

RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

HOOK-EYE.—A. C. CARL, Joplin, Mo. As ordinarily attached and located, hooks and eyes lie flat upon inner and outer sides of a garment and close to opposite edges of the same, and in engaging the hooks with the eyes, their points come in contact with the portion of the fabric directly underneath the eyes and wear and injure the goods. To prevent this result the eyes are provided with a guard interposed between them and the fabric, so that contact of the hooks with the latter is prevented.

BUILT-UP MATERIAL FOR BELTS AND THE LIKE.—JOSEPHINE MÜLLER, New York, N. Y. In this material the major portion of the warp consists of ribbons of oil-cloth, patent-leather, felt, etc., the glazed and finished faces of which are their outer faces and in which the weft consists of cord or braid, whereby to provide a fabric which when single ribbons are used is especially adapted for use as the body portion for bags and like articles, and wherein when the ribbons are used double or are placed back to back, a fabric is provided which may be equally finished on both faces, being especially adapted as material for waist belts.

HOSE-SUPPORTER.—H. ALLEN, New York, N. Y. One purpose in this invention is to provide a supporter or garter that is exceedingly simple, comprising practically but two parts, and wherein the supporting members, or those adapted for attachment to the sock, will draw equally upon the limb back and front.

HOLDER.—C. C. WILLIAMS, Westfield, Pa. The purpose of the invention is to provide a holder, arranged for convenient attachment to a support for easy manipulation, to engage and securely hold the article in place and for ready adjustment, especially when used as a cuff holder, to adjust the cuff relative to the coat sleeve.

COMBINED GARMENT.—M. TARTIKOFF, New York, N. Y. The invention consists of a supplementary waistband, and a shield, the shield and waistband being provided with buttons on opposite portions for detachably connecting them together and to a pair of pants or other similarly worn garments, with elastic members connected to the shanks of the buttons, holding them in place and affording a yielding connection between the pants and the shield.

SAFETY-CLASP FOR PURSES AND THE LIKE.—W. MCILROY, Empire, Panama. The object here is to provide a compact, easily operated device for detachably fastening a purse or a like receptacle upon the dress, skirt, or waist in such a manner that the purse cannot be easily stolen; and also afford a neat ornamental auxiliary pocket for convenient use.

SUSPENDER ATTACHMENT.—J. HAUSER, Spokane, Wash. The attachment affords means for reliably securing together the ends of the looped portions of suspender bands in a manner which will permit the release of the parts when a changed adjustment is desired, whereby the suspended bands are lengthened or shortened as occasion may require.

Electrical Devices.

INSULATING-BUSHING.—L. STEINBERGER, New York, N. Y. In this patent the invention has reference to insulating bushing such as may be employed in connection with high potential conductors, and used at points where such conductors enter or leave a building or pass through a wall, panel, or other barrier of any kind.

DISK STRAIN-INSULATOR.—L. STEINBERGER, New York, N. Y. This invention relates to strain insulators, and particularly those of the disk type, Mr. Steinberger's more especial object being to improve the general construction of such insulators and to render them, as near as practicable, proof against the evil effects of moisture. It relates further to increasing the dielectric properties of the insulators and giving them a high degree of mechanical strength.

FLEXIBLE SUSPENSION FOR CONDUCTORS.—L. STEINBERGER, New York, N. Y. This invention relates to means for suspending conductors, and more particularly to a flexible suspension for conductors such as are used for transmitting currents of unusually high potential. One object among many is to promote flexibility between the conductor and the cross arm or other stationary member, whereby the latter and its connections are supported.

TELEGRAPH-REPEATER.—L. B. CECIL, Santa Barbara, Cal. The main line in operation, makes and breaks in the circuit are repeated on the branch line through the contact of the contact point on an armature with the lower end of the trunnions. When the branch line is working, the makes and breaks in the circuit are repeated on the main line by means of the contact point and the lower end of a lever on a relay, and in either case the arm on the bracket of the relay which is working keeps the armature of the relay which is not working from operation.

RELAY FOR TELEGRAPHS.—J. SCOTLAND, Hearts Content, Newfoundland. The invention relates to the art of telegraphy and has for its object to provide a relay and more sensitive than those heretofore known. Another object is to so construct the relay that there will be a greater and a more rapid demagnetization when the circuit on the main line is broken.

Of Interest to Farmers.

CHICKEN-PERCH.—W. H. COLE, Broken Bow, Neb. The object of the inventor is to provide details of construction for a perch, which adapt it to contain and automatically discharge a graduated quantity of liquid and insecticide, or germicide, from a reservoir in the pole upon the exterior surface, for extermination of lice or mites that infest fowls or growing chickens, and also for the destruction of disease germs.

TRAP-NEST FOR HENS.—M. J. WHITTY, Croton-on-Hudson, N. Y. The object here is to provide a nest with means for holding the door for the entrance sufficiently open to permit a laying hen to enter, and which will be released by the entering of the hen, permitting the door to spring closed, thus trapping the fowl until such time as an attendant may take the number of the fowl for recording the number of eggs laid during the season.

GATE.—E. J. A. RICE, Harvard, Neb. The more particular improvements relate to means whereby the gate may be readily operated by a person intending to pass through it, the improvements further tending to render the gate, as far as possible, easy in its action and simple in its construction.

GRAIN-SCOURER.—T. GROSE, Port Adelaide, South Australia, Australia. This machine for use in scouring grain has several advantages over scourers hitherto in use, in that it is simple and economical in manufacture, is far more durable, is driven much more slowly, requiring less motive power, and is most effective in operation.

Of General Interest.

THREAD-SPOOL.—E. A. ZOBEL, Holmesville, Neb. The invention pertains to an improvement in thread-spools, and in carrying it out, what is usually a waste product is utilized, namely corn-cobs, which are particularly useful for the purpose in view of their cheapness and the facility with which they may be worked up into the finished product.

SANITARY PIPE-STEM.—J. J. GOTTSCHALK, Taunton, Mass., and B. W. PHELPS, Providence, R. I. One purpose of the invention is to provide a stem adaptable to any pipe and so constructed as to form within the stem a reservoir of saliva and the reception of foreign substances, preventing such factors collecting in the bowl of the pipe or its stem except in the reservoir.

SASH-HOLDER.—E. T. GASKILL, Newbern, N. C. By this invention it is sought to provide a sash that can be moved up and down with equal facility and will be retained in any position to which it may be adjusted. In operation the sash will be held from rattling and can be secured in any desired position up or down and will be dust proof from the outside in the use of the invention.

DISPLAY-BOX FOR FRUITS AND VEGETABLES.—F. E. CABANIS, Platteville, Wis. The invention is in the nature of a skeleton guard for boxes or other receptacles for fruits and vegetables and other articles. It is so constructed that it is extensible lengthwise and thus adapted for boxes of different lengths, and it is also adjustable outward, or at different points to the open side of the box.

HAND-BAG.—T. R. WEIDEMANN, Jersey City, N. J. The object in this case is to provide a hand bag arranged to provide a main compartment and a plurality of supplementary compartments for the storage of money, handkerchiefs, and other articles, to which convenient access can be had without opening or otherwise disturbing the main compartment.

GRAPPLE.—C. L. SIMMONS, Spokane, Wash. The invention relates to hoisting and its object is to provide a grapple more especially designed for hoisting concrete blocks and other articles, and arranged to securely grip the article to permit of carrying the same to the desired destination and to allow the operator to conveniently release the article.

HARMONICA.—A. W. ANDERSON, Seldovia, Alaska. The invention relates to teething rings for children and has for its object to provide a harmonica in the form of a teething ring so that when it is used a sound or music will distract the attention of the child, and quiet it when it bites on the ring, and in that way cuts its gums with its newly formed teeth.

WATER-ELEVATOR.—A. HAAS, New York, N. Y. The purpose of the invention is to improve upon a construction for water or liquid elevators, for which Letters Patent were formerly granted to Mr. Haas, so as to adapt the same to conditions under which it has been found that a double spiral screw can be successfully employed, the improvements relating particularly to the construction of the body of the device and the double spiral screw, and the details of the construction at the receiving and discharging portions of the device.

SPRAY-NOZZLE.—A. S. WASHBURN, Germantown, N. Y. The nozzle is adapted for use in spraying trees, shrubbery, plants, and the like, so constructed that even when the liquid includes a preponderance of Paris green, lime, sulfur, etc., there will be but a minimum tendency to clog, it being possible for the nozzle to be continuously used for a long time without cleaning, the tendency of the nozzle in operating being to free itself of all particles contained in such mixtures.

COVER.—F. G. LAUSTER, Sr., Ionia, Mich. The cover is simple and inexpensive to manufacture, and has means for removably mounting it adjacent to the side of the barrel or cask after it has been removed from the top, thus obviating the necessity of either holding the cover or placing it on the floor, while the material is being removed from the barrel.

SHEARS-HOLDER.—H. L. KOCHER, Cementon, Pa. Means are provided for conveniently holding a pair of shears or scissors pendent on one leg of a pair of overalls worn by paper-hangers, so that the workman can readily grasp the shears for use while at work, and instantly replace them in the holder when the use of both hands is necessary for the proper execution of the work.

Hardware.

SPIKE-PULLER.—W. E. WERD, H. RODDA, and J. H. VIOL, Butte, Mont. The invention is an improved labor saving device for pulling spikes from railroad ties, and the like, in a rapid and easy manner, without pulling off the heads of the spikes. It may be of any desired size, but for the purpose of pulling spikes it should be about five feet long and of stout and substantial construction, capable of bearing a considerable strain.

HINGE.—W. B. RODMAN, Charleston, S. C. The invention has for its object the provision of a hinge in which the two main leaves are connected by lazy tongs formed of two intermediate leaves, arranged in series with the main leaves, and also by two auxiliary leaves arranged in series with the main leaves, each auxiliary leaf being connected to the opposite intermediate leaf.

SAW-TABLE GAGE.—M. E. LOEHR, Claypool, Ind. The object of this invention is to provide a new gage, by means of which the adjustment may be accurately determined and which will normally remain locked in position, but which, by movement of the hand, may be released for readjustment.

CARRIER.—A. K. LEE, Chaparral, Ariz. Ter. The object here is to provide a carrier, more especially designed for use on cans, pails, and like receptacles, and arranged to permit placing the carrier conveniently in position on the receptacle or removing it therefrom, and to allow of folding the carrier into a comparatively small space for shipping, storing, or other purpose.

Heating and Lighting.

GAS-MIXER.—L. M. SIMMONS, Reynoldsville, Pa. More particularly, the invention relates to that type of mixer in which there is employed a tube adapted to be connected to a source of gas at one end and adapted to be connected to a burner at the opposite end, and having within the tube a helical baffle to bring out the thorough and complete commingling of the gas and air, and to produce a uniform mixture thereof, so that there will be perfect combustion of the gas.

WATER-HEATER.—P. SASSO and J. P. FARUGIA, Alexandria, Egypt. The invention relates to water heaters, and the object of the invention is to produce a heater having a large heating surface, to the end that the water will become quickly heated. It may be used with fuels of any kind.

ADJUSTABLE REGULATING-COCK.—W. N. BEST, New York, N. Y. In this instance the invention has reference to certain improvements in cocks adapted for use with gas burners for lighting or heating purposes, and relates more particularly to certain improvements whereby the flow of gas is rendered more uniform and the extent to which the cock may be opened, limited.

Household Utilities.

AWNING.—W. G. BUSCHEMEYER and G. R. CASPARI, Louisville, Ky. The object of the invention is to simplify and strengthen the connection between the awning frame and window casement, whereby it may be cheaply manufactured and assembled, and is unlikely to become deranged or broken. It refers to awnings more especially disclosed in Letters Patent granted to Mr. Buschemeyer, in which provision was made for the discharge of heated air at the top of the awning.

CLOTHES-DRIER.—L. DUNCAN, Butte, Mont. The inventor's aim is to provide a drier, embodying details that adapt it for convenient service, render it light, strong, durable, and easy to erect in or out of doors, and permit parts thereof to be closely folded into a compact package when not in use.

WASHBOARD.—SARAH F. O'CONNOR, New York, N. Y. The board has hooks at each end for engaging over the top edge of the tub and supporting the board therein in a slightly depressed position, the board being preferably made of slats corrugated longitudinally on their upper faces, these corrugations not only engaging the clothes and preventing them from slipping when the clothes are scrubbed with a rubbing device, but also serving as a rubbing surface.

PAN HOLDER AND STOVE LID LIFTER.—B. KESSLER, Harlem, Idaho. This device may be used either as a holder or handle for pans, or as a stove lid lifter. The handle is fitted with a shank which terminates in a toe adapted to fit the slot of a stove lid. This toe

may also be fitted into a fork which may be passed under a pan while a catch on the handle serves to grip the rim of the pan.

VENTILATOR.—H. SHLAMOWITZ, New York, N. Y. One object of the invention is to provide a ventilator for use in connection with windows or other openings in buildings, which is so constructed that in a certain arrangement of the parts air can enter the room freely, but in an upward direction, that is, in a direction toward the ceiling, the air at the same time screened to prevent the entrance of dust, dirt, or the like.

Machines and Mechanical Devices.

DOOR-HANGER.—E. G. WORDEN, New York, N. Y. The object of the improvement is to provide a hanger which will facilitate the hanging of the door and enable the height of the door to be nicely adjusted. Further, the object is to construct and arrange the parts so as to relieve the mechanism of jars or shocks, when the door is swung open or closed.

AUTOMATIC SPEED-CHANGING MECHANISM.—K. V. HÖHNE, 20-21 Umlandstrasse, Charlottenburg, Germany. The purpose here is to provide a method and apparatus by means of which the speed ratio of pulleys, shafts, and the like connected by gearing can be changed automatically in accordance with the greater or smaller speed of the driven pulley, shaft, or the like, in such a manner as to secure a uniform speed of rotation of the motor.

WATCHMAN'S TIME-REGISTER.—G. W. ELLIS, Germantown, Pa. With this recorder it will be impossible to register except at such times as a pin is in engagement with the switch arm, which occurs once every two hours, and is not of long duration, and it will be equally impossible to register unless such station has been visited. Since all the mechanism may be inclosed, no tampering with the record is possible, and a glance at the numbers appearing through the slit will show at once, whether the trips have been made, and if not, on what days trips are omitted.

AUTOMATIC DEPOSIT-BOX.—H. G. DORSEY, Granville, Ohio. The invention relates to improvements in deposit or collection boxes, and relates more particularly to locking mechanism for controlling the same. It is adapted for use in connection with boxes of any size or character, or employed for doors of rooms, bath houses, etc. The nature of the locking mechanism is not dependent upon the nature of the box or room in connection with which the mechanism is employed. The time control may not be employed in connection with the other mechanism.

AIR-COMPRESSOR.—H. E. BAILEY, Albany, N. Y. The intention in this case is to provide an air compressor which is simple and durable in construction, not liable to leak or to get out of order, and arranged to prevent the water from accidentally passing into the receptacle filled with beer or other liquid.

CURRENT-MOTOR.—J. R. JEFFREY, Fairview, British Columbia, Canada. In the practical application of this invention Mr. Jeffrey provides a wheel adapted to be supported horizontally in the current of a stream, motion being imparted to the wheel by the action of vanes secured to the periphery of the wheel. The invention is entirely automatic in its action. No attention is required after the wheel is once lowered into the water.

POWER-HAMMER.—J. HAMILTON and L. PIERCE, New York, N. Y. One purpose of the inventors is to provide a stationary channeled piston rod and a hammer that is in the nature of a piston, sliding on the rod, together with a valve connected with a source of steam supply, or a supply of compressed air, and exhausts, which valve is controlled by mechanism operated by the movement of the hammer, whereby the valve is opened alternately to one or the other port or channel in the piston rod to cause the hammer to rise and fall.

SAWMILL-DOG.—A. V. WINEMAN, Greenville, Miss. In the operation of the device, the upper dog is moved into contact with the log after which the lug is engaged with a notch. On now swinging a lever the sliding bar is moved downward to force the upper dog into the log, and the lower dog is swung to force the latter also into the log.

LOGGING APPARATUS.—T. W. TILLEY, Bellingham, Wash. The aim of the inventor is to provide an apparatus which will, in operation, give complete control of the logs which are being moved and which will obviate the necessity of using brakes for holding the log cable when the log is descending a grade.

TACK-DRIVER.—D. A. SAWYERS, Unionville, Iowa. The invention refers to mechanism for use in driving tacks, nails, and the like, the more particular object being to provide a driver with an improved form of magazine for holding the tacks, and further provided with means under control of a trigger and a lever actuated directly by the operator for discharging the tacks one at a time and driving them as discharged.

LUBRICATOR.—J. P. JOHNSON, Abercrombie, N. D. The object here is to provide a lubricator by means of which moving bearings can be continuously supplied with oil from a stationary reservoir, which is so constructed that it is impossible for dust or other foreign matter to become mixed with the oil being fed to the bearings, and by means of which the different bearings can be simultaneously sup-

plied with different quantities of oil in accordance with their requirements.

BARREL-PACKING MACHINE.—J. H. VOGT and L. STORCK, Stamford, Conn. The invention is an improvement in packing machines for barrels and such like shipping cases which are filled with granulated or pulverized material and has for its purpose to provide for the uniform hammering or application of pressure to the material as the latter is placed in the case.

Prime Movers and Their Accessories.

MEANS FOR CONNECTING AND DISCONNECTING RECIPROCATING ENGINES.—S. S. SMITH, Osage, Iowa. The object of the improvement is to easily and quickly disconnect any reciprocating engine, and especially those of a locomotive, and leave the same balanced after it has been disconnected as it was while working or under normal working conditions. In such engine construction counter-balances are used to equalize the weight of the pitman or connecting rod.

INTERNAL-COMBUSTION ROTARY ENGINE.—H. LEE, Bowral Street, Kensington, near Sydney, New South Wales, Australia. The purpose of the inventor is to provide an engine working on the rotary principle, which will utilize the power of the gases generated by the explosion more fully than heretofore. Its essential features consist of a rotary compressor, an intermediate rotary valve, and a nave or rotor carrying a sliding piston within a chamber of peculiar construction and varying contour.

Railways and Their Accessories.

CAR-FENDER.—C. KLEYMEIER, Covington, Ky. The purpose of this invention is to provide details of construction for a street car fender, which render the device compact and convenient for placing upon or removing from a car; the fender, when in position for service, being adapted to positively guard against accidents, and when in operation gently but positively moving laterally from the track a person or object, that is picked up by the fender, and without injury to the person or object.

RAILWAY CROSS-TIE.—F. N. DRANE and H. A. DRANE, Corsicana, Tex. The object of the invention is to provide a tie, provided with spaced concrete tie blocks, connected with each other by a metallic cross rod, extending centrally through the blocks and having means for adjusting the blocks toward or from each other, to bring rails held on the blocks to proper gage, and to allow of raising either block and maintaining both blocks and their rails in the same plane.

Pertaining to Recreation.

BOWLING-ALLEY.—C. B. BRENNEMAN, Boston, Mass. The invention is an improvement in bowling alleys and the alley-way is of ordinary form and construction, comprising the floor, the side walls, and the return grooves, adjacent to the side walls, and upon each side of the floor. Instead of pins, balls are used, and that portion of the floor upon which the balls are placed is provided with depressions arranged in proper position with respect to each other.

Pertaining to Vehicles.

WHEEL FOR MOTOR VEHICLES.—J. V. PUGH, Guiting House, Allesley, Warwick, England. This invention relates to the wheels of road vehicles, and the object is to provide a reliable and readily detachable wheel. It consists in a wheel composed of a permanent wheel hub, a removable hub enveloping the permanent hub and carrying the spokes and felly clutched members between and formed integral with the hubs.

VEHICLE-WHEEL.—G. H. GROTH, Cincinnati, Ohio. The invention relates to certain improvements in vehicle wheels, and more particularly to the steering wheels of motor vehicles. The object is to so construct the wheel that the ordinary steering knuckle may be employed, but at the same time, the pivot of the steering knuckle may be located in the plane of the wheel.

SELF-PROPELLED VEHICLE.—C. RICHTER, Tampa, Fla. The invention relates to self-propelled vehicles, and more particularly to that class usually characterized as automobiles. An object of the invention is to provide a self-propelled vehicle which is adapted to travel on land and water. Also to provide a vehicle adapted to travel on land and water and having means for propelling the vehicle on land and water.

LAND-ROLLER.—H. P. A. ANDERSEN, Cushing, Neb. The invention provides a roller, wherein plain disks with a central peripheral grip alternating with toothed disks mounted upon a common axle, so that they revolve with the axle and revolve thereon, whereby opposing plain disks form ridges and pack the soil, preventing the finer particles from rolling away, while the interposed tooth disks penetrate the crowns of the ridges, cultivating the ground and leaving it in the best condition to absorb moisture, thus tending to prevent the earth from being washed away.

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



Full hints to correspondents were printed at the head of this column in the issue of November 14 or will be sent by mail on request.

(11012) H. J. P. says: 1. When a town is being changed by an electric company from a direct-current system to an alternating, it is not possible to run a motor of any kind of direct-current type with the alternating system, is it? A. Some forms of alternating current may be used upon a direct-current motor by bringing the motor to speed before the current is thrown on. The motor will then keep step with the current. It is far better to use a self-starting alternating-current motor. 2. Which is considered the most up-to-date system, the direct or the alternating current? A. The alternating current is displacing the direct current in a great many places. 3. Rewiring of the houses I presume would not be necessary? A. The house wiring is the same for both kinds of current.

(11013) J. M. K. says: 1. How should I make the connections for a miniature overhead trolley line, direct current? A. The positive pole of the current is usually connected to the trolley wire and the negative pole to the rails. 2. Are magnetism and electricity the same? A. Magnetism and electricity are not the same. Magnetic whirls are the result of an electric current, and surround the wire through which an electric current is flowing. 3. In your issue of October 17, 1908, page 257, is an article on ice making at home. Is Prof. Audiffren's machine on the market? And if so, where can it be gotten? A. The machine will probably be placed on the market in this country in a short time. Address will be supplied by mail. We do not give addresses in this column. 4. Cannot the current from a 6-volt, 4-ampere direct current be raised to 110 volts direct current through transformers or something? A. An electric current can be transformed from 6 volts to 110 volts, by means of a transformer, but the amperes will be cut down in the same ratio as the volts are raised. Starting with 4 amperes you will have about 0.2 ampere at the finish and not much work can be done. 5. Acetylene gas made from calcium carbide is not adapted for use in balloons.

(11014) R. S. says: Would you kindly inform me whether a dynamo is capable of creating more power than that required to run it? In other words, when a dynamo is creating a certain amount of power, is the power back of the dynamo greater or less than that created? A. The power used to drive a dynamo is always greater than the electrical power which the dynamo can furnish. There are no perpetual-motion machines in operation as such a one would be if it could furnish more power than is put into it to make it go. The dynamo is simply a transformer of energy and not a creator of energy. There is no machine which can create energy. All machines merely transform energy to some special use, always with a loss, the object being to get some other form of service, the loss being the price paid for the exchange. Steam in the engine cannot be used for light; electricity can be so used. Steam cannot be conveyed many miles to drive cars at a distance from the engine house. Electricity can be conveyed hundreds of miles, and there be used as power or light.

(11015) L. W. H. says: If you will allow me I will state the question: In a dynamo, electricity is generated by the armature shaft cutting the lines of force of a magnet. Is it a fact that clouds passing east or west generate more electricity than those passing north or south, considering the earth as a great magnet? Is this why our electrical storms come from the west? A. We do not know whether clouds moving from west to east generate more electricity than do those moving north or south. Storms all move from a westerly toward an easterly quarter. The wind in a storm is moving with a rotary motion, drawing from the outside toward the center of the storm. The rotation in the northern hemisphere is opposite to the motion of the hands of a clock, or over from east to west. This is caused by the rotation of the earth upon its axis. In the southern hemisphere the rotation and the winds in storms are in the opposite direction from what they are in the northern hemisphere. This is to be found fully discussed in Davis's "Meteorology," which we will mail for \$2.50.

(11016) W. P. B. asks: 1. What can I mix with coal tar to dissolve it? A. Any of the hydrocarbon oils will dissolve asphaltum, or coal tar—gasoline, naphtha, benzine, kerosene, as also turpentine. 2. The house fly can use its legs and wings with great rapidity, the two fore legs as a man uses his hands. Are they moved by muscles? If not, by what? A. Flies and other insects move their legs and wings, and other parts also, by muscles as do the higher vertebrate animals. There is this difference, however, that the muscles of insects are not gathered into bundles terminated by tendons, as are those of the vertebrates, but are in straight fibers, not joined to each other

in most cases. The fibers form layers which may be regarded as separate muscles. The fibers are composed of minute fibrillae which have been seen to be striated as are the muscular fibers of vertebrates. It is hardly necessary to add that these fibers are very numerous, numbering several thousand in a single insect. The segments of the body are also well provided with muscles. Some of these go from the front of one segment to the front of the next, and others go to the rear of the next segment. Thus the segments can be tilted to and fro. The muscular strength of many insects is enormous, far exceeding that of the higher animals, relative to their weight. It is said that a flea can leap 200 times its own length. An equivalent leap for a man 6 feet would be 1,200 feet. A beetle has been known to sustain 500 times its own weight and creep out from under it. What would an equivalent load for an elephant be? For a man of 200 pounds in weight it would be 50 tons. Beetles often gnaw holes in lead pipes, and an instance is recorded of a European beetle gnawing a hole an inch in diameter in an iron canister in which it was confined, proving not only its muscular strength, but also the hardness of its mandibles. 3. Jupiter and Venus are now and have been in view near together. Approximately how far apart are they? A. When Venus and Jupiter are to be seen near each other in the sky Jupiter is nearly 500 millions of miles farther from us than is Venus, or about his own distance from the sun. 4. What can I put around the roots of trees from 1 to 4 inches in diameter to kill them? A. An ax at the root of a tree is the easiest mode of killing it. The simplest mode adopted in clearing new land by the early settlers was to girdle the trees near the ground and they were dead the next season. There is nothing which can be put into the ground to kill a tree that would not kill whatever else was growing there.

(11017) W. B. B. says: 1. In E. S. Lincoln's article in the SUPPLEMENT for September 26, should not the formula $R(D-1)$

$X = \frac{d}{R(D-1)}$ read $D-d$ instead of $D-1$?

Letting the currents corresponding to deflections D and d be represented by I and i respectively,

$$I = \frac{E}{R}, \quad i = \frac{E}{R+X}$$

$$\text{Whence, } \frac{I}{i} = \frac{D}{d} = \frac{R}{R+X} = 1 + \frac{X}{R}$$

This gives $X = \frac{d}{d} \frac{R(D-d)}{R}$

A. Your correction of the printer's error in the article seems to be justified, and to be all right. 2. If the efficiency of a motor is $E-e$

where E and e are the impressed and counter E.M.F. respectively, so that eI is loss, then to have efficiency 100 per cent, e must equal E , in which case no power at all would be used. At least that is the only way I can see it, though I have been studying the matter for years. In other words, if the motor uses any power at all, all the power it uses is loss and is therefore not used after all. Can you explain that so that I can understand? If it is not all loss, what part is not? A. Take care and do not conclude that a motor of 100 per cent efficiency would be a perpetual-motion machine. It is a queer inference that you make, "in which case no power would be used." What is to produce E to which for 100 per cent efficiency e becomes equal? Power must be spent every instant in forcing the motor against the counter electromotive force, and the current it generates, else there would be no motion of the motor and no counter electromotive force to be overcome by the impressed electromotive force. We suggest that you read the chapters in Carhart's "University Physics," vol. 2, upon "Electromagnetic Induction and the Efficiency of Motors." We will send the book for \$1.75 postpaid.

(11018) O. B. F. asks: We want formula for painting concrete walls of a bathroom, so that it may be washed with water; would also like an enamel effect if it could be had. A. Cement may be painted with any waterproof washable paint, such as is used for bathrooms, if the caustic properties have become sufficiently neutralized by exposure for the paint to adhere. As this requires some time, it is often effected artificially as follows, with new concrete. Sponge the surface with a solution of 12 fluid ounces of oil of vitriol (H_2SO_4) to a gallon of water. This neutralizes any caustic lime present in the cement surface and turns it into the inert sulphate of lime (gypsum). It also roughens the surface so as to give the paint a firm hold. To remove final traces of alkali, wash with strong vinegar and allow it to dry thoroughly before applying the paint. Prime the surface treated as above with a coat of good old raw linseed oil, and let it dry and get quite hard; if applied liberally that will have stopped all the pores, and next put a coat of flat paint, composed of the necessary pigments, linseed oil, turpentine, and Japan dryer, which may be repeated if the first coat shows up unevenly, and finally, a finishing coat of weatherproof gloss paint or enamel. By the above method, you can use any colors you prefer, but if you wish to preserve the natural color of the cement, a wash of 1 part of water-glass (silicic

of soda) to 3 parts rain water may be applied; this decomposes any lime present on the surface, and converts it into silicate, the surface becoming hard and glassy and entirely resisting the action of moisture.

(11019) W. K. asks: I am in a plumbing shop where they do some lead-burning occasionally, and in order to become thoroughly familiar with the theory I got a book from you on the subject, by Fay, in which it says that pure hydrogen can be produced from pure zinc or iron steeped in sulphuric acid; it further says that hydrogen for lead-burning is generally obtained by using ordinary spelter (and acid), and by this latter process we obtained very good results. We ran out of spelter one day and tried the iron, both cast as well as malleable, and we certainly obtained some kind of gas, but it would not burn with a blue flame; the flame was yellowish green; the addition of air from the mixing fork would not change its color; it was oxidizing and the lead would not unite. Now, I would like to know what kind of iron must be used to get a blue unoxidizing flame, or if there is a practical way to purify this gas so as to make it fit for burning acid to give a flame similar to that obtained from spelter, without making the lead-burning apparatus unhandy and complicated? A. We should not advise using iron for making hydrogen, nor sulphuric acid either. We use zinc or spelter, and hydrochloric acid, or as you may know it better by the older name, muriatic acid. You cannot get hydrogen rapidly by the use of pure zinc. Commercial zinc will yield hydrogen rapidly. If pure zinc is used a few drops of platinum chloride should be added to start the action. To prepare the spelter for the action of the acid it should be melted and poured from the ladle into a pail of water, slowly, so as to allow it to granulate. The large surface presented to the acid by granulated zinc will give a rapid evolution of gas.

(11020) J. C. B. asks: 1. Can the experiments made by means of the rectilinearator be taken for granted as demonstrating the concavity of the earth? It was found that the earth curved concavely toward a straight line 8 inches the first mile, 32 the second, 72 the third, and the fourth mile the rectilinearator touched the water. A. No experiments have ever been performed which proved the earth to be concave. It is not concave, but convex, and curves away from a straight line by 8 inches in the first mile, etc., as you give the figures for concavity. They are the figures for convexity. Within a few years the experiment to show the convexity of the earth by setting stakes in still water has been several times performed, and always with the result that the middle of a set of stakes is seen to be higher above a straight line than the end stakes. All astronomy, navigation, engineering, surveying and geography proceed upon the basis of a convex earth, and the results come out right. This conformity of fact to theory proves the theory to be true. 2. If the sun is such a great distance as 93 million miles from the earth, why is it in the morning or evening shining through clouds the rays of light seem so slanting? A. The slanting up of the sun's rays at rising or setting is due to the rays passing over our heads. As they come from the horizon and pass over us they must seem to pass from the horizon toward the place overhead. Thus they must seem to rise. If the earth were concave they would seem to descend and not to ascend.

(11021) J. W. E. L. asks: Your reply No. 10898 has brought to my mind a condition that I have often thought of. Am I about right in asserting that only a little more than 30 per cent of the energy stored in coal is available at the boiler stop valve? This in being converted into useful work at the engine is again so wasted that in ordinary triple marine engines about 8 per cent is available to propel the ship. A common type of marine engine is twin screw, four Scotch boilers, developing 5,000 I. H. P. I have often wondered what condition would be brought about by dividing the engine into four or six high-speed types, and building them inside the boilers. Practically I think that it could be accomplished, and I would value your opinion upon its theoretical efficiency. A. Your suggestion of putting the engines inside the boilers in order to save the heat lost by radiation is certainly novel and ingenious, but we fear it is hardly practicable. Your figures are about right as to the proportion of the heat energy in coal actually delivered by the engine in useful work, but the principal losses are not at points where they would be prevented by the insertion of the engines in the boilers. Of about 90 per cent total losses only 1.5 to 2 per cent is lost by radiation from main and auxiliary pipes and about 2 per cent or a little over in radiation from engine; these are the only losses which could be saved as you suggest, the balance being 1 per cent lost through grates, 5 per cent radiation from boiler, 20 per cent or more in chimney gases, and the balance in main and auxiliary exhausts. The theoretical advantages would therefore be hardly sufficient to justify such a change, apart from the practical disadvantages such as inaccessibility of the engine for repairs, etc.

(11022) E. E. L. asks: 1. I have a Wheatstone bridge arrangement the conductor of the four arms of which is ordinary tap water and into the circuit of the ordinary wire bridge is interposed an electro-magnet