latter and mainly higher up is a celluloid tesselated panel for the purpose of holding the heads of a number of buttons for display.

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.

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

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Drying Machinery and Presses. Biles, Louisville, Ky.

Inquiry No. 7593.—For manufacturers of charcoal burners for making charcoal out of refuse wood.

Handle & Spoke Mchy. Ober Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 7594.—For machines to make stapled and drawn push brooms.

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

Inquiry No. 7595.—For manufacturers of tubes (steel and iron) and angle iron for manufacturing bedsteads.

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

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I sell patents. To buy, or having one to sell, write Chas. A. Scott, 719 Mutual Life Building, Buffalo, N. Y.

Inquiry No. 7597.—For dealers in tar oil suitable for high lubricants, and cutaneous troubles.

WANTED.—Purchaser for Monazite, Molybdenite and Wolfram. Apply Monasite, Box 773, New York.

Inquiry No. 7598.—For manufacturers of wire buckles.

WANTED.—Ideas regarding patentable device for water well paste or mucilage bottle. Address Adhesive, P. O. Box 773, New York.

Inquiry No. 7599.—For manufacturing of metallic tubing.

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. 7600.—For manufacturers of automatic funnel which closes when bottle is full.

LATEST ADVERTISING.—High-grade Illustrating, Designing, Printing. Catalogues a Specialty. Smith Motion Picture Adv. Co., 505 Panama Bldg., St. Louis, Mo.

Inquiry No. 7601.—For manufacturers of metal collapsible tubes for putting up tooth paste.

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

Inquiry No. 7602.—For manufacturers of blow pipes run by foot power and pressure.

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. 7603.—For manufacturers of gas machines for small plants for making gas.

WANTED.—Interest in flourishing manufacturing business; or join with reliable party starting industry of merit. References of both must be satisfactory to each other. Every reply positively confidential. State nature of business. Address Flourishing, Box 773, N. Y.

Inquiry No. 7604.—For dealers in rare metals, such as platinum, etc.

WANTED.—A man of experience; capable of running a 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 essential. Address Heavy Machinery, Box 117, Station A, Hartford, Conn.

Inquiry No. 7605.—Wanted, printing wheel same size and character as used on a stock printer.

Inquiry No. 7606.—For manufacturers of celluloid watch cases.

Inquiry No. 7607.—For dealers in snakewood and boxwood in the log, and cut into pieces.

Inquiry No. 7608.—For manufacturers of experimental and electrical apparatus, such as lecture sets for schools and colleges.

Inquiry No. 7609.—For manufacturers of novelties, such as aluminum markers cut, pressed and enameled.

Inquiry No. 7610.—For manufacturers of case makers' canvas; also suitable cloths for box covering.

Inquiry No. 7611.—For manufacturers of box-making machinery, clasps and catches.

Inquiry No. 7612.—For manufacturers of a foot press for imprinting names on rubber holders and lead pencils.

Inquiry No. 7613.—For manufacturers of combination padlocks.

Inquiry No. 7614.—For manufacturers of drying machinery for fish products.

Inquiry No. 7615.—For manufacturers of machinery for heading square head machine bolts and carriage bolts, and for cutting and rolling threads for same; also machinery for punching and tapping nuts.

Inquiry No. 7616.—For manufacturers of glass balls and marbles, both in United States and Germany.

Inquiry No. 7617.—For manufacturers of steel tubing and materials suitable for aeroplane surfaces.

Inquiry No. 7618.—For manufacturers of induction coils.

Inquiry No. 7619.—Wanted, address of parties who bend sled runners.

Inquiry No. 7620.—For manufacturers of peppermint.

Inquiry No. 7621.—For manufacturers of nails, saws, wire, hinges; also cotton goods.

Inquiry No. 7622.—For manufacturers of ball bearings.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(9857) R. D. F. asks: Would you kindly answer these questions? Why will a rainbow form a half-circle at sunset? Why does a rainbow usually show less than a half circle? Why would a bow form a complete circle seen from a balloon? A. A line drawn through the center of the sun and the eye of the observer passes through the center of the rainbow. This line is called the axis of the bow. An angle is formed with this line, the vertex of the angle being at the eye. At an angle of 40 degrees from this line in every direction violet may be seen, and at 42 degrees from this line red may be seen. It should be obvious that all the points which are at the same angle from the axis will lie on the circumference of a circle. The rainbow is for this reason a circular arc. When the sun is on the horizon, the axis will be in the horizon and a half circle is above the horizon whose other half is below the horizon. At sunset then a rainbow will be a half circle. If the sun is high in the heavens, the axis line will go below the surface of the earth before it reaches the horizon, and the part of the rainbow seen will be less than half a circle. If one is upon a mountain top, so that the axis extends far out above the horizon, more than half of the circle of the rainbow will be seen, and from a balloon it is possible to look down upon a cloud and see a circular rainbow, or the whole of the bow. Looking down upon the spray of Niagara Falls, one may see more than half a circle of a rainbow formed by the sun's rays in the gorge below.

(9858) W. W. asks: What is the scientific explanation of the fact that if an egg is held between the hands and compressed along its longitudinal axis, it is almost incapable of being crushed, while a pressure on a transverse axis readily accomplishes a contrary and expected result? A. The ends of an eggshell are domes, and are filled with an incompressible liquid. If these domes are fitted into the soft palms of the hands, and pressure evenly applied to the shell in the direction of its longitudinal axis, it will require considerable force to crush the shell. The liquid contents prevent the shell from collapsing inward; the soft palm prevents it from bursting outward. The part of the shell which is not covered by the hands is very nearly a cylinder, and although it is thin it has considerable strength to resist crushing.

(9859) A. E. S. asks: Kindly advise if an electric doorbell circuit can be formed with the ground and a single wire for a distance of two blocks. Also the formula for the solution of saltpeter used in destroying tree stumps by boring a hole and allowing the fluid to remain all winter, and in the spring pouring in kerosene and setting afire. A. An electric circuit can be completed through the earth for any purpose. Make a good ground at each end of the line in water or moist earth, and the bell will ring as well as if a return wire is used. There is no formula needed for using saltpeter on a tree stump. Bore deep holes in the stump, fill them with saltpeter and then with water, and plug the hole. This is done at any time. After six months or longer open the hole, fill it with kerosene oil, and set this on fire. The saltpeter causes the fire to smoulder in the wood.

(9860) R. R. asks: Will you please answer the following question in physics for me? What is the difference, if any, between "mass" and "weight"? For instance, what is the difference between 10 pounds mass and 10 pounds weight; or between 10 kilogrammes mass and 10 kilogrammes weight? A. The mass of a body is determined by the quantity of matter the body contains. Any body has an invariable mass. The weight of a body is not invariable but is affected by the force of gravity at the place of the body. The same mass, 10 pounds of lead, for example, will be the same all over the earth, but it will not weigh the same. It is customary to consider the unit of mass as the weight at a place where the intensity of gravity is unity. At Paris, France, the intensity of gravity is 980.96 cm. The weight of a body at Paris is then 980.96 times its mass. Mass is defined as weight divided by gravity; or weight at any place is its mass multiplied by gravity at that place. Gravity at Washington is 980.10.

NEW BOOKS, ETC.

THE PHYSICAL CONSTITUTION OF THE SUN. By William Appleby. San Francisco, Cal.: The Whitaker & Ray Company, 1905. 8vo.; pp. 510. Price, $4.50.

Mr. Appleby has a theory, and his theory, to use his own words, "has for its foundation one single act of nature, which is effected and completed by three laws. These three laws are: Impregnation, Fermentation, and Condensation; all other effects being subordinate to these or natural consequences thereof." From this it may be gleaned that the book does more credit to Mr. Appleby's vivid imagination than to his achievements as a scientist.

LEHRBUCH DER GEWERBE-HYGIENE. By Dr. Josef Rambousek. Vienna: A. Hartleben's Verlag, 1905. 8vo.; pp. 135.

The author's very practical book is divided into two main parts, the first of which is devoted to industrial hygiene, and the second to installations tending to improve the welfare of laborers. In this first division we find an elaborate discussion of ventilation of factories and workshops; disposal of refuse; injuries sustained by workmen due to improper regulation of temperature; bad illumination, overstraining of the muscles, and evil influences in general. In the second division excellent chapters will be found on workingmen's dwellings; hours of labor; division of labor; proper food of the laborer, and the proper care of the body.

SMOKE ABATEMENT. By William Nicholson. Philadelphia: J. B. Lippincott Company, 1905. 8vo.; pp. 256; 59 illustrations. Price, $2.

In the present volume the author has endeavored to give, as concisely as possible, an account of the smoke abatement movement, and to indicate the means by which the smoke nuisance may be combated. The author contends that so far from being a necessary evil, it is one that is easily remediable, and for the removal of which adequate machinery actually exists. Three chapters are given to the legal aspects of the subject. The leading types of the various appliances now on the market for the purposes of smoke abatement and fuel economy are illustrated and described.

THE PRINCIPAL PROFESSIONAL PAPERS OF Dr. J. A. L. Waddell, Civil Engineer. Edited by John Lyle Harrington, C.E. New York: V. H. Hewes, 1905. 8vo.; pp. 991.

This valuable collection of papers, by one of the foremost civil engineers of his day, represents some of his best literary work during a lengthy professional career. It is a fact well understood among the members of the profession that much of the most valuable published engineering data of a practical kind appears in the form of papers that are read at the meetings of engineering societies, or in the form of addresses delivered to engineering schools. Although many of these addresses appear in the printed proceedings of the engineering societies, there are others that never secure even that much permanent record. Moreover, the proceedings are generally only to be found in the possession of those who were members of the society at the time of publication. The information contained in such papers is of the kind that is gathered by the engineer after his graduation. Much of it is sought for in vain in the current text books, and it possesses a value that can only be fully appreciated when search has been made for it, often in vain, among the standard publications. It was considerations of this nature which led the editor to gather Mr. Waddell's papers into book form; and it is sufficient to say of its contents that their range of subjects is as wide as that of the experience of their gifted author. The work is beautifully printed, and is enriched with half-tones, line drawings, and an elaborate series of diagrams and statistical tables. Among other chapters may be mentioned Notes on Railroad Drainage, and General Notes on Railroading; four chapters on Civil Engineering Education; a chapter on the Compromise Standard System of Live Loads for Railway Bridges and the Equivalents for the Same; an excellent chapter of advice to the intending bridge engineer as to the best way to furnish himself, after graduation, with the necessary experience to render him a competent consulting bridge engineer. One of the most lengthy and important chapters is an elaborate discussion of the design and construction of elevated railroads.

GEOLOGY OF WESTERN ORE DEPOSITS. By Arthur Lakes. Denver, Col.: The Kendrick Book and Stationery Company, 1905. 12mo.; pp. 415. Price, $2.50 net.

This is the second edition of a meritorious book. The author is a well-known geologist. The clear style in which the book is written will make it easier for miners to understand. Every prospector should have a copy. A marked feature of the book is its copious illustration.

RAFTER AND BRACE TABLES. By H. J. Aurlie. New York: Industrial Publication Company. N. D. 18mo.; pp. 29.

METHODS OF CHEMICAL CONTROL IN CANE SUGAR FACTORIES. By H. C. Prinsen Gierligs. Manchester, England: Norman Rodger, 1905. 8vo.; pp. 85. Price, $1.40.

THE HONORABLE PETER WHITE. A Biographical Sketch of the Lake Superior Iron Country. By Ralph D. Williams. Cleveland: Penton Publishing Company N. D. 8vo., pp. 205.

THE EXPERIMENTAL BACTERIAL TREATMENT OF LONDON SEWAGE. Being an Account of the Experiments Carried out by the London County Council between the years 1892 and 1903. By Prof. Frank Clowes, D.Sc. (Lond.), F.I.C., Chemist to the Council, and A. C. Houston, M.B., D.Sc. London: Printed by James Truscott & Son. 8vo.; pp. 242. Price, $4.

MATTONI E PIETRE DI SABBIA E CALCE. By E. Stoeffier. Milan: Ulrico Hoepli, 1905. 32mo.; pp. 232.

CONTI E CALCOLI FATTI. By Italo Ghersi. Milan: Ulrico Hoepli, 1904. 32mo.; pp. 191.

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