, or sand scrubbing, then immersing in a tin bath, which may be made with 10 ounces dry tin salt (chloride of tin), 10 ounces alum, 7 ounces cream of tartar, 20 gallons of water, or in proportion for smaller quantities. A strip of pure tin (block tin) should be attached to the articles when immersed. Articles to remain in bath from 1 to 8 hours, according to thickness of tinning required. Wood or stoneware should be used for holding the solution. You can obtain the chloride of tin through the drug trade.

(37) A. C. B.—The mathematical center of revolution or axis is an imaginary line through all revolving bodies. It is not necessarily endowed with motion. The material or physical properties of all material bodies in revolution move on a mathematical center; even the molecule on the center turns.

(38) C. W. G. asks how to convert malleable casting into steel before being annealed or after annealed. A. Malleable castings pass through the condition of a steel casting during the annealing process. By arresting this process before it is finished, the metal will be found to have some of the properties of steel. The annealed castings may also be recarbonized by cementation.

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