different parts of a coil, since such formulas have proved a very poor reliance when applied to an actual case. Slight differences in quality of material and sizes, or in thickness of insulation may lead one astray in the rigid application of a formula. Mr. Collins has taken up each part of an induction coil by itself and has discussed its size, construction, and adaptation to the other parts in a most complete and satisfactory manner. The best proportions are given for a series of coils giving a spark of twelve inches and under. Higher than this it is not necessary to go, since one requiring more energy than can be converted by a coil giving a spark twelve inches long will use a transformer and not an induction coil. The different uses of a coil are also considered and such variations as are necessary to adapt a coil to Roentgen-ray or wireless telegraph work are given. Of course these differences are principally in the secondary winding, where will be found in separate columns the data for these two services. This is a very important advantage of this book over other books recently published upon this subject. One cannot but notice the care with which small details are worked out. The numerous cuts show every separate piece in fullness and completeness. The volume contains 160 illustrations, while a single illustration may contain as many as 21 cuts as does the one on page 101, illustrating the construction of an interrupter. The data furnished in the form of tables are quite as full. Of tables there are 122, containing the sizes and dimensions of every detail of every part of an induction coil, and also the prices of every kind of material to enter into it. It is difficult to see how any one with the slightest skill in the use of tools can fail to build a good coil under the guidance this book affords. We believe it will displace all other books upon this subject.

THE MANUAL OF STATISTICS. Stock Exchange Handbook. New York: The Manual of Statistics Company, 1909. 12mo.; 1194 pp. Price, $5.

The thirty-first annual issue deals with railroad securities, industrial securities, government securities, stock exchange quotations, mining, grain, provisions, cotton, money, bank and trust companies. It is admirably printed and the maps are clear and numerous. The information conveyed is of exactly the nature which is of almost daily request in offices where financial matters are of any moment. It should be on the desk of every railway and bank official.

THE BANKING AND CURRENCY PROBLEM IN THE UNITED STATES. By Victor Morawetz. New York: North American Review Publishing Company. 12mo.

The author of this book, Mr. Victor Morawetz, is an authority on corporations and finance. His book is chiefly concerned with solving the problem of currency shortage, which seems to confront this country at recurring periods. He advances a plan for cooperation between the banks and the Treasury, which includes a note redemption fund to be elastic, regulating the uncovered volume of notes outstanding, and thus giving stability to financial institutions generally.

THE NEW BUILDING ESTIMATOR. A Practical Guide to Estimating the Cost of Labor and Material in Building Construction, from Excavation to Finish, with Various Practical Examples of Work presented in Detail, and with Labor Figured Chiefly in Hours and Quantities. A Handbook for Architects, Builders, Contractors, Appraisers, Engineers, Superintendents, and Draftsmen. By William Arthur, Box 482, Omaha, Neb. New York: Published by David Williams Company.

Probably no task requires nicer judgment on the part of the engineer or architect than the estimation of building costs. For this reason any book which will materially help him in solving the peculiar problems which are presented to him must be welcomed. Mr. Arthur in his previous edition has demonstrated the fact that he is certainly competent to guide the estimating engineer and architect. The new edition of his book brings the prices up to date and incorporates much new tabulated matter.

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SOME NEW AMERICAN AEROPLANES.

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plane he has made use of eight of these propellers, and has arranged them in a line between the two planes, the idea being to give a propulsive effort throughout the entire width of the machine. It has also been proven that a number of small propellers will give a greater thrust per horse-power than one or two large ones. Mr. Kimball makes use of the same motor and wire-rope drive that he employed in his helicopter; but he has improved upon this drive by installing a friction clutch between the driving drum of the motor and the driven drum carrying the wire ropes. The clutch consists of a cast-iron floating ring, and also of a leather lining in these two drums. It allows a certain amount of slipping to occur at the start, so that the propellers are not strained and broken as before. It is also set so that it will slip with a 25 per cent overload. This improvement, according to the inventor, has made a rope drive for aeroplanes entirely practicable. The wire rope used is only ⅛ of an inch in diameter, and consists of six strands, each of which contains 19 wires. The rope has a tensile strength of 2,000 pounds, while the pull to which it is actually submitted is only 80 to 90 pounds. There are two endless cables, one for each set of four propellers. They are held under proper tension by a single idler for each one. The motor makes 1,900 revolutions per minute to 1,600 of the propeller, and the cable travels at the rate of 7,500 feet per minute, or about 86 miles an hour. The propellers have four blades each. They are 3 feet 10 inches in diameter, and have a pitch of 4 feet. The thrust obtained is about 175 pounds. The motor is a four-cylinder, two-cycle engine of an improved type, the cylinders being 4 x 4. It develops 50 horse-power at 2,000 R.P.M.

The main planes of the Kimball machine are 37 feet by 6½ feet, and they are spaced 4 feet 2 inches apart. They have a very slight curve of about 1 in 26, and their angle of incidence is about 5 deg. The rear edges project out 18 inches beyond the main plane and are rather flexible. The machine is provided with movable wing tips, 4 by 4 feet in size, on the ends of both planes. There is a double-surface horizontal rudder in front, 12 by 2½ feet in size, the planes of which are spaced 3 feet apart. This rudder is located 9¾ feet in front of the main planes. It is operated by a lever convenient to the right hand of the aviator, while another lever worked by the left hand operates the two sets of four vertical rudders each, placed on the rear of the movable wing tips. This lever also operates the front wheel, in order to steer when running on the ground.

The main features of the Kimball aeroplane are the use of multiple propellers and fitting of quadruple vertical rudders close to the main planes, near their extremities. If the inventor can run his propellers at a high enough speed to obtain from 300 to 400 pounds thrust, he will probably be able to get in the air; but at the present writing he has made only one attempt, which was unsuccessful in this respect.

MAKING THE EYE OF SCIENCE.

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of the proper shape and curvature.

But, you will want to know, how does the workman know when the glass to be tested fits the test glass? It is in this "how" that the exquisite fineness of the test resides, for the beautiful phenomena of Newton's rings comes into play here. Any extremely thin and attenuated film will show diffraction colors—soap bubbles are common examples. Every child knows that the bigger the bubble, the more beautiful the colors, and the grown-up knows that the bigger the bubble, the thinner the film. When the glass to be tested is laid in the test-glass hollow, there is a thin film of air left between

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them. If this thin film of air is of even thickness throughout, the lens will be filled with a glow of color which changes as pressure may be brought to bear on the lens, thus thinning the film of air. If this glow is but one color and with no colorless patches, it is evident that the lens fits the glass perfectly; if the color is in bands or rings, or if more than one color shows, it is equally evident that the lens does not fit over all its surface, and consequently is not accurately ground and polished. This is the most delicate test known to science for equality of surfaces, and, if properly done, is absolutely reliable.

Microscopic objectives are tested in other ways. A 1/12-inch objective possesses a front element so small as to be seen with difficulty. It is actually 1/7 millimeter in diameter. This is too minute to admit of using the color test. These tiny lenses are ground by workmen of whom there are hardly ten in the world—men who have spent their lives over the tiny lathes and shells which grind hemispheres of glass of such exceeding smallness as this. It is more by feeling and intuition than by examination with magnifiers that they know when such lenses are true and perfect to their shells, but it is the fine optical and visual test on a diatom of fine markings and infinitely small size, such as *Amphipleura pellucida* or *Pleurosigma angulatum*, which determines their degree of perfection.

When all the elements of a fine anastigmatic photographic lens are ground, they have then to be cemented together, if it is a cemented lens, and, most important of operations, trimmed so that the optical center and the mechanical center of the several individual elements coincide. While the clear Canada balsam cement is yet "green," the glasses are revolved on a lathe, and the workman observes in them a reflection of a light source—in the illustration, a burning gas-jet held in the hand. When the optical centers of the lenses do not correspond with the center of revolution or mechanical center, the reflected image dances. The cement is softened with heat and, by pushing on the edges of the revolving lenses, the operator makes them move against each other until the flame is reflected perfectly, and remains absolutely stationary while the lens revolves. When this condition is obtained the cement is allowed to harden, and the edges of the lenses are trimmed away with a diamond cutter.

The several lenses which compose a fine microscopic objective are not only centered and trimmed, but mounted, on one lathe and by one man, who also makes the mounting. This departure from the modern factory practice of "one man, one job," has been found necessary because no two lathes, be they ever so accurately made, revolve in exactly the same way, and if a lens be trimmed by one lathe and mounted in brass cells made on another lathe, the mechanical and optical centers will not align perfectly.

A 1/12-inch microscpoic objective is a collection of lens elements, the magnifying power of which is equivalent to a single lens of 1/12-inch focus or about 120 diameters. Its working distance, i. e., the distance the front element has to be from the object viewed, may be slightly greater or less than 1/12 inch. With an eyepiece of ½-inch focus, such a lens will give a magnification in the microscope of 2,400 diameters, or 5,760,000 times. In other words, if a diatom could be enlarged in wax as much bigger than the original as the image of it is greater than it is itself, by such an equipment as is described above, it would hold on its surface 5,760,000 diatoms.

It is obvious that any error in the making of such a lens is magnified equally with the object. If the lenses are in the least degree decentered, the amount of error is magnified according

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to the magnification of the object seen. It is essential, therefore, that the mounting be absolutely accurate, a condition satisfied by using the same lathe for both making the mount and trimming the lenses of the objective.

A photographic lens of high quality must pass tests of great difficulty and searching power. It is put in a camera and tried out on an accurate chart, and must "cover" a certain area of this chart at a certain distance, while rendering the image perfectly flat and without distortion. Uncorrected photographic lenses have a great many aberrations—curvature of the field, spherical aberration, coma, flare, astigmatism, curvilinear distortion, chromatic aberration; and a good photographic lens must be without these, or it fails to pass its tests. In the optical factory in which the illustrations for this article were made, every photographic lens is provided with a ticket, and on this chart the expert lens examiners put down a check mark against every fault or aberration of the lens under examination. A perfect lens, such as is marketed, shows on its chart nothing more damaging than the presence of a few minute air bubbles, impossible to avoid in the special optical glass which is used in the production of "anastigmats." These air bubbles, often giving great concern to purchasers who do not understand their harmlessness, do nothing more damaging than to decrease the light-passing capacity of the lens by a percentage equal to the percentage their area is to the area of the lens—a small fraction of one per cent.

In addition to testing out for optical aberrations, the tester hunts for striæ, streaks in the glass, for strains, for improper centering, for imperfections of cementing, for poor mounting, for defects in the glass not classified, as scratches and marred places, so that, when a lens has finally passed the inspector, it is a perfect specimen so far as human ingenuity can make it.

Microscopic objectives, on the work of any one of which may depend not only the success of scientific experiments and the obtaining of new knowledge in a hundred branches, but even human lives, are the subject of the most minute care in testing. An unskilled observer may find it difficult to distinguish between the image made by a poor and a good one-twelfth, but the scientist who uses it, and equally with him the trained man who examines it before its being put in stock, has no difficulty in finding out from the severe test objects whether it will properly "resolve" the fine markings on a diatom, whether it has "color fringes" or not, whether its field is flat or not.

Lens calculated, glass selected, shells and blocks carefully machined, glass ground once, twice, and again, lens elements tested, repolished or ground if necessary, centered, mounted, again tested, charted, and reinspected, the glass eyes of the microscope and the camera, twin eyes of science and the two most important tools in the laboratory, go from the factory all over the world to the laboratories where are made a large per cent of all the discoveries in science of all kinds, but particularly in the natural sciences and in all those departments of human knowledge which have to do with the body and with health and the cure of disease. And all the work done in these laboratories depends in the first instance on a little bit of glass, a mathematical formula, and the precision with which the glass can be made to fit the $x^2 n^2$ of the master optician.

Testing Ancient Bronzes.

Old objects of bronze and copper are usually covered with thick layers of oxide which make it impossible to recognize the true character of the metal or alloy. The removal of this highly valued patina is not generally allowable, and the metallic surface that may be exposed at sharp

(*Concluded on page 435.*)

Gas engine, E. J. Gulick	923,046
Gas extractor and mine ventilator, G. Laws	922,603
Gas machines, interlocking device for, L. H. Miller	923,063
Gas, manufacturing, W. H. Cone	922,857
Gasolene engine, H. J. Wegner	923,093
Gate, Z. T. Cox	922,461
Gate opener, F. A. Schuster	922,963
Gearing, G. Westinghouse	922,827
Gearing, reversible transmission, M. W. Kouns	922,599
Gearing, speed change, Garvin & McClellan	922,880
Glass drawing machine, L. A. Thornburg	922,973
Gluing textile fabrics, machine for, Schroder & Seldal	922,962
Golf ball, E. Kempshall	922,773
Governor, W. Fox	922,689
Grading attachment for vehicles, road, W. S. Livengood	922,493
Grain bin dump distributer, J. R. Pattinson	922,944
Grain mill signaling attachment, B. B. & J. W. Spratlin	922,821
Grain sprouting or germinating apparatus, A. W. Grunwaldt	922,888
Gramophone, L. T. Haile	923,119
Gripper attachment, J. R. Grove	922,762
Grubbing and root breaking machine, D. M. Gates	922,572
Gun, portable, O. Lauber	923,052
Gun, recoil, Lauber & Bominghaus	923,051
Hammer attachment, D. M. Eddy	922,568
Hanger. See Bedstead rail hanger.	
Harness suspending means, J. Howard	922,904
Harrow or cultivator, J. Courtenay	922,671
Harvester, potato, L. Kniffen	922,915
Harvesters, apparatus for straightening grain upon, D. H. Simmons	923,084
Hat brim curling machine, C. E. Sackett	922,959
Hay fork, A. A. Parish	923,072
Headlight, R. H. Welles	922,826
Heating device, Perelzveich & Rosenbusch	922,503
Heating device, orchard, R. Henry	922,478
Heating plant, room, B. Korting	922,783
Heating storage water, system of, J. L. Curran	923,025
Heddle making machine, C. B. Borgeson	923,011
Heel and protector therefor, boot, J. W. Baddock	922,555
Heel, shoe, M. Molitor	922,499
Hinge, D. W. Lenahan	922,605
Hinge, C. W. Ellerbe	923,037
Hinge, post, W. S. Emery	923,038
Hoisting and conveying apparatus, A. E. Norris	922,807
Hoisting apparatus, H. Aumund	922,554
Hoisting apparatus, W. F. Murray	922,937
Hoisting apparatus, C. Conklin	923,022
Hoop lug and connection, J. T. Hogan	922,767
Horn, cam operated, M. R. Hutchison	923,049
Horn or alarm, mechanically actuated diaphragm, M. R. Hutchison	923,122
Horse detacher, J. G. Miller	922,797
Horse detaching device, M. F. Sadler	922,518
Horseshoe, G. Marshall	923,060
Hose coupling, gas, C. Sautter	923,081
Hose pipe coupling end connection, Nelson & Brown	922,805
Hot-air engine, E. M. Fraser	922,875
Hub clutch gear, vehicle, B. Settergren	922,965
Igniter timing device, J. G. Heaslet	922,764
Indicator, H. D. Flegel	922,466
Inkstand, W. Rodiger	922,957
Insulating joint, A. F. Batchelder	922,556
Insulator, electric line, R. Henry	922,477
Insulator, third rail, L. M. Randolph	922,951
Internal combustion engine, C. D. McClintock	922,613
Internal combustion engine, T. D. Kelly	922,911
Ironing board, S. A. Barber	922,446
Ironing board, H. F. Knorr	922,487
Ironing board, G. F. & C. I. Wilson	923,097
Ironing table, folding, C. A. Detwiler	923,117
Irrigator having a constant temperature, E. de N. du Plantier	922,810
Jam dolly, A. Ricketts	922,514
Knob spindle compensator, W. S. Trask	923,091
Labeling machine, F. W. Wild, Jr	923,096
Labeling machine, bottle, G. A. Thornhill	922,974
Labels to garments, etc., attaching, M. Mayer	922,608
Ladder, H. B. Fuller	922,878
Ladder, trussed, A. P. Boyer	922,847
Lamp, electric arc, L. O. Kozar	923,127
Lamp, gas, A. H. Humphrey	922,907
Lamp, mercury or other vapor electric, Kent & Lacell	923,124
Lantern, Koch & Mayforth	922,598
Latch, door, E. H. Todt	922,975
Latch, gate, B. H. Hannemann	922,889
Lathe, self-feeding scratch brush, J. H. Goss	922,761
Lemon squeezer, A. J. Bennett	922,449
Lens for building lights, F. Schwickart	922,964
Letter box, H. C. Giles	922,574
Level, H. A. Schatz	922,960
Lifting jack, A. M. Colt	922,856
Lightning arrester, E. E. F. Creighton	923,024
Liquid elevator, J. P. Buchanan	922,749
Liquid raising means, H. P. W. Esping	922,870
Liquids, apparatus for controlling the flow of, A. Priestman	922,629
Loading and unloading mechanism, G. Davis	923,028
Lock alarm, J. Newman	922,616
Loom, W. C. Perry	922,718
Loom thread parting mechanism, A. E. Rhoades	922,511
Looms, weft-feeler for automatic weft-replenishing, W. R. Stitt	922,539
Lumber handling apparatus, C. E. Cleveland	922,854
Magnetic separation, W. B. Moore	922,800
Mail bag delivery apparatus, G. A. Mains	922,707
Mail bag exchange apparatus, C. W. Burke, et al	922,665
Mail receiving and delivering apparatus, automatic, H. H. Hunter	922,701
Maize cars, utilization of, F. L. Stewart	922,822
Mangling roller, F. W. Lauterbach	922,488
Manhole frame and cover, combination, D. A. Harrington	922,892
Manure spreader, W. I. Wiedemeyer	922,830
Mashing machine, A. R. Keller	922,486
Match box, G. Gleasure	922,472
Match safe and cigar cutter, combined, D. C. Flanigan	922,570
Match safe and lighter, J. G. & A. L. Portteus	922,507
Measuring and indicating device, H. J. Marx	922,931
Mechanical movement, R. J. Forman	922,467
Mechanical movement, O. H. Slafter	922,532
Metal construction, W. P. Lawrence	922,919
Metallic linings, making seamless, Burr & Gibbs	922,851
Metronome, White & Hunter	923,094
Milk container, G. W. Maxwell	923,061
Milking machine, O. Mortensen	923,065
Mill. See Pulverizing or grinding mill.	
Mincing machine knife, A. Gomory	922,884
Miter box, W. H. Eastman	922,680
Mixtures, apparatus for obtaining intimate, E. Dor-Delattre	922,863
Mortar mixer, G. D. Scheiffler	922,724
Motor control system, H. F. Stratton	922,540
Motors, short circuiting device for electric, C. A. Schnur	922,521
Mower attachment, S. E. Staal	922,970
Muffler cut out mechanism, L. S. Chadwick	922,563
Music holder, R. W. Mills	922,610
Music roll container, L. Haas	922,695
Music sheet turner, Shaw & Yost	922,527
Music instrument, stringed, A. S. Leslie	922,921
Needle lubricating device, J. B. Hadaway	922,696
Needle and the like, holder for, F. W. Hawkes	922,893
Nozzle, G. L. Burden	922,664
Nozzle, H. B. Helm	922,895
Nuisance, device for preventing dog, A. H. Roberts	922,956
Nut and bolt, self-locking, M. Jacobs	922,482
Nut lock, S. Truston	922,543
Nut lock, L. T. Twyman	922,642
Nut lock, R. F. Ross	922,721
Nut lock, R. Scherer	923,082
Oil can, T. W. Alexander	922,996
Oil switch, H. L. Van Valkenburg	922,825
Ore pulverizer, Good & McCullough	922,577
Ore treating furnace, C. C. Medberry	922,609
Ore volatilizing, revolving, H. H. Hughes	922,906
Ores, treating nickel, A. G. Betts	923,005
Oven, camp, W. H. Hart, reissue	12,961
Packing box, G. Cerf	923,017
Packing for elastic fluid turbines, shaft, K. Ahlquist	922,551

Classified Advertisements

Advertising in this column is 75 cents a line. No less than four nor more than ten lines accepted. Count seven words to the line. All orders must be accompanied by a remittance. Further information sent on request.

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. There is no charge for this service. **In every case it is necessary to give the number of the inquiry.** Where manufacturers do not respond promptly the inquiry may be repeated.

MUNN & CO.

BUSINESS OPPORTUNITIES.

WANTED.—Address of makers of first class tire benders. Hoopes, Bro. & Darlington, Inc., West Chester, Pa.

Inquiry No. 8868.—Wanted to buy nickeloid for buttons.

MY BOOK, "Building a Business," tells how mail order agency business can be started with capital of $50 to $100, and make several thousand dollars annually. It's free. Robert Hicks, St. Louis, Mo.

Inquiry No. 8904.—Wanted to buy new or second hand machinery for making "bow type," mouse and rat trap springs and wire parts, single machine or full outfit.

WANTED.—Sole agency for patented article. Quick seller for little money. Address O. Kuehn, 442 Central Park, W., New York.

Inquiry No. 8908.—For a dealer in tapes and cords for Venetian blinds.

PATENTS FOR SALE.

FOR SALE.—Patent No. 787,968.—Typebar for first-class visible typewriter that is cheap to manufacture. Carries its own guide, furnishing perfect and permanent alignment under heavy manifolding. Address John Winsor, 146 Mott Street, Corry, Pa.

Inquiry No. 8918.—For manufacturers of "Wydt's Electro-Catalytic Sparking Plug."

FOR SALE OR ROYALTY.—Patent 891,783. Boiler flue fastener. Forms perfectly steam tight joint. Positively prevents leakage. No swaging, no packing, easily adjusted. Small cost to manufacture. H. T. Foster, Abbotsford Inn, Los Angeles, Cal.

Inquiry No. 8921.—For the manufacturers of gilt paper.

HELP WANTED.

LOCAL REPRESENTATIVE WANTED.—Splendid income assured right man to act as our representative after learning our business thoroughly by mail. Former experience unnecessary. All we require is honesty, ability, ambition, and willingness to learn a lucrative business. No soliciting or traveling. This is an exceptional opportunity for a man in your section to get into a big paying business without capital and become independent for life. Write at once for full particulars. Address E. R. Marden, Pres., The National Co-operative Real Estate Company, Suite 378, Marden Building, Washington, D. C.

Inquiry No. 8922.—Wanted the address of Worthington Boiler Co.

MECHANICAL ENGINEER wanted to take charge of outside construction. Give experience. Address Construction, Box 773, New York.

Inquiry No. 8928.—For the manufacturers of a steam rotary excavator as described in the Scientific American of December 12, 1908, page 347.

MECHANICAL ENGINEER wanted for charge of designing and drafting office for large engineering works. Give experience. Address Mechanical, Box 773, New York.

Inquiry No. 8931.—For parties who manufacture the Western Stump Borer for boring stumps.

PARTNERS WANTED.

CAPITALIST OR PARTNER WANTED by the inventor of patent No. 910,488 on aerial navigating apparatus. His object is to secure capital to pay for foreign patents and in promoting the improvements and experimenting of the aerial flying machine. The inventor will only sell a half interest. A grand opportunity for the right party. J. D., Box 773, N. Y. City.

Inquiry No. 8936.—Wanted machinery used to spin or wrap paper pencils in the manner that paper pencils are made.

FOR SALE.

ADVERTISER has a slightly used hand-operated Burroughs Adding and Listing Machine for sale at a liberal discount from the list price of a new machine. This machine is as good as new and will last a lifetime. It has been displaced by the latest style Burroughs electric. I will be glad to quote a price on request. For further particulars and full information address **S. A., Box 773, New York.**

Inquiry No. 8941.—For manufacturers of machinery for making fly screens.

EDUCATIONAL.

CIVIL SERVICE EMPLOYEES are paid well for easy work; examinations of all kinds soon; expert advice, sample questions and Booklet 40 describing positions and telling easiest and quickest way to secure them free. Washington Civil Service School, Washington, D. C.

Inquiry No. 8957.—Wanted manufacturers of angle bars either malleable steel or sheared.

LISTS OF MANUFACTURERS.

COMPLETE LISTS of manufacturers in all lines supplied at short notice at moderate rates. Small and special lists compiled to order at various prices. Estimates should be obtained in advance. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8960.—For the address of the Windsor Mfg. Co., manufacturers of waterproof collars and cuffs.

A LIST OF 1,500 mining and consulting engineers on cards. A very valuable list for circularizing, etc. Price $15.00. Address Munn & Co., List Department, Box 773, New York.

Inquiry No. 8966.—Wanted the address of the Cobendet Motor Co.

Inquiry No. 8969.—Wanted machines that make accordion dress plaiting (steam).

Inquiry No. 8972.—Wanted to buy complete outfit for making meat hooks.

Inquiry No. 8974.—For address of firms interested in fishing reels.

Inquiry No. 8975.—Wanted the address of the builders of moving stair cases.

Inquiry No. 8977.—For manufacturers of machinery for manufacturing denatured alcohol.

Inquiry No. 8978.—Wanted the address of manufacturers of dry pans or crushers to grind sand for plastering and cement works.

Inquiry No. 8980.—For the address of manufacturers of mortars and pestles that are used by druggists.

Inquiry No. 8982.—Wanted a machine or process for slitting or laminating the edges of heavy cardboard, impregnating the slit or laminated edge with a waterproof material and compressing the edge after treatment. The object of the process is to produce an edge that shall be waterproof and which shall not fray or split when in use.

Inquiry No. 8984.—Wanted the address of the manufacturers of Cypress wash tubs.

Inquiry No. 8986.—Wanted to buy crown and flint glasses for telescope objectives.

Inquiry No. 8987.—Wanted, the manufacturers of the Van Winkle, Woods & Sons, and the Weber power meters.

Inquiry No. 8988.—Wanted to buy a large building or abandoned manufacturing plant having a large water power in a populous town.

Inquiry No. 8989.—Wanted a machine for making cocoa fiber mats.

Inquiry No. 8990.—For information regarding shoes not made of leather but similar to the same and are as durable.

Inquiry No. 8991.—Wanted to communicate with manufacturers of large straw hats for every-day wear.

Inquiry No. 8992.—Wanted to buy cheap glass eyes suitable for images of animals, etc.

Inquiry No. 8993.—Wanted to buy producer gas plants.

Inquiry No. 8994.—For manufacturers of an apparatus to produce very high temperatures.

Packing, metallic ring, J. Sieger	922,635
Pail fastening and sealing device, C. C. Batchelor	922,557
Pail holder, milk, T. N. Oium	922,621
Pail stand, foldable paste, J. A. Jensen	922,909
Paper fruit box, E. W. Cornell	922,459
Paper holder, toilet, Aspenleiter & Miller	922,745
Paper wrapper for moldings, etc., F. Kaufman	922,772
Pavement, street, S. E. Finley	922,687, 922,688
Pen and pencil clip, F. C. Lowrey	923,055
Photographic dry plate, L. Husson	922,908
Photography, F. W. Donisthorpe	923,030
Photography, color, E. Clifton	923,019
Photometer, W. Herrimann	922,583
Pianissimo device, G. A. Wheeler	922,828
Piano pedal and making the same, A. L. Ebbels	923,036
Picture machines, automatic light shield for moving, D. C. Woodworth	922,743
Pile fabric, woven, J. K. Dalkranian	923,027
Piling, interlocking sheet, C. S. Boardman	923,110
Piling, metal sheet, T. C. Jackson	922,769
Pipe coupling, etc., blank for the manufacture of middle rings for, G. H. White	922,990
Pipe joint coupling, H. B. Hodge	922,480
Pipe wrench, D. B. Edwins	922,866
Planter, combination, C. Linder	922,922
Planters and fertilizer distributers, broadcast attachment for, B. F. Cranwell, et al	923,023
Planting machine, B. C. McCoy	922,940
Plow, R. T. Huggins	922,905
Plow, rolling drum, J. P. Smith	922,535
Plug, plumber's sanitary test, Turner & Stalla	922,544
Pocket box, combination, C. Jensen	922,592
Pole piece fastening device, J. D. Firmin	922,760
Pole support, T. Haines	922,763
Post card and fan, combined picture, K. Munster	922,715
Potato digger, J. Reuther	922,816
Potato digger, J. S. Robbins	923,079
Power transmitting device, F. R. McBerty	922,802
Press, A. G. Fell	922,759
Printing and vending machine, ticket, F. W. Smith	923,085
Printing, book press for color, N. P. Tornbladh	922,542
Printing machine, A. B. Dick	922,861
Printing mechanism, R. A. Pollock	923,074
Projectile, E. Gathmann	922,573
Propelling vessels, means for, F. Ishoy	923,123
Pulley attachment, clutch, W. C. Perry	922,719
Pulverizing or grinding mill, J. W. Fuller, Jr.	922,468
Pulverizing roller, E. E. Porter	922,505, 922,506
Pump, hydraulic air, P. Lewis	923,053
Pump or condenser, air, H. Keller	922,595
Punch, rivet, C. L. Bean	922,660
Puzzle, A. R. Foss	922,874
Rail and gutter, combined life, J. F. Booraem	923,010
Rail chair, J. C. Wise	922,653
Rail fastening, M. F. Bonzano	922,843, 923,008, 923,009
Rail joint, E. M. Smith	922,533
Rail joint, C. R. Baldrige	922,835
Rail joint, insulating, B. Wolbaupter	922,742
Rails from spreading, means for preventing, C. H. Magruder	922,928
Railway spike and lock, J. M. Jones	922,483
Railway switch, R. L. Brewer	922,661
Railway tie, L. F. Exner	922,569
Railway tie, metal, J. J. Pierce, Jr.	922,626
Railway ties, attachment for wooden, C. H. Bennett	923,004
Railways, etc., underground subway for street, G. W. Jackson	922,768
Rake attachment, W. E. Riley	922,515
Razor, safety, J. Reichard	923,077
Receptacle especially adapted for mustard, Lindewirth & Wieck	922,492
Recorder. See Time recorder.	
Register, J. Frick	922,876
Registering the mean working pressure, indicator for continuously, M. Arndt	922,553
Relay, cable, I. Kitsee	922,780
Rock drilling engine, water feed, dust laying, C. H. Shaw	922,526
Roller, harrow, and cultivator, combined, O. A. Gallatin	922,469
Rosette, E. Tregoning	922,977
Rotor construction, E. Mattman	922,794
Roundabout, C. D. Sauve	922,723
Rug holder, porous, C. E. Knapp	922,703
Rule, C. Hansen	922,580
Sad iron heater, W. A. Flatt	922,872
Saddle spring, harness, W. H. Aide	923,102
Safety device, automatic, W. D. Gelser	922,881
Salt cellar, H. J. Trimble	922,978
Sand blast device, S. L. Young	923,100
Sandpaper wheel, W. G. Liebig	922,491
Santolol esters, E. Sprongerts	922,538
Sash and window locking device, ventilating, F. W. Hold	922,901
Sash lock, automatic, E. Heid	922,894
Sash lock, window, H. L. Corson	922,670
Sash locking device, J. E. Gibbs	922,882
Sash or screen hanger, storm, Peters & Grant	922,625, 922,720
Saw blades and means for attachment of the saw blade thereto, cap plate for cylindrical, Williams & Wegner	922,650
Saw blades and the attachment of the saw blade thereto, cap plate for cylindrical, Williams & Wegner	922,649
Saw grinder attachment, G. W. Pippen	922,504
Saw mills, setting mechanism for twin band, C. E. Cleveland	922,855
Saws, sawdust catching attachment for circular, D. J. Bemiller	922,840
Scaffold and derrick, adjustable, M. Bailer	923,002
Seal, snap, E. J. Brooks	923,014, 923,015
Separator sieve, H. Shupert	922,732
Sewing machine, binding, J. P. Weis	922,646
Sewing machine feed mechanism, F. W. Merrick	923,062
Sewing machine needle plate, N. Woolsey	922,744
Sewing machine take up, F. F. Dorsey	923,031
Sewing machine thread controlling mechanism, button, B. T. Leveque	922,786
Shade bracket, H. Arnold	923,000
Shaft collar, G. A. Donahue	922,463
Shaft coupling, E. C. Griffin	922,579
Shafts, machine for cutting keyways in, Goad & Hayes	922,691
Shear table and actuating mechanism therefor, F. C. Biggert, Jr.	923,109
Ship's draft indicating means, F. J. Meno	922,933
Shoe, J. E. Shawhan	923,083
Shoe cleaning device, R. Henry	922,479
Shoe fastener, C. P. Topliff	922,976
Show case, L. Spady	922,820
Sight, J. T. Peddie	922,945
Sign holder, G. Huneryager	922,700
Sign, illuminated, M. C. Ryan	922,958
Sign, movable advertising, J. H. La Pearl	922,784
Signaling system, J. Means	922,709
Siphon, W. Harrison	922,698
Skate, A. J. Kennedy	922,774

points and edges is too small to afford the desired indications. Two German investigators, having found that pure copper and bronzes containing various proportions of tin give characteristic streaks when rubbed on a touchstone, have devised a method of determining approximately the composition of any bronze object by comparing its streak with those made by a series of bronze bars of known composition. In practice, four such bars are found sufficient. The four bars are rubbed on the touchstone (Lydian slate or polished biscuit ware) and by the side of the four marks a fifth is made with a point or edge of the object under investigation. Pure copper gives a pure red streak, but a tinge of yellow is added by as little as 1 per cent of tin.

Chemical analyses of prehistoric bronze show percentages of tin ranging from 1.5 to 30, but very few specimens contain less than 6 or more than 12 per cent of tin. Silver, lead, antimony, arsenic, bismuth, nickel, and cobalt occur only in traces, and the proportion of iron is also very small in most cases. It is a remarkable fact that nearly all prehistoric bronzes are very nearly or quite free from zinc, of which many modern bronzes contain as much as 10 per cent.—Umschau.

America's Heavy Fire Loss.

At the forty-third annual meeting of the National Board of Fire Underwriters, held in New York city May 13th, President J. Montgomery Hare made an address, in which he stated that a comparison with statistics of losses in foreign countries shows that the loss per capita in the United States is from 10 to 30 times greater than in the principal European cities. For the last five years, he said, the annual fire loss in this country has averaged $269,200,412, the total for the period being $1,346,022,059, or about three-quarters of a million for each day of the five years. In this period the figures were largely increased by the San Francisco conflagration, but even taking the two years since then the losses have kept well above the $200,000,000 mark.

Without counting losses from forest fires, the destruction of property in 1907 by fire totaled $250,084,709, and in 1908, $217,885,850. The figures for this year give no promise of improvement, President Hare said, having reached a total of nearly $53,000,000 for the first three months.

According to dispatches from Atlanta, nothing which has been suggested for the benefit of the South since the war has aroused such unanimous enthusiasm as the proposed highway from New York to Atlanta. Whereas the suggestion originated with automobile users, it is obvious that any scheme for the promotion of good roads through country districts remote from railroads must directly benefit agricultural and other large communities largely dependent upon highways for transportation. Three alternative routes have been suggested, all of which follow the same course from New York to Philadelphia. Two routes thence to Washington are identical, whence one lies through Rapidan, Charlottesville, Lynchburg, Danville, Greensboro, and Salisbury, where it joins the third route and reaches Atlanta *via* Charlotte, Blackburg, Spartansburg, Hartwell, and Winder; while the other goes through Richmond, Petersburg, Raleigh, Columbia, S. C., and Royton to Winder. The third route leaves Philadelphia westward to Harrisburg, thence down the Cumberland and Shenandoah valleys to Harper's Ferry and Lexington, crossing the mountains to Martinsburg and Salisbury and continuing as above. The New York Herald and Atlanta Journal have offered prizes for the best sections of road in the various districts, and an endurance test for automobiles is projected, with the object of comparing the results on different routes, the ultimate decision as to the highway route being dependent upon the local road conditions achieved by local authorities.

Skirt marker, Wells & Meek 922,740
Skirt marker, J. D'Elia 923,029
Slack adjuster, automatic, C. O. Anderson. 922,552
Sleeve, splicing, H. Frankel 922,690
Slicing machine, bread, G. A. Kinder 923,125
Sliding gate, W. W. Wasden 922,548
Slip coupling, E. J. Gulick 923,043
Smoke consuming furnace, P. J. Flanagan.. 922,871
Snap hook, W. Groake 923,473
Soap holder, liquid, H. W. Burgner 922,453
Socket fastener, E. L. Miller 922,936
Soy or sauce substitute, manufacturing, K. Okazaki 923,070
Speculum, C. H. Borden 922,845
Speed adjuster, L. R. Culver 922,674
Speed controller, W. J. Seitz 922,525
Spindle, J. N. Kelsea 922,912
Spoke, T. H. Walbridge 922,737
Spring wheel, E. B. Anderson 922,658
Spring winding tool, A. Worcester 922,656
Sprinkler system, automatic, J. P. Casey.. 922,456
Stadia reading apparatus, E. J. Young.... 922,833
Stalk cutter, raspberry and similar, M. B. Sherman 922,529
Station indicator, H. C. Wallace 922,984
Steam generator, H. Ritchie 922,817
Steam generator and heater, F. L. Dutcher. 923,034
Stencil machine, G. Remnsnider 922,815
Stoves, lamps, etc., attachment for gas, W. A. Caldwell, Jr. 922,666
Strain resisting mechanism, G. H. Forsyth. 923,040
Strainer for lubricating systems, C. H. Worsey 922,657
Stream motor, R. Wilson 922,652
Stream motor, P. J. Hansen 922,890
Street cleaning machine, F. B. Dickason... 922,877
Suit case attachment, T. Cosgrove 922,567
Sulfocyanids, manufacture of, K. M. Chance 922,564
Surgical device, C. E. Eckrode 923,118
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Canadian patents may now be obtained by the inventors for any of the inventions named in the foregoing list. For terms and further particulars address Munn & Co., 361 Broadway, New York.

SEALED PROPOSALS.

SEALED PROPOSALS will be received at the office of the Light-House Engineer, Tompkinsville, N. Y., until 1 o'clock P. M., June 28, 1909, and then opened, for furnishing materials and labor of all kinds necessary for the construction and delivery of a light-house at Staten Island Rear Range Light-Station, Ambrose Channel, New York, in accordance with specifications, copies of which, with blank proposals and other information, may be had upon application to the Light-House Engineer, Tompkinsville, N. Y.