the accompanying drawings, and the measurements on the drawings were taken by Weston instruments while the lamps were in operation.

Figs. 1, 2 and 3 illustrate the relation of the volts to the dimensions of a gas-carrying current. The demonstration consisted in the operation of three lamps illustrating the tendency of the volts to vary directly as the length and inversely as the diameter, as seen by the figures of the drawing. One lamp is 54 inches long and three-quarters of an inch inside diameter, another is half the length and the same diameter, and the third is the same length as the first and twice the diameter; the drop in volts of the second and third is approximately one-half that of the first. The error in the lamp having the greater diameter, which measured 54 volts instead of 45, as should have been the case, was probably due to impurity developing in the vapor and a factor which appears on comparing tubes of widely different diameters.

Figs. 4 and 5 of the drawings illustrate the relation of current to resistance; the resistance varying inversely with the current, the volts tending to remain constant. Fig. 4 illustrates a divided vapor circuit, one leg carrying four amperes, while the other leg is carrying two amperes, the voltage over each leg being approximately the same.

The second demonstration, Fig. 5, illustrates a divided circuit consisting of a lamp with an additional electrode midway between the other two, whereby the current in the upper portion of the lamp is one-half that in the lower portion. The drop in volts over each of these portions should have been the same and the resistance of one should have been half that of the other, but for the discrepancy which was due to the greater vapor density in the lower portion, owing to the presence of the mercury forming the negative electrode.

The next demonstration illustrated negative electrode resistance or initial reluctance to allow current to pass. It also illustrated the passage of only a limited amount of current by an electrode prior to having its initial reluctance overcome. Fig. 6 was a lamp having an auxiliary electrode one-third of the distance between the positive and the negative electrode, which on being connected with the negative electrode by a conductor having a negligible resistance, allowed only 0.02 of an ampere to pass through this short circuit, although it was subjected to a measured electrical pressure of 44 volts, while the lamp was passing about three amperes.

These demonstrations practically illustrated results obtained by me from a great number of experiments.

Fig. 7 illustrates one form of my lamp adapted to run on an Edison 110-volt circuit with an efficiency of one-half a watt per candle.

Figs. 8, 9 and 11 show actual efficiencies of my lamp at different electric pressures, while Figs. 8, 9 and 10 illustrate the control of the resistance of the lamp.

Fig. 11 illustrates the electrical variation due to variation in gas density and an immediate effect of variation in current and a result brought about by a variation in gas density.

Fig. 12 illustrates the effect on one of my lamps of varying its heat-radiating ability.

Fig. 13 is the efficiency curve for the same lamp.

The large lamp exhibited was operated by direct current. The Weston ammeter in circuit with the lamp indicated seven amperes. The drop in volts across the lamp was 100 volts measured by a Weston voltmeter and the light given by this lamp was approximately 1,500 candles. It was, I believe, the first public exhibition of a high-power vapor lamp, and it was exhibited with standard instruments attached for measuring its current consumption; in fact, all the demonstrations were made with standard instruments attached for general inspection.

"Progress of Invention."—One of the Fifty Best Books.

In January of each year the New York State Library prints a list of five hundred of the leading books of the previous year and submits it to the librarians of the State, and others who may be interested, for a vote as to which of the fifty best books should be added to a village library. Usually about two hundred persons respond. While the list is, of course, simply an expression of opinion of persons who know as to what books are most in demand, even if they are not intrinsically the best, at the same time it so closely approximates the public taste in the matter that they may be regarded with great interest. We find that Miss Mary Johnston's "To Have and to Hold" holds the first place, while Edward W. Byrn's "Progress of Invention in the Nineteenth Century" is placed thirty-seventh. Considering that this is a serious book, and entirely different from works of fiction, biography or travel, it will be seen that the relative rank is high, especially as it leads our great American humorist, Mark Twain, by ten numbers, "The Man that Corrupted Hadleyburg" being forty-seventh. At the time this list was compiled Mr. Bryn's book had only been out some three months, which makes its inclusion with the "Fifty Best Books of 1900" most gratifying. We have received many expressions of appreciation from purchasers of this book, and the notices have been uniformly pleasing.

The Current Supplement.

The current SUPPLEMENT, No. 1321, is one of the best numbers of this edition which has appeared in some time. The leading article is devoted to the Field Columbian Museum, and it is accompanied by eight illustrations. "Searchlight Signaling at the Pan-American Exposition" is by Orrin E. Dunlap. "A Water-Softening Process" is described in detail. "The Glasgow International Exhibition of 1901" is accompanied by a map. "Animal Diseases and Animal Food" is by D. E. Salmon, Department of Agriculture. "A General Survey of Foreign Trade" is by Frederic Emory. The first installment is published in this issue, and our next issue will present a large and elaborate map showing all the countries of the world to which we export goods.

Evelyn B. Baldwin, who is to lead the Baldwin-Ziegler Arctic expedition, sailed for Hamburg April 18. He will confer with members of the German and British Antarctic expeditions, and will then go to Dundee, where his ship, the "America," is fitting out.

Contents.

(Illustrated articles are marked with an asterisk.)

RECENTLY PATENTED INVENTIONS.

Engineering Improvements.

REVERSING AND CUT-OFF MECHANISM FOR ENGINES.—WILLIAM A. MILLIGAN, Strasburg, Ill. It is the object of the invention to provide a mechanism for use on various types of engines, notably locomotive and traction engines. The mechanism is easily manipulated to shift the engine valves for cut-off or reversing purposes, and is completely under the control of the engineer.

Mechanical Devices.

SPOKE-DRIVING MACHINE.—FERDINAND UNCKRICH, Galion, Ohio. This invention relates to an apparatus for holding wheel-hubs and for driving spokes. By means of this apparatus the hub is held and turned as each spoke is driven therein; and the spokes are placed in position with mechanical uniformity, at the same time, permitting the work to be done more rapidly and effectively than by hand.

CHANGE-GEARING.—KIRK G. JOHNSTON, Piqua, Ohio. This change-gearing is particularly adapted for automobiles and comprises but two gear-wheels so arranged that adjustment of different speeds can be quickly made. The change-gearing is of very simple construction, and is not liable to be easily injured.

MOP-WRINGER.—THOMAS F. CONDON, Dorset, Vt. The wringer can be used on any ordinary pail, and squeezes the mop to any desired degree. The construction comprises a supporting frame, provided with an upwardly-projecting member. Bell-crank levers are pivoted to the frame; and squeezing rollers are mounted in the bell-crank levers. A slide is vertically movable on an upwardly-projecting member of the frame and extends inwardly above the rollers. A link connects each of the bell-crank levers with the slide.

LATHE.—WILLIAM ROBINSON, Aurora, Ill. The invention is a watchmaker's lathe which is especially designed for automatically turning articles having more than one diameter, such as balance-staffs, barrel-arbors, center-staffs, cannon-pinions, third and fourth escapement pinions, pallet arbors, type-bar pins for typewriting-machines, and the like. The novel features of the invention are a carriage supported by a spindle, mounted both to turn and to slide. On the spindle is a yoke. A revolvable-cam mechanism is employed to impart a sliding motion to the spindle and a swinging motion to the yoke, the cams being rotated to give the desired motion to the carriage so as to turn the article according to a predetermined design.

DRIVING-GEAR.—WILLIAM H. YOUNG and WILLIAM R. DANLEY, Rockyford, Col. The patent shows a means of employing a bicycle frame and gearing as a convenient means for effectively driving small machinery by foot-power. In the present instance the bicycle sprocket-wheel is geared by a chain with the central shaft of a coffee-mill.

Railway Contrivances.

SWITCH.—JOSEPH T. EVANS, Rushville, Neb. This railway-switch is arranged to be opened and closed by a mechanism under the control of the engineer of a train, so that the train can be run on the main track or on a side track. An engineer can close a switch which has carelessly been left open, and thereby prevent accidents. The arrangement comprises a switch-shifter having a three-armed lever adapted to be actuated by a device under the control of the engineer. Notched bars are connected with the lever. A shifting-lever has connection with the switch points, and is adapted to be alternately engaged by the notched bars.

Vehicle Accessories.

MEANS FOR SECURING ELASTIC TIRES TO WHEELS.—WILLIAM F. WILLIAMS, 17 and 18 Great Pulteney Street, Golden Square, London England. The means of attachment comprise inwardly-projecting flanges or wire edges on the tire or its cover, which are received in the groove of the rim; a metal strip or strips adapted to engage the flanges and to encircle the wheel-rim, so that when drawn tightly they hold the tire securely in position in the groove of the rim; and by means of which the tension may be applied to the band or bands and maintained after the tire has been put on the wheel, so as to insure a close butt-joint of the ends of the tire and prevent creeping.

Miscellaneous Inventions.

FALL-BOARD AND MUSIC-DESK.—CHARLES F. REEPS, Albany, N. Y. The invention provides a new fall-board and music-desk for pianos and organs. The construction is such that the board is noiseless in operation, and is adapted to fold very compactly to permit the music-desk or rack to come close to the keys. The music-desk is automatically moved into an active position upon opening the fall-board.

COMBINED UNDERVEST AND CORSET-COVER.—CORINNE DUFOUR, Savannah, Ga. The combined undervest and corset cover comprises a body having a front and rear flap secured to its upper end, these flaps being provided with means for securing their outer corners together. Thus the combined garment can be used for the protection of the chest and back with an ordinary dress, or employed as a corset-cover with a low-necked dress.

GARMENT-FASTENER.—WILLIAM F. SCHMIDT, Blanco, Cal. The inventor has devised an improved garment-fastener, which is designed for use on skirt-bands for properly fastening the end of the skirt-band together and for connecting the skirt-band with the waist to hold the skirt in position and give it the proper hang.

CHICKEN-COOP.—CHARLES H. CANFIELD, Bath, N. Y. The coop has two compartments in which fowl may be placed, and from which they may be independently removed. The various arrangements of parts provide proper ventilation for the fowl, and also enables them to be readily seen and inspected. The coop, when not in use, may be folded and transported from place to place, thus occupying very little space.

HORSE-BOOT.—ARTHUR COLE, Oak Lodge, Telford Park, Streatham Hill, London, S. W., England. This invention relates to improvements for boots for horses when employed on grass lands for the purpose of drawing rollers, mowing-machines, carts and the like, chiefly used in keeping golf-links, cricket-grounds, parks and lawns in proper condition. Such boots are used to prevent, as far as possible, the marking and cutting up of the grass by the animals' feet, especially in wet weather, when the ground is soft.

WEATHER-STRIP.—MRS. ALICE HAZELTON, Lamoni, Iowa, Administratrix of Norman N. Hazelton. The threshold is formed with a longitudinal recess in its upper face, such recess being in advance of the recess formed in a lower plane than the corresponding face in the rear of the recess. A retaining-plate is secured upon the threshold in the rear of the recess, and is projected at its front edge over the recess. The weather-strip is formed with a guard-plate, and with curved ribs above and below the plane of the guard-plate. The weather-strip operates when the door is open as a wear-plate for the sill, and is adjusted by the door, in position, to serve as a weather-strip when the door is closed.

TRIPPING ATTACHMENT FOR CANE-SLINGS.—LOUIS H. AVET, Plaquemine, La. Slings for lifting sugar-cane, hay, corn, and the like, are commonly provided with pivoted hooks, which can be tripped to release the sling to discharge the load. Such hooks must be restored to their normal position by hand and re-engaged with the releasing device. Mr. Avet has devised a construction and arrangement of sling-hooks which restores them to their original position automatically, thus saving time and labor.

BOLT-HOLDER.—HERMAN STADE, Flandreau, S. Dak. The bolt-holder is provided with a lever having a chisel-shaped fulcrum made to clutch the bolt-head, while the outer end of the lever is anchored to some solid part to permit pressure to be brought on the chisel-shaped fulcrum to clutch the bolt-head and thereby hold the bolt against the turning strain, both in turning up nuts and in twisting them off. The device is practical and cheap, and holds bolts of all sizes very firmly in almost any position.

ATTACHMENT FOR REED OR PIPE ORGANS.—EDGERLY R. BAILEY, Clarinda, Ia. By the use of this attachment, chords or tones once struck continue in duration as desired by the performer, thereby permitting further execution, the tones thus produced intermingling with the sustained ones. In other words, certain keys may be struck and held depressed indefinitely without requiring continued pressure of the player's hand, so that the corresponding notes will sound as long as desired, or until the depressed keys are mechanically released at the will of the player.

PROJECTILE.—DR. WILLIAM F. COLE, Provident Building, Waco, Texas. The projectile is to be used only in a gun having an elliptical bore, since this form has merits which are of much importance. The projectile is elliptical in cross section throughout the length of its body, and is also twisted to conform with the bore of the gun. The front portion of the body is likewise tapered toward the point, which is constructed with a thin edge having a twist or reverse curve. With this form of projectile the rapidity of rotation is maintained and the flight even increased, while the resistance and friction of the air are said to be reduced.

NON-REFILLABLE BOTTLES.—ALEXANDER BRIELMAYER, South Nyack, N. Y. The non-refillable bottle comprises a casing fixed in the neck of the bottle. In this casing a conical stopper having an outlet-channel is mounted to slide. An outlet-tube is fixed in the casing and opens at one end into the bottle, the other end of the tube opening into the stopper-outlet when the stopper has moved into an outermost position upon tilting the bottle. After the contents have been poured out of the bottle, and the bottle is placed upright, then the stopper by its own weight glides back to close the outlet-channel.

DISTANCE AND ALTITUDE MEASURING INSTRUMENT.—LEWIS N. HORNBECK, Minco, Ind. Ty. The instrument is an improved combination distance and altitude measuring instrument designed for use by mariners and by surveyors and engineers. The instrument is particularly noteworthy for the rapidity with which results are obtained.

POLYPHONE ATTACHMENT.—NEWMAN JENSEN, Eureka, Cal. This invention provides an attachment for phonographs which is designed to reproduce the recorded sound with double the usual volume. The arrangement consists of two styli and diaphragms fitted to two tubes opening into a common horn. Not only is the volume of sound increased, but its

quality is enhanced; for the very rapid reproduction of the sound produced by one stylus gives to the tone something of that human timbre which is only too often lacking in talking-machines.

PICTURE HANGER.—I. H. Solomon, 48 Center Street, Manhattan, New York city. This device is intended to regulate the position, height and inclination of a hanging picture. In other words, with this attachment in use, any picture may be tilted so that it assumes the position most favorable to its proper exhibition. If, after having been thus inclined, it be found that the picture hangs too high or too low, the height desired may easily be attained. These operations may be very rapidly performed by any one. In order to secure the result mentioned it is not necessary to remove the picture from the wall, nor is the frame or wire in the least injured. The device may be operated as often as is desired and may be attached to a frame of any size with perfect safety.

LOCK-BOLT.—Edwin F. Conber, Selkirk, Manitoba, Can. This lock-bolt for door-locks is provided with a bolt lengthwise adjustable, so that under all conditions it will sufficiently clutch the hasp or bolt clutch. This adjustment enables the bolt to be engaged securely with this hasp or catch, should the door or frame shrink, without necessitating the resetting of the lock or its hasp.

PAPER BOX.—Joseph T. Craw, Jersey City, N. J. The paper box is especially adapted to be used as a wrapper for fine bricks. The construction is such that the box may be partially open at both ends, or entirely open at one end and partially open at the opposite end. The end of the box can be partially closed by side and end flaps, cushions being formed against which another box containing a brick may abut. Thus, bricks can be packed and shipped without damage.

ATTACHMENT FOR INK-BOTTLES.—Louis Schoen, Manhattan, New York city. Mr. Schoen has invented a simple device which is readily attached to the neck of an ink-bottle and which includes in its construction a pen-rack, a penwiper, and a lid which supports a cork for the bottle. A portion of the cork can be utilized for clamping pens which are to be removed from a penholder.

WINDOW-SHUTTER.—Frank Chase, South Sutton, N. H. The object of the invention is to provide a window-shutter arranged to permit the operator to open or close the slats conveniently from the inside of a room without being compelled to open the window-sash. A finger-lever is fulcrumed on the window-frame below the sash, the fulcrum of the lever being coincident with the sash to permit the rocking of the lever when the sash is closed. A connection between the lever and an adjustable part of the window-shutter permits the operation of the latter.

AUXILIARY BOX-COVER.—Moritz Meyer, Manhattan, New York city. The inventor has devised an auxiliary box-cover for use on cigar-boxes. The cover can be attached to the box without disturbing the cigars or without requiring the removal of the original box-cover. The improvement permits the contents of the box to be conveniently removed, excludes dust, moisture, and the like.

BUST-FORM.—Emily H. Wright, Manhattan, New York city. The bust-form provided by this invention is easily attached to a corset, readily maintains its form, and gives the dress the proper hang. The bust-form has sufficient flexibility readily to conform to the motion of the body without discomfort to the wearer.

Designs.

SHOELACE FASTENER.—Benjamin F. Koch and Samuel Bloom, Brooklyn, New York city. The leading feature of this design is a cylindrical body portion having a hook-like projection at one side terminating in an enlargement.

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.

NEW BOOKS, ETC.

GAME AND FISH COMMISSIONERS' REPORT.

The Fourth Annual Report of the New York Game and Fish Commissions for the year ending September 30, 1898, has just been received at this office. The Commissioners deserve much credit for producing this work, copiously illustrated with handsome colored photographs of many varieties of both game and fish, which are as true to nature as art can show them. A large variety of both salt and fresh water fish are shown, colored very natural to life, while the illustrations of ducks, pheasants and plovers are most interesting. The letterpress is extremely interesting, treating in detail the habits and diseases of many kinds of fish. The increasing interest in all out-of-door sports and the living things of nature is wonderful, and is proving of great benefit to the country at large. To many sportsmen the love of nature, the propagating and protection of game and studying their habits has in a measure taken the place of a desire to kill everything in sight. The Game and Fish Commissioners are all well-known men, who have truly at heart, without any selfish motives, the protection and welfare of the game and fish of the State of New York and elsewhere.

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 your name and address to the party desiring the information. **In every case it is necessary to give the number of the inquiry.**

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 462.—For manufacturers of aluminium.

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

Inquiry No. 463.—For manufacturers of taxidermy supplies.

Motor Vehicles, Duryea Power Co., Reading, Penn.

Inquiry No. 464.—For manufacturers of spring-motor fans.

WATER WHEELS. Alcott & Co., Mt. Holly, N. J.

Inquiry No. 465.—For small motor fans for use in dwelling houses for circulating air; motor like that used for sewing machines.

Yankee Notions. Waterbury Button Co.. Waterb'y, Ct.

Inquiry No. 466.—For manufacturers of sponge rubber.

Dies & Special Machinery. Amer. Hdw. Mfg. Co., Ottawa, Ill.

Inquiry No. 467.—For manufacturers of machinery for making hair felt.

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

Inquiry No. 468.—For manufacturers of all kinds of rubber specialties.

"For sale New Automobile Steam—$400. Wilson Bros., Easton, Pa."

Inquiry No. 469.—For parties to make a bent wire novelty.

Sheet Metal Stamping: difficult forms a specialty. The Crosby Company, Buffalo, N. Y.

Inquiry No. 470.—For a small ice plant of about 2 tons capacity.

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

Inquiry No. 471.—For manufacturers of very strong paper boards.

Our number 4 Catalogue of Automobile parts, write us, Standard Welding Co., Cleveland Ohio.

Inquiry No. 472.—For small gas engine developing about ¼ of a horse power.

Rigs that Run. Hydrocarbon system. Write St. Louis Motor Carriage Co., St. Louis, Mo.

Inquiry No. 473.—For manufacturers of small gasoline or kerosene engines suitable for farm work.

SAWMILLS.—Variable friction feed. Send for Catalogue B. Geo. S. Comstock, Mechanicsburg, Pa.

Inquiry No. 474.—For manufacturers of rubber wading pants with boots attached for fishermens' use.

Ten days' trial given on Daus' Tip Top Duplicator. Felix Daus Duplicator Co., 5 Hanover St., N. Y. city.

Inquiry No. 475.—For special rubber rivets and compounds for repairing pneumatic carriage tires.

Machine Work of every description. Jobbing and repairing. The Garvin Machine Co., 149 Varick, cor. Spring Sts., N. Y.

Inquiry No. 476.—For manufacturers of sheet iron 24 inches wide and up.

For sale and introduction in Scandinavia, of American goods, any and all. Apply to O. P. Jespersen and Sonner, Copenhagen, Denmark.

Inquiry No. 477.—For small gutter making machines for domestic use.

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. 478.—For a street outfit for making popcorn.

For Sale.—Right to take out foreign patents on my invention. Suspender End Attachment, U. S. patent to issue May 4, 1901. Address C. H. Dome, Prescott, Ark.

Inquiry No. 479.—For manufacturers of small cheap globe or gate valves.

Will sell outright, or on royalty to manufacture my patented poison guard paper, a device to be used as a safe-guard against accidents with poison. For making Wrapping Paper, Roll Paper, Paper Bags, Boxes, Envelopes, Labels, etc., and changing any ordinary bottle to a poison bottle by pasting the paper on it: also poison packages. For Wholesale and Retail Druggists, Manufacturers of Chemicals, Paint, etc. Will stand full investigation. For particulars, Address, Patent, care of the Scientific American, New York.

Inquiry No. 480.—For manufacturers of cable chain made from ⅛ inch to ¼ inch wire.

Sheet Metal Novelties, Articles and Stampings of all sizes. Tools and dies manufactured on contract. Address Standard Stamping Co. Cor. 7th & Hudson Sts., Buffalo, N. Y. U. S. A.

Inquiry No. 481.—For dealers in wood engravers' supplies.

Wanted.—Skilled artist in mechanical art work. No one need apply who has not a knowledge of mechanics coupled with artistic ability and experience. Address Artist, P. O. Box 773, New York.

Inquiry No. 482.—For parties to make a cheap tin box, flat and round; of a half pint capacity.

A Winton motor carriage, model 1899, for sale. Price, $500 f. o. b. cars Syracuse. This machine is in good running order, and was run less than 500 miles. Address, William Schmidt, 339 East Genesee St., Syracuse, N. Y.

Inquiry No. 483.—For manufacturers of an electric pen for perforating maps or patterns.

Moistener and Sealer. For moistening and sealing Stamps, Envelopes and Labels. Patents for sale or on royalty. Excellent chance for manufacturer with facilities for introducing a useful device. Address, CHAS. L. VOSE, Westerly, R. I.

Inquiry No. 484.—For parties to install system for electric welding of iron tubing.

Tempting Terms.—Those who are planning an early trip to the Pan-American Exposition will be interested to learn that the $12 excursion tickets from New York to Buffalo, over the Lackawanna Railroad will be on sale every day during May. The limit is ten days.—Another excursion trip is for $13 and tickets will be good for fifteen days, beginning June 1. A particularly tempting rate is a $9 excursion ticket to be sold on Tuesdays during May, good for five days, and honored only in coaches.—A beautiful guide to the Exposition, telling about its many wonderful features, is being sent out in response to requests accompanied by four cents in stamps, to T. W. Lee, General Passenger Agent, New York City. Write for one.

Inquiry No. 485.—For the makers of machines for stiching and riveting belts with solid copper two-prong rivets and fasteners.

Inquiry No. 486.—For manufacturers of boiler engines.

Inquiry No. 487.—For parties to make light sheet metal article.

Inquiry No. 488.—For dealers in new or second hand gasoline engines of about ¼ or ½ horse power, for running car of about 60 pounds weight.

Inquiry No. 489.—For manufacturers of stereoscopes and magnifying glasses.

Inquiry No. 490.—For dealers in life motion picture machines, such as the Chronophotographic Machine, the Mutograph and others.

Inquiry No. 491.—For manufacturers of round cheap mirrors 2⅝ in. diameter with metal rims; also without rims.

Inquiry No. 492.—For manufacturers of cheap mechanical telegraph instruments, key and sounder combined—no battery.

Inquiry No. 493.—For manufacturers of tin tubing of eleven-sixteenths inch and ¾ inch in diameter, the seams to be soldered.

Inquiry No. 494.—For small ice making machines and cooling apparatus to work by hand.

Inquiry No. 495.—For manufacturers of steel tubing one-sixteenth inch thick by 4 in diameter and over 2 feet long.

Inquiry No. 496.—For the present address of the Northrop Loom Co.

Inquiry No. 497.—For parties handling the Tropenas process for steel castings.

Inquiry No. 498.—For small practical and cheap typewriters.

Inquiry No. 499.—For manufacturers of glass moulding machinery.

Inquiry No. 500.—For machinery for envelope making.

Inquiry No. 501.—For manufacturers of up-to-date brick and tile machinery.

Inquiry No. 502.—For manufacturers of gasoline lighting system for buildings.

Inquiry No. 503.—For manufacturers of liquid-air motors and generators for use in a boat.

Inquiry No. 504.—For manufacturers of machines for testing lubricating oils.

Notes & 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.

(8165) W. F. G. writes: Please refer me to some article or work where I can find plain and easy directions and specifications for making and constructing a home-made apparatus for practice work and experiment (with the ordinary Morse key and sounder) in wireless telegraphy? A. We can furnish you Fahie's "History of Wireless Telegraphy," price $2 by mail. Also Supplement 1131, 1177, 1192, 1213, 1219, price ten cents each, all containing information concerning wireless telegraphy.

(8166) A. G. asks: 1. Can I use any other metal instead of platinum on the spring and screw of the induction coil described in Supplement 160, as I have difficulty in getting it? A. Platinum should be used because it burns very slowly and does not oxidize easily. 2. Can I use well-varnished wood instead of vulcanite as a commutator cylinder? A. Yes; but use shellac varnish.

(8167) C. A. asks: Would you kindly tell me what way to arrange the carbons in an electric arc furnace so that I could get about one square inch of heating surface, that is, the arc between the carbons; and could two large carbons be used, say, four inches long, with a quarter-inch arc, or would it be advisable to use small ones? Could you give me an idea of what heat there is in an arc, and would it be very expensive to run such a furnace? A. You can arrange the carbons as you propose for an electric furnace, and increase the number of pairs till you have the heating surface you require. The heat of an electric furnace is the highest on the earth ever produced by man. Any desired heating effect can be produced by continuing the current for a sufficient time. Supplement 1077 gives an account of a number of electric furnaces; price ten cents.

(8168) J. K. asks: Will you please tell me whether there is any way of taking the ink from half-tone pictures or engravings on paper off on glass so as to show in a magic lantern? A. We do not know any way of removing a picture from paper to glass so as to use the glass as a lantern slide. The best way is to make a photographic copy of the picture and use that as a slide.

(8169) G. E. H. writes: 1. The instructions for the construction of voltmeter and ammeter, in Supplement 1215, are particularly for E from 0 to 125. How much less wire No. 40 would I use to get a better reading for electro-plating dynamo of 8 volts, allowing a range of 0 to 15 volts? A. To change a voltmeter so that it shall give about the same deflection for 15 volts as for 125 volts, you will need about one-eighth as many turns of wire in the coil. 2. The capacity of machine will be 35 amperes. Would not No. 8 be about right for winding the solenoid for the ammeter? A. No. 8 wire carries 35 amperes with ease in the open air. 3. Wire tables give carrying capacity of wire thus: "Concealed" and "open." When is it supposed to be open and concealed? A. "Concealed" wire is wire in molding so as to be out of sight and away from a cooling draft of air. It will heat worse than open wire or wire exposed to the air. 4. Allowing 2,000 amperes per square inch phase, state rule for figuring carrying capacity of any size wire. A. A wire cut open exposes a circular end. Find the area of that circle by measuring the diameter and multiplying the square of the diameter by 0.7854. Multiplying this result by 2,000, you have the amperes of carrying capacity.

(8170) R. S. V. asks: 1. Is there any way in which I can tell the difference between iron and steel; and between common copper wire and magnet wire? A. It is not easy for an inexperienced person to tell iron from steel. Magnet wire is copper wire covered with a winding of cotton or silk thread. 2. In making a magnet close the iron core half to be covered with paper or some other non-conductor, will common wire do instead of magnet wire? The iron core should be covered so that the copper wire shall not come in contact with it. The copper wire must be covered with cotton winding so as not to come in contact with any other wire. 3. What kind of instrument measures the ohms of resistance of anything? A. There is no instrument for measuring resistance. A standard of resistance is required and a galvanometer. Books on electrical measurement will tell you the process. 4. Will those small carbon rods you tell how to make in "Experimental Science," on page 705, do for pendants for the microphone on page 585 instead of battery carbon? A. Yes; if made small enough. 5. What is meant by cautery work. A. Cautery is cutting by a hot knife or wire heated by electricity. 6. For that water decomposer in "Experimental Science" on page 560, do you need to use platinum wire all the way to the batteries? Should it be insulated, and what size should it be? A. Platinum wire is needed only for the parts under the water. Any size will do.

(8171) R. L. S. asks: 1. What is the method for testing fields and armatures for short circuits? A. Measure the resistance as the work proceeds, and if that does not decrease there should be no short circuits. Parham's "Shop and Road Testing of Dynamos and Motors," price $2 by mail, should meet your needs. 2. How can I make a cheap rheostat to be used with current up to 30 volts and 8 amperes? A. If by your question you mean that you want 30 volts in your external circuit and will take up the rest of the voltage in the rheostat, you will proceed as follows: Suppose the voltage of the circuit is 110. There will be a drop of 80 volts in the rheostat, and 30 in your apparatus; 8 amperes will flow through both. You will require 10 ohms of wire arranged in coils with air circulating through them so as to keep them cool. No. 13 iron wire will be the right wire to use. You will need 600 feet of it. If the voltage is other than 110, proceed in the same way as above, and calculate the length of wire at about 60 feet per ohm. We should suppose it to be better to buy a rheostat from some dealer in your city.

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