

RECENTLY PATENTED INVENTIONS.

Electrical Devices.

APPARATUS FOR ELECTRICAL SIGNALING.—L. DESPREZELS, 20 Rue du Chateau d'Eau, Paris, France. The apparatus is so arranged as to allow of obtaining by means of a cheap construction an easy and ready transmission of signals between two or more stations at the same time. It can be used for signaling by wire, as ordinary telegraphic apparatus, as apparatus for signaling for railway, as fire-alarm, as commutator for electric bolting, as calling apparatus, a commutator in telegraph or telephone stations when several are connected to one and same wire, as registering gyrometer, as sound-controller, and the like. Also used for signaling without a wire as calling apparatus or commutator in being introduced with Morse telegraph into the circuit of the Branly tube.

Of Interest to Farmers.

CORN-CUTTING MACHINE.—C. LEIDY, P. V. JOHNSON, and J. G. MARTIN, Fostoria, Ohio. In this patent the invention relates to harvesting-machines, and especially to that class used for cutting corn. The principal objects of the invention are to provide a machine capable of being drawn by three horses and which will cut two rows of corn simultaneously, which will support a shock and afterward discharge it from the machine, and will cut the stubble.

BAND-CUTTER AND FEEDER FOR THRESHING-MACHINES.—F. FREDERICK, Taylors Falls, Minn. In respect to one of its features the invention is an improvement in that class of attachments for threshing-machines in which the feed or advance of the grain to the threshing-cylinder is automatically regulated and kept practically uniform by a governor, preferably by one comprising a friction-wheel variably rotating in contact with a disk upon whose face it is radially, automatically, and variably adjustable for producing fast or slow speed. Operation of the rakes or means for feeding the grain is thus governed automatically according to the quantity and condition of the grain.

Of General Interest.

SIGN.—R. M. PEARSON and W. LETZIG, Little Rock, Ark. The object of the inventors is to provide a new and improved sign which is very attractive both in the day-time and at night, the sign-letters being wholly illuminated and readable on both sides of the sign and illuminated by the same source of light at a comparatively little expense.

GATE-VALVE.—R. J. POWERS, Chicago, Ill. The invention has reference particularly to improvements in gate-valves for sewer-pipes, the object being to provide a gate-valve of novel construction so arranged as to automatically close the sewer pipe and prevent the inlet of waste or sediment should a backflow of water occur.

BOTTLE-STOPPER.—E. CAMPBELL, Rossland, Canada. The principal object of this invention is to provide a stopper designed to be inserted within a bottle or similar vessel, which stopper after it has been securely sealed in the neck of the bottle is so fractured or marked that it will be impossible to refill the bottle after the original contents have been removed and without insuring detection of the fraud.

CASING-HEAD.—F. E. HOWE, Marietta, Ohio. Mr. Howe's invention relates to an improvement in casing-heads and means for connecting it with the casing in oil, gas, or artesian wells so as to prevent the leakage of fluid from the well, its object being to produce a device which shall be efficient, cheap, easily applied, and one which can be applied in varying sizes of casings.

COMPOSITION OF MATTER FOR FORMING PIPES OR TUBES, ETC.—J. S. GREGG, Pomona, Mich. The improvement relates to the manufacture of pipes or tubes, etc., from plastic cement, and has for its object to provide a novel plastic composition by means of which tubing can be readily and quickly produced. The materials employed in the manufacture consist of equal parts of a good quality of powdered cement and sand and a suitable quantity of powdered resin, all mixed with water impregnated with liquid glue.

CAP-FASTENING FOR VESSELS.—A. BROCKELBANK, Ossining, N. Y. The purpose of this invention is to provide a construction for the neck of a bottle or like receptacle and a construction of cap for the same which will enable the cap or cover to be quickly placed in closed position on the receptacle and turned to a locking engagement with the neck of the receptacle and further turned in the same direction to provide for a convenient removal of the cap or cover from the receptacle.

RECEPTACLE FOR CIGARETTES.—A. Q. WALSH, New York, N. Y. The purpose of this invention is the provision of a receptacle especially adapted as a receiver for cigarettes and to so construct the receptacle that ready access may be gained to even the last cigarette therein and so that the cigarettes will be kept moist in a manner which will not affect their color or flavor.

METHOD OF MAKING CULINARY STOCK.—W. B. KERR, Medford, Mass. The invention relates to the manufacture of food products; and its object is to provide a new and improved method of making culinary stock, which stock can be readily converted by the consumer

into an easily-digested, nourishing, and palatable stew having the flavor of malted oysters, clams, and like bivalves.

MEANS FOR SUPPORTING CHINAWARE IN GLAZING-KILNS.—F. G. HANEY, East Liverpool, Ohio. The inventor's object in this instance is to provide means for reliably supporting dishes and the like in saggers, so that the dishes will be maintained nearly upright and the points of contact between the ware and the supports reduced so as to have scarcely any area, and also that these points of contact with the ware be located where any slight defect will not mar the general surface of the glazed ware.

CABLE-CLIP.—W. GREGER, Barron, Wash. This invention has reference to improvements in clips designed for engaging with a wire cable, an object being to provide a clip that will overcome the strain and adapted to pass over the deep-flanged sheaves and also so constructed as to pass freely around the large grip-pulley and under the hold-down-sheaves.

BATH-SUIT BAG.—W. A. ALLEN, New York, N. Y. The purpose of this invention is to provide a bag adapted to carry a folded bathing-suit to and from the body of water in which the bath is to be taken, the said bag being particularly adapted for use in connection with bathing-suits for men, and to so construct a bag that it will be durable, economic, simple and waterproof, or substantially so, and to provide a construction of bag which when filled, closed, and locked will constitute a sightly, compact package of small size, having a handle by which it may be readily supported from the carrier's wrist.

Railways and Their Accessories.

AUTOMATIC RAILWAY-SIGNAL.—J. C. LAMBERT, Tonica, Ill. This invention refers to means actuated by passing of rolling-stock over selected portions of a railroad-track which show a signal, sound an alarm, or give both automatically, and has for its object to provide construction for an automatically-operated signal which is reliable in operation, which may be employed on single or double track railroads, signal trains or stations in either direction of travel on the road, and be adapted for repair of signal device quickly and cheaply.

INCLINED RAILWAY.—S. E. JACKMAN, New York, N. Y. Mr. Jackman's invention relates to railways such as are principally used for amusement in pleasure resorts, exhibitions, and like places. The object is to provide a new and improved inclined railway arranged to utilize the ground-space to the fullest advantage by providing a long up-track without diminishing the rise thereof for the purpose of requiring less power to haul cars up the track.

MAIL-BAG-DELIVERY DEVICE.—J. S. KAUFFMAN, Degraff, Ohio. In the form of this inventor's improvements he employs specially constructed and organized devices at a railroad-station for delivering mail-bags to a catcher therefor on a moving car, as well as other specially constructed and organized devices on the car for similarly delivering mail-bags to a catcher therefor at a station, said devices being adapted to be operated conjointly or practically at the same time and each set being adapted to be operated independently either to deliver a bag or to receive one from the other. The device is inexpensive, effective, and reliable and possesses the capacity for long and repeated service.

Pertaining to Vehicles.

BICYCLE ATTACHMENT.—B. R. PEPPER, Yazoo City, Miss. In this instance the intention of the inventor is the provision of a new and improved bicycle attachment arranged to store up power on a downgrade for use in propelling the bicycle on a level grade or on an upgrade to secure riding as easy as possible. It may be attached to other wheeled vehicles.

Prime Movers and Their Accessories.

HYDRAULIC PUMP.—R. H. RUSSELL, Galveston, Texas. The inventor's object is to provide means whereby fluid may be employed and used over and over again in transmitting power for working the fluid elevating or pumping means. His broad conception comprehends the use of liquid, air, or gas placed under pressure and conveyed to the pump for working it. A liquid-elevating pump is employed having a special reciprocable hollow piston, means for conveying fluid under pressure into the pump-cylinder alternately at opposite sides of its piston, and peculiar means whereby fluid-power means is alternately fed to pumping-cylinder through operation of a controlling-valve.

SMOKE-CONSUMING FURNACE.—J. B. HARRIS, Nashville, Tenn. The object of the present invention, which relates to smoke-consuming furnaces, such as shown and described in Letters Patent of the United States formerly granted to Mr. Harris, is to provide a furnace arranged to cause a reduction of the volume of nitrogen in the fire-box by introduction of minute jets of steam to deflect the rising gases and smoke in the fire-box, to bring same near the air-inlet ports for mixture with air drawn in by action of steam-jets, and to insure a more ready and complete combustion of the mixture.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. In every case it is necessary to give the number of the inquiry.

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 6633.—For manufacturers of small chains, like bicycle chains, small enough to take the place of tape which operates typewriter carriages.

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

Inquiry No. 6636.—For manufacturers of pearl buttons.

Perforated Metals. Harrington & King Perforating Co., Chicago.

Inquiry No. 6637.—Wanted, addresses of automatic vending machine or coin slot machine manufacturers or dealers.

Handle & Spoke Mch. Oher Mfg. Co., 10 Bell St., Chagrin Falls, O.

Inquiry No. 6638.—For parties manufacturing machinery for making improved cross-head bale ties for hay.

Adding, multiplying and dividing machine, all in one. Felt & Tarrant Mfg. Co., Chicago.

Inquiry No. 6639.—For manufacturers of artesian wells with automatic pressure system or chemical engines for the purpose of waterworks and fire protection.

One-eighth horse power battery motors, \$5 each. Walsh's Sons & Co., Newark, N. J.

Inquiry No. 6640.—For firms selling large machines for loading short-run shells, same being loaded by power and capacity being 20,000 to 30,000 per day.

Commercially pure nickel tube, manufactured by The Standard Welding Co., Cleveland, O.

Inquiry No. 6641.—For manufacturers of machines testing the saturation of paper.

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

Inquiry No. 6642.—Wanted, information on the recovery and marketing of wool grease or lanoline; also manufacturers of a plant to extract the same.

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

Inquiry No. 6643.—For manufacturers of an endless 38-inch steel band, like an endless band saw, save that it must have a sharp, continuous cutting edge like a knife.

In buying or selling patents money may be saved and time gained by writing Chas. A. Scott, 719 Mutual Life Building, Buffalo, New York.

Inquiry No. 6644.—Wanted, address of the Dical Engine Co.; also makers of crude petroleum engines.

We manufacture iron and steel forgings, from twenty pounds to twenty-five tons. Crank shafts of all varieties. Erie Forge Company, Erie, Pa.

Inquiry No. 6645.—For manufacturers of advertising folders with following imprint: "Patented by Albert Oertel, November 15, 1892." "Copyright 1902 by C. I. Boyer."

We Manufacture on Contract anything in light hardware. Write us for estimates. Edmonds-Metzel Mfg. Co., 143-153 South Jefferson Street, Chicago.

Inquiry No. 6646.—For manufacturers of tools for making gold wire and shell jewelry.

We manufacture anything in metal. Patented articles, metal stamping, dies, screw mach. work, etc. Metal Novelty Works, 43 Canal Street, Chicago.

Inquiry No. 6647.—For manufacturers of small steam turbines of $\frac{1}{4}$ to $\frac{1}{2}$ h. p.

THE SCIENTIFIC AMERICAN SUPPLEMENT is publishing a practical series of illustrated articles on experimental electro-chemistry by N. Monroe Hopkins.

Inquiry No. 6648.—Wanted, addresses of parties selling grinding machines for grinding lenses, etc.

WANTED.—Colonial silverware. Any one wishing to sell any authentic silver made in this country during the eighteenth century, please communicate with C. A. M., Box 773, New York.

Inquiry No. 6649.—Names and addresses of firms manufacturing spring motors, such as are used for revolving display stands.

VALUABLE PATENT FOR SALE.—An indispensable article for women. Has large demand in all department stores. Patent No. 774,191. Address Acme Hygienic Co., 132 West 90th Street, New York.

Inquiry No. 6650.—For manufacturers of needle books, containing an assortment of needles; also address of party manufacturing Perfect Dust Beater.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery and tools. Quadriga Manufacturing Company, 15 South Canal Street, Chicago.

Inquiry No. 6651.—For manufacturers of asbestos cloth (not paper) or asbestos wearing apparel.

Space with power, heat, light and machinery, if desired, in a large New England manufacturing concern, having more room than is necessary for their business. Address Box No. 407, Providence, R. I.

Inquiry No. 6652.—Wanted, an illustrated price list of ticket-making machines; also firms manufacturing the same.

You can rent a well equipped private laboratory by day, week or month from Electrical Testing Laboratories, 548 East 50th Street, New York. Absolute privacy. Ask for terms and facilities.

Inquiry No. 6653.—For manufacturers of inexpensive mixer which will readily mix light material, including loam and straw, well moistened.

We are prepared to handle all kinds of work in the polishing and buffing line. We employ none but the best of help, and feel warranted in soliciting business in these lines. Rostand Manufacturing Co., New Haven, Conn.

Inquiry No. 6654.—For manufacturers of wind pumps, such as are used for pumping out barges, boats, etc.

TO INVENTORS AND MANUFACTURERS. Representative of large European electrical concern seeks novelties (technical preferred) for exclusive sale. Buys also patent rights. First-class credentials. Write in strict confidence, stating full particulars, to Patent Abroad, Box 773, New York.

Inquiry No. 6655.—For manufacturers of automatic novelties and mail order specialties of all kinds.

Gut strings for Lawn Tennis. Musical Instruments, and other purposes made by P. F. Turner, 46th Street and Packers Avenue, Chicago, Ill.

Inquiry No. 6656.—For manufacturers of small boxes made of enameled pressed steel or sheet iron.

Inquiry No. 6657.—For manufacturers of window display fixtures; also artistic metal signs.



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.

(9565) E. M. H. asks: An empty 10-gallon metal air tank weighs 10 pounds. How much dead weight will be required to sink it in fresh water? Charge the same tank with 100 pounds of air, would it hold up more weight than if not charged? Could you pump the air out of the tank so that it would sink of its own weight? A. A tank of 10 gallons capacity will hold about 1-1-3 cubic feet, and when this is sunk in fresh water it will be buoyed up by a force equal to the weight of 1-1-3 cubic feet of water. This is very nearly 83 1-3 pounds. Since the tank weighs 10 pounds, an addition of 73 1-3 pounds in the tank will sink it. If 100 pounds of air are pumped into the tank, it will sink the same as if 100 pounds of lead were put into the tank. We have now 110 pounds total weight of tank and air, and 83 1-3 pounds buoyant force of water. The difference, or 26 2-3 pounds, will be the force with which it will sink. Pumping air out of the tank will make it lighter, and so it will float better. You cannot make a thing sink by pumping air out of it. Air weighs under ordinary pressure about 1 1/4 ounces per cubic foot, and 1-1-3 cubic feet will weigh 12-3 ounces. The tank will weigh 12-3 ounces less when the air is pumped out of it than it did when full of air. You cannot pump 100 pounds of air into such a tank. The pressure would be about 9,000 pounds per square inch, and no tank of this size and weight could withstand any such pressure.

(9566) V. F. asks: 1. Why is the core of induction coil made of small iron wires instead of one solid piece? A. The core of an induction coil is made of wire, and not solid, in order to prevent the whirling currents, called "Foucault" currents, which would travel round the core if they could do so. They would heat the core very greatly. 2. Is it the volts, amperes, or watts that make an electromagnet? A. Amperes turns produce magnetism in a coil. One ampere flowing once around a turn of wire is an ampere turn, and the voltage produced by a coil is proportional to the ampere turns in the coil. Hence a coarse wire is used of low resistance, so that there may be a large number of amperes flowing through it, and often many turns are put on, so that the ampere turns may be as great as possible. This applies to the primary winding. 3. Is there any relation between sizes of primary and secondary wires and increase in voltage of an induction coil? Where can I get a book which treats in a simple manner the subject of storage batteries? Also one telling of the process of refining crude petroleum? A. Treadwell's "Storage Batteries," price \$1.75, is a good book; Bottone's "Management of Accumulators," price \$1.50, is also to be recommended. A good book upon refining petroleum is Brant's "Practical Treatise on Petroleum," price \$7.50. 4. It is a law in physics that in the magnetic lines of force, the direction of such lines at any point is a tangent to the curve at that point. What, then, is the direction opposite the middle of a bar magnet? Opposite the end? A. The same rule applies to determine the direction of the magnetic lines when the lines are straight as when they are curved. At the middle of a magnet the tangents coincide with the lines themselves, as they do also at the ends of the magnet. A straight line is a curve with an infinite radius.

(9567) A. W. D. asks: For some time I have been trying to find out what the temperature of the oxyhydrogen flame is, but have been unable to do so. Also, could you tell me if there is any other way, as by the use of a furnace, whereby a person could in the laboratory get a heat equivalent to that of the oxyhydrogen flame? A. The temperature of the oxyhydrogen flame has been variously given by different investigators, from 3,600 deg. Fahr. to 4,400 deg. Fahr. A recent writer gives the latter figure. The temperature of the electric arc is much higher than this, possibly reaching 7,000 deg. Fahr. A valuable book upon this general subject is "High-Temperature Measurements," which we send for \$3. The material "thermit" is considered to give a higher temperature than the oxyhydrogen flame.

(9568) W. E. H. asks: What have you on thermo-electricity or thermopiles in book form, not papers? A. There is no book upon thermo-electricity, that is, a book treating only

of this topic. The subject is not large and important enough to call for separate treatment. You will find the mathematical data of thermoelectricity in Everett's "Units and Physical Constants," price \$1.25; a good chapter in Watson's "Physics," price \$3.50, also in Barker's "Physics," price \$3.75. These with occasional papers in the journals include all there is to be had. There are no practical generators of electricity by heat. All which have been brought out are failures and have been retired. Only the thermopile as a measuring instrument is left, and this has only a scientific interest.

(9569) L. L. S. asks: Can you suggest to me something giving comprehensive directions for making a practical electric telephone which will work on a single-wire line (grounded) about three-eighths of a mile long? A. You will find the information you require for making a practical electric telephone in our SUPPLEMENT, No. 966, and SCIENTIFIC AMERICAN, Vol. 72, No. 7. We send these papers for ten cents each. You can operate these instruments over a single wire for a much greater distance than you specify, by grounding the wire at each end of the line, as is done in the telegraph lines.

(9570) C. L. V. asks: Please explain in your Notes and Queries column why a distinct shock is felt when a piece of metal is passed you by another person, in a house which is wired for electric lights. I have noticed this a number of times in this house, but never in any other. A. An electric charge is easily generated in cold, dry weather by walking along a woolen carpet, especially if one scuffs the feet a little on the carpet as he walks. In this way one may light the gas without a match by presenting the tip of a finger to the gas jet. A spark will pass from the finger to the tip of the burner, and a slight shock may be felt. It is obvious that the same shock may be given to another, by reaching out the hand to him. A piece of metal is not needed, nor is it necessary that the house should have electric lights in it. It can be done anywhere in the cold regions, in the cold season.

(9571) E. B. asks: Will you please refer me to some publication or copy of the SCIENTIFIC AMERICAN which will explain the faults of rotary engines that prevent them from coming into general use? A. None of the past numbers of the SCIENTIFIC AMERICAN SUPPLEMENT have articles which explain the faults of rotary engines and their reasons for not going into general use. The great difficulty with a rotary engine is to obtain a simple means of admitting the steam, allowing it to expand to the proper degree and then exhausting it at the right moment, and at the same time preventing leakage past the piston, even after the engine has become somewhat worn. Under ordinary conditions, there is no special advantage of the rotary engine over the ordinary crank and connecting rod, because the loss of efficiency due to the crank and connecting-rod motion is practically zero. SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 1193, 1158, 1186, and 1309, contain valuable illustrated articles on rotary engines. Price 10 cents each, mailed.

(9572) W. T. M. asks: I am contemplating putting in a little dynamo to light the house which would require about eight lights. I have a water power about 800 feet from the house, consisting of a 6-inch pipe with about 60 pounds per square inch pressure in it, and I would run the dynamo with a water motor of the Pelton type. Now I should like to be able to turn lamps on or out at will, and I am told that I cannot do this with the ordinary type of dynamo without either a governor on the motor or a rheostat in the field circuit. I don't want to bother adjusting a rheostat to every change in the load, and there do not seem to be any water motors on the market with governors small enough for such a light load. Now are there any types of dynamos on the market which can be run by a water motor without a governor and which will maintain a voltage constant enough to do the business? A. We think you are asking the impossible when you ask to run a small dynamo with a small water motor and have it give a constant E. M. F. Even if that could be had, you would not be able to turn lamps on and off without an adjustment of current on the dynamos. A plant cannot be set going and left alone to run itself. The Pelton Water Wheel Company may be able to fit you out with some device for light service, and we would advise you to write them on the subject.

(9573) W. F. H. asks: Will you please answer in the Notes and Queries column of the SCIENTIFIC AMERICAN the following questions: 1. Have wireless telegraph messages been sent across the Atlantic Ocean, and if not, what is the greatest distance over which they have been sent? A. While it is regarded as possible to send messages of words across the Atlantic Ocean by wireless telegraphy, we are not aware that it has ever been done, certainly not commercially. Signals have been believed to be sent across the Atlantic. These consisted of the dots which indicate the letter S in the Morse alphabet. Messages can now be sent to a distance of several hundred miles, and so sent between ships at sea and over the passes in Alaska. 2. Can carbon plates that have been used in dry batteries be used in making new dry batteries? A. Carbon plates are not affected by use in an electric battery, and

can be used as long as they last. The black substance in which they are packed requires renewing, but the plates themselves do not need replacing.

(9574) H. A. asks: 1. I separated the two strips of a gold leaf electroscope by electrifying them with a rubbed hard-rubber rod. After that I brought a burning match near them, and observed that the strips fell together again. Did the heat of the flame cause that, and why? A. In the old manner of statement, heated air is a better conductor of electricity than is cold air, and thus the electricity passed off from the gold leaves. The present mode of statement is that the hot air is ionized, and the ions discharge the electroscope. 2. Which is the best way for covering glass with sealing wax, as necessary for instance for the top of a Leyden jar and similar electrical instruments? A. A red varnish may be made for applying to glass by adding vermilion to orange shellac. 3. What book can you recommend me for the study of the radium rays science? A. Rutherford's "Radio-Activity," price \$3.50, and Soddy's "Radio-Activity," price \$3, are the most recent books upon the subject. 4. I would like to have full description of an electric influence machine (Wimshurst) if possible, with instructions and views for construction. A. You will find full descriptions of Wimshurst and other static machines in Gray's "Electrical Influence Machines," which we send for \$2.

(9575) A. R. asks: I have an English pocket altitude barometer, and I am in San Jose at an altitude of 1,135 meters. $1135 \times 3.28 = 3722.80$ feet. Now the barometer shows as 25.1 inches 3.6 lines, which according with the circle of altitude, corresponds to a height of about 4,550 feet. I get the same result according to Prof. Airey's tables. Please explain what is the matter with them, and how to arrange it. A. The probability is that your barometer is out of adjustment, since it gives an altitude of 4,550 feet, when the true altitude is 3,723 feet, or a little over 800 feet too much. Aneroids require to be set by comparison with a mercurial barometer. They should be compared very often if any dependence is to be placed upon their readings. The United States Weather Bureau does not allow aneroids to be used for observations which are to be made a matter of record in the Bureau. They are not reliable. They are very convenient for travelers, but require frequent correction.

(9576) H. Z. L. says: Which of the pairs of wheels, inner or outer, leave the ground when an automobile turns a sharp corner at high speed, under these conditions: (1) Road level, (2) machine evenly balanced on both sides, (3) corner sharp enough to raise one pair of wheels. This question came up in class, and, as I said that the inner wheels left the ground, if any, I was laughed at by the rest of the class, including the professor. I come to the highest court of appeal, so as to avoid all misunderstandings. A. In the case stated by you of an automobile rounding a curve on a smooth level road, provided the wheels could not skid sideways (which is what generally happens) the machine would be tilted upward on the base of the outer wheels as a fulcrum, thus lifting the inner wheels from the ground. This would happen because centrifugal force acts on the center of gravity of the machine to project it horizontally outward, which it cannot do, as we have presupposed that the wheels cannot skid. Therefore, it must swing the center of gravity about the base of either the inner or outer wheels as a fulcrum. Since the center of gravity of the machine is above the base line of the wheels, and since centrifugal force tends to project it outward, it is impossible for said center of gravity to move about the base of the inner wheels as a fulcrum without causing the outer wheels to sink into the ground. Consequently, the base of the outer wheels must act as a fulcrum and the inner wheels be raised in the air, as there is nothing but the force of gravity to prevent them from so doing. In the case of a suspended car, the reverse is true, as there the center of gravity would be below the base line of the wheels, and it could not move centrifugally around the base of the outer wheels as a fulcrum without causing the inner wheels to sink into the track. Consequently, it would have to move about the base of the inner wheels as a fulcrum, and the outer wheels would be raised. In closing, we would advise you not to be too hard on your professor. One mistake is no haystack. And every one makes mistakes sooner or later. Only editors are always right. So spare the poor professor. Be kind to him. You may be one yourself some day if you study hard now, and exercise charity.

(9577) H. F. S. asks: Will you kindly give me the dimensions, or refer me to a book, that contains the information, of a small motor suitable for running a ventilating fan? The motor to be of the two-pole type with circular inclosed field magnet; to be run by a battery. A. We have not published the plans for a fan motor of the regular inclosed type, nor do we know any published description from which you could make such a motor to run by a battery. We have, however, in our SUPPLEMENT No. 641 full plans for a motor which will easily drive a fan, sewing machine, or small lathe, and which is driven by a battery. A good battery is described in SUPPLEMENT No. 792. We send these papers for 10 cents each.

(9578) J. V. asks: Will you kindly inform me in Notes and Queries when it is sunrise? Is it when the disk of the sun is first seen above the horizon or when the entire disk is above the horizon? The same would apply also to the setting of the sun. A. The times of sunrise as given in ordinary almanacs are the local mean times when the upper edge or limb of the true sun, as corrected for refraction, is in contact with the sensible horizon of the place, or of any place of equal latitude. This is Todd's definition as given in his "New Astronomy," a valuable book which we can send for \$2.

(9579) V. E. M. asks: 1. Two cars start from a power-house on an electric road, the last car using 1-3 of the power; how does the current get to the car ahead after some of it passes through the motor of the first car? Please explain in full. A. The E. M. F. of the trolley feeders is sufficient to provide current for all the cars which will be on a section of the line at one time. Feeders run from the bus bars of the station to the beginnings of the sections of the line, and each feeder enters and supplies current to its own section. If the motors require 500 volts the E. M. F. at the dynamo will be perhaps 10 per cent above that, or 550 volts, to allow for the drop of the line. A booster may be used to keep the pressure at the remote ends of the lines up to the necessary point. As to the particular point about which you ask, how a car ahead gets current when a car behind it is taking current also, there is no difficulty in understanding this if you understand how a house further along the street can get water while you are drawing water in your house from the same main in the street. The main is large enough to supply all the houses which are connected to it, and so is the feeder for a particular section of a trolley line. 2. What is the method of making an Edison Lalande cell (fluid battery)? A. The negative plate of the Edison primary battery is made from copper oxide prepared by compressing it. It cannot be made without heavy presses. The other parts of the cell have no particular method of manufacture, different from making other zinc plates by casting them. The caustic potash is the potash of commerce.

(9580) W. T. J. asks: A person would sit on a chair and two people stand on either side. Then they would all take three deep breaths simultaneously. At the third breath the persons on the sides placed two fingers under the knees and arms of the one in the chair, and while inhaling raised the one in the chair fully five feet off the floor without any effort whatever. This was done to half a dozen different people, and as some of them weighed 150 pounds, it seems impossible to account for it. A. We have stated our view of the feat of lifting a person while inhaling breath or otherwise preoccupied, in answer to Query 8856 in Vol. 88, No. 9, to which we would refer you. As the writer used to lift more than 100 pounds with his little finger when a boy, he does not think it an impossible feat to lift 75 pounds with two fingers of each hand, as is required if two persons lift a man weighing 150 pounds in the manner you describe. The four girls who lift a lady weighing nearly 200 pounds only lift 50 pounds each, and this again is not a very heavy weight for a girl to lift. The preoccupation of the mind by breathing in unison and the intentness upon the effort of lifting at the same instant as the rest enable one to do much more than if not so preoccupied.

(9581) A. R. says: 1. What effect does static electricity have on dynamos? A static electricity will have no effect upon a dynamo unless the discharge is powerful enough to burn out the wiring, as in the case of lightning. 2. How can I tell when there is static electricity in a belt? A. When a belt has an electric charge upon it one may draw sparks from it by holding the fingers toward the belt; or the hair will stand up when one is under the belt. An electroscope will be charged by the belt. 3. What would I need on a switchboard for an isolated plant and connections for same? A. Upon a switchboard are put the switches, ampere meter, and voltmeter, and frequently the field rheostat of the dynamo. The connections of these are made to the places which they are to control. The voltmeter is in shunt with the poles of the dynamo. The ammeter is in series with the line so that all current goes through it. 4. Do the Fire Underwriters require a man to pass an examination and have a license to wire a building? A. The Fire Underwriters do not license men to do electrical work. They simply require that work conform to their rules, or else the insurance is withdrawn. Fire Underwriters are the representatives of the fire insurance companies.

(9582) F. G. C. says: Will you be so kind as to inform me in your Notes and Queries what proportion and how engineers produce in maps the scale 1:30,000? For instance, in a lot of land of 175.50 hectares, how is that scale of 1:30,000 reduced to 175.50 hectares? What is the population in the following nations: Russia (how many inhabitants in Europe and Siberia); Turkey in Europe and Asia; France, England, Italy, Denmark, Holland, Belgium, Prussia, Germany, Austria, China, Korea and Japan, Spain? Could you give us in your valuable SCIENTIFIC AMERICAN a drawing or description of the Port Arthur defenses or fortress? It would be most in-

teresting to subscribers who could judge the tremendous resistance of their heroes. A. If each linear dimension on the land is divided by 30,000 it can then be represented on the map according to the scale you mention. For instance, if the difference between any two points on the ground were 60,000 feet, it would be correctly represented by a distance of two feet on the map. All the distances should be measured on the ground in the same kind of units, either feet or inches, or meters or centimeters, and then the same kind of units that are used in measuring the distances on the ground should be used in laying off the corresponding distances on the map after the division by number representing the proper scale has been performed. The population of the countries and continents you name is as follows:

Europe	393,486,000
Asia	829,768,000
Russia, including Siberia	141,000,000
United Kingdom	80,372,000
Denmark	2,465,000
France	38,962,000
Italy	45,862,000
Holland	5,347,000
Belgium	19,254,000
Germany	58,549,000
Austria	26,151,000
China	407,253,000
Korea	12,000,000
Japan	45,862,000
Spain	18,618,000
Turkey	24,932,000

You will find queries of this nature fully answered in our SCIENTIFIC AMERICAN Reference Book, price \$1.50. The metric tables are very full. The SCIENTIFIC AMERICAN, January 14, 1905, fully described the Port Arthur defenses.

(9583) J. E. G. asks: If $\frac{1}{8}$ cubic inch of rifle powder were confined in a chamber of 1 cubic inch square and ignited, what would the pressure be on each of its six sides? Would the pressure remain any length of time? A. It is impossible to estimate the pressure which would be produced in a rifle chamber if $\frac{1}{8}$ of a cubic inch of powder were ignited in a confined space of a cubic inch. A certain quantity of gas would be generated, but the pressure of this gas would depend upon its temperature, and the maximum temperature which is attained in such circumstances depends on the rate of combustion and the character of the chamber in which it is confined; so that it is impossible to form any accurate estimate of it. If the chamber were airtight, the pressure would gradually decrease as the liberated gas cooled. After it was cooled to the temperature of surrounding objects, the temperature would remain constant, and the pressure of the confined gas would then remain constant. It is roughly estimated that gunpowder when burned expands to 2,600 times its original volume. Assuming this figure, the pressure in the problem you give would be about 325 atmospheres, or approximately 4,800 pounds per square inch.

(9584) C. H. asks: 1. I have a quantity of No. 16 copper wire in pieces of from 2 to 3 feet in length; would it do to wind the armatures and field magnet described in SCIENTIFIC AMERICAN SUPPLEMENT No. 641, if the joints were soldered and wrapped with tape? A. If a good soldered joint is made, you can wrap it in tape and use such a wire in winding a field or armature. These joints will, however, be larger than the single wire and will, if there are many of them, cause the winding to be more or less irregular, and unsightly. A neat job cannot be made with splices in the wire. 2. Why is the sodium salt better than the potassium salt for use in a bichromate cell? A. Sodium bichromate is easily dissolved in water, cold or hot. Potassium bichromate requires hot water to dissolve it to sufficient strength for battery use. When sulphuric acid is added to the potassium bichromate solution an alum crystallizes out upon cooling, and crystals are liable to form in the cell also. Neither of these things occurs with the sodium salt. Chromic acid is now to be procured from dealers in chemicals and is to be preferred to either of the bichromates.

(9585) A. G. says: Please tell me what are the chemical formula of: (1) ferric chloride, (2) chromine, and (3) bleaching powder? A. The chemical formula for ferric chloride is FeCl_3 . Chromine is not a simple chemical compound, but some mixture to which a trade name is given. It is not probable that it is to be found in the market at the present time. Chromic acid is used in batteries, now or one of its compounds, either sodium or potassium chromate. Bleaching powder is a substance concerning which a difference of opinion exists among chemists. We follow Remsen's "Chemistry" in giving its formula as CaOCl_2 .

(9586) W. H. P. asks: I would like to ask through the medium of your Notes and Queries how frozen water pipes are thawed out, by means of electricity, without the use of storage batteries. Is the positive pole of the dynamo connected to one side of the frozen pipe and the negative to the other? If so, why is the dynamo not "short-circuited"? A. Water pipes are thawed by electricity by sending a current of the proper strength through the frozen portion till the water runs. It would not do to throw the current of a dynamo upon a short section of a water pipe. As you say, it would short-circuit the machine.

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A rheostat would be necessary for a direct current, and a choke coil or a transformer for the alternating current. We have published the details for the operation, to which we would refer our readers again; they are to be found in the SCIENTIFIC AMERICAN, vol. 90, No. 12, and vol. 92, No. 7, price 10 cents each mailed.

(9587) R. T. P. says: In your SUPPLEMENT of December 3, 1904, page 24,185, you say that if 1,000 pounds water was given a velocity of 16 feet per second, it would lift 1,000 pounds 4 feet high. This you will find in the accompanying paper with sundry calculations. Will you kindly look them over, and if suitable to your paper, I would like to get up a controversy upon what I think may be the nucleus of a new power. A. We are sorry to have to inform you that the assumption on which you have based all your calculations is entirely erroneous, and yet it may be difficult for us to point out to you exactly where your fallacy lies. If you were to pass through the center of a ship a tube, as you suggest, keeping the effective displacement of the ship the same, the added resistance to be overcome by the propeller would be equal to the sum of the work that could be obtained from a turbine placed in this tube, plus all losses in the turbine due to imperfect efficiency, plus the friction of the water on entering the tube and passing through it. The water in the tube will be incapable of doing work unless there is a difference of pressure on the two sides of the turbine. If there is a greater pressure at the front end of the tube, this pressure is created by additional work done by the propeller in forcing the vessel ahead. A better plan than the one you suggest would be to place at the sides of the vessel undershot wheels or paddle wheels, and get useful work from the shaft connecting them. In this instance you can probably see that if the shaft were required to do useful work, and therefore overcome resistance, that the paddle wheels would act as brakes on the side of the vessel to retard its progress, and that whatever retarding force they exerted would have to be made up by the propeller in order to keep the speed of the vessel constant.

(9588) V. O. K. asks: An eighth of an inch of water is put in a shallow dish, a small piece of lighted candle placed in the center, and an inverted tumbler is placed over the candle. Now, I would like to know why the water rushes up into the tumbler after the light has just gone out? A. The heating of the air usually drives some of the air out under the water seal of the glass while the candle is burning, and the products of the combustion do not occupy as much space after as they did before the candle had burned them. The result is that water rises into the glass as the gases cool. We have never seen it "rush up," as you express it.

NEW BOOKS, ETC.

ELEMENTS OF MECHANICAL DRAWING. By Gardner C. Anthony. Boston: D. C. Heath & Co., 1905. 16mo.; pp. 152; illustrated. Price, \$1.50.

This book forms one of the works of the Technical Drawing series. It is a revised and enlarged edition, intended for use in the evening drawing school and technical college. The first two chapters are given up to instruments and their use and general instruction as to tracing, lettering, shading, tinting, etc. The third chapter contains a large number of geometrical problems. The drawings illustrating these problems are on the same page with the text, where they can be readily examined. The book has no folding plates and all the drawings are condensed as much as possible. Besides chapters on conic sections, orthographic projection, isometric and oblique projection; the development and intersection of surfaces; and spirals, helices, screw-threads, and bolt heads, there are a large number of problems contained in the back of the book, which are intended to be solved by the student after he has mastered the principles in the preceding chapters.

THE CONSTRUCTION OF CRANES AND OTHER LIFTING MACHINES. By Edward C. R. Marks, A.M.I.C.E., M.I.M.E. New York: D. Van Nostrand Company, 1904. 12mo.; pp. 250; 202 half-tone plates and diagrams. Price, \$1.50.

This is the third edition, revised and enlarged, of a very useful and complete work on all kinds of lifting machinery. Starting with a description of the general principles and practice in standard types of lifting machines of the smaller kind, such as pulley blocks, crabs, and winches, and double and treble purchase crabs, the author next describes all sorts of cranes from the simplest types worked by hand to the huge and most elaborate types operated by steam or electric power. Another section of the book is devoted to the description of various patented inventions relating to lifting machinery. In this section are given all the latest inventions and improvements in this line. Part III. describes the present practice employed by leading makers of lifting machinery in the construction of hydraulic cranes and jacks, electric locomotive or travel jib cranes, electric walking jib cranes, foundry cranes and winches, electric overhead traveling cranes, Temperley transporters, and electric and hydraulic lifts or elevators and pneumatic hoists. The book is well illustrated with large cuts of the machinery described and with diagrams of the working parts.

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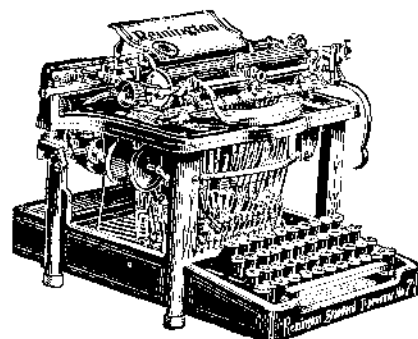
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