RECENTLY PATENTED INVENTIONS. Electrical Devices.

ELECTRIC RAIL.-L. STEINBERGER, New York, N. Y. Among the several improvements in this case Mr. Steinberger provides a system for heating the rail, thereby keeping it clear of snow and ice; renders the heating mechanism readily accessible without incurring danger on the part of operators; provides thor ough insulation between the rail and its support; renders different parts of support detachable, so that the same may be taken asunder without much interruption in traffic; concentrates the heat as nearly as possible to contact-surface of the rail; confines and retains heat near contact-surface and prevents its ab sorption by the body portion of the rail-supports; and provides an inclosed chamber within the rail, to prevent radiation of heat except toward the contact-surface of the rail.

INSULATOR-PIN.-L. STEINBERGER, New York, N. Y. The more particular objects of this inventor are to so improve the insulation as to lessen the tendency under wet-weather conditions of a high-voltage current to arc over the surface of an insulator or its support or partly over the surface of an insulator and partly through the air from the conductor to the ground or to the support for the insulator, if this support be grounded. He also seeks to preserve the insulating device and its accompanying parts from deleterious weather action and to enable it to be used for supporting insulators or for supporting a conductor directly.

ILLUMINATING DEVICE.-A. RICHTER. New York, N. Y. The invention has reference to an illuminating device intended especially for use in connection with incandescent electric lights, but useful with other lights, if desired. It resides in certain novel features of construction and arrangement of parts, involving a rotating light by means of which the rays are projected rapidly in all directions.

Of Interest to Farmers.

HORSE-HOE.-E. A. HARVEY, Hillsboro Bridge, N. H. In this patent the purpose of the invention is the provision of a construction of horse-hoe whereby the wings can be opened and closed more expeditiously and conveniently than heretofore and wherein the ad justment of the wings can be readily made while the hoe is in operation.

HAY-PRESS.-C. COTHAM, Monticello, Ark. The invention relates to presses of the toggleplunger type, and has for its object not only to provide a press of this character having new and improved means whereby the plunger may be operated, but also to simplify and improve the press-box, feed-door construction, and frame.

CULTIVATOR.-E. B. WINTERS, Coffeyville, Kan. The purpose of the invention is to provide a simple implement having disk cut ters which can be operated either by pushing or pulling and to provide such means for adjustment of the cutters that the implement may be quickly and conveniently adapted for the cultivation of plants on a reach of level ground or in a hollow and whereby further adjustment may be made to adapt it to wide or narrow rows. It relates to hand or garden cultivators.

PORTABLE FENCE-POST .--- W. R. HARRIS, Pelican, La. Mr. Harris has produced a port able fence-post and base therefor possessing advantageous features of construction and organization, and the entire structure is readily portable besides being strong, durable, and capable of withstanding strains. Members of the post can be separated from each other for any purpose, and the materials employed in constructing either post or base may be such as may be found to be best suited therefor in different localities.

Of General Interest.

or any danger of breaking or unduly strain-Mr. Howland's invention relates to oiling ap-TUSCH. New York. N. Y. The object of this ing the fabric or fibers thereof. The invenparatus, and more particularly to cans proimprovement is to provide a carrier having an tion is more particularly an improvement upadjustable racer-base to allow of readily and accurately fitting the base on a race-plate of vided with a force-feed. The arrangement of on the portable hand-tool for which Letters the valve for ready cleaning, the means used Patent of the United States were formerly for introducing the nozzle into otherwise inacany desired thickness to allow of taking up granted to Mr. Forbes. cessible places, the retention of oil within the wear and to permit of conveniently and cheaply FURNACE-FRONT.-J. BISHOP, Bartow, delivery-tube until the pressure generated by renewing the base in case the same is com-Fla. The invention relates to furnace-fronts; and its object is to improve the construction pletely worn out. A further object is to allow the piston raises the valve and forces out the oil, and the effective venting of the can, are convenient removal of the yarn-guide for reof this part, to increase durability, and render among the advantages of this efficient device. pairs or other purposes. COKE-PULLER.—H. F. PEARSON, Redstone, is to improve the construction of water-jack-Col. This apparatus is especially adapted for eted doors used in furnace construction. Prime Movers and Their Accessories. use in pulling coke from the ovens and load- Among the many advantages, the horizontal-ROTARY ENGINE .- H. M. LOFTON, Ating it upon wharves or cars. The objects of arch construction facilitates the care of the LANTA, GA. This invention relates to a type the invention are to improve the construction fire; and a certain fire-door is water-jacketed, of rotary engine in which the rotary piston of the device, to render it universally adjustpreventing the door from becoming highly has radially sliding blades adapted to be proable, so that the material may be reached at heated and warping out of shape. jected beyond the periphery of the piston durall points and from all directions, to make it MAIL-BOX.-W. O. DRESSER, Cripplecreek, ing a portion of the revolution. A piston of easily operable by a single attendant, and to Col. This box is intended for use for street this character is employed in connection with make it efficient and certain in operation. and rural delivery of mail-matter. The invena casing of generally oblong form. The in-ventor provides an interior surface of the METHOD OF REVIVIFYING SPENT tion provides a novel construction of box made CLAYS .- A. B. LATTING, Memphis, Tenn. In of metal and suitably constructed of the differcasing on certain curves of his own devising this patent the improvement has reference to ent plates secured together. A plate may be which he finds to give improved results in a method for revivifying spent clays-such, for provided in front to receive name and number. securing smooth and easy operation of the instance, as fuller's earth and other mineral The drop-lid can be thrown open and will reengine free from pounding. The engine also main so while letters are being placed in the substances used for purposes of absorbing has various other improvements including a box. If desired it may be cast in aluminium grease, cleansing garments, and the like. By new arrangement of the ports, designed to balthe means employed by this inventor the profor attachment to office-doors, club-rooms, ance the pressure against the blades during a cess is rendered virtually continuous. rooming-houses, etc. portion of their travel. BLANKET-PROTECTING DEVICE.-T. T. SQUARE .-- D. B. LYNCH, Reno, Nev. The CHALONER and G. H. CHIPCHASE, New York, improvement pertains to squares, and has for Railways and Their Accessories. N. Y. The invention has reference to improveits principal object the provision of such a tool ments in devices for preventing a horse from by the aid of which a number of operations SWITCH.—J. C. SCARGLE, Philadelphia, Pa. by shock or jar and will instant biting and tearing his blanket or clothing while may be conveniently performed. In this device The design in this case is to automatically op-

in a stall and also serves as a means for preventing a vicious horse from turning his head laterally to injure with his teeth a person who may be leading him.

HARNESS-SADDLE.-G. MCMULLIN, Elk Rapids, Mich. The invention is an improve-ment in flexible harness-saddles. A feature is the construction and attachment of a check line fastening or loop. Another, the construc-tion and attachment of leather terrets. The saddle is particularly adapted for use as a coach-pad or gig-saddle. This saddle can be made for track-harness, light driving-harness, and express-harness. A similar saddle can be made for double harness, dispensing with the sliding bearing-strap,

SAND-DRIER.-W. KING, Cedar Rapids, Iowa. The principal objects of the invention are to provide means for the effective separation of sand from coarser materials mingled therewith, for drying both the fine and coarser materials, and for separating the former from the latter. Further objects are to provide means for permitting steam or any volatile matters to escape from the material operated upon, for slowly feeding the material over a drying-surface, and for effectively supporting the apparatus and applying heat in an economical and efficient manner.

BOILER-TUBE FASTENER.-A. J. ERVIN and J. R. WALKER, South Cumberland, Md. With this fastening it is unnecessary to make any change in the tube-sheets as ordinarily arranged, and the same tubes may also be used, only, furnish the separate nipple. Flues are made ready to install and necessity for rolling ends cold, is eliminated. Each tube acts as a stay, drawing the opposite sheets toward one another and preventing loosening of tubes. When these tubes are used as flues, means pro vide for avoiding undue expansion and contraction. Either end of the flue may be removed separately without interfering with the other parts.

FOLDING BOX.-C. B. RUTLEDGE, Tullahoma, Tenn. This invention relates to folding boxes, popularly called "knocked-down" bexes. It is intended to be especially useful as a receptacle for articles of any kind and is capable of being folded up into a compact body, which can be quickly opened out into the form of a box. The box should be especially useful for grocers, druggists, or confectioners for various purposes.

OIL-CAN.-T. B. WILKINSON, Rivera, Cal. The object in this improvement is to provide a novel construction whereby the fluid contents of the can may be forcibly ejected through the spout by a pumping action. To discharge oil the operator grasps the handle of the can and the pull-bar will press the latter up against the handle, and will eject the oil by the action of the piston through the connecting rod and spout.

SELF-MEASURING CORK.-E. S. RAY MOND and W. W. FRASER, Denver, Col. The invention relates to measuring stoppers corks for bottles or like vessels, and the object had in view is a device of that character af fording in itself the ready measuring of medicine in tea, dessert, or table spoonful. It is particularly useful to persons traveling on cars, as the jolting or vibrations thereof render it extremely difficult, if not impossible, to measure medicine with a spoon.

HAND-OPERATED PUMP.-W. H. JORDAN. Have. Kan. The object of this invention is to provide novel features of construction for a hand-operated pump which adapt it for very convenient and effective service as an instrument for the abstraction of pus or extravasated blood from a wound, boil, or ulcer on the human body. It may be constructed in a very compact form so as to be small and light.

LAUNDRY DAMPENING APPARATUS.-H. M. FORBES, Portage, Wis. This apparatus is intended for use in applying steam or vapor to starched goods along the lines of fold in order that they may be folded without difficulty

the usual scales upon both sides, and in the handle is an opening for hanging the tool. Near the center of the handle an opening is formed to receive the level.

Machines and Mechanical Devices.

AUTOMATIC DAMPER AND VALVE REGULATOR.—C. E. SANFORD, Oswego, N. Y. This device admits of general use, but is of peculiar value in cases where the mechanism is desired to be simple and reliable, and more particularly where the apparatus is provided with electric circuits in which it is desirable to prevent the circuits from being closed by any means so as to remain closed, battery energy being thus conserved.

TREADLE-HAMMER.-C. M. NIELSEN, 3 Blaagaardsstræde, Roskilde, Denmark. In this improvement the rear end of the hammer-arm is secured to a plate spring, the lower end of which is connected through the medium of rods, and a system of similar springs pivotally mounted in the underframing to another spring is in turn coupled by a strap fitted with an adjusting-screw to a further spring movably connected at both ends to the underframing, so that the last-named springs can be brought nearer to or farther away from each other by means of the adjusting-screw, whereby the hammer can be raised to greater or less extent, according to the blow to be delivered, by depressing the treadle.

ORE-CONCENTRATOR.-M. R. LYLE, Oakland, Cal. This invention concerns itself especially with the construction of a concentrator or dry washer. The object of the inventor is to produce a device which is simple in construction and which subjects the ore-bearing gravel or earth to a succession of separations by gravitation. Means are provided for agitating the device during the concentration pro-

REGISTERING DEVICE FOR PRINTING-MACHINES.-W. H. WALDRON, New Brunswick, N. J. The invention relates more particularly to such wall-paper-printing machines in which the paper is run two or more times through the machine for successive impressions. The object is to provide a registering device for multicolor-printing machines, arranged to permit a quick, convenient, and easy adjustment of the printing-rolls relative to the impression-cylinder to secure an accurate regis tering of the printing-rolls with a previous impression on the paper.

VOTING-MACHINE.-J. P. PAYNTER, TOpeka, Kan. Among the several objects of the inventor are, first, to prevent fraudulent voting by providing certain safeguards of a mechanical nature; second, to protect the voter from espionage while giving him unrestricted choice as to candidates and parties; third, to provide certain improvements in construction and operation whereby the general purposes of a voting-machine are carried out more efficient-The mechanisms provided are automatic. ly.

WHEELBARROW-BEARING. - J. STANLEY, New York, N. Y. The object of the invention is to provide a bearing for wheelbarrows, handtrucks, and other wheeled vehicles, easy to apply, and arranged to produce an equal distribution of the load on both ends of the axle, to reinforce the forward ends of the frame beams, to insure an easy running of the wheel, and to prevent the latter from falling out or being forced out of position.

DERRICK.-E. A. SOHN, Bedford, Ind. The inventor's object is to provide an apparatus in which the source of motive power, the drums, and all of the gearing are connected with the derrick as an integral part, and all arranged to turn with the boom and mast, producing there by a self-contained derrick and avoiding the usual practice of leading the boom and fall lines from the derrick to a power-house lo cated at some more or less distant point from the derrick.

OILER .- W. L. HOWLAND, Monmouth, Ill. BRAIDING-MACHINE CARRIER.-R. HAN-

the handle and blade may be provided with erate the switch by a passing car or train. The inventor's principal object is to provide means for efficiently operating the switch in a simple manner without greatly increasing the cost of the equipment, and also to improve the form of the switch itself. It is applicable to steam, electric, and in fact, all other forms of railways.

CAR-JOURNAL BOX .- A. V. PEPPARD, San Luis Potosi, Mexico. The object of this invention is to provide simple novel details of construction for a car journal-box which will permit the use therein of the standard brass and facilitate the free removal of a worn-out or split brass without excessive loss of time be merely raising the box sufficiently to remove the bearing-weight from the brass that is to be displaced, and thus enable the insertion of a new one.

RAILROAD-TIE.-J. L. CATLETT, Vincennes, Ind. Mr. Catlett's invention is an improvement in steel cross-ties. In his construction the ties are laid along the road-bed, the rails laid thereon and secured in place. No gaging is required, since the ties themselves gage the rails, and as the ties are of uniform size no blocking is required. When properly ballasted, the ties are immovable and traffic tends to fix them more securely. The track is more easily kept in shape and the rail will be free from depressions due to imperfect ties.

APPARATUS FOR LAYING AND TAKING UP RAILWAYS.—G. I. RITCHIE, Crossett, Ark. Mr. Ritchie's invention relates to an apparatus for laying down and taking up railways which is adapted particularly for use in connection with temporary roads, such as those which are constructed in lumber districts. In this industry rail or tramways are frequently laid through forests, and when the supply of timber along the road is exhausted the road is taken up and relaid, these operations frequently recurring and involving considerable expense. The object is to provide a practical means for doing this work quicker and at less expenditure. By his arrangement he is enabled with great facility either to take up or lay down a railway, dispensing with all hand-labor excepting in bolting up or unbelting fish-plates to connect or disconnect track-sections.

RAIL.-H. HERDEN, Wellsboro, S. E. FITCH, and J. H. BURGOYNE, JR., Galeton, Pa. In this patent the invention relates to certain improvements in rails, especially those for use upon railway-tracks, and includes a method of constructing a railway-track with such rails. The principal objects of the invention are to provide for more rapidly and conveniently laying rails and for more efficiently securing them in position upon the track and to each other.

RAILWAY-RAIL JOINT .-- J. T. EVANS, New York, N. Y. In this instance the invention has reference to improvements in joints for railwayrails—the inventor's object being to provide a joint of novel construction that may be readily placed in position and secured without the employment of bolts as ordinarily used with fishplate joints.

Pertaining to Recreation.

GAME APPARATUS .- W. J. HAMILTON, Franklin, Pa. The purpose here is to provide an exceedingly interesting and amusing game and one that will tax the patience of the player, in the playing of which it is required to transfer marbles or other rolling objects from a tunnel or subway to a plane surface above it, which surface is provided with openings communicating with the tunnel, the transfer to be made by shaking the device until all have passed through one at a time, it being required to keep the extracted objects upon the plane until all objects have been landed.

Pertaining to Vehicles.

COMBINATION BED AND CARRIAGE FOR CHILDREN.—S. D. CARMICHAEL, Tama, Iowa. This contrivance may be readily taken apart and folded together, either for storage or transportation of the structure, and again assembled in position for use. It affords the maximum of comfort to the occupant and may be converted into either a cariole or a bassinet when desired, and possesses all of the advantages of the indoor uses for which the latter are usually employed. It is comparatively cheap to manufacture.

BREECHING .- C. A. ACKENHAUSEN, Leavenworth, Kan. The object here is to provide a preeching for harness athe which will more effectively resist the destructive strains to which the breeching is necessarily subjected and which will also enable the breeching to be constructed more easily and cheaply than heretofore. The end is attained by forming the body and stays of the breeching of an integral section of leather, to which the holdback and hip straps are attached by rings or buckles. VEHICLE-WHEEL.-G. L. GLASER, New York, N. Y., and J. OLSEN, Jersey City. N. J. The purpose of this invention is to provide a wheel which contains in its inner circumference, not in contact with the roadway, an elastic or pneumatic cushion which takes up and diminishes any shock or jar upon the axle as the result of the wheel rolling over uneven roadway and which contains a mechanical contrivance constructed so that the driving-hub may be instantly displaced from its center when at rest and will as quickly recover its normal center, or, in other words, the hub may assume eccentric centers to which it may be pressed

by shock or jar and will instantly and auto-

Designs.

DESIGN FOR A CHAIR .-- W. F. WITTICH, Codv. Wvo. In this instance the designer has produced a new, original, and ornamental arrangement of a chair in a very skillful and graceful manner. The whole frame is made up of antlers. The seat and back upholstered, and the latter shaped like an inverted shield, in the upper part of which a circular clock is inserted.

DESIGN FOR A ROSARY .--- H. F. NEHR, New York, N. Y. The ends of the main length of this beautiful article, are brought together and fastened in a heart, pendent from which is a short continuation of the above mentioned length holding at its extreme lower end a neat and chaste crucifix.

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

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.-You will find inquiries for certain classes of articles numbered in consecutive order. If you manu-facture these goods write us at once and we will send you the name and address of the party desir-ing the information. In every case it is neces-sary to give the number of the inquiry. MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 7570.-For manufacturers of con-tinuous distilling apparatus.

"C. S." Metal Polish. Indianapolis. Samples free Inquiry No. 7571.-For manufacturers of ma-chines for making shoe laces, corset laces, etc.

Drying Machinery and Presses. Biles, Louisville, Ky.

Inquiry No. 7572.-For manufacturers of large springs such as are used in nusic boxes. Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St.,

Chagrin Falls, O. Inquiry No. 7573.-Wanted, address of parties doing pressed metal work.

Sawmill machinery and outfits manufactured by the

Lane Mfg. Co., Box 13, Montpelier, Vt. Inquiry No. 7574.-For manufacturers of hand wagon wheels

WANTED -- Patented specialties of merit, to manufacture and market. Power Specialty Co., Detroit, Mich.

Inquiry No. 7575.-For manufacturers of electrical novelties or burglar alarms and supplies. The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Machine Company,

Foot of East 138th Street, New York.

Inquiry No. 7576.-For manufacturers or dealers of plate glass; also address of firm making fancy pic-ture and mirror frames. I sell patents. To buy, or having one to sell, write

Chas. A. Scott, 719 Mutual Life Building, Buffalo, N. Y. Inquiry No. 7577.-For manufacturers of rubber-covered casters.

WANTED.-Purchaser for Monazite, Molybdenite and Wolfram. Apply Monasite, Box 773, New York. Inquiry No. 7578.—For manufacturers of small vacuum pumps.

FOR SALE.-U. S. Patent Right No. 730,757. Rotary roasting oven for drying grain or bakin: cereal foods. Address J. B. Galbreath, Decatur, Mich.

Inquiry No. 7579.-For manufacturers of white and colored door knobs.

A practical man wishes to invest \$2,000 in a well-estab lished machine shop. Must bear investigation. Invest ment, Box 773, New York.

Inquiry No. 7580.-For manufacturers of blanching machines.

I have for sale the patent of a Folding Umbrella sure to sell at sight. Offers solicited. Mrs. A. Studams, 732 Federal Street, Camden, N. J.

Inquiry No. 7581.—Wanted, address of parties who handle repairs for Swiss music boxes. WANTED.-Ideas regarding patentable device for water well paste or mucilage bottle. Address Adhe

sive, P. O. Box 773, New York. Inquiry No. 7582.-For manufacturers of practical rotary or turbine gas engines.

FOR SALE .- Paying up-to-date metal working plant Best location; good building. \$75,000, or will sell large interest to right man. Chance, Box 778, New York. Inquiry No. 7583.-For manufacturers of blot-ting paper.

I have for sale the U.S. and all foreign rights of new patent Improvements in Water Tube Types of Boilers Great economizer. J. M. Colman, Everett, Wash.

Inquiry No. 7584.-For manufacturers of lenses such as are used in miniature cameras.

WANTED.-A Young Man familiar with drafting to assist superintendent in an iron casting plant. Good opportunity for advancement if capable. Draftsman, Box 773, New York.

Inquiry No. 7585.-For manufacturers of chain-making machinery. Manufacturers of patent articles dies moto



Scientific American

HINTS TO CORRESPONDENTS.

our miormation 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 adver-tised 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

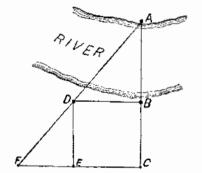
Minerals sent for examination should be distinctly marked or labeled.

(9849) W. C. N. asks: 1. What is quarry water (or sap)? What effect has it on stone, and how is it gotten rid of? A. We would say that quarry water or sap is the

NOT ST AGGE RED STAGGERED RIVETS

water or moisture which is absorbed in stone cut from the portion of a quarry which is below the level of the ground water in the territory surrounding the quarry. Many kinds of stone are sufficiently porous to absorb a considerable quantity of water in this way. Quarry water may be got rid of by allowing the stone to season or dry out by exposure to the atmosphere. 2. Also define these terms used in construction : "Needles," "chases," "staggered." A. "Needles" are the vertical struts which are used to support or jack up a wall temporarily when the underpinning is taken out. The spool of spacing different arti-pipes or wires. The term "staggered" is used former for transforming 110-volt alternating current to direct current of about the same boiler. When each rivet in one row comes opposite the space between the rivets in the adjoining row, the rivets are said to be "stag-gered." Fig. 2 shows three rows of rivets Fig. 2 shows three rows of rivets which are not staggered. Fig. 1 shows three rows of rivets which are staggered.

(9850) L. L. says: Some years ago the SCIENTIFIC AMERICAN gave a very simple way of measuring approximately the width of a river without any other instrument than a measuring tape. A. Select a tree or other conspicuous object on the farther bank of the



river, as A. Select another tree or stake on the near bank of the river, as B. Measure off any convenient distance—say one or two hundred feet—from B to the point C, which shall be in the line AB. Select a third tree or stake, as D, and complete on the ground the parallelogram BCED. Then find the point F on the ground which is in line with EC and also in line with DA, and measure the distance from E to F. Then AB will equal BD multiplied by BC divided by EF.

(9851) D. L. asks: 1. Kindly explain are quite fully explained in Oudin's "Polyphase through your magazine how, by experimenting Apparatus and Systems," which we can send with a pendulum, it has been calculated that you for \$3.00. (9853) he gravity force of the earth is 289 times as J. C. H. writes: equator is determined from the length of the day, or the velocity of rotation of the earth at : the equator. This gives the value of centrifugal force as 0.1112 of the mass of a body at the equator, which makes the body lighter by this amount. The force of gravity at the equator is 32.0902. Hence if there were no centrifugal force, the weight of a body would be the sum of these two, or 32.2014, which is the real mass of the matter of the body. Hence centrifugal force lightens a body 0.112/32.2014, which equals 1/289 very nearly. You can find all these matters demonstrated in the library of the university of your city. The librarians professor of mechanics or astronomy will advise vou.

will attract a body with an ultimate velocity of 7 miles a second at the moment it would strike the earth. How can I find the corres ponding velocity with reference to the sun and the moon? A. You will find the solution of the problem of fall from infinity in Watson as above, or in Young's "General Astronomy," Sec tion 429. We can send you the book for \$3.25. 3. If we imagine a tunnel through the earth Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication. then letting a body fall into it, what would be the maximum velocity, and at what point in the tunnel would that velocity be attained? A. A body falling through the earth as you describe will have its highest velocity at the center of the earth. The finding of the velocity is a problem of analytical mechanics, to which we refer you. 4. If a bullet sent out from a rifle and in a perpendicular direction will reach a height of one mile, how far would it go at an angle of 30 degrees with the horizontal plane? A. If a bullet will rise a mile in a vertical direction, it will rise to the same distance when rising at an angle of 30 degrees to the horizon. 5. What would be the weight of a cubic foot of water at a depth of 8 miles? A. The compressibility of sea water is 44 millionths per atmosphere at 12 deg. C.; that of pure water at the same temperature is 47 millionths. while at the freezing point it is 50.3 millionths The temperature would vary considerably as we descend in water. Upon this datum you can calculate the density at a depth of 8 miles. We must say that your questions remind us of an examination paper in college, and we never liked to take examinations.

(9852) F. L. J. asks: 1. In your issue of August 5, 1905, Query 9722, there is described an experiment with a cent and a spool. I have tried this carefully several times, but without success. Kindly give me more complete directions. A. Your failure with the spool and cent experiment is perhaps due to your having the cent too far from the end of the spool when you begin to blow. The pins should be driven into the spool so that the cent is less than a sixteenth of an inch from the spool. When you blow, the cent will then be pushed up against the spool and held there till you stop blowing, the spool being held vertically down. A disk cut from a calling card and as large as the end of the spool or larger A. A transformer of the ordinary sort will not change an alternating to a direct current. You require a motor dynamo for the purpose, if you wish to obtain any considerable current. For small currents you may use an electrolytic rectifier. 3. Why are permanent magnets made of steel, while the cores of electro-magnets are made of soft iron? A. If an electro-magnet is always to be magnetized in the same way, and it is not necessary to demagnetize it suddenly, the core is not made of iron but of steel. Many dynamos and motors have the field cores of steel. When an electro-mag-net is to be demagnetized suddenly, as when the armature is to vibrate like that of a telegraph sounder, the core should be of soft iron in order to demagnetize it suddenly, and make the click quick and sharp. 4. Why are electro-magnets always wound with a great deal of fine wire? A. Electro-magnets are not always wound with many turns. They are wound with the calculated number of turns to produce the degree of saturation necessary for their work. 5. Would they not give as good results if wound with a few turns of heavy wire, provided the number of ampere turns was the same in each case? A. Electro-magnets are not wound with any coarser wire than can be avoided, in order to keep the current as low as possible for the work to be done. The heat ing is in proportion to the square of the current, hence with twice the current there will be four times the heating. For this reason a larger number of turns of finer wire are better than a smaller number of turns of coarse wire. 6. Can the speed of an induction motor be lowered with a resistance in series with it? A. The speed of an induction motor may be altered in a number of ways. One of these is by a controller similar to that of a trolley car in the motor circuit. These methods of control

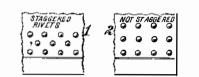
an ar great as the centrifugal force at the equator. ticle No. 9806, page 306, dated October 14, A. The force of gravity at any place is deter- 1905, in which R. L. I. asks a question about mined from the time required by a pendulum of potential energy, and your editor says he did known length at that place to make one oscilla- not know the definite answer. The following tion. The centrifugal force of the earth at the solution is the most plausible. When the coiled spring is placed in the tube and acid put on, a certain portion is dissolved, say the millionth part of a cubic centimeter. This gives a millionth part of a cubic centimeter in which the remainder of the spring can uncoil and exert its energy. In this way the dissolved portion is always giving room for more expansion. The questioner asks whether the heat in the coiled spring is greater than in an uncoiled one. This difference is so small and would amount to such an infinitely small amount, that it could be left out of question. A. If the explanation of the case of the coiled spring dissolved in acid as given will assist you to find what you need, or the above satisfies our correspondents, we are quite power of the glass. If a glass magnified five satisfied that they should adopt it. It is a Watson's "Theoretical Astronomy" will case for quoting Mr. Lincoln's famous certifi- seen at a distance of 4 feet. The restoration contain it. 2. From an infinite or very great cate of recommendation of something which of the colors by the opera glass constitutes distance, in an astronomical sense, our earth was presented to him: "If this is the sort rather a pretty optical experiment.

of a thing a man would like, this is just the thing he would like." We should not expect the spring to behave that way. We should expect it to grow weaker as it became thinner during its solution till at last it would have no elasticity left with which to uncoil. Its reaction against the band which held it would diminish till nothing of the steel was left.

(9854) W. B. S. says: In the edition of your paper of July 15, 1905, question No. 9693, F. L. asks whether a bullet dropped from the muzzle of a rifle would reach the ground quicker than one fired from the rifle at the same elevation with the rifle held perfectly horizontal. I understand your answer thereto, but to my mind it does not explain all the factors entering into the problem. For instance, the bullet fired from the rifle is acted upon by two forces, i. e., the propelling force of the powder which forces the bullet in a direction diagonal to the pull of gravity, and the pull of gravity; whereas the bullet dropped from the muzzle of the rifie is acted upon by the one force only, i. e., the pull of gravity. It thus seems to me self-evident that when the bullet is fired from the rifie there is a force behind it which in a degree counteracts the pull of gravity, that is, this horizontal force would tend to keep the bullet in the air longer than would be the case without this force. Moreover the bullet traveling in a horizontal direction would consume the extra time necessary to cover the horizontal distance, whereas the bullet dropping from the muzzle would have only the perpendicular direction to the earth. Why would it not then require less time for the bullet to travel the perpendicular than the oblique distance? Would the speed of the bullet fired from the rifle or the resistance of the atmosphere enter into the problem as factors? A. The problem of the motion of a rifie ball shot horizontally and another dropped vertically is a very old one, and there is no disagreement among scientific men regarding it. All the books say the same about it, that both balls keep in the same horizontal plane as they move. The force of the powder drives the bullet horizontally and has no influence upon its downward motion. It falls by gravity alone, just as the one dropped vertically does. As you say, there are two motions in the bullet which is shot and one in the one which is dropped. This statement makes the whole matter plain. The writer has performed the ex-periment probably thousands of times, and never with any deviation in the result. Both balls strike the ground at the same time. Neither the difference in the speed of the two bullets nor the resistance of the air is concerned in the motion of the bullets. Gravity draws each down the same distance in the same time.

(9855) O. F. N. writes: Question No. 9806, asked by R. L. I., about the energy of a coiled spring, seems to me to be of great importance. The energy must be somewhere, even if the spring is dissolved in some acid. That is my opinion. I have formed theories about that which I hesitate to advance, as I am inclined to believe that you would not publish the same, as these theories seem to be against your own judgment that nobody knows it. A. We are not looking for theories as to the energy of the coiled spring dissolved in acid, but for facts. Has anyone measured the recovery of the energy during solution, to tell us what becomes of it? One speculation is no better than another if given by a person who has not experimenetal evidence to offer in support of his inference. It is not a question of our own judgment, but one of experimental evidence. Anyone having experimental evidence on the matter can have a hearing.

(9856) G. B. asks: In projecting a lantern slide upon a screen with a single double convex lens the lines on the picture, when viewed close to the screen, within a foot or two, give the colors of the rainbow. If, however, the observer goes back ten or twenty feet more from the screen all this color effect im-mediately disappears. Will you please explain why this color effect is not equally visible at this distance. I understand, of course, if a chromatic lens is used there will be no such color effect. What I do not understand is why, when you see it so plainly at a foot away, you cannot see it equally plainly at 10 feet, although all the other parts of the picture are equally visible at either distance. A. The lines of a picture are visible to the eye when a line subtends an angle at the eye of about a minute of arc. This is the limiting angle of vision without optical assistance. When one stands one foot from the screen on which is a picture with lines projected by an ordinary convex lens, the lines fill more than this angle. So also do the interference fringes on the edges of the lines. At 20 feet distance from the screen a space twenty times as broad is required to fill the same angle as was filled by a line at one foot distance from the screen. All which is in the wider space is combined in the eye at 20 feet into an image of the same size as was occupied by the line at 1 foot. The color fringes then are combined into white light again, and only the black is seen. If one uses an opera glass at 20 feet the colored fringes are restored and are as visible as at the 20 feet divided by the magnifying diameters the lines and fringes appear as when



stamping, screw machine work, hardware specialties machinery tools and wood fibre products. Quadriga Manufacturing Company, 18 South Canal St., Chicago. machinery tools and wood fibre products.

Inquiry No. 7586.-For makers of the instrumen called the "Leak Finder," used for locating leaks in underground water mains.

Absolute privacy for inventors and experimenting. A well-equipped private laboratory can be rented on moderate terms from the Electrical Testing Laboratories, 548 East 80th St., New York. Write to-day.

Inquiry No. 7587.-For machines to make stapled and drawn push brooms.

Manufacturers of all kinds sheet metal goods. Vende ing, gum and chocolate, matches, cigars and cigarettes, amusement machines, made of pressed steel. Send samples. N.Y. Die and Model Works, 508 Pearl St., N.Y

Inquiry No. 7588.-For makers of rubber pillow

WANTED .- A man of experience; capable of running factory that is manufacturing heavy machinery Should have \$25,000 to invest in the business which can be shown to be profitable. We don't want the money without the man. The experienced man is the first Address Heavy Machinery, Box 117, Station A. Hartford, Conn.

Inquiry No. 7589.-For makers of typewriter parts, such as machine parts.