RECENTLY PATENTED INVENTIONS.

Engineering.

VALVE OPERATING MECHANISM.—Jacob J. Moore, Chambersburg, Pa. This inventor has designed novel means whereby the engine may be reversed or throttled by the use of a single lever and eccentric. The construction is such that when the lever is adjusted to its central position the eccentric will be adjusted to set the valve to shut off steam, and if the lever be moved either forward or back it will so throw the eccentric as to move the valve to open the port to admit steam to one or the other side of the piston to properly move it, to drive the engine forward or back. Duplicate eccentrics, one for each side, will be needed in locomotives.

Railway Appliances.

CAR COUPLING.—Edward J. Lahan, Quincy, Ill. In this coupler the drawhead has the usual flaring mouth, but with its sides, top and bottom, solid, whereby the interior coupling members are protected from the weather and the head rendered more stable and compact. The coupling is effected by means of a gravity latch, working automatically when the drawheads come together, obviating the need of going between the cars, and the uncoupling may be effected from either the sides or the bottom of the cars. The device is extremely simple and inexpensive.

SWITCH LOCK.—Samuel E. Bartlett, Red Bank, N. J. This invention relates to interlocking switch systems for railroads, where the switch, signal, and switch lock are all operated from a tower. The new device consists of a switch or bolt under the control of the operator and adapted to engage the switch bar to lock the same in position by an ingenious system of sliding plates which are engaged by the bolt. By this mechanism the operator is prevented from locking the switch unless it is in its proper position, and he cannot display the proper signal controlling such switch unless it is properly set and properly locked.

FLANGER.—Thomas W. Macfarlane, of Ellensburg, Washington. This invention consists of a novel device for removing snow and ice from the rails of railway tracks, and is especially adapted to remove the snow and ice usually left by the snow plow on the tops and sides of the track rails. The flanger is secured directly to the truck, and the cutter, with its attachments as the apron which throws the loosened ice and snow to one side, is operated with a piston rod connected with a cylinder attached to a suitable air or steam supply. A coiled spring returns the mechanism to the normal position when the air or steam pressure is removed.

UNDERGROUND RAILWAY CONDUITS.—Wilton F. Jenkins, Richmond, Va. This invention consists of a cylindrical tube or conduit the edges of which are formed in a peculiar manner at each side of the slot to give the requisite thickness to resist the weight of traffic in the street. Yokes pass under the conduit tube and secure the rails, thus obviating the use of bolts or rivets to fasten the rail. This connection between the rail and the yoke is a universal one and enables the rail to be grasped at any point without cutting holes in the rail or yoke. By the construction of the overhanging walls and stiffening web a vertical distance from the top of the slot rail to the outer periphery of the cylinder is secured so as to allow blocks of paving material to be laid in sufficient vertical depth close up to the slot rail so as to secure a substantial finish.

CONDUIT ELECTRIC RAILWAY.—Wilton F. Jenkins, Richmond, Va. This simple and effective device consists of a conduit tube provided with two horizontally projecting arms carefully insulated and bent to receive the two conducting wires which are laid loosely in a recess provided for them. A hook-shaped trolley is provided for each conductor which raises the wire from the support and is provided with a wiping attachment or pad which cleans the supporting arm at each passage of the trolley.

ELECTRICALLY OPERATED RAILWAY SWITCH.—William S. Gavey, Brooklyn, N. Y. This switching device is intended to be operated from a moving electric or other car. By an ingenious system the switch may be automatically operated by a moving car so as to be thrown before the car reaches it and to be thrown back after the car has passed, also to provide a switch system adapted to railways having numerous sidings so that each car will turn its particular switch, but pass over the other switches without affecting them. The switching is done by electro-magnets, the current being obtained from an overhead trolley wire with the aid of a contact pulley.

Miscellaneous.

AMALGAMATOR.—Nathan Leroy Raber, Corvallis, Oregon. This invention consists of cells, which receive the agents by the electrolysis of which the mercury may be cleaned or purified, and a lead or similar conductor extended longitudinally within the cell whereby an electrical discharge from end to end of the cell is secured. Various other devices for regulating the supply of the quickening agent, the mercury, etc., are provided. By the construction and arrangement of the several parts of the amalgamator the whole surface of the mercury at the point of contact with the thin stream of pulp is kept perpetually clean and active.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

A TEXT BOOK OF MECHANICAL DRAWING. Part III. Machine Drawing. By Gardner C. Anthony, A.M. Tufts College, Massachusetts: Published by the author. Pp. 50, 16 plates. Cloth. Price $1.80.

This is an excellent work. The treatise is intended to teach the practical application of the principles of projection to the illustration of machinery, and to furnish such practical examples as may serve for problems to the student and suggestions to the draughtsman. It is really refreshing to see a book on mechanical drawing which gives the proper amount of lettering and dimensions. The plates, with a few exceptions, are arranged so that they are visible while the text is being read; this is the proper way of inserting plates and maps, but is unfortunately a rarity. The whole work bears the stamp of being made by a thoroughly competent and conscientious draughtsman.

THE TINSMITHS' PATTERN MANUAL. Patterns for tinsmiths' work. By Joe K. Little. Chicago: The *American Artisan* Press. 1894. Pp. ix, 248. Price $1.

This work treats in great detail of the development of tinsmith's articles for the purpose of cutting out the pieces therefor from the flat metal. This it does elaborately, its purpose, evidently carried out, being to lay down general geometrical principles by which work other than that described in the book may be done. The text consists of a series of problems well illustrated, and an excellent index, with both page and paragraph references, is a feature worthy of being noted.

DAVID OF JUNIPER GULCH. A story of the placer regions of California. By Lillian Shuey, author of "California Sunshine," etc. Chicago: Laird & Lee. Pp. 413. Price $1.

CRIME AND PUNISHMENT: A NOVEL. By Fedor Dostoieffsky. Translated from the original Russian by Frederick Whishaw. Chicago: Laird & Lee. Pp. 456. Price 50 cents.

THE EGYPTIAN HARP GIRL: A MYSTERY OF THE PERISTYLE. By "Quondam." Illustrated. Chicago: Laird & Lee. 1894. Pp. 292. Price $1.

PAUL WEISS. Ingenieur au Corps des Mines. Le Cuivre. Avec 96 figures intercalées dans le texte. Paris: Librairie J.-B. Bailliere et Fils. 1894. Tous droits reserves. Pp. viii, 344. Price $1.

SCIENTIFIC AMERICAN BUILDING EDITION.

APRIL, 1894.—(No. 102.)

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Patent Electric Vise. What is claimed, is time saving. No turning of handle to bring jaws to the work, simply one sliding movement. Capital Mach. Tool Co., Auburn, N. Y.

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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.
Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.
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.

(5958) T. R. B. asks: Will you please state in your answer to my inquiries of 24th what is the best size of wire to use for telephone lines? A. No. 12 galvanized iron or steel wire is generally used for telephone lines.

(5959) F. J. M. writes: Referring to article on "Wind Pressure," in SCIENTIFIC AMERICAN SUPPLEMENT, No. 950. 1. Why should the wind pressure against one side of a cube be less than upon a thin plate of same size? A. In the thin plate there is a vortex formed at the back of the plate which prevents reaction, while in a thicker body, like the cube, the vortical space is filled by a solid, allowing the displaced air time to return behind the cube and counteract the vortex made by the outward flow of air at the front edge. The same effect is observed under the same conditions in the movement of plates and solids through water. 2. Why should the wind pressure acting upon a hemispherical cup, when its convexity is turned toward the wind, be greater than upon a flat plate of equal diameter? A. The wind pressure is less when the convexity is turned to the wind than when a plane surface or concave one is turned to it. Convexity is a mistake in your question. It should be concavity.

(5960) B. writes: 1. I would like to get some data concerning the small vanes in exhausted bulbs which are caused to revolve by the action of the light. I think they are known as "Crookes' mill." What is the minimum intensity of light at which they will revolve? A. It will revolve in the dark, provided there is heat. Its action does not depend on light. 2. Suppose a 16 candle power lamp were placed at a distance of 6 inches from the vanes, what would be the approximate number of revolutions? A. A 16 candle power lamp at a distance of 6 inches will revolve the vanes quite rapidly, but the velocity varies with radiometers of different forms. 3. Are they for sale, and at what price? A. Radiometers are for sale by most dealers in physical instruments. The price is from $3 to $5. 4. Has a description of them ever appeared in the SCIENTIFIC AMERICAN, and if so, in what number? A. For information on Crookes' radiometer, we refer you to SUPPLEMENT, Nos. 13 and 26. Price by mail 10 cents each.

(5961) W. S. R. asks: 1. Please tell me how to make a Gramme ring motor. A. You will find a full description of a small Gramme ring motor in SUPPLEMENT 641. 2. Also how to make a two or three horse power water wheel for a brook with a fall of 12 inches and a force of 20 barrels per minute. A. SUPPLEMENTS 61, 380, and 704 contain descriptions of turbines for various uses. You can probably get the information you desire from these articles. 3. Is the —— Piano Company a reliable firm? A. We do not furnish information of this character. 4. How can I make a galvanic bichromate battery to run 641 motor? A. For instructions for making bichromate battery, we refer you to SUPPLEMENT 792. 5. Is there any way to make a boiler to run a one horse power engine? If so, how can I make it and where can I get the material? A. For directions for making small boilers, see article on the subject contained in SUPPLEMENT 702.

(5962) B. S. L. asks: 1. Why, when a person looks at an object through the large end of an opera glass, the object appears smaller and at a great distance? A. The reversal of the glasses produces the effect, the negative lens being then in front of the magnifying lens. 2. Will No. 21 double-covered copper wire give just as good results on the armature of eight-light dynamo, SUPPLEMENT 600, as single-covered No. 20, and thus insure better insulation? And will not an addition of more wire on field magnets give a stronger current? Also is the sheet iron disk armature core to be preferred to the wire core? A. Double-covered copper is probably to be recommended for the purpose named. The E. M. F. will be a little greater and the current will be a little less. There are certain ratios of resistance between armature and field which are not advantageous. 3. Is it practical for an amateur to attempt the construction of a gas engine, and can you give me the address of a firm where gas engine castings are made? A. A gas engine is very troublesome to build. You might address gas engine manufacturers who advertise in our columns; but we doubt if any of them would furnish castings. 4. What are the dimensions of coil and size of wire used on a coil to produce a spark one inch in length? A. Exact dimensions of the induction coil asked for cannot be given. Consult SUPPLEMENT 160 for information in regard to a coil giving 1½ inch spark. This can be regulated to produce a 1 inch spark. 5. The formula for a good leather cement, also a good rubber cement. A. An India rubber cement is made of: 15 grains of India rubber, 2 ounces of chloroform, 4 drachms of mastic; first mix the India rubber and chloroform together, and when dissolved the mastic is added in powder. It is then allowed to stand for a week or two before using. Leather and Pasteboard, Cement for.—Strong glue, 50 parts, is dissolved with a little turpentine in q. s. water, over a gentle fire; to the mixture is added a thin paste, made with 100 parts of starch. It is applied cold, and dries rapidly.

(5963) B. T. writes: 1. We evaporate from 2,100 to 2,300 gallons of water per hour in our boilers. What should be the dimensions of such a boiler or boilers to do that amount of work with some degree of economy? A. The evaporative power of a boiler is approximately given by the formula $1{\cdot}833\left(\frac{S}{28+F}\right)e =$ pounds of water per pound of fuel, in which S is the heating surface and F the pounds of fuel, and e the evaporative power of the fuel. Taking $e=15$ we have $10{\cdot}448$ pounds water per pound of coal. Taking this as representing your case, you will need a boiler to burn 230 pounds of coal per hour, or about 20 square feet of grate or natural draught, and a heating surface of 200 to 300 square feet. Conventional horse power of a boiler is not reliable. 2. What is the market value of mercury per pound? A. About 75 cents a pound. 3. What is the weight of one cubic foot of mercury? A. 846 pounds at 60° Fah. 4. At what temperature will mercury start to evaporate? A. It evaporates slowly at ordinary temperatures. It boils at 675° Fah. 5. Will mercury dissolve in alcohol, ether, or any other oil or grease? A. No. 6. If mercury be put in iron vessel, will it attack the iron? A. No. 7. If mercury be heated to 200 or 250 degrees, will it give off any gas or fumes so as to endanger the person handling the same? A. It will slowly produce bad effects; the practice is an unsanitary one. 8. Have you a good book on modern boilers? A. We can supply you with the following books: "A Manual of Steam Boilers," by Thurston, price $5 by mail; also "Steam Boilers," by Rose, price $2.50.

(5964) W. B. J. says: Can you inform me through your valuable paper how to mark fine steel tools with acid, using a rubber stamp? A. Have a plain border round the design, large enough to allow a little border of common putty to be laid around the edge of the stamped design, to receive the acid. For ink, use resin, lard oil, turpentine, and lampblack. To ¼ pound of resin put 1 teaspoonful lard oil; melt, and stir in a tablespoonful of lampblack; thoroughly mix, and add enough turpentine to make it of the consistency of printer's ink when cold. Use this on the stamp in the same manner as when stamping with ink. When the plate is stamped, place a little border of common putty around and on the edge of the stamped ground. Then pour within the border enough acid mixture to cover the figure, and let stand a few moments, according to the depth required, then pour the acid off. Rinse the surface with clean water, take off the putty border, and clean off the ink with turpentine. Use care not to spill the acid over the polished part of the article. For the acid, 1 part nitric acid, 1 part hydrochloric acid, to 10 parts water by measure. If the effervescence seems too active, add more water. 2. How are knife blades marked that have names on them? A. Knife blades are sometimes marked in this way, but generally the brand is placed on knives, etc., when they are in a heated condition by a steel stamp. 3. Can cast iron be plated with aluminum? If so, how can I do it? A. Yes; copper the iron, then deposit the aluminum, using the following formula: Fifty parts by weight of alum are dissolved in 300 of water and to this is added 10 parts of aluminum chloride. The solution is heated to 200° Fah., and when cold 39 parts of cyanide of potassium are added. A feeble current should be used.

(5965) F. L. asks: 1. Are all alternating generators excited by a separate direct current machine? A. No. Sometimes they are self-exciting, having a commutator in addition to the collecting rings. 2. Is an alternating current ever used for arc lights or for exciting the fields of a dynamo? A. It is often used for arc lighting, not for exciting dynamo fields. 3. Will the current alone be cut down by increasing the resistance of a coil or line, or will the voltage also be affected? A. Increasing the resistance of the circuit will tend to increase the potential at the terminals. 4. Is the earth's attraction greater at a high elevation than at sea level? A. No; it is less. 5. How is the displacement or tonnage of a vessel or ship computed? A. By various rules, some arbitrary and some based on approximate calculation of the immersed volume of the ship. 6. How do the supposed spiritualists and magicians perform the trick of lift-

ing up a chair or small table by simply placing the hands upon them? A. Sometimes a ring is worn which has a slot in it. A pin is driven into the chair or table. The performer catches the pin in the slot and so lifts the table.

(5966) I. R. asks: 1. Can a storage battery be charged off an alternating circuit of 50 volts? A. It cannot be so charged. 2. What is the difference between the make-up and winding of an alternating and continuous current motor? A. We must refer you to our SUPPLEMENTS which illustrate the same. They are quite different. 3. How many storage batteries will it take to run a Stanley fan motor (made by the Electric Supply Co., Chicago) 10 hours daily? A. Two or three if the motor is wound for them. Otherwise, many more may be needed. 4. Can a 2,000 volt arc continuous circuit be tapped in such a way as to get a current of 50 volts, and not be able to hinder the lights nor short-circuit the wires in any way? A. It c n be done by putting in a shunt of forty times the resistance of the line included between its connections thereto. It will if used tend to interfere with the service and will be very dangerous to admit into a house. We advise you not to attempt it.

(5967) A. W. S. asks: 1. How much wire and what size will be required to wind a 60 ohm telegraph sounder? A. 903 feet of No. 28, which requires 2066·116 feet for a pound of wire of this size; or if you prefer, you can can wind with 568 feet No. 30, 3,111 feet to the pound. 2. Also for an instrument of 150 ohms resistance? A. 893 feet of No. 32. Of this 5963 feet are required for one pound. 3. What is the advantage of silk-covered wire over cotton-covered for this purpose? A. Silk makes a better insulator and takes up less room. 4. Can you recommend any book which treats on telegraphy? A. We recommend "Modern Practice of Electric Telegraph," by F. L. Pope, price by mail $1.50; "Hand Book of Telegraphy," by T. D. Lockwood, price $2.50.

(5968) B. B. M. asks: 1. Will a storage battery of 4 cells, each cell composed of 8 plates, 1½×3 and 1-16 inch thick, be sufficient to run a 2 candle power incandescent lamp for several hours at a charging? A. No. The plates are too small. 2. Is there any good metal of which the containing jars of a storage battery could be made, and which would not be attacked by the solution? A. Lead will answer. 3. Which is the best method for making the plates of a storage battery? To merely roughen the plates, and allow the lead oxide to be formed by repeatedly charging and discharging in opposite directions, or to coat all the plates with red lead, or to coat the positive plates with red lead and the negative plates with litharge. A. This is a very open question. For amateur's use probably the roughened plate, treated with nitric acid, and then formed, is probably the best. In commerce pasted or porous plates are almost universal in this country.

(5969) J. G. says: Could you inform me what is used by laundrymen to bleach clothes, besides javelle water, and a so what they use to remove fruit stains from clothes? A. Make a strong solution of chloride of lime (hypochlorite of lime—bleaching powder) in water, allow to settle, and draw off the clear liquid. Rinse the goods in clean water containing about 5 per cent of sulphuric acid, and then pass them slowly through the bleaching solution. They should then be well rinsed in water containing a little carbonate of soda. If the cloth is much colored, it may be necessary to allow it to remain for a short time in the bath. This is the usual method of bleaching in laundries. 2. To remove fruit and wine stains from table linen, moisten with dilute sulphuric acid and then rub with aqueous solution of sulphite or hyposulphite of soda in water, or spr ad the stained part over a bowl or basin, and pour boiling water through it. or rub on salts of lemon and pour boiling water through until the stain disappears or becomes very faint.

(5970) J. H. B. says: Can you tell me how a soft solder can be made so that it can be used without acid? I want one that can be run into sticks and used with a slight heat. A. Melt together in a crucible, at a very moderate heat, bismuth, 1 part; tin, 3 parts by weight; lead, 2 parts; and cast in slender sticks. You will need acid or some flux however. No solder is made that will work without, except on very clean surfaces.

(5971) M. L. writes: Is the hypothetical ether supposed to be rigid or not? Can it be matter and be imponderable also? If it occupies space between the molecules, say of glass, and vibrates freely among them, must not the molecules of ether be very much smaller than those of glass, and will the molecular theory of matter admit of this condition? Why does glass transmit light, and wood not? Are there any other theories of light, heat, and sound propagation besides the ether wave and air wave theories? A. The ether is very imperfectly described, and cannot have the attributes defined as in the case of perceptible matter. It is not matter in the everyday sense, and is not subject to the molecular laws of matter. No reason can be given for transparency except that certain bodies seem to exclude ether from the space they occupy. Wood however is not transparent, from multiple reflection largely. Other theories have been advanced, but are rather more unsatisfactory.

(5972) E. H. E. asks: What was the composition of the mixture called "staff," used in the modeling of the statuary and in the construction of the World's Fair Buildings at Chicago? A. Staff is composed of plaster of Paris, alumina, Portland cement, mixed with glycerine, dextrine, and water; coarse bagging or New Zealand hemp is used to give strength. The composition varies according to the particular kind of work to be done. See the SCIENTIFIC AMERICAN for August 8, 1891, and March 18, 1893.

(5973) Constant Reader asks: What is the color and general appearance of aluminum as found in the raw clay, and is it visible to the naked eye? Also, what is the cheapest price that it has been marketed for? Are there any chances for a person to-day to try and discover a means by which to lessen the expense of the so-called metal? A. Aluminum is not found in the metallic state. It cannot therefore be discerned in clay. The lowest price is about 50 cents per pound. There is a possibility of course of reducing the cost of extraction.

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April 10, 1894,

AND EACH BEARING THAT DATE.

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