

sap liable to contaminate the fresh sap. By boring but one hole and in avoiding blazing the tree by cutting off bark, Mr. Grimm's method secures the great advantage of prolonging the life of the tree.

TROLLING-HOOK.—A. H. SMITH, Tremont, La. The barbs of this hook may be made to enter openings in the shank when not required for use, enabling the hook to be carried in the pocket without danger. The hook may be placed in a receptacle without the barbs becoming entangled with objects. The hook is so constructed that when taken by a fish it will fasten strongly in position, but may be quickly released without the introduction of fingers into the mouth.

PAINT OR PROTECTIVE COMPOSITION.—E. G. BERTRAND, 22 Rue Legendre, Paris, France. The present invention refers to a paint, and is intended mainly for the painting of houses and windows, its special property consisting in preventing to a great extent the passage of heat-rays, while at the same time letting the light-rays pass. It is applied like whitewash or grained or with a pad or daber, and packed in a tub, box or barrel.

MANHOLE-COVER.—C. E. BURNEY, New York, N. Y. This cover is more particularly of the type employed in that part of a ship known as the "tank." Very little labor and skill is needed in the operation. By placing the lid upon the lower side of the casing—that is, placed toward the water—little pressure is needed to hold it in place, the idea being that if the manhole-cover were subjected to excessive water-pressure this pressure would serve to make the joint still tighter.

DOOR FOR BOOKCASES OR THE LIKE.—O. O. BUICE, Montgomery, Ala. The intention in this patent is to provide for bookcases, show-cases, and like holders a new and improved door, simple and durable in construction, easily applied, and readily moved into a closed or open position completely out of the way of the user of the case.

CUFF-HOLDER.—J. H. and A. I. DWORK, New York, N. Y. This device for holding cuffs is attached to the sleeves of one's shirt, and it is of that general class in which is provided a shank with an attaching device at each end, one device being adapted to engage the shirt and the other to engage the cuff.

CHAIR HEAD-REST.—R. S. GIBSON, New York, N. Y. The present invention may be classified as relating to improvements in head-rests for barbers' chairs or the like, the object being to provide a new and clean bearing-surface or rest for each customer, thus reducing the danger of spreading scalp diseases or the like.

DEVICE FOR TRUING MUSICAL STRINGS.—C. A. GRAHAM, Columbus, Ohio. Strings for musical instruments formed of catgut and the like are generally of non-uniform diameter, and this defect impairs the accuracy of their notes. This invention overcomes the defect, and the end is attained by providing a grinding device to the action of which the string is subjected, so that the surface of the string is cut or ground down into true uniformity.

BOTTLE-CLOSURE.—C. J. GUSTAVESON, Salt Lake City, Utah. The object in view in this case is a novel construction of bottle-cap, label, and connections between the label and the cap whereby the latter cannot be removed or displaced without marring the label in such manner as to indicate that the bottle has been opened.

SPRING-FRAME.—F. A. HALL, JR., Montclair, N. J. Heretofore it has often been a disadvantage that frames for woven-wire springs are liable to rupture, slight strains being sufficient in some cases to make the frame useless. This weakness is mainly present in the connection between the side-bars and the brackets, and this invention resides in forming on these parts interengaging wedge-like surfaces bound firmly together, to prevent twisting or working movements of the parts.

Designs.

DESIGN FOR A CUP.—R. L. JOHNSON, Hanley, Staffordshire, England. In this design the upper portion of the cup is plain and cylindrical. The portion leading to the bottom flange is vertically fluted. The cup has a ring-handle. Leaf decorations appear at the bottom of the knuckles on the body, and between each group of leaves a bar-scroll is introduced.

DESIGN FOR A COVERED DISH.—R. L. JOHNSON, Hanley, Staffordshire, England. The cover of this design is decorated at its center by a cluster of leaves, from which rises the handle. Depressions, a scroll and clusters continue the decoration. The body is vertically fluted, and lead to vanishing effects. A bar-scroll is formed near the upper edge, and at the upper knuckle are clusters of leaves. Stem-handles are at the ends. The base is flared and decorated with clusters of leaves.

SHOE.—C. F. KLEIN, New Orleans, La. The invention in the present patent is in the nature of an improvement in shoes, having reference especially to the reinforcing of the vamp at the lower end of the front opening of the shoe and also preventing the external tip above the toe from becoming distorted or torn by the laster.

DESIGN FOR A STATUETTE.—R. F. OUTCAULT, New York, N. Y. The design comprises a base supporting the representation of

a nondescript dog, appearing with a smiling face and sitting on its haunches alongside a mischievous boy, the latter appearing in an erect standing position.

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 the information. In every case it is necessary to give the number of the inquiry.

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Marine Iron Works. Chicago. Catalogue free.
Inquiry No. 4252.—For manufacturers of a needle threader.

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Crude oil burners for heating and cooking. Simple, efficient and cheap. Fully guaranteed. C. F. Jenkins Co., 1103 Harvard Street, Washington, D. C.

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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.

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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.

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

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FOR SALE.—Stone sawing machine pat. No. 717,911. Claud S. Payne, E. R. No. 4, Salem, Ind.

Inquiry No. 4267.—For makers of safety oil lamps for railroad cars, which extinguish automatically in case of collision or accident.

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WANTED.—Cheap novelties in large quantities for advertising purposes. Address John H. N. Davis, Secretary United States Insurance Adjusting Company, 324 Dearborn Street, Chicago, Ill.

Inquiry No. 4269.—For castings and materials for building a one-half horse power dynamo.

Successful salesman of high-class specialties ("for 14 years in Southeastern New England") desires connection with a progressive firm, as

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FOR SALE.—Patents on two valuable inventions. One adapted to handle by shop rights, the other a useful novelty suitable for hardware trade, novelty stores, or agents. Chas. B. Post, New London, Ohio.

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Inquiry No. 4276.—For makers of spring steel $\frac{1}{8}$ inch in width.

Inquiry No. 4277.—For makers of automatic electrical clocks for closing circuits, having 24 figures on dial.

Inquiry No. 4278.—For manufacturers of voltmeters and ammeters for battery circuits having a scale of 1 to 10 volts or more.



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.

(9044) D. G. E. asks: In what respect, if any, do the magnetic properties of nickel, cobalt, etc., differ from those of iron? Can these metals be used for cores of electromagnets? A. While it would be possible to use cobalt or nickel for the cores of an electromagnet, the power required to magnetize the cores would be much greater, and the cost would be very much greater. These metals are inferior to iron in permeability.

(9045) W. D. C. says: Can you please inform me what per cent of the entire earnings of the railroads of the United States is from passenger traffic, what per cent is from freight, what per cent is from mail, and what per cent is from express? A. In 1901 passenger earnings were \$360,702,686; freight earnings were \$1,126,267,653; express and mail not reported in detail, but the miscellaneous returns were \$125,478,488.

(9046) A. B. B. says: Please let me know what is the process for etching on glass. A. This preparation may be made by mixing sulphate of barium and fluoride of ammonium in the proportion of three parts of the former to one part of the latter, with sufficient sulphuric acid to decompose the ammonium, and bring the mixture to the consistency of rich milk. The mixture should be made in a receptacle of lead and kept in a bottle of the same material or of gutta percha.

(9047) W. E. B. says: Please give me a good formula for making chloride of gold, as commonly used in toning photographs. A. Dr. John H. Janeway, an amateur photographer, suggests the following method: Dissolve a \$2.50 gold piece in 6 drachms of chemically pure muriatic acid, 3 drachms chemically pure nitric acid, and 3 drachms distilled water. Put the gold in a large graduate, pour on the acids and water, cover the graduate with a piece of glass to shut off or retard the escape of fumes, and set in the sun or in a warm place. When the gold is dissolved add bicarbonate of soda very gradually, stirring with a glass rod at each addition, until effervescence has ceased and the froth subsided, and the carbonate of copper which has been formed is deposited as a green precipitate. Now add 6 ounces of water, and let the whole settle for not over thirty minutes, and then very carefully filter the solution. To the clear golden liquid which has passed through the filter add carefully enough nitric acid, chemically pure, to turn blue litmus paper decidedly red, then add enough pure water to make the solution measure 32 fluid ounces. The solution will keep for any length of time, and 1 ounce will tone four sheets of paper. 2. Please tell me where I can procure pure gold for this purpose. Is it necessary to use pure gold for this purpose? A. Nearly pure gold must be used. 3. Can I procure books which will enable a person of ordinary intelligence to master assaying without a teacher? Is a course of home study without aid, except such as can be gotten from textbooks, a practicable way of getting a good practical, working knowledge of the subject? Where can one procure the needed books and apparatus? A. We can supply "The Assayer's Guide," by Lieber, price \$1.50; "A Manual of Assaying," by Brown, price \$2.50. You can study assaying at home. We have mailed you the address of parties handling supplies.

(9048) A. W. writes: During my late residence in the highland of Bolivia, a discussion arose among a number of people, including some engineers, upon the following question: Would a rifle fixed in a vise at right angles to the line of gravitation on the sea-shore, carry a longer or shorter distance than the same rifle fixed under same conditions at 13,000 feet above the sea? I take it that the density of the atmosphere is the only variant in the question, as the difference in attraction of gravitation would be so small as to be not worth consideration. A. At 13,000 feet the air, being much less dense, will resist the rifle ball less than at the sea level. Hence we think the ball would be sent further by a given energy of the powder than at the sea level.

(9049) W. B. G. says: Where are some of the largest flywheels? Give diameters and number of revolutions per minute. State why a small wheel can safely revolve faster

than a large one. Does the diameter of a wheel figure as much in the possibility of high-revolution as does the style and make-up of the wheel, that is, will not a 20-foot wheel weighing ten tons and having a heavy center revolve more rapidly and with less danger than a wheel of the same diameter and weight with heavy rim? A. The larger flywheels are from 25 to 30 feet diameter, and in special plants much larger, making from 60 to 80 revolutions per minute. Small flywheels can run faster than large ones. The strain increases with the rim velocity. The strength of the wheel against its destruction by work and centrifugal force is the main item in its construction. A proper proportion between hub, arms and rim due to its proposed velocity is necessary for safety in its design.

(9050) F. M. A. says: Will you please answer the following: 1. A formula for making water paint for painting outside of buildings, and can oil color be used for coloring water paints? A. The basis of the cold-water paints is casein. This is mixed with lime and dry mineral coloring matters in accordance with the color desired. Powdered barium hydroxide has also been suggested instead of the lime. The mixture of casein, lime or barium hydroxide and coloring matter is mixed with water to the desired consistency. 2. Which is best, alternating or direct current for incandescent lamps, and which above current is used for street car system? A. The alternating and the direct are equally adapted to the incandescent lamp. In America the direct current is employed for street car use. 3. About how many years do permanent horseshoe magnets keep their power, or do they always keep their power when a piece of iron is kept on or about 1-32 inch from their poles? A. A horseshoe magnet does not lose its power if a piece of iron about the size of the magnet is kept across the poles.

(9051) W. C. R. asks: Will you please tell me through your paper what the effects of electric currents are on a compass needle? If a certain battery current flowing over a single wire, parallel with needle and a half inch above it, will deflect needle 10 deg., will a battery four times as strong turn needle same distance, if current wire is four times as far away (or two inches)? Will ordinary electric light currents affect needle in same way and in same proportionate distance and strength of current? I want to find out in a general way if the effect on a magnet or compass needle is in proportion to strength of current, and also in proportion to distance from magnet, and about what the proportion is? I took a compass needle, and arranged on blunt pivot that had just friction enough so one cell of battery moved the needle a little. I then tested with a 220-volt electric current, and could not get that immensely stronger current to move it at all. What was the trouble? A. A law can hardly be stated for so crude an arrangement as a needle on a pivot and deflected by a single straight wire laid above it. The general law is that the strength of current varies as the tangent of the angle of deflection. By strength is meant the amperes. The volts are the pressure, not the current strength. It may be that you had far less amperes with the 550 volts than you had with the cell of battery, due to the much higher resistance of the circuit in the former case. The distance of the wire from the needle affects the deflection as the square root of that distance. That is, a wire removed to twice the distance would, other things being equal, produce one-fourth the effect. At four times the distance the effect will be one-sixteenth as great. You will find the matter fully treated in textbooks of electricity. See Thompson's "Elementary Lessons."

(9052) R. McC. says: Will you kindly answer the following questions: 1. How many ampere turns will it take to saturate a horseshoe magnet $\frac{3}{8}$ -inch by 1 inch by 14 inches so it will have about a 2-pound pull? A. Taking the problem of the number of ampere turns for a given lifting power of an electromagnet as you state it, about 350 ampere turns are necessary. The core will then be far from saturated. We fear that you have not taken the return circuit of the magnetic lines into account. So little information is given in the question that you had better make a magnet and try it, then change the winding till you get what you require. This is the best way under any circumstances. 2. How large a current will 32 magnets the same size use, saturated 3,000 times in one minute, the magnets to have about a 2-pound pull? A. The current used by these magnets will depend entirely upon the winding, and not at all upon the number of times the interrupter acts in a minute. If one ampere flows around each magnet 350 times, each one will take 1 ampere. If you wind so that 2 amperes flow around 170 times, then 64 amperes will be used. The watts required will be the same in any case. It will be better to wind for rather a small number of amperes, since the loss by heating will be less.

(9053) T. F. says: What is the difference in temperature of the water of Niagara above and below the falls? How much coal would it take (per minute) to raise that amount of water to the difference in temperature? A. It has been stated that the difference in temperature of the water above and below the falls of Niagara is in the neigh-