RECENTLY PATENTED INVENTIONS.

Mechanical Devices.

ORE WASHER AND SEPARATOR.—Henry P. Holden, Washington, D. C. This apparatus, which is intended for use in placer mining, is designed for treating the ores in large quantities. The invention embodies various novel features by which to increase the capacity of such apparatus. The improvements relate to the construction and arrangement of the different parts of the apparatus, including the riddle, screen and hopper, as well as to the rake, which is counterbalanced and operated in one direction by a suspended weight.

BAND-SAW MILL ATTACHMENT.—Zebulon Z. Linton, Fernwood, Miss. This attachment relates to feed-out devices, and embodies novel features to the end that springy timber will be prevented from clamping the band-saw, and the timber will be held in proper alignment as it passes from the saw, so as to insure uniform and straight lumber. A spring-seated kerf-guide yielding laterally to heavy pressure allows springy timber to follow the proper course.

OIL-CAN.—William L. Howland, Monmouth, Ill. This oil-can has a piston pump attached to force out the oil in an ample, steady stream. The can spout at its inner end enters the lower end of the pump cylinder, and a single valve controls the inlet to the cylinder and the outlet to the spout.

Agricultural Implements.

DRAFT EQUALIZER.—Henry Carpenter, Edmond, Oklahoma. The distinguishing feature of this equalizer is a bar called by the inventor a "pusher bar," which is pivoted to the evener and ranges rearwardly in a diagonal direction against the tongue, connections being provided for effecting, through the medium of the pusher bar, an equalization of the draft of two, three or more horses.

HARVESTER REEL.—Edward O. Beckman, Piper City, Ill. This inventor has devised a reel in which the blades are connected with the shaft by parallel connecting bars so that the parts fold after the manner of a parallel ruler. Adjusting bars connect with the blades and with a sliding collar on the shaft. The reel is adapted to be easily detached and to be folded into small compass, for economizing shed space.

Wagons and Harness.

VEHICLE RUNNING GEAR.—John E. York, inventor. The purpose of the running gear devised by this inventor is to prevent side lash on the pole and to enable the wheels to readily surmount stones or like obstructions. The front wheels are mounted on stub axles formed centrally on spider-frames, two vertically aligned arms of which are pivoted to the axle, the remaining two arms of the spider being pivoted to transverse links which connect the spiders at opposite ends of the axle. The invention, we understand, has proved advantageous on wagons bearing heavy loads. Particulars may be had from George M. Pillsbury, Lowell, Washington.

HORSE-COLLAR FASTENER.—John H. Emerson, Quincy, Ill. In this ingenious collar fastener, the connecting billet at the meeting ends of the collar is fastened at one end by a buckle, by which the necessary adjustment to the neck of the animal is obtained, and this adjustment is not again disturbed in removing or placing the collar. To the opposite end of the billet is secured a slotted plate and a stay strap. The plate is slipped over a staple on the collar and the stay strap passed through the staple. Thus the collar may be quickly placed on the animal or removed without disturbing the buckle connection.

Household and Culinary Devices.

LID HOLDER FOR VESSELS.—Benjamin F. Koch, Brooklyn, New York city, and John W. Cogswell, Hoboken, N. J. The device forming the subject of this patent is designed to hold the lid on a cooking vessel while pouring liquid contents therefrom. The holder is in the shape of a frame with hooks for engaging the flange of the vessel, finger-pieces for engaging and releasing the hooks, a spring for normally holding the hooks engaged, and a handle portion to aid in tilting the vessel.

FRAME FOR MOSQUITO CANOPIES.—Lottman Brothers Manufacturing Company, Houston, Tex. The latest patented improvement in the very useful canopy frames of this company is ingeniously and simply constructed of wire and in a manner to give the side-arms the form of braced cantilevers with the strength to maintain the canopy frame in the proper position and sustain it against downward strain.

BROILER.—Adrien Tenu, Manhattan, New York city. In the ordinary broiling devices that are adapted to contain a charcoal or like fire, and used, by hotels largely, in lieu of broiling over ranges or the like, the fire is very destructive on the broiling grate, and the inventor mentioned has provided for lessening this destructive action by arranging a sliding grate, and the casing is arranged so that the hot coals may be raked under the grate in one position, while when not in use the grate is not subjected to the intense heat of the coals.

SCRUBBER.—Mary N. Van Derbeck, Lincoln, Neb. A unique scrubbing device has been patented by this inventor, whereby an ordinary scrubbing brush is clamped in a head having a pivoted handle and a wheel or roller to run on the floor at the rear of the clamping head. The roller serves to hold the brush level as the device is forced over the floor, and also bears a part of the thrust incident to the manipulation of the device.

Miscellaneous Inventions.

CARVING OR DELINEATION MACHINE.—Arthur C. Féron, Manhattan, New York city. In this machine a tracer traverses and follows the lines of a drawing or model, and a pencil or carving tool reproduces the lines followed by the tracer, but in a reverse position. The invention provides a most useful instrument where a plurality of figures of the same kind are to be reproduced and it is necessary to first reproduce from an original a reversed design and then use this as a pattern. In the Féron devices there is a central elongated guideway, suspended as from a ceiling, and from a central pivot moving in the guideway, arms project at opposite sides and carry the tracer and the pencil or rotating carving tool, novel links and braces being provided to project like the main arms, on opposite sides from pivots traveling in the guideway.

BOOK HOLDER AND LEAF TURNER.—Clark W. Hadlock, Newton, Kans. This invention is especially intended for use by railway conductors, more particularly on freight trains, where frequent turning of the leaves in both directions is necessary in making up the complicated record of freight. The frame is adapted to secure the train book on the usual writing board, and so that the board can be held on the conductor's arm unaffected by the motion of the car and the leaves be readily turned as required.

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.

THE MEASUREMENT OF GENERAL EXCHANGE VALUE. By Correa Moylan Walsh. New York: The Macmillan Co. 1901. 8vo. Pp. 580. Price $3.

The author deals with the Nature of Exchange Values, the Correlation of Exchange Values, on the Measurement of General Exchange Values, Selection and Arrangement of Particular Exchange Values, Mathematical Formulation of Exchange Value Relations, the Question of the Means and Averages, Brief Comparison of the Means, the General Argument for the Geometric Means, Review of the Arguments for the Harmonic and Arithmetic Averages of Price Valuation, the Method for Constant Sums of Money, the Method for Constant Mass-Quantities, the Universal Method, the Doctrine of the Conservation of Exchange Value and the Measurement of Exchange Value in All Things, and, lastly, the Utility of Measuring the Variations in Exchange Value of Money. The author uses mathematics freely, and the book will prove interesting to political economists.

HAND BOOK OF PRACTICAL MECHANICS FOR USE IN THE SHOP AND DRAFTING ROOM. By Charles H. Saunders, Ph. D. Boston, Mass. 1901. 16mo. Pp. 227. Price $1.

A full index gives a clew by which any of the tables and formulæ can be found. The tables are particularly valuable. The book varies greatly in typographical excellence. Many of the tables seem to have been prepared by photo-engraving. The book will prove of real assistance to mechanics and engineers in their everyday work.

LES AUTOMOBILES ELECTRIQUES. Par Gaston Sencier and A. Delasalle. Avec un préface de Charles Jeantaud. Paris: Vve. Ch. Dunod. 1901. Pp. 390.

The authors have produced a work on electromobiles, which, without being too technical, describes various forms of electric carriages and trucks with an exhaustiveness that will be appreciated, particularly by the makers of electric carriages. It is to be regretted, however, that the admirable printing of the work is somewhat marred by cuts which are not often very clear. The book is to be welcomed, on the whole, as a valuable addition to the literature of the automobile. Particularly interesting is the chapter dealing with the various types of storage batteries.

LA SÉRIE DE TAYLOR ET SON PROLONGEMENT ANALYTIQUE. Par J. Hadamard. Paris: C. Naud. 1901. 16mo. Pp. 102. Price 50 cents.

PRODUCTION ET EMPLOI DES COURANTS ALTERNATIFS. Par L. Barbillon. Paris: C. Naud. 1901. 16mo. Pp. 103. Price 50 cents.

We have frequently had occasion to comment upon the admirable series of "Scientia" monographs published by Carré and Naud. The present two volumes maintain the high standard set by the previous works. The new light thrown by M. Hadamard on Taylor's formula will do much to illuminate a difficult mathematical problem. His work is scholarly, and for the mathematician decidedly interesting.

Dr. Barbillon's book is written for the electrical engineer, and is devoted to a mathematical discussion of alternating currents, which is thorough and scientific.

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

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

Inquiry No. 1137.—For broom-making machinery.

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

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Machine chain of all kinds. A. H. Bliss & Co. North Attleboro, Mass.

Inquiry No. 1139.—For portable wooden buildings.

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

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

Inquiry No. 1142.—For manufacturers of novelties.

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

Inquiry No. 1143.—For manufacturers of corrugated steel diaphragms for use in ammonia pressure reducing valve.

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

Inquiry No. 1144.—For parties in Canada to manufacture grafite boxes.

Machinery designed and constructed. Gear cutting. The Garvin Machine Co., 149 Varick, cor. Spring Sts., N. Y.

Inquiry No. 1145.—For parties dealing in heavy hydraulic tubing for bollow shafting. The size to be 3¼ inches outside diameter, walls ½ inch or 5/8 inch thick, to turn down to 3 inches diameter.

See our Collective Exhibit—Section "S," Electricity Building, Pan-American Exposition. Standard Welding Company, Cleveland, Ohio.

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To Patentees. Wanted to manufacture article which will retail to lady consumers for about $1.00 leaving good margin of profit.—C. S. O, Box 773, N. Y.

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Inquiry No. 1148.—For manufacturers of electric shoe polishing apparatus.

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. 1149.—For manufacturers of balloons.

The best book for electricians and beginners in electricity is "Experimental Science," by Geo. M. Hopkins. By mail, $4. Munn & Co., publishers, 361 Broadway, N. Y.

Inquiry No. 1150.—For manufacturers of novelties in Canada.

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WANTED.—Punch and die work, press work and light manuf'g. Daugherty Novelty Works, Kittanning, Pa.

Inquiry No. 1153.—For manufacturers of flagstaffs for small toy flags.

WANTED.—Souvenirs, premium goods, toys and Christmas novelties. Sherman, Arch Co., 142 Merrimac Street, Boston, Mass.

Inquiry No. 1154.—For manufacturers of wood for the frame of box kites.

Inquiry No. 1155.—For manufacturers or dealers in Spanish tile roofing.

Inquiry No. 1156.—For a bag fastener known as the "Boss Fastener."

Inquiry No. 1157.—For manufacturers of machinery for making cardboard pie plates, butter dishes etc.

Inquiry No. 1158.—For manufacturers of gas engines in New York City.

Inquiry No. 1159.—For manufacturers of machines for making wooden pegs for shoes.

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Inquiry No. 1161.—For manufacturers of electric dynamos.

Inquiry No. 1162.—For address of parties having Swedish anvils for sale.

Inquiry No. 1163.—For dealers in second-hand turning lathes and drill presses in Chicago, if possible.

Inquiry No. 1164.—For manufacturers of a condenser ¾ to 1 microfarad capacity.

Inquiry No. 1165.—For manufacturers of air pumps and compressors.

Inquiry No. 1166.—For dealers in elevating machinery for elevating grain and feed, and machinery for cleaning oats.

Inquiry No. 1167.—For manufacturers of electrical heating apparatus.

Inquiry No. 1168.—For manufacturers of models of locomotives made of cardboard.

Inquiry No. 1169.—For manufacturers of coffee roasters of about 150 pounds capacity and a cooler for same.

Inquiry No. 1170.—For the present address of the Farmers' Handy Wagon Company.

Inquiry No. 1171.—For manufacturers in the United States of a mechanical apparatus used for loading coal inside the pits.

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.

(8295) P. C. T. writes: I would like instructions for making a simple, very cheap and easily made galvanometer for measuring currents from 1 to 4 Leclanche cells if you have papers having such instructions. A. We have no paper giving instructions for just the instrument you require. SUPPLEMENT No. 1215, price 10 cents, gives a voltmeter and an ammeter which you might modify to your needs. Bottone's "Electrical Instrument Making for Amateurs," price 50 cents by mail, contains descriptions of these instruments as well as many others.

(8296) C. P. R. asks: May I trespass on your valuable time with a query with hope of answer? It was recently stated that at Bahrein, on the southwest coast of Persia, on the Persian Gulf, the natives obtain their supply of fresh water from springs at the bottom of the Gulf more than a mile from shore, and that divers go down 200 feet, fill their goatskin bags or sacks with fresh water as it bubbles from the springs at the bottom, and bring it to the surface without allowing the salt water to mix with it. The article further stated that no one knows how the natives learned of the supply, but that the water had been taken in that way probably for centuries. Now can and will you give me any light on this matter, as to the probability or improbability of the water supply coming from such a source and being secured in such a manner? A. There is nothing impossible nor improbable in the statement that fresh water is collected from springs which come up through the earth at the bottom of salt water. We personally know several places where pump logs have been put down into such springs and fresh water is pumped up through the salt water. The only improbable point in the story which you quote is in regard to the distance to which the men descend under water to secure the fresh water. Submarine divers have not gone below 200 feet from the surface with the advantage of armor, air supply and weights to sink them. The effort has been made to reach a wreck in 240 feet of water. The accounts state that at 130 feet the diver began to experience serious trouble. At 200 feet, after suffering terribly, he lost consciousness and was hauled up. Divers cannot work much below 100 feet. It is very improbable that men can be in the habit of descending 200 feet below the surface of the ocean.

(8297) W. H. asks: Could you inform me what is the best coating for the glass plates of static machines, whether shellac varnish or other varnish? I have been using bleached shellac varnish and it blisters and flakes off. A. Shellac varnish is the best coating. The glass must be perfectly clean and dry when the shellac is applied. A very slight trace of grease, such as a finger-mark, will prevent the adhesion of the varnish to the glass. Glass may be cleaned by washing it first in strong sodic hydrate (caustic soda), then in nitric acid, and last in distilled water. It is then allowed to dry. The surface should not be touched by anything, cloth or hands, after it leaves the acid. It will then be chemically clean. Before applying the shellac the glass should be warmed to render it perfectly dry. If these directions are followed there will be no trouble with the adhesion of the varnish.

(8298) D. G., Jr., asks how to temper steel dies in imitation of cloth or fine hair line, etc., so as to avoid the scale that appears on the surface of the die. A. Bright-faced dies that are to be kept free from scale in the hardening process should have their faces covered with a layer of hard soap and the die heated face up, which will keep the air from oxidizing the surface. Then it will come out of the hardening bath bright.

(8299) C. B. B. asks: Will you please tell me whether the dynamos described in SUPPLEMENTS 844 and 865 can be used to run electric furnace described in SUPPLEMENT 1182? A. The dynamo of SUPPLEMENT 865 will give current enough for a small electric furnace. A lower voltage is to be preferred, and a dynamo especially designed for such work would be very much better than one which was intended for lighting.

(8300) W. T. B. asks: I would like information in regard to the best manner of placing rods for the protection of buildings from lightning. A. The putting up of a lightning rod is a simple matter and requires very

little instruction; but if one has some knowledge of electrical matters, he can easily determine how a rod ought to be put up. The most important points to be attended to are tight joints and a good earth connection at the bottom of the rod. The parts of the rod should be screwed together with couplings, as in water and steam pipes. A small iron water pipe would make a good lightning rod; so would a flat strip of iron one inch wide and 1-16 inch thick. There is no need to go to the expense of a copper rod. Iron is by many considered really better than copper. The grounding of the rod must be attended to with great care. The lower end of the rod *must* be in water or in moist earth. A plate of iron or a coil of the rod itself should be connected to the end of the rod to insure good contact between the rod and the earth. Rods should be carried up at all the corners of the building, and go to the peaks of the gables and along the ridges of the roof, up chimneys, pinnacles and towers, to all the highest points of the building, but there should not be high rods above the roof and chimneys, such as are very often seen in the older practice of putting up lightning rods. Lightning rods are not put up to invite the lightning to come down that way, but to take care of it, if it insists upon coming. Rods should be fastened to the metal of roofs, gutters, and leaders, and should not be insulated from the house by glass insulators as was formerly the universal method. Such insulation is useless, since a quarter inch of glass cannot hold back a discharge which has already jumped through perhaps a mile of air. Short points may be put upon the rod at all the higher parts of the building, not more than a foot above the building, but these are not necessary. The idea that a tall rod protects a certain area around its base is no longer considered true. The rod if solid should not be more than a half inch thick. If it is a tube it may weigh about as much per foot as if it were solid. Heavy telegraph wire if put up plentifully would be as serviceable as a rod. A building well netted over with such wire, better galvanized for durability, would be as thoroughly protected as with the most expensive rod. Remember that surface of metal is what is wanted in a rod rather than weight. In many respects a heavy rod is inferior to a light one of greater surface. Continuity of the metal is the most important feature. There must be no air gaps, no loose joints. It will thus be seen that a blacksmith with a little gumption is just as well able to do the work of making and putting up a rod as the best engineer. Much valuable information upon this subject has been printed each year in these columns. You should also have SUPPLEMENTS, Nos. 249, 348, and 998, price ten cents each. We append the rules given by Prof. S. P. Thompson as a summary of the modern views upon this subject. It will be noted that our advice given above differs slightly in some unimportant particulars from these rules. 1. All parts of a lightning conductor should be of one and the same metal, avoiding joints as far as possible, and with as few sharp bends and corners as may be. 2. The use of copper for lightning rods is a needless extravagance. Iron is far better. Ribbon is slightly better than round rod; but ordinary galvanized iron telegraph wire is good enough. 3. The conductor should terminate not merely at the highest point of a building, but be carried to all high points. It is unwise to erect very tall pointed rods projecting several feet above the roof. 4. A good deep *wet* earth should be provided, independent of gas or water pipes, to which the conductor should be led down. 5. If in any part the conductor goes near a gas or water pipe it is better to connect them metallically than to leave them apart. 6. In ordinary buildings the conductor should be insulated away from the walls, so as to lessen liability of lateral discharge to metal stoves and things inside the house. 7. Connect all external metal work, zinc spouts, iron crest ornaments and the like, to each other and to the earth, but not to the lightning conductor. 8. The cheapest way of protecting an ordinary house is to run common galvanized iron telegraph wire up all the corners, along all the ridges and eaves, and over all the chimneys, taking them down to the earth in several places to a moist stratum, and at each place burying a load of coke. 9. Over the tops of tall chimneys it is well to place a loop or arch of the lightning conductor made of any stout and durable metal. Any man of intelligence can put up a lightning rod or wire from these simple rules, and may then feel assured that he has done all that can be done to protect his home from a stroke of lightning.

(8301) F. R. M. asks: 1. When light rays cross each other or reflect back upon themselves as they are made to do in diagrams of images formed by lenses and mirrors, why do they not become mixed up and produce interference? A. They do not become mixed up, but do interfere when the reflection is at a suitable angle. It is in this way that the fact that light is due to a wave motion was demonstrated by Fresnel. These interferences cannot be seen in the open, but require a dark room and special arrangements. They can be seen by placing the hand over the eye so that you can look at a bright light, such as an open window will furnish in a clear day. You will then see innumerable dark lines in the space between two fingers, parallel to the fingers. These are interference lines. The waves do not become mixed up, because any number of sets of waves can pass at once through the same space as if no other wave were there. This is the case with water waves on a lake or the ocean. It is the case with sound waves. Two persons can talk at the same time in the same room and be heard by others. A whole orchestra can play at the same time and no jumble or mixture of the sound result. Perfect harmony will result. We see no reason why light waves which are not vibrations of ordinary matter, as these other vibrations are, should be mixed or confused by existing in the same space together. 2. When two moving shadows approach each other, why do they rush together just before they meet? A. We would try to explain this if we thought the question stated a fact. We do not think two shadows move any faster as they come near each other than they did when further apart. 3. Is it a fact that food will sour more quickly if put into a refrigerator while still quite warm? If so, please explain. A. We do not think so. The reason a hot dish should not be put into a refrigerator is that it heats the air and destroys the work the ice has already done. In the hot refrigerator food will then spoil. This is because the air of the refrigerator has been heated, and not because hot food was put in. 4. Why is it that milk sours in a thunderstorm? A. We do not know.

(8302) C. W. R. asks: Will you please refer me to some book describing fully transformers made to transform a two-phase to a three-phase current or *vice versa*? A. We presume you wish to find the plans from which you can make the transformer you require. We do not know any published plans of this sort. There are good books upon the theory of the transformer. Such is Kapp's, price $1.75 by mail; Adams's "Transformer Design," price $1.50 by mail. By the aid of these you might work out what you need.

(8303) F. W. writes: I have a small motor which runs a fair speed when using 4 volts and ¼ ampere. I would like to run the motor on a 110-volt light circuit. What size wire must I use on the field and armature? A. There is probably not room for the wire to rewind the motor for 110 volts. The better way is to put the motor in series with two 16-candle lamps. It will then get ¼ ampere and a few volts.

(8304) G. O. S. writes: During a thunder shower here it was said that some of the stitchers using sewing machines run by an electric motor connected to the shafting by a 10 or 15 foot leather belt experienced a sensation like that of one's feet going to sleep. Is it possible that they felt a slight shock? It is not dangerous to run the motor during a thunder shower, is it? The power is furnished by the Edison Company. A. Anything is possible with the lightning, but it is not apparent from your description that anything happened. The sensation may have been from electricity, and again it may have been from nervousness, No one can tell. A quiet mind would eliminate one cause of unpleasant sensation at such a time. No electric disturbance is likely to have passed from the Edison wires through a leather belt to the sewing machine. If the Edison wires are underground they are not likely to receive a lightning discharge. Aerial wires are very often struck by lightning, but when suitable lightning arresters are used there is little likelihood of the electricity of the lightning entering a building. If your installation is properly made there should not be any special risk at the sewing machines during a thunderstorm.

(8305) W. S. P. asks: 1. What are the modern works upon the telephone? I don't mean the working of an individual telephone, but the methods for connecting and working them. A. The best work upon this subject is Miller's "American Telephone Practice," price $3 by mail. It is very full and complete. Another important work is Hopkins's "Telephone Lines and Their Properties," price $1.50 by mail. With these two you have a very complete presentation of the whole subject. Of smaller books there are Webb's "Telephone Handbook," price $1, and Poole's "Practical Telephone Handbook," price $1.50 by mail. 2. What are the strengths of the several currents used in telephone work, say inside of New York city? (Not long-distance.) What strength suffices for ordinary speaking current? A. The current strength, of course, varies with the different transmitters. It is very minute with all. Prof. Cross, of Boston, by employing very delicate instruments and great refinement of method, reached the following results: The current in the secondary wire of the induction coil of the Edison transmitter, 0.072 milliampere; of the Blake transmitter, 0.132 milliampere; of the Hunnings transmitter, 0.556 milliampere. 3. What for the magneto-electric that rings the local call bell? A. Magneto call bells are wound to 300 to 500 ohms for local work; for bridged work much higher, to 10,000 ohms even. The E. M. F. of the magneto when run as ordinarily by hand is from 65 to 75 volts. As the current is alternating, the amperes are less than the quotient of the volts by the ohms; but at any rate the current strength is very small. We have no exact data upon the point.

(8306) L. A. F. asks: Is there an escape or loss of electric fluid if the electric light bulb or lamp is removed from its holder when the current is on? Will the meter register it? A. If a socket is in good condition there ought not to be any leakage when the lamp is removed. If, however, there is leakage the meter will register the current which is lost.

(8307) J. M. asks: 1. If a stone is dropped into the ocean at a very deep part, will the stone sink to the bottom or will it remain above the bottom and float in the water? I heard some people say that the pressure was so great that the stone could not sink. A. Anything which begins to sink in the water of the ocean will continue to sink till it reaches the bottom underneath it. The pressure is very great. At 24,000 feet it is four tons per square inch, and at the greatest depths of the ocean it is about five tons per square inch. This will compress any article which sinks to that depth very greatly and render it much heavier relatively to the water; but the water is not compressed to any degree by even that great pressure. So that the article which is sinking and being compressed is all the time growing heavier relatively to the water and will sink faster the farther it sinks. 2. Has a cannon on board of a man-of-war a device to make it rebound, or is the cannon fastened to the ship? A. The old method was to allow the gun to run back by its recoil so as to load it again. All modern guns are breechloaders and do not run back by their recoil. The force of the recoil is taken up by a liquid pressure, some liquid such as glycerine being used.

(8308) Farmer asks: Will you kindly tell me through your paper whether lightning rods secured to buildings with malleable iron brackets are a protection against lightning? It would appear to me that the rods should be insulated at all points where they come in contact or are secured to the building or they must be more dangerous than otherwise. A. Opinions differ upon this point. Equally good authorities are to be found upon both sides of the question. We are personally inclined to the opinion that a lightning rod may just as well be connected to the house directly as to use a glass insulator. Our reasons for this opinion are that the glass will be wet as soon as rain falls and its insulating value will be greatly reduced; and the electric discharge, which has already leaped through thousands of feet of air between the cloud and the earth, will not mind the few inches of air through which it must pass in going from the rod to the iron support of the rod around the insulator.

(8309) A. S. asks: How many units of heat for a stated weight of the metals sodium and potassium are evolved in passing to the condition of KOH and NaOH respectively? A. When one gramme of potassium combines with oxygen there are 1,745 units of heat produced. When one gramme of sodium combines with oxygen 3,293 units of heat are produced. We have no separate data for the change from the oxide to the hydrate.

(8310) J. C. M. writes: I have a son 15 years old who wants to learn all about electricity and electric instruments. You no doubt have such books on sale. I would like to have catalogues of them, with your recommendation of such as you think most suitable for him. He wants a *descriptive* and *practical* work—one that will give him complete instructions for making and repairing any *part* of any *kind* of electric or magnetic appliance. A. There is no work or set of books which can supply what is asked in this request. We presume the intention is to ask for books by means of which the lad can make a beginning of learning electricity. We can furnish Sloane's "Electrical Library" for $5 by mail. There are also separate books to be had upon making telephones, putting in electrical bells, etc. After these might come the building of a small dynamo or motor, the making of a galvanometer and induction coil. These can be found in Bottone's "Electrical Instrument Making for Amateurs," price 50 cents.

(8311) W. I. P. asks: Where can I get information on the subject of wave motion and the attempts to use it as a power? A. See SUPPLEMENTS, Nos. 536, 825, 861, price ten cents each, for articles describing various devices which have been employed to utilize the force of waves to do work.

(8312) H. R. asks: As to the electric motor described in "Experimental Science." Do you sell it or its parts? A. We do not sell any of the apparatus described in "Experimental Science" or the parts of any of it. The object of the book is to stimulate ingenious persons to "make things" by showing them how to proceed. This object it is accomplishing. There is no book so well adapted to help one to build suitable and sufficient apparatus for studying science within its limits as is this book.

(8313) F. R. asks: What book or paper gives information on the Marconi wireless telegraphy. I wish a description of instruments and operation of same. Can such instruments be made in an ordinary machine or model making shop. A. Fahie's "History of Wireless Telegraphy," price $2 by mail, gives descriptions of the various systems which have been invented, Marconi's among the rest. We have published several papers on the subject, but none which gives details of construction such as would enable a man to build a copy of the apparatus. Moreover, Mr. Marconi is changing his apparatus continually as the results of his experiments, and no description is up-to-date upon the subject. There is nothing about the apparatus which could not be built in any ordinary shop.

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