RECENTLY PATENTED INVENTIONS.

Electrical Devices.

LUBRICATOR.—J. H. WALKER, Lexington, Ky. This invention is an improvement in lubricators especially designed for use on trolleys. In carrying it out the inventor provides lubricating devices in connection with two boxes providing the bearings for the opposite ends of the wheel-shaft and supports these boxes in the harp-prongs, and holds them from turning by proper mechanism.

TURNBUCKLE-STRAIN.—L. STEINBERGER, Brooklyn, N. Y. This inventor has produced a new and improved turnbuckle-strain, the particular object being to provide a device of great tensile strength and which will so distribute the mechanical stress as to subject the weaker parts of the strain to a minimum danger of breaking.

THERMOSTAT.—J. D. GOULD, New York, N. Y. In the practical wiring of a building comparatively short lengths of cable are used, and when the ends are left uncovered or open the soft fusible wire when melted is apt to flow out at the end without closing the circuit. The object of the invention, therefore, is to provide protecting or sealing coverings for the ends of the thermostatic sections which will prevent any outflow, and thus insure the fusion of the conductors between the ends.

Engineering Improvements.

APPARATUS FOR HOISTING AND CONVEYING.—L. S. AUSTIN, New York, N. Y. In this system are employed two endless conveyers, one a bucket conveyer and the other a belt or apron conveyor They travel over pulleys mounted on a shaft and transfer material without drop or shock. Means are provided to close the open sides of a series of buckets, to prevent the premature discharge of the load. A bucket conveyer is used wherein each bucket is fastened at a single point, as by a row of rivets, to the endless apron of such conveyer. Spring connections act to steady and prevent sidewise displacement of the buckets when passing around the pulleys.

MARINE-ENGINE GOVERNOR.—G. F. LASHER, Portland, Ore. The apparatus comprises a float which works in a stand-pipe built in the hull of a vessel immediately contiguous to the stern. This float has connection with a cam which is actuated as the float falls in the stand-pipe, the cam throwing up a rack and causing it to mesh with a continuously-driven worm, whereby the rack is moved longitudinally, and through a connection between the rack and the throttle the speed of the engine is decreased, according to the extent of the movement of the rack.

SELF-CLEARING PROPELLER.—C. H. LEE, Southampton, N. Y. In this case Mr. Lee secures an improvement on his former self-clearing propeller. By mounting or carrying an antifouling device on a part of the propeller itself, he maintains the clearing device and the propeller in a predetermined invariable operative relation. The device is held from rotation with the propeller by retaining devices, the latter being supported by the stern-post or other part of the vessel. The clearing device is loosely fitted to the stationary retaining devices in order that the clearing device may have a certain amount of play with the propeller or its shaft with relation to the retaining device.

ROTARY ENGINE.—A. I. OSTRANDER, New York, N. Y. The invention in this case has reference to improvements in rotary engines, the object being to provide an engine of this character of novel construction adapted to utilize all the energy of the steam, thus resulting in economy of the motive agent.

CABLE-LUBRICATOR.—M. J. MCGILL, Park City, Utah. The particular idea in this improvement is to produce a portable apparatus suitable for lubricating moving cables. The device may be placed in position in a few minutes. It consists of very few parts, and its adjustments enable it to be so used that the lubricant is applied economically and effectually. The parts are all of simple construction and are readily replaced when worn out or broken.

Household Utilities.

TRAY-CARRIER.—CLARA L. POILLON, New York, N. Y. This invention relates to a center handle attachment for trays, whereby the tray may be centrally supported and carried by one hand and so balanced that the liability of dishes or material shifting will be reduced to a minimum. The handle supports a ring, or socket, above the tray, in which ring, or socket, a tea or coffee-pot may be placed to keep warm. An alcohol-stove is placed upon the tray beneath the band, or socket.

SIFTER.—C. B. COMEGYS, Ashgrove, Mo. The improvement relates to that class of household cereal sifters in which a can is provided with a sieve in the bottom and an agitator working over the sieve. This class of devices has heretofore been commercially impracticable on account of cost. This invention seeks to produce a thoroughly durable and efficient sifter at such cost as will insure its extensive adaptation, and this end is attained by certain novel features of construction.

Of Interest to Farmers.

COTTON-PICKER.—H. WISWALL, JR., Washington, N. C. The invention is in the nature of a picker of that type in which a flexible pipe with a suction-nozzle on the end is directed by hand to the open cotton-bolls on the plant, which nozzle is provided with picking devices which loosen and detach the cotton, while the suction from a fan carries the fiber up to a receptacle.

BEEHIVE-FRAME.—H. VOGELER, Newcastle, Cal. This apparatus is strong, simple in construction, and efficient in operation. It overcomes objections of former frames in relation to guarding against crevices, by causing the vertex of a V-shaped edge to pass diagonally across the edge, thereby permitting a greater area for shifting without dangerous disarrangement.

FURNACE.—G. T. WYATT, Olmstead, Ky. The object of this improvement is to provide a furnace for use on the plot of ground used as a hotbed or plant-bed in tobacco-growing districts to thoroughly heat the ground and destroy weeds, seeds, and the like preparatory to sowing tobacco-seed, the furnace being simple and durable in construction, easily moved about, very economical in the use of fuel, and arranged to burn trash and other cheap fuel.

INSECT-CATCHER.—G. I. SILVERA, Crescent, Ora Cabessa, Jamaica. This device is more especially designed for the removal and capture of lice, ticks, and other pests from the skin of cattle, horses, and other animals. It is simple, easily manipulated, and arranged to readily dislodge insects from the skin and gather them in a receptacle for destruction in large quantities.

GRAZING-MUZZLE.—H. G. BANKS, Baum, Indian Ter. The object in view in this new and improved device is to provide a muzzle of simple, light, yet strong construction that will permit an animal to pluck grass from the ground, but will prevent him from eating fruit from trees or bushes, corn from the standing stalk or on the ground, and also prevent the animal from biting trees.

COTTON-PICKER.—J. GRIFFIN, Greenville, Miss. The machine invented by Mr. Griffin is a pneumatic cotton-picker provided with a motor and traction mechanism for driving it through the fields and having an air-blast apparatus operated electrically under the control of an operator or operators. The picker is adapted to easily pass over the cotton stalks.

STALK-CUTTER AND CRUSHER.—R. B. ELISON, Morven, Ga. The inventor of this improvement in stalk-cutters and clod-crushers intends to provide a simple, novel construction whereby to cut up cotton and other stalks and for crushing or chopping up new ground after it has been plowed up or broken up. When desired the machine may be supplied with a tongue, instead of with shafts.

SHOE FOR CLOVEN-FOOTED ANIMALS.—B. BRAND, Braila, Roumania. The characteristic of the invention is that wearing-surfaces corresponding to the shape of the hoof are provided with a light encircling portion and have a horizontally-bent edge which can be forced into a corresponding groove upon the hoof. The whole is secured to the hoof by means of a screw passing through the hoof.

FENCE-POST.—P. CHAPMAN, Council Grove, Kan. It is the object of Mr. Chapman's invention to provide means for supporting fence-posts and securing them to the supports thereof. In one side of a stone base support a groove leads from the top a short distance. Into this the fence-post is inserted and fastened by a horizontal anchor-bolt having a drop-pin connected with its inner end, and a nut applied to its outer end. The post is provided with holders for the line fence-wires.

BAG-HOLDER.—D. W. MITCHELL, Niagara Falls South, Canada. The aim of this inventor is to provide a simple construction of holder by which a bag may be held while being filled, can be filled to the top while being freed from the holder, and in the use of which the bag can be readily applied to and removed from the holder and will be securely held when in connection therewith.

COTTON-CHOPPER.—H. F. MACKEY, Crystal Springs, Miss. The purpose of this invention is to provide a cotton-chopper having independent blades normally engaging in a manner to form a V scraper, the point of the V facing forward, which blades in their combined or V arrangement practically scrape the surplus plants from the rows instead of removing them by a rotary digging or hoe action.

SEEDER.—E. F. MOLCK, Sibley, Ill. In this patent the purpose of the improvement is to provide an end-gate seeder which will be of simple and economic construction, being driven from a wheel of the wagon to which the seeder is applied, and to so construct the seeder that dual hoppers are employed, the main hopper carrying such seeds as oats, wheat, barley, rye, etc., while the auxiliary hopper is adapted to contain clover or grass seed.

Machines and Mechanical Devices.

LIFTING OR SCREW JACK.—J. M. MARZOLF, Homestead, Pa. This contrivance is simple in construction and organization, effective in operation, and comprises few elements, which are not easily broken and which may be readily taken apart and again assembled for use. It is capable of ready application to the lifting of weights or to other purposes.

CUTTER-HEAD.—J. M. KUEBLER, Wausau, Wis. The principal object in this case is to provide a cutter-head in which it will not be necessary to make a new set of knives for each design to be cut out from the work. By means of the construction provided the same knife may be used for different designs, and thus a great saving in tools is obtained.

VARIABLE-SPEED AND REVERSING MECHANISM.—R. B. HAIN, Los Angeles, Cal. Mr. Hain has invented this improved mechanism for producing variable speed or reversing and it is applicable to machinery of various kinds, particularly automobiles or other motor-driven vehicles. It is adapted for driving forward at different speeds or for reversing and driving backward at different speeds.

FOLDING ATTACHMENT FOR CALENDERING-MACHINES.—M. NEWGARDEN, New York, N. Y. The invention relates to that order of apparatus employed in cloth-finishing; and the object is to provide a new and improved attachment for use on the feed-table of calendering-machines designed for making bias and other folds in a very simple, quick, and accurate manner on narrow or wide fabrics.

STOP-MOTION.—G. A. MARTIN, Myerstown, Pa. The intention in this improvement is to provide a new stop-motion, more especially designed for use on knitting-machines, which is simple and durable in construction and arranged to insure a quick stopping of the machine as soon as a yarn or thread breaks or gets caught in the knot-catchers or becomes fastened on the spool or runs slack from the spool.

Railway Accessories.

RAILWAY-BRAKE.—S. CHENEY, Main Street, Freeling, South Australia, Australia. In this patent the improvements relate to brakes which are mechanically and automatically operated by the momentum of vehicles coming together as a result of the speed of an engine being checked. The improvements consist in placing at each end of a vehicle, preferably in the center, a supplementary buffer carried by a lever pivoted to the vehicle-frame and having means upon the vehicles coming together to apply the brakes. Means are also provided to render the buffer inoperative when shunting is carried on.

REFRIGERATOR-CAR.—H. F. STANLEY, New Orleans, La. The present invention relates to freight-cars of the general construction shown in a former patent granted to Mr. Stanley, and it provides a novel means for forming ice-chambers, the partitions and racks that enter into the construction of this feature of the car being arranged to be readily folded into small compass and moved into a position enabling practically the whole content of the car to be utilized for freight when refrigeration is not required.

Miscellaneous.

BUCKLE FOR SEALING MAIL-BAGS, ETC.—J. ANSCHAU, Glen Innes, New South Wales, Australia. This buckle can be effectively sealed without the use of wax; and the essential feature of the invention is a slip of paper, cardboard, or other suitable material carrying a light metal strip adapted to catch on the frame of the buckle. A seal is arranged to overlie the tongue of the buckle in such a way that the strap engaged with the buckle cannot be removed therefrom without destroying the seal.

BOTTLE OR VESSEL STOPPER DEVICE.—G. P. SULLIVAN and Z. P. FREEMAN, Tampa, Fla. The stopper in this invention cannot be withdrawn without leaving indications thereof. It is made nearly of the same diameter as the upper portion of the neck in the bottle, and the head being extended laterally over the edge of the neck it is impossible to insert a wire or other instrument so as to spread the wires and thus effect withdrawal of the stopper without breaking of the wires.

SHOE-HEELING JACK.—J. H. MULLEN, JR., New York, N. Y. In ordinary devices for the purpose of fixing heels on shoes the last is held in place by means of a pin passing in a hole in the last directly in line with the heel, and therefore the last is weakened at this point and soon becomes broken. This invention provides a jack and a connection with the last whereby there will be practically no danger of splitting the last while fastening a heel.

INSERTIBLE CLOSURE FOR LIQUID-RECEPTACLES.—G. H. KLEMM, Fowler, Col. The object claimed in this invention is to provide novel details of construction for the closure of a liquid-package, such as a filled bottle or other receptacle having a neck, which will effectively prevent the refilling of the bottle after its contents have been removed.

SPECTACLE-HOLDER.—R. MCL. GROOMS, Marfa, Texas. The purpose of the inventor is to provide a construction of spectacle-holder adapted to receive the nose-piece and lenses and their frames, holding these parts in a flat protected position and, further, to provide means for holding the curved temples folded one upon the other, and means for securing the free ends of curved temples whenever desired.

NON-REFILLABLE BOTTLE.—L. F. BIZOUARNE, 34 Rue des Apennins, and E. KUGLER, 28 Rue Fessert, Paris, France. The present invention relates to improvements in non-refillable bottles, in which the inventors seek to prevent the fraudulent refilling of a bottle or other container with inferior liquor or other substance and at the same time to permit the contents of the container to be readily drawn off, as may be desired.

REINFORCED NECKTIE-SHIELD.—GERTRUDE FLASKAMP, Hoboken, N. J. The object in view in this invention is to provide a new and improved shield arranged to readily connect the clasp with the reinforcing-strip and secure the latter to the shield to strongly reinforce the latter and to securely hold all the parts in proper position.

CORSET.—J. SCHUFFLAY, New York, N. Y. Means are provided in this improvement whereby to exert a uniform downward and rearward pressure upon the abdomen, reducing this part of the body and producing a long-waisted effect, yet enabling the corset to be worn without discomfort, as the pressure is distributed in two directions from the back waist-line to a point at the central lower portion of the abdomen-section of the corset.

COMBINED PAPER-CUTTER ATTACHMENT AND BOOK-MARK.—C. J. I. DEVLIN, San Francisco, Cal. In this case the aim is to provide a cutter so designed as to form a part of the general make-up of books, magazines, and other publications issued and sold with uncut edges, thereby supplying a reader with means for conveniently cutting the leaves, and to so construct the cutter that it is available as a book-marker.

COMPOSITE MATERIAL.—A. LEISEL, Peekskill, N. Y. Mr. Leisel's invention relates to improvements in composite materials particularly adapted for decorative purposes, such as wall-hangings, signs, panels, etc.; and the object is to provide a composite material that shall be very strong, yet thin and flexible, and capable of ornamentation by embossing, painting, or tinting and be impervious to water.

SINGLE-TRIGGER FIREARM.—J. A. R. ELLIOTT, Kansas City, Mo. In the present case the invention refers to improvements in firearms, particularly double-barrel guns, in which the two hammers are released by a single trigger; and the purpose is to provide simple means whereby the firing mechanism may be set for discharging either barrel first and without danger of firing the other until the mechanism is set therefor.

FOLDING PAPER BOX.—G. A. HARTRAMPF, Atlanta, Ga. The purpose in this improvement is to so construct a box that it will be economic and well adapted for the purpose intended, being capable of shipment in flat form and compact masses and of being quickly and conveniently set up, the bottom being stiffened and blocked to the body when the box is set up either by the weight of the material in the box or by reason of a locking device, or both.

NUT-LOCK.—G. J. CALLAHAN, Rifle, Col. This nut-lock is simple and durable in construction, cheap to manufacture, easily applied, and arranged to permit of proper screwing up of the nut before securely locking the nut in place. Neither bolt nor nut requires special treatment, as the improved washer can be applied to any ordinary bolt and nut now generally in use.

DESIGN FOR TEXTILE FABRIC.—W. S. FRIEDLANDER, Passaic, N. J. This inventor has produced a new, original, and ornamental design for textile fabric. The design comprises a fabric having thereon the representation of pine branches and cones on the branches.

HAIR-CLAMP.—W. J. KOENIG, New York, N. Y. The purpose of this invention is to provide means for holding the end of a braid of hair to prevent the braid from becoming unlaid or to hold a loose bunch of hair in form. To this end the device comprises a novel form of clamp in which the hair is held tightly without entangling the hair in the clamp.

TOY.—I. D. WORCESTER, Pittsburg, Pa. The present invention relates to improvements in that class of toys called "tick-tacks," the object being to furnish an article of this character that may be readily attached to a smooth surface, such as glass, and operating to cause a ticking noise to attract attention to goods displayed, or to afford amusement.

CAMERA ATTACHMENT.—W. R. SMITH, Napa, Cal. The inventor claims as an object the provision of a hood to take the place of the usual focusing-cloth. To this end the improvement comprises certain novel features of construction which enable the attachment to be permanently connected with the camera, yet thrown into open position to reach the interior of the camera for adjustment or other purposes.

LIQUID-MEASURING DEVICE.—C. SIMON, Avilla, Ind. The principal object of the present invention is to provide a simple and inexpensive device which may be connected with a valve of a discharge-faucet of a liquid-receiving tank or receptacle in such manner that the amount of liquid discharged from the tank will be measured and automatically controlled.

MUSICAL INSTRUMENT.—J. A. BARTHOLOMEW, New York, N. Y. The invention consists of novel features and combinations, and the object in view is the provision of a new and improved musical instrument of the whistling type arranged to permit the user to produce an exceedingly loud, far-reaching and harmonious sound.

PENCIL HOLDER AND GUARD.—S. J. DOHRMANN, Louisville, Ky. This device is in that class which comprises a tubular body having an eraser at one end and fitted at its other

end to receive a pencil; and the invention consists in the special construction of the tubular body in connection with the rubber eraser and the form at the end of the tube which receives the pencil.

WELT-KNIFE.—H. KARPENSTEIN, New York, N. Y. The intention in the present case is to provide an improved knife which embodies means for regulating the depth that the blade may cut into the leather, thus placing the knife more thoroughly under the control of the operator and preventing the implement from injuring the leather or the article by the accidental slipping of the knife.

FISHING AND TRAPPING DEVICE.—R. F. ARMSTRONG, Effingham, Kan. This is a device for catching fish and small animals, but it is particularly adapted for use as a fishing appliance. It relates to that general class in which a tripping or bait hoot is provided in conjunction with a number of impaling hooks, which are spring-actuated and released by the trip-hook to impale the fish when the bait is taken.

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(9091) E. L. H. says: Do the heat units in gasoline oil differ in different oils at the same specific gravity? That is, has Penn. gasoline and Coli. gasoline the same heat units in gasoline oil of the same specific gravity? A. The heat value per pound of all gasoline is the same, and for practical purposes the heat value of all petroleum products per pound is very nearly a constant quantity, being not far from 19,600 British thermal units per pound. The heating value per gallon will vary with the specific gravity, depending on the number of pounds of oil to the gallon. 2. In breaking the circuit at platinum points, what causes the spark? Is it caused by the burning of an atom of the platinum or is it electricity? A. In breaking the circuit at platinum points, the spark is caused by heating the particles of air between the points to a white heat, caused by the resistance of the air to the passage of the electricity. The air is heated by the electricity in very much the same way that the carbon filament in the incandescent lamp is heated.

(9092) A. V. B. says: 1. Theoretically what are the most favorable conditions for obtaining the greatest efficiency compound steam engines? A. Theoretically, the highest efficiency with a compound steam engine can be obtained with the highest possible boiler pressure and the most perfect vacuum attainable, and the cut-off in both cylinders arranged so that the steam in each case expands down to the back pressure line. Practical considerations, however, and the influence of the condensation of the steam in the cylinders, materially alter the last half of this statement in practice, and the steam is seldom expanded more than from two to three or three and a half times its original volume in each cylinder of the compound engine. 2. For given stroke, what should be proportionate diameter of cylinders. A. There is no fixed rule governing the proportioning of the diameters of the cylinders of either simple or compound engines. Practice and the judgment of engineers differ widely on this point. You can get a good idea of the proportions that are used in common practice by going over the files of any of the leading power journals and noting the comparative sizes of the cylinders given for the different engines that are described. By making a calculation of such figures from them, you obtain the best rule for cylinder proportions which it is possible to formulate with the present state of our knowledge. 3. Is there any rule for proportioning stroke and diameters of cylinders for given rate of piston speed. A. The piston speed does not materially influence the cylinder proportions, other things being equal, and high piston speed is favorable to good economy, and the best engines have a piston speed varying according to their size and design from 600 feet per minute to 700 or 750 per minute. 4. Which do you consider the best type of compound engine now operating on the different railways? A. The experience with compound locomotives has been too short for engineers to decide definitely which is the best type. With stationary engines, the cross compound Corliss engine is conceded to be the most economical. 5. What are the difficulties to be overcome in adapting the compound engine to the locomotive? These answers to be based on the performance of a two-cylinder compound or one high and one low pressure cylinder. Any information along these lines not covered by questions asked will be appreciated. Please give comparative performance of simple and compound engines, same power working under same conditions, relative to cost of performance, consumption of fuel, etc. A. The difficulties that have to be overcome with the compound locomotive are: First, the difficulty in starting on grade or under heavy load. Second, equalizing the work on the two sides of the engine under all conditions of load. Third, the balancing of the reciprocating parts. Fourth, the difficulty of simultaneously varying the cut-off in the two cylinders in such a way as to get the same effect as is obtained by shortening the cut-off in the simple cylinder. Fifth, the increased danger of breakdowns, due to the more complicated mechanism and the difficulty of getting engineers who can intelligently operate and care for the compound engine. With stationary engines a gain of nearly 40 to 50 per cent may be obtained by compounding. With locomotives the decreased fuel consumption is not quite so great, 35 per cent being perhaps an average figure. If you will write to the Baldwin Locomotive Works at Philadelphia, Pa., for catalogues of their compound locomotives and information regarding their performance, we think they will give you some valuable information.

(9093) W. F. N. writes: I wish to elevate 125 miner's inches of water 18 feet, and have a waste flume 30 feet long, 6 feet wide, 12 inches of water deep, running 20 feet in 4 seconds. What is the best way to do this? There is no fall at end of flume, and I wish to utilize the power the water gives. Would it be best to put in an undershot wheel with lifting buckets in each side, or an undershot wheel and work a centrifugal pump or any other kind of pump that is best adapted to the work? A. The flow of waste water in your flume, at the rate of 20 feet in four seconds, corresponds to only about 3-100 of one horse power. This would lift only about 8-10 of one cubic foot of water to a height of 18 feet per minute, if it could all be utilized. The amount of power available is so small that we do not consider it at all practicable to attempt to use it. A gas engine and a centrifugal pump would probably be your most feasible plan.

(9094) J. N. P. says: Please answer the following questions: 1. How is the horse power of a river estimated, when the depth, breadth, and fall per mile are known? A. The horse power of a river is estimated by first finding the number of cubic feet of water that flow per minute when the river is at its lowest. This may be obtained by multiplying by the average velocity of the water per minute. This velocity may be determined approximately by timing rods loaded at one end as they float down stream. It is next necessary to ascertain what head or fall is available for a waterwheel, in case the river is dammed or canals built. The horse power equals the number of cubic feet per minute multiplied by 62.4, multiplied by the available fall in feet and this product divided by 33,000. 2. How is the horse power of a pipe estimated when the size of the pipe and the quantity of water delivered per minute are known? A. The horse power of the pipe is estimated by multiplying the number of cubic feet of water per minute in the pipe by 62.4, multiplying this by the head in feet, and dividing this product by 33,000.

(9095) A. P. says: Will you kindly inform me which is the best way to can sweet corn for further use so it will not spoil, such as the canning factories do? A. Among fruits, etc., green corn is one of the most difficult to preserve by canning. The following is the method in use by many of the large canning establishments: The corn, after removing from the cob, is filled into the clean cans so as to leave no air spaces. These are placed in a large oven or other air-tight vessel, and subjected to hot steam under pressure. The harder the corn, the longer the exposure required to cure it; it is said that in some cases as much as eight hours is requisite, but usually much less than this. A large vessel of boiling water, in which the cans are immersed, may be used instead of the steam oven, but is not so effective. On removal from the oven or water bath, as the case may be, each can (they must be filled to the cover with fruit) has the cap with a very small hole tapped in its center immediately soldered on. As soon thereafter as the can stops blowing, as the escape of steam and air through the vent is termed, the hole is quickly soldered. This must be done before the air begins to enter. Other fruit is cured and canned in like manner; tomatoes rarely require longer than fifteen to twenty minutes steam curing. Where the pits are left in fruit, a longer time is requisite to completely destroy all fermentative germs.

(9096) C. W. W. asks: 1. What is the theory of the rotary magnetic field? (I do not find the explanations in Thompson's "Elementary Lessons in Electricity and Magnetism" and "Polyphase Currents" quite clear.) How are the poles shifted so as to cause masses of metal to rotate uniformly in the field? A. The theory of the rotary magnetic field is very mathematical and cannot be worked out in a paper. We must refer you to the books upon mathematical electricity. A rotary field is produced by the phases of the current succeeding each other in turn around the field, thus producing currents in the armature coils, or the coils of the rotary portion of the motor, so that the "rotor," as it is sometimes called, is dragged on after the shifting phases of the current through the stationary portion of the motor. The coils of the rotor are closed and have no connection with the external circuit, thus they do not receive any current from outside. 2. What is an induction motor? What special application has it? A. An induction motor is one whose rotation is produced in the manner described above, by the induction of currents in the body of its rotor, due to the induction of the alternation of the phases of the current through its field or stator. It is used for the same purposes as any other motor. It does not require that the current shall be transformed to a direct current, as an ordinary motor does. A long-distance transmission is by alternating currents, many of them being also polyphase. The induction motor can use these directly, or with only the transformation of the voltage. A direct-current motor requires that a rotary converter shall be used to change the current to a direct current. 3. In wireless telegraphy are the electric waves propagated in *all* directions from the antennæ, or in a given direction only? A. The waves from a wireless telegraph apparatus are transmitted in all directions. 4. Is the incessant sparking sometimes observed between the trolley wire and the wheel especially heavy in rainy weather? A. The sparking from a trolley wire is due to the trolley leaving the wire, producing a gap over which the current arcs. 5. In vacuum tubes why does not the current "jump" across the electrodes by sparking instead of "flowing" (as it were) across? What is the "flow" due to? To the gas molecules? A. In vacuum tubes the particles of gas are driven from the cathode in streams across the tube. The character of the discharge through the tube depends upon the degree of exhaustion of the air. With the highest exhaustion no electricity will pass across the space between the terminals even when they are quite near together. See Thompson's "Elementary Electricity."

(9097) S. H. asks: 1. What is the highest rate per second theoretically that the current flowing through the primary of the large induction coil described in "Experimental Science" could be interrupted and still obtain maximum results from the secondary? A. The question of interrupting the primary current in an induction coil is a practical rather than a theoretical one. Nor are we able to say definitely what the upper limit of interruption may be. With the Wehnelt electrolytic interrupter, as high as from 1,000 to 3,000 times per second have been attained. With mechanical breaks the rate is less. With an alternating current 20,000 alternations per minute are recorded in our data; more may have been used. The effects in this instance are said to have been not as great as with a mechanical break. The rate for any particular case may be determined by comparing the musical note emitted by the interrupter with a tuning fork and determining its pitch. The number of vibrations per second will thus be determined. 2. What is the time required for the magnetism to leave the iron core after the current is broken? A. We have no data for demagnetizing iron. The time should be about the same as the rates of vibration given above, since a coil will not give a maximum spark except with the best demagnetizing effect.

(9098) J. L. asks: 1. I have a 1½ horse power gasoline engine run by dry cell batteries. Would I get more speed if I used wet batteries with a dynamo, and why? A. The kind of battery used with your gasoline will not make any difference to its power. The battery is used to produce a spark to ignite the vapor simply. You can do this by a dynamo after the engine is turning fast enough to bring the dynamo up to full speed. But for a small boat you will not gain anything by the change. 2. Does machinery run better at night than day, and the reason therefor? A. We know of no reason why machinery should run better by night than by day.

(9099) C. R. V. says: If a water pump, plunger type, should be made from a tube having a ½ or 5/8-inch bore, and plunger fitting snugly in same, check valve each side, etc., plunger moving or having a stroke of 4 inches, what would be the limit of revolutions per minute if fastened to a wheel and crank, that it would work satisfactorily? Would it be necessary to decrease the revolutions per minute in ratio to increasing the stroke to gain same results as a smaller or shorter stroke? What is the fixed rule for this? A. The most practical speed for the plunger of all pumps is about 100 linear feet per minute. This speed is irrespective of the size of the plunger and the length of the stroke. If this speed is much exceeded, the valves do not seat properly and the pump does not work smoothly. If the stroke is decreased, the number of revolutions per minute may be increased in the same ratio to keep the piston speed the same.

(9100) H. E. C. writes: I am seeking information concerning wagons. I feel quite sure that some experiments have been made relative to the size of wheels, size of axle skein proper, location of load, etc., but I am unable to find such matter in published form. I need the information in preparation of an article for an agricultural paper upon farm wagons. Can you help me out in any way? A. Theoretically, the larger the wheel and the smaller the axle the less the friction. Practical considerations of strength and convenience therefore govern the determining of the sizes of wheels and axles used. As a rule, larger wheels are used on the rear axles of wagons. Therefore, a load can be drawn more easily if it is placed near or over the rear axles. The wagon also steers more readily if the load on the front axle is small. These are the only points governing the location of the load. In Vol. XIV., page 1014, of the Transactions of the American Society of Mechanical Engineers, you will find an article by Thomas H. Brigg on the haulage of horses, which may interest you.

(9101) W. W. R. writes: We have an artesian well here about 1,000 feet deep that is throwing out salt and white sulphur water at the rate of 400 gallons per second. This is correct. I tested it three different times, and made it that or a little over. I am satisfied it will rise in a 6-inch pipe 30 to 50 feet, and