

in operation, and arranged to prevent leakage, as the valve proper is held to its seat by the pressure-supply and opens against the latter when manually actuated.

Designs.

DESIGN FOR A WHISK-BROOM HOLDER.—M. A. SKALL, New York, N. Y. In the present case the ornamental design relates to a whisk-broom holder. The upper part of the holder comprises three hinged mirrors. The lower part consists of an ornamental tapering broom holder.

DESIGN FOR COFFEE-POT OR SIMILAR ARTICLE.—E. PIEPENBRING, Washington, D. C. This design is for a coffee-pot or the like of symmetrical form elongated vertically and narrowing toward its upper and lower ends, the spout and the handle being correspondingly elongated and the spout uniting with the body near the lower end thereof and extending upward alongside of and conforming to the curvature of the body to a point near the upper end of the spout where the latter is curved outwardly.

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.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring them. In every case it is necessary to give the number of the inquiry.
MUNN & CO.

Marine iron works. Chicago. Catalogue free.

Inquiry No. 4441.—For manufacturers of an inside tube cutter.

ADROS.—Duryea Power Co., Reading, Pa.

Inquiry No. 4442.—For makers of wind mills. For hoisting engines. J. S. Mundy, Newark, N. J.

Inquiry No. 4443.—For firms that manufacture and supply dealers or jobbers with electric insoles.

Morgan Emery wheels. Box 517, Stroudsburg, Pa.

Inquiry No. 4444.—For the manufacturers of Prof. Winkren's electric insoles.

"U. S." Metal Polish. Indianapolis. Samples free.

Blowers and exhausters. Exeter Machine Works, Exeter, N. H.

Inquiry No. 4445.—For makers of steam motor cars.

Mechanics' Tools and materials. Net price catalogue. Geo. S. Comstock, Mechanicsburg, Pa.

Inquiry No. 4446.—For makers of petroleum launches, having a self-starting engine.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co. Box 13, Montpelier, Vt.

Inquiry No. 4447.—For all sorts of electric dynamos for lighting, nickel, and electroplating purposes.

FOR SALE.—Patent (No. 487,561) on Book or Copy Holder. B. Gardener, Chippewa Falls, Wis.

Inquiry No. 4448.—For makers of foot power launches.

Let me sell your patent. I have buyers waiting. Charles A. Scott, Granite Building, Rochester, N. Y.

Inquiry No. 4449.—For manufacturers of Almond's flexible metallic tubing.

Gear Cutting of every description accurately done. The Garvin Machine Co., 149 Varick, cor. Spring Sts., N. Y.

Inquiry No. 4450.—For a machine for filling a 4-ounce bottle with tooth powder.

Bargain, 300,000 feet seamless steel tubing, 5-16 to 2 inches diameter. The Cleveland Distributing Co., Cleveland, O.

Inquiry No. 4451.—For a machine for labeling bottles.

The largest manufacturer in the world of merry-go-rounds, shooting galleries and hand organs. For prices and terms write to C. W. Parker, Abilene, Kan.

Inquiry No. 4452.—For the name and address of the builders of the "Essex" hot air engines.

The celebrated "Hornsby-Akroyd" Patent Safety Oil Engine is built by the De La Vergne Refrigerating Machine Company. Foot of East 138th Street, New York.

Inquiry No. 4453.—For makers of electric motor wheel chairs.

Contract manufacturers of hardware specialties, machinery, stampings, dies, tools, etc. Excellent marketing connections. Edmonds-Metzler Mfg. Co., Chicago.

Inquiry No. 4454.—For makers of lumber planers and matchers.

WANTED.—Canadian agent to sell patent on the only practical lace curtain rack ever invented. A paying proposition. Address Standard Mfg. Co., Xenia, Ohio.

Inquiry No. 4455.—For makers of adding machines.

Matthews Torpedo Launches. Matthews & Co., Basscom, Ohio, U. S. A. Builders of high grade power boats.

Inquiry No. 4456.—For makers of a light die press which will bolt to the bench, and will punch out 4-inch round checks of thick press board, cardboard, light brass and heavy tin.

WANTED.—Some one who is able to give United States patent No. 706,836 a practical test and develop same on equitable basis. J. W. Webmeyer, 2241 Warren Street, St. Louis, Mo.

Inquiry No. 4457.—For machinery for rolling out gum or manufacturing chewing gum.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 18 South Canal Street, Chicago.

WANTED.—Philadelphia selling agency for leading manufacturer. Building materials preferred. Box 2734, Station J, Philadelphia, Pa.

WANTED.—Patent Office draughtsmen; only thoroughly experienced men need apply. Must show specimens of patent drawings. Munn & Co., SCIENTIFIC AMERICAN office, 361 Broadway, New York.

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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.

(9110) T. W. A. asks: 1. A railroad train going at a rate of over 60 miles per hour rounds a sharp curve. Will the train if it should leave the track be likely to fall outward, or does the raising of the outside rail overcome this tendency and make it likely to fall inward? Grant the following: If the track were level, the train would fall outward, now if the outside rail is raised, will it fall inward? A. A railway train rounding a sharp curve at a high speed cannot under any supposable conditions fall over in the inner side of the track. The elevation of the outer rail is made such as to overcome the tendency to overturn to the outward side of the track, and the train goes round the curve as if on a level, when it moves at the speed for which the elevation of the outer rail was calculated. If the velocity of the train very much exceeds the velocity for which the outer rail has been elevated, the train would leave the track on the outer side of the curve. The tracks for bicycle racing are made very steep at the turns in order to enable riders to go round the turns at full speed, and when rounding a turn the rider feels in equilibrium while leaning far in toward the center. To him he is as if riding on a level. The centrifugal force is neutralized by the elevation of the track or rail. 2. What nationality was the captain of the "Columbia" in the last cup races? A. Capt. Barr commanded the "Columbia" in the cup races. He was born in England.

(9111) A. H. S. asks: How much more sunshine is there at the equator than at the north pole during the year? Where are the longest days—at the equator or the North Pole? We have a great argument over this question. A school teacher and others contend that the sun shone longer at the North Pole than at the equator, and I thought it absurd, so we decided to leave it to your good judgment. A. At the equator the sun rises and sets at six the entire year. All days are twelve hours long, and all nights of the same length. Regarding the effects of refraction and cloudy weather, the sun is above the horizon at any place on the equator and shines just half of the year. This half-year of sunshine is divided into equal parts of twelve hours each. At either pole the sun is above the horizon for six months and below it for six months of the year. There is but one day of six months' duration and one night of the same length in a year. You will see from this that there is the same duration of sunshine at the poles as at the equator. The same is true for any place on the earth. Add the length of sunshine for all the days in a year in our latitude, and the sun will be just a half year. The longest day is at the pole, and it is six months long.

(9112) E. R. says: Would you please oblige me by answering a few questions concerning the motor given in SUPPLEMENT No. 1210, under the heading "How to Make a Sewing Machine Motor Without Castings," by Cecil Poole, for about \$5, with the labor? The wire alone cost me \$6.66—3 pounds of No. 21 wire on each field coil, 27 layers deep, and 66 turns wide. Why must the field have so many ampere turns? Would this motor work as a generator with an adjustable rocker arm? Would it light nearly two 110-volt lamps? A. If you build the motor according to the last paragraph of the description on page 19394 of SUPPLEMENT No. 1210, for ¼ horse power, and connect it in shunt, you will probably be able to light two 16-candle 110-volt lamps with it as a dynamo. As to the figure of cost given by Mr. Poole (\$5), while this was true in 1899, it can hardly be expected to remain true indefinitely. Prices of material are very much higher now than they were then.

(9113) G. T. asks: How to remove gases of combustion and decomposition from a small room. Passing the air through a liquid would not be objectionable. A. To purify air, remove the solid particles by passing the air through cotton; the moisture and ammonia and germs, by passing through sulphuric acid; the sulphur, by passing through a solution of lead acetate. Pass now through calcium chloride or soda lime to remove last traces of moisture, etc. Only pure oxygen, nitrogen, and argon remain.

(9114) F. C. F. asks: 1. What is the best method to produce lantern slides in which

the high lights will be clear glass and the shadows dense enough for the lime light? I print by contact, and have used for developing hydroquinone, metol-hydroquinone and pyro, and an acid fixing bath, yet there always is a slight veil over the high lights. A. The only mode in which lantern slides can be produced with no development in the sky and high lights is to have a negative which is opaque in the high lights. 2. Can you give a simple method by which an amateur could color lantern slide transparencies? A. To color slides requires artistic sense and knowledge of the mixing and applying of color. We think that is all that is required. Much assistance can be had from the chapter on coloring slides in Hopkins' "Experimental Science." This book also gives instructions for making slides as well as cameras, and an exhaustless amount of scientific experimenting. 3. Why is it that water when flowing through a funnel or into a small outlet always whirls, producing a depression or an opening over the outlet? Why is the whirling always counter-clockwise? A. There is probably something in the shape of the outlet of a funnel or wash basin which determines the course of the liquid as it runs out. A loss of equilibrium is soon seen, and the water whirls. Centrifugal force is produced, causing the opening into the pipe below. We would try to explain why the whirling is always counter-clockwise if it were so. We have just tried a wash basin, and found the motion always clockwise when left to itself. By a motion of the hand it could be made in either direction. Probably some inequality in the orifice determines the matter.

(9115) A. M. says: 1. In answer to query 8996 in the issue for May 9, you clearly explain the working of a radiometer. Please tell me why it will not work as well in open air as in a vacuum. A. The radiometer only works at a particular degree of vacuum. Too little gas in the tube, and there is not enough energy to the radiation to rotate the disks; too much gas, and there is too much resistance to the motion for the feeble energy of radiation to start the disk. 2. Why will a single-phase alternating electric current not start a direct-current motor, if the relative polarity of field and armature be the same, whatever be the current phase? A. An alternating current will only run a direct-current motor when the alternations exactly coincide with the change of the brushes from one segment of the commutator to the next. This is the case when the speed of the armature is in step with the alternations. For this reason the motor must first be brought up to speed by some outside motor and the current then switched on. 3. Will the precession of the equinoxes put the seasons, after a time, in different months, for example, summer in October or November? A. The calendar is adjusted so that the year will always correspond with the season. Winter will be as now and summer in the same months as now forever.

(9116) O. D. says: Kindly inform me whether or not there is a substance which will resist the lines of force of an electric magnet, I mean to resist them, not screen them as iron will. A. There is no known material which will present resistance to the passage of magnetic force. It must be apparent that a force which has passed through the earth and the air will not be retarded any more by passing through materials the same as it has already passed through. The screening action of iron upon lines of magnetic lines of force is perhaps not understood. It screens a space from magnetic force because iron furnishes an easier path for the magnetic lines than any other material. Hence the magnetic lines leave that space and pass through the iron. Iron presents less resistance to the passage of magnetism than any other known material.

(9117) C. K. B. N. writes: Can you tell me where I can get a complete report of the findings or extracts from the report of the delegation which came to this country several years ago from Russia, and which made a tour of investigation of our scientific schools? A. If you write to the United States Commissioner of Education, Washington, D. C.; we think that he will be able to tell where you could obtain the report you desire.

(9118) J. B. M. asks: Can a single wire carry a current to produce electric light, run a sewing machine, operate telegraph instruments, and a telephone service, all to be in use at the same time, and with perfect safety to the operator? A. We suppose the same current can be used for all the purposes you name and for all others at the same time. It is done all the time. It is only necessary to have the various motors and instruments wound for the voltage of the current. We cannot guarantee perfect safety, however. Electric service is safe if ordinary caution is exercised in its use at all points.

(9119) A. F. S. says: I am building a Ruhmkorff induction coil to give a 6-inch spark and write for some advice, for which I would be very grateful. I propose to make the coil in eight sections insulated from each other with hard rubber disks and paraffine. The size of wire to be used in the secondary is No. 36 B. & S. Now what I desire to know is this: Can a coil of this size be made to operate successfully by using single cotton-covered wire instead of silk, having the coils boiled in paraffine? I think that cotton

would do well enough, especially if it is soaked in paraffine. And other precautions taken to thoroughly insulate the windings. I made a small coil, using cotton-covered wire in the secondary when silk was advised, and the coil worked well, so I am thinking that cotton-covered wire would work successfully with a large coil if built in a number of sections. If you know of coils being built by using cotton-covered wire, would like to know of it, as it would give me some confidence in cotton. A. We do not advise the use of cotton-covered wire in a coil built to give a spark as long as 6 inches. The reason for using silk is not that silk is a better insulator. No porous insulation is any better, of course, than the same thickness of air. Silk is used because it does not occupy as much room as cotton and more turns can be put into the same space. It is most important to bring the turns as near the primary as possible where the induction is strongest. With silk insulation this is best secured. We do not doubt that a coil can be constructed from cotton-covered wire to give a long spark. More wire per inch will be required if cotton-covered wire is used.

(9120) A. B. S. writes: As a long reader and subscriber of your publications, I desire to ask if there is any secret in the preparation of fluoroscopic screens for X-radiance, or if the high price is due to the high-priced material—platinobarium-cyanide (or tungstate of calcium). Where can they be procured? A. There is no secret in making a fluorescent screen for X-ray work. Skill only is required to distribute the crystals with perfect evenness and to attach them to the cardboard by the adhesive employed. The crystals must also be of uniform size, sifted through a sieve of rather a fine mesh. We should buy rather than try to make one. The cost is in the material used. It is advised that barium-platinocyanide only will be satisfactory, since tungstate of calcium is fluorescent for quite a time after it is excited. It is cheaper but poorer, and is little used now.

(9121) J. B. S. says: I want to excavate earth and move the same to make a fill of about 60,000 cubic yards. If you know of any machinery that will do this, I would be pleased to hear from you. I do not want to go to the expense of a steam locomotive excavator. A. The only suggestions that we have to offer you for excavating earth are a steam shovel or to use hydraulic means in case there is a sufficient supply of water in the vicinity.

(9122) F. H. says: In Notes and Queries of June 13, 1903, No. 9056, C. B. C. asks: "What would happen if a direct-current motor were connected with an alternating current dynamo?" You answer: "If the alternating current were sent through a direct-current motor at rest, it would be heated and burn out." The theory here may be all right, but in practice it does not work. I had a No. 2 Porter motor, and a 110-volt direct-current dynamo, which I ran with a 110-volt alternating current. The dynamo would run as a motor with the full current, but the Porter motor required to have some assistance put in the circuit, or else it would burn out the one ampere fuse which I used. Both motors would start from a standstill, but the armature of the dynamo had to be placed in a certain position, or else it would stick and emit a buzzing sound. What was the cause of the noise? It seems to me that as you can reverse a direct current, and have the motor go, just the same, an alternating current which simply reverses back and forth, continually, would run the motor just as well as the direct current. A. The dynamo which you say will stand an alternating current of 110 volts is probably series-wound, and so has the benefit of the entire resistance of its coils to act by their self-induction in cutting down the current. If you would turn the current upon a large shunt-wound motor, we think you would see the fire fly or the fuses blow. Your dynamo did not start from rest in a proper sense. You say you had to set the armature to make it start. The usual way to run a direct-current motor on an alternating current is to have the armature turning rapidly when the current is thrown on. The "sticking" of which you speak is the refusal to turn. There is no sticking in the ordinary sense. The buzzing sound you hear is the note produced by the alternations of the current in the wire of the dynamo. It can always be heard in an arc lamp and coils generally when an alternating current is passing through them. Your reasoning about reversing a direct current and still having a motor go, and applying this to an alternating current, is not correct. When a direct current is reversed in a motor, both the field and armature has the current reversed in them, and the resulting polarity is the same. Two reversals leave the current the same as before. This is of course not the case with an alternating current.

(9123) T. C. G. says: Can you give me reliable rules for finding the sets of elliptical and spiral car springs? Also the length a bar should be to make a spiral car spring of a given free height? Do you know where I could buy a book dealing with car springs? A. The question of calculating elliptical and spiral car springs to give definite results is an exceedingly complicated one, and one that requires considerable experience as well as theoretical knowledge. You will find quite a complete discussion of the theoretical side of this subject