

RECENTLY PATENTED INVENTIONS.
Electrical Devices.

AUTOMATIC VENTILATING APPARATUS.—J. A. HUMMEL, Mount Vernon, N. Y. The invention relates to ventilation, and concerns itself especially with apparatus intended to be used in theaters and similar places. The object is to provide automatically-operated ventilating apparatus simple and reliable in operation. A special purpose has been to provide means for preventing the body of the theater from filling with smoke in case of fire on the stage or in the wings.

TROLLEY-WIRE HANGER.—A. J. LAVERTY, Athens, Ohio. Many advantages are possessed by this invention over the ordinary form. Among these may be mentioned the arrangement of the lugs evenly supporting the clamp-nut and securing a direct and equal pull on the clamp. The projecting ends of the lugs prevent any twisting of the reduced ends of the clamp, even when the greatest force is exerted on the clamp-nut. The clamp may be entirely detached from the hanger. The latter is useful as a splicing-clamp for securing breaks in the trolley wire.

INSULATOR.—T. CARTER, Frankfort, Ky. In this instance the invention relates to insulators admitting of general use, but more particularly to insulators intended to hold wires used in telegraphy, telephony, and the like. The device is of peculiar service to linemen, as it admits of quick and permanent repairs at a small expense.

INSULATOR FOR HIGH-TENSION LINES.—E. GIRAUD, 18 Rue Royale, Paris, France. In the present patent the invention is a divisional application of a former patent, and relates to an insulating apparatus intended for high-tension lines and so arranged or fitted up as to automatically put the line-wire in communication with a discharge or return conductor when the said wire is broken at any point in order that the falling portions of the falling wire shall not be dangerous.

Of Interest to Farmers.

FINGER-BAR.—C. O. WYMAN, Anoka, Minn. The prime object of the inventor is to provide a bar which may be adjusted around its longitudinal axis so as to change the inclination of the bar and sickle with respect to the ground, thus leaving the stubble long or short without changing the elevation of the harvester-platform. The present is a division of Mr. Wyman's former application for harvesters.

WEED-CUTTER.—H. B. NOLEN, Lamar, Wash. This invention has reference to weed-cutters such as used on farms for cultivating fields. The object of the invention is to produce an implement of this class which is of simple construction and provided with a plurality of cutters the position of which may be readily adjusted.

MOTOR-PLOW.—J. W. MCGUIRE, Joliette, N. D. The plows proper are arranged in gang in a frame of peculiar construction, which is connected with the motor proper, the plows being in a line inclined or oblique to the axle of the motor, so that one works slightly in advance of or in rear of the adjacent one. Each plow is adapted for independent adjustment vertically not only as a whole or bodily, but also at the point and heel, so that its pitch may be varied as required for entering the soil or running at different depths therein.

GRAIN-SEPARATOR.—A. MCRÆ, Pendleton, Ore. The separator commences to separate grain from the straw under the cylinder, and continues such operation the full length of the machine, and by reason of the chain web running over the arched bottom of the separator such arrangement admits of the long separation and materially assists in said separation, and furthermore, by running the web over the arched bottom and by reason of being held in place by slide-guides it does the work perfectly and admits of the long separation.

Of General Interest.

WHIP-HOLDER.—L. MILLER, Saratoga Springs, N. Y. The object in this improvement is the provision of a holder which will shape and retain the form and shape of whips and which will also embody the desired features of simplicity, durability and convenience. It does away with the necessity of tying or knotting the lash and at the same time imparts a curve of the gooseneck form so difficult to give to the upper portions of a whip.

HORSESHOE-CALK.—O. J. HENNEBEUL, Wilkes-Barre, Pa. One purpose of the invention is to provide a continuous and marginal calk and a construction of horseshoe to which the calk is adapted and to so form said factors that they will be simple and economic and so that the calk can be readily applied to the shoe or removed therefrom by one of ordinary intelligence.

CALIPERS.—A. S. KOCH, Lancaster, Pa. This implement is of the so-called "figure-eight" class employed by watchmakers in testing balance-wheels, and other parts, the object being to provide a caliper with a novel form of pointer and the means for mounting the pointer, whereby it may be readily turned to one end or the other of the caliper and also turned from the plane of the caliper.

SIPHON-COLLAR.—C. R. SCHULTZ, Murray Hill, N. J. In this patent the invention has reference to siphon-collars, the more particular

object being to provide an arrangement to avoid any danger of breaking. The two-part siphon-collar by distributing the strain not only upon an annular bead, but also in a measure throughout the substance of the glass immediately adjacent thereto, prevents the possibility of undue breakage in case any part of the apparatus should receive a jar or blow.

DEVICE FOR SPLITTING STONE.—J. F. COPPS, Alberene, Va. In splitting off a horizontal slab the wedges are arranged to operate at the opposite ends of the adjacent drill-holes, so that one wedge will operate in the extreme inner end of its drill-hole and the wedge in the next drill-hole will be at the outer end of its drill-hole, and so on throughout the series, so that splitting action is exerted at the opposite ends of the adjacent drill-holes, whereby an even lifting action on the slab which it is desired to split from the body of rock is obtained, and the line of division will be approximately horizontal throughout.

METHOD OF SPLITTING STONE.—J. F. COPPS, Alberene, Va. The method consists in forming a series of holes having generally the same direction longitudinally and arranged in approximately a common plane, the holes extending nearly through the body of stone to be split, and subsequently exerting a splitting force in the direction in which it is desired to separate the stone, such force being exerted in the extreme inner or closed ends of some of the holes and in the extreme outer or open ends of some adjacent holes whereby to secure a splitting of the body of stone in approximately a straight plane.

SEWER AND CULVERT MOLD.—H. BESSER, Alpena, Mich. The principal objects of the inventor are to provide for adjusting the parts of a mold so as to permit sewer and culvert sections of different sizes to be molded in the same mold, and to provide means whereby all sides except one can be formed by the usual molding process against the surfaces of the mold and the other side by the use of a trowel moved along the edges of two sides of the mold, and to provide mold parts permitting the ready disassembling thereof and provide for easily setting up the molds and securing their several parts together.

APPARATUS FOR CONDENSING GASES.—S. T. MUFFLY, Philadelphia, Pa. One object of the inventor is to provide an efficient, rapid, and relatively inexpensive combination of apparatus for dissolving gases or solid particles carried by gases in any desired solution, it being more particularly desired to provide an apparatus having above characteristics for recovering hydrocyanic-acid gas given off during operation of cyanid processes, and more particularly in connection with the process of extracting precious metals from ores described and claimed by Mr. Muffly in a former application for a United States patent.

Hardware.

STOCK AND DIE.—M. G. CORNELL, JR., New York, N. Y. Of the purposes of this invention one is to provide a construction wherein the die is provided with openings in its side edges leading directly to the threaded aperture for reception of the article to be threaded and wherein the socket of the stock receiving the die is provided with corresponding openings, enabling a lubricant to be readily introduced through said openings to the cutting-threads of the die where they are in engagement with the article being threaded.

Heating and Lighting.

HYDROCARBON-BURNER.—W. KEMP, Tucson, Ariz. Ter. In this improvement Mr. Kemp seeks to produce a burner wherein the inflow of air and of liquid or gaseous fluid is regulated independently of each other, to the end that an intense or modified heat may be secured and regulating means are normally under the control of an attendant, such burner involving small expense in installation and repairs. It constitutes a division of a prior application filed by the inventor.

Household Utilities.

COOKING-STOVE.—E. C. COLE, Chicago, Ill. The invention is an improvement in cooking-stoves, and relates particularly to the construction of the upright grate-front and of the broiler for co-operation therewith. Mr. Cole finds in practice by constructing the grate-front with the openings or spaces between the grate-bars narrowed or contracted at the upper portion of the grate the boiler may be set upright, and uniform results secured.

CURTAIN-LOOPER.—J. W. HENSON, New York, N. Y. This invention pertains to improvements in means for looping or draping curtains, particularly lace curtains, the object being to provide in connection with a curtain a draw-string so arranged that the body portion of the curtain may be looped or folded from the border outward, thus leaving the inner edge of the border in full view from the top to the bottom.

SCREEN.—W. O'BYRNE, Port Chester, N. Y. This screen is of the kind that is placed in the windows of buildings to prevent the entrance of insects. More specifically, the invention relates to that type of screen which is attached to the casement and to the sash and which extends itself automatically, as it were,

to fill the open space at the window. The object is to provide an arrangement for attaching such screens to the sash and to the casement, to the end that the screens may be removed or replaced with the greatest facility.

WINDOW-SHADE FIXTURE.—W. D. HARPER, Loco, Indian Ter. This fixture comprises special means whereby it may be readily applied to window-frames of varying widths between the inner side faces of the stiles and also comprises two special bracket members from which the shade-roller is supported through the intermediary of a specially-constructed detachable member co-operating with the bracket members. The improvement may be readily applied and again removed without in any way marring the outer surface portion of the stiles or upright members of the window-frame.

Machines and Mechanical Devices.

ORE-SEPARATOR.—A. PERRY, Caribou, Col. The object of this invention which relates to screening-machines for separating finer from coarser materials, is to provide a separator for treating dry or wet ores to separate the finer from the coarser in a very quick, simple and effective manner without danger of the coarser materials clogging the meshes of the screen.

MACHINE FOR CLEANING FIBER.—W. A. ADAMS, Winchester, Ky. One end of a bunch of hemp is cleaned, withdrawn and then reversed to clean the other end. The invention consists of a novel construction of machine for doing this and also in the combination therewith of an air-blower which acts upon the hemp between the period of its protrusion into the machine and the period of its withdrawal, whereby two important results are obtained, one of which is to loosen up and thrash about the hemp by this blast of air while in the machine and between two distinct operations of the machine on the fiber and the other of which is to prevent the fiber from wrapping around the drum or its journals.

BALING APPARATUS.—F. P. ELLIS, Messer, Kan. In the present patent the invention has reference to baling apparatus, and has for its principal object the provision of an efficient machine for compressing and securing or tying bales of material. A casing furnishes a chamber in which the bale is formed, this preferably having closed top and bottom walls, while the sides are open for a considerable distance to permit the passage of tie-wires.

SAND-BLAST MACHINE.—C. A. P. HESS, 5 Avenue de l'Opera, Paris, France. In certain machines, one and the same current of compressed air sucks the sand and at the same time projects it against the surfaces to be scraped or cleaned. There is thus produced within the projector an agitation or eddy due to the fact that the operations of suction and projection of the sand are simultaneous and not distinct and successive. By reason of this energy of projection does not correspond with the pressure of the compressed air at the generator. The invention obviates this defect.

CENTRIFUGAL CREAM-SEPARATOR.—Z. L. TRUESDELL, Camden, Ind. Centrifugal action effects the separation of milk and cream, the heavier particles circulating outward and passing upward between the inner and outer sections to be discharged at the skim-milk outlet, while the lighter or cream particles accumulate toward the center of the bowl and pass upwardly, surrounding the feed-tube, but not in contact with it, and into the eccentric bore of inner section of the skimmer-cone and thence out of the discharge, being controlled by a screw-valve.

PNEUMATIC DRILL.—H. BROUSSEAU, New York, N. Y. In this invention there are four cylinders and four pistons, the latter being driven by air, which is admitted continuously through a single rotary valve. The four pistons turn four stub-shafts and the latter are provided with gear which all mesh with a single large gear which is rigid upon the shaft to be driven. The revoluble parts are as far as possible supported in ball bearings.

SEWING-MACHINE.—W. JASPER, New York, N. Y. The machine allows for work on hats having a wide brim, so that wire or the like or braids or other trimmings may be stitched to the brims not only at the outer edge but at a point at or near the crown, and the invention provides means whereby a wire or the like may be secured to the hat by a stitch staggered across the wire from one side to the other. This allows uncovered wires to be secured to the hat, and it avoids the necessity of stitching through a reed, cord, or covered wire.

STAMP-AFFIXING APPARATUS.—J. SCHIMMEL, JR., Olean, New York. In the present patent the invention has reference to apparatus for affixing adhesive stamps to such objects as mail-matter, and has for its principal objects the provision of effective means for accomplishing this end with a minimum of manual intervention. The base of the apparatus serves as a support for the object which is to be stamped.

TIME CHECK OR RECORDER.—L. M. SOBER and E. E. BROWN, Oklahoma, Oklahoma Ter. This inventor seeks to provide a machine for time recording in which means are provided for quickly and effectively making the proper record on the strip or sheet, moving the said sheet along after each entry to expose a new surface for the succeeding entry, and in which means are also provided for perforating

the sheet between each entry, so that each entry may be separated from the other and filed away for proper reference.

Medical Appliances.

TRUSS.—H. EAGON, New Comerstown, Ohio. In this improvement in trusses the perineal band retains the pad in firm contact with the hernia, and the pressure may be varied by using a spring of the proper tension. By means of the hinged plate the truss may be placed in position on the body and the pad afterward adjusted to proper position, and the spring can be made to conform to the position of the pad, since it is pivoted to the plate. The pads may also be made interchangeable, pads of different shape being provided for the same frame to meet different shapes and varieties of hernia.

OBSTETRICAL FORCEPS.—L. G. BARTON, Willsboro, N. Y. In this instance the invention has reference to obstetrical forceps, and more particularly to those of the axis-traction type. Its principal objects are the provision of such an instrument which may be readily applied to the head and efficiently manipulated to effect delivery.

Prime Movers and Their Accessories.

GOVERNING MECHANISM.—J. G. CALLAN, Lynn, Mass. The object of this inventor is to provide a governing mechanism of improved construction which will regulate the amount of motive fluid supplied to the motor under normal conditions and which will shut down the motor irrespective of the position of the regulating valve or valves when the speed exceeds a certain predetermined limit.

OSCILLATING-PISTON ENGINE.—J. BERGESEN, New York, N. Y. This invention refers to a peculiar form of oscillating-piston engine useful in connection with fluid under pressure. It is especially designed as a steam steering-gear for marine wheels. It belongs to that class in which a quadrant-shaped cylinder is provided and a wing or piston arranged to swing in the same. The journal on which the wing is carried is provided with steam-ports and a valve coacting with the ports being engaged with or mounted on said journal or stem. The object is to improve the valve, so as to render action of the engine more certain and rapid than heretofore, and to avoid loss of steam and difficult operation.

OSCILLATING VALVE FOR STEAM-ENGINES.—T. V. ELLIOTT, New York, N. Y. This invention relates to the two-cylinder type of reciprocating engines; and its object is to provide a new and improved valve for controlling the admission and exhaust of the motive agent to and from the cylinders in a very simple manner and without danger of leakage of the motive agent.

Railways and Their Accessories.

CAR-COUPLING.—J. HOUSEHOLDER, Big Chimney, and J. C. GALBREATH, Charleston, West Va. The coupler is designed especially for use in connection with mine-cars. The principal objects are to provide a simple automatic coupler of such construction as will admit of dispensing with the usual draw-bar-and-link coupling and allow the coupling to be effected on curves equally as well as on straight lines.

APPLIANCE FOR RAILROAD-CARS.—G. E. HANES, Gunnison, Col. The aim of the improvement is to provide an appliance for use on cars to permit easy, convenient, and quick removal of worn-out or broken journal-brasses and replacing of the same by new ones or to allow of holding a broken car-wheel against turning when it is desired to side-track the car for repairs of the broken car-wheel.

SAFETY-BRIDGE LOCK.—H. ALSOP, Chicago, Ill. The invention relates to improvements in locks used on stock-cars, such as illustrated in a former patent granted to Mr. Alsop, and has for its object to produce a simple, cheap, and efficient locking device to retain the safety-bridge in its vertical or closed position.

BALL-BEARING.—J. N. PETERSEN, New Orleans, La. In this patent the object of the inventor is the provision of a new and improved ball-bearing arranged to relieve the bearing of jars and jolts incident to end thrust, to prevent jamming or crowding of the balls by allowing sidewise play thereof, to render the bearing dust-proof and oil-retaining, and in case the bearing is applied to rolling-stock of railroads to lessen the friction of the wheel-flanges against the outer rail when running around sharp curves. The bearing will efficiently serve the purpose for which it was designed, its construction being very successful for railroad rolling stock and for all heavy duty, where it is desirable to reduce friction.

LUBRICATING DEVICE.—W. H. PROCTER, Loco Buildings, Khurda Road, Jatni, Bengal, India. In the present patent the invention has reference to improvements in lubricators for bearings, cranks, shafts, slide-blocks, eccentrics, and other moving parts, and has for its object the thorough lubrication of the bearing-surfaces. The device may be applied to existing machinery.

Pertaining to Recreation.

AMUSEMENT DEVICE.—W. F. MANGELS, New York, N. Y. This invention refers to pleasure-railways; and its intention is to provide a new and improved amusement device

for use in parks, pleasure-resorts, and other places and arranged to give an exciting ride to the occupants of the car and to afford considerable amusement to the onlookers.

BOWLING-SLIPPER.—W. J. BARNETT, New York, N. Y. One purpose of the invention is to provide a slipper for the heel of a shoe which can be readily carried in the pocket and whenever required may be conveniently and expeditiously applied and secured and as readily removed, and also to provide the heel-slipper with an effective attaching medium to effectually hold the slipper in place under all conditions of usage, but which will in no manner interfere with the muscular play of the foot.

MERRY-GO-ROUND.—J. L. ARIZTIA, Iquique, Chile. This invention is an improvement on that class of apparatus which include a circular rotatable platform carrying horses or other quadrupeds ridden by persons. Mr. Ariztia has devised an improvement in which a series of annular platforms or rails is substituted for the ordinary rotatable platform, the same being supported and adapted to travel circularly on flanged rollers fixed on horizontal shafts radiating and driven from a common center.

Pertaining to Vehicles.

WAGON-BRAKE.—T. N. JOHNSON, Wilbur, Wash. The operation is entirely automatic. Moving on level ground, the relation of parts is unchanged; but on starting down an incline the bed tends to swing forward when spring-supported or to roll forward when on the rollers, rocking the rock-shaft and drawing the brake-beam to the rear, thus pressing the shoes against the peripheries of the wheels. As soon as level ground is reached the bed swings or rolls back, rocking the rock-shaft in the reverse direction, releasing the brake-shoes. Means are provided to regulate the power of the brake.

VEHICLE-BODY.—W. D. McNUTT, Upper Sandusky, Ohio. While relating generally to improvements in wagon-bodies, the invention more particularly seeks to provide an improved construction of "storm-wagon" body which while useful for the ordinary purposes of light wagons is more especially designed for use for those who have to ride more or less through rough weather, like mail-carriers, parcels-delivery carriers, etc.

COOLING APPARATUS.—D. McR. LIVINGSTON, New York, N. Y. The invention relates more particularly to cooling apparatus employed in connection with motor-vehicles propelled by explosive-engines. It has a wider field of usefulness and may be embodied in a condenser or heating apparatus. In coolers of this character walls are provided having such a conformation and such a relation to each other as to produce when assembled conduits for the passage of water or other fluid to be cooled and passages at approximately right angles to the conduits for passage of atmospheric air or other cooling fluid.

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.

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Thomas B. Jeffery & Company,
Kenosha, Wis. Department of Construction.

Inquiry No. 8148.—Wanted, addresses of firms that want articles manufactured of wood under contract for them.



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.

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Scientific American Supplements referred to may be had at the office. Price 10 cents each.

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Minerals sent for examination should be distinctly marked or labeled.

(9995) B. T. asks how to make buff wheels. A. Turn up the wooden disk to form the wheel on the mandrel on which it is to run. Cover the periphery of the wheel with good glue, prepared as for gluing wood, stretch the leather around and confine it with shoe pegs driven in about 2 inches apart. When dry turn off true with a sharp chisel. Give the leather a coat of glue and roll it in emery, so as to make it retain it by being imbedded in the glue. Let the wheel dry until the glue is hard and it is ready for use.

(9996) C. L. F. asks how to preserve bird-skins. A. Make an incision from the breastbone to the vent; with a small piece of wood work the skin from the flesh. When the leg is reached, cut through the knee joint and clear the shank as far as possible, then wind a bit of cotton wool on which some arsenical soap has been put round the bone; do the same with the other leg. Now divide spine from root of tail, taking care not to cut too near the tail feathers, or they will come out. Next skin the wings as far as possible and cut off. The skin will now be entirely clear of the body. The skin must now be turned inside out and the neck and skin gently pulled in opposite directions till the eyeballs are fully exposed. The whole of the back of the head may be cut off and the eyes and brains taken out and their places filled with cotton wool. The whole skin should be rubbed well with arsenical soap or plain arsenic, and the neck returned to its natural position, when, after filling the body with a little dry grass or wool, the job is done. It is very easy, and the skin of a bird is much tougher than one would suppose, though, of course, they vary, the nightjar being very thin, while humming birds are fairly tough. All the apparatus required is a sharp knife and a pair of scissors, or, for large birds, a strong pair of nippers to divide the bones.

(9997) C. N. asks how to destroy weeds. A. 1. The best way, says a correspondent, to apply salt to paths, to destroy weeds, is as follows: Boil the salt in water, 1 pound to 1 gallon, and apply the mixture boiling hot with a watering pot that has a spreading rose; this will keep weeds and worms away for two or three years. Put 1 pound to the square yard the first year; afterward a weaker solution may be applied when required. 2. The plants should be cut off close to the ground and a few drops of coal oil poured on to the crowns. They immediately commence to decay and are utterly destroyed. Troublesome weeds on the lawn can thus be speedily disposed of, but others will likely take their place.

(9998) J. N. A. asks for formulas for writing on zinc. A. 1. Mix verdigris, 1 part; sal ammoniac, 1; chimney black, or any mineral color, ½; water, 10; stir well or shake the bottle before employing, and use a quill, not a steel pen, for writing. This ink is a poison. 2. Get a lemon, squeeze the juice out of it into a pot, and put into it an old copper cent or piece of copper, not the present bronze coin. Let it stand for a day or two. Write with a quill pen. 3. Dissolve 100 grs. of chloride of platinum in a pint of water. A little mucilage and lampblack may be added.

(9999) C. L. asks how to lace belts. A. The ends of a belt should always be cut off square, not guessed at by the eye, but laid off with a tool. The holes ought to be made with a small punch at a proper distance from the end; the size of the holes and the distances of them depending on the width of the belt. The use of an awl is reprehensible, for the holes are apt to be made irregular by it, and much larger than there is need of. The end of the lace should be tied with a square knot in the middle of the outside, for the corners of the belt where it is cut are most exposed and apt to whip out. Tying a belt lace does not look so neat as where the ends are put through an incision, but tying saves the belt from having extra holes made in it. The laces ought to be of the same thickness from end to end, or as nearly so as possible. It often happens that laces have very thin spots

in them; such should be kept for short belts, and never used for long ones. Moreover, the holes must be made at equal distances apart and not too many of them. Every hole weakens the belt, and none that are not absolutely essential should be cut. All new laces, as well as new belts, should be stretched by hanging weights on them before they are used; petroleum, sawdust, resin, and similar substances should never be used. When a belt gets harsh or dry, neat's-foot oil is the best thing to apply to it.

(10000) C. W. asks: Please explain the following phenomenon. I had occasion to use an electric light bulb, and I observed that whenever I touched it in a dark room with my hand it became luminous. I found that the filament was not luminous, and that the luminosity occurred when it was touched by the flesh or other soft objects, and also when rubbed by them. If the bulb was moist, the phenomenon did not occur. A. All glass tubes or bulbs in which there is a vacuum of the right degree will glow in the dark when near an electrified body, as you have observed in the case of the lamp bulb. The static electrical charge is probably the cause of the glow.

(10001) C. M. S. asks: 1. Why does not an arc lamp short-circuit a current or cause a live wire, the same as when the two wires leading from the generator are touched together and pulled apart, thus making an arc? A. The carbons of an arc lamp do not short-circuit the current because the resistance of the coils in the lamp cut the current down to the number of amperes needed to light the lamp. 2. Is there any form of a rheostat used in the ordinary arc lamp? A. There is a rheostat in all arc lamps. 3. Please send me one of the SCIENTIFIC AMERICAN SUPPLEMENTS showing the construction of an electric furnace. A. Our SUPPLEMENT 1182 contains a good article upon the construction of an electric furnace.

(10002) M. G. F. asks: Will you state through Notes and Queries how a plate of glass should be shaped or cut so as to reflect the colors of the rainbow from the sun's rays without any water being used? I have seen, apparently, a flat glass reflect a rainbow on a screen or background when no water was present. A. If two glasses are placed one upon another and slightly pressed together, there will frequently be small circular rainbows, which may be projected upon a screen by a lens. No water need be used. The glasses for this purpose should not be very smooth or fit each other very closely. Wright's "Optical Projection," price \$225, describes the mode of arranging to show these rings, under the title Newton's rings.

(10003) J. E. S. asks: 1. How can one tell the positive terminal of a dynamo? A. The best way to tell the positive pole of a dynamo is by an instrument called a pole tester. These can be had from dealers in electrical goods, for which see our advertising columns. 2. In a compound-wound direct-current dynamo does the current on leaving the positive brush flow through the series field, thence through the external circuit to the negative brush, or does it on leaving the positive brush flow through the external circuit and then through the series field winding to the negative brush? A. It makes no difference whether the series field of a compound-wound dynamo is connected to the positive or the negative brush and the external circuit. 3. On a compound-wound "Wood" Fort Wayne alternator the name plate reads thus: "K. W. 75. Poles 16. R. P. M. 1050. Volts no load, 2,000; full load 2,200. Amps. full load, 35." The machine is now run at 550 R. P. M., generating current at 1,060 volts, and the peak of the load is 31 amperes. The machine heats considerably. What causes it, and what is the full load at that speed and voltage? A. For the cause of the heating of your alternator you would better address the company which made the machine. Their engineer can give you the advice needed.

(10004) K. G. C. asks: Owing to the precession of the equinoxes, is the apparent diurnal motion of Polaris around the pole of the northern celestial sphere describing now a larger or a smaller circle than formerly, or in other words, is the star approaching or receding from the actual pole? A. At present the distance of Polaris from the North Pole is about one and a quarter degrees. At the time of the Star Catalogue of Hipparchus, it was 12 degrees distant from the pole. It will approach the pole for the next hundred years, at which time it will be within a half degree of the pole. After that time it will recede from the pole, or rather the pole will recede from the star.

(10005) S. asks: Since the recent earthquake in California, many questions have arisen regarding earthquakes and their effects on buildings. If you will publish an opinion on the following one, you will oblige many of us: In the case of earthquake, where is the greatest oscillation—at the top of buildings, or at the base? A. If a building is overturned by an earthquake, the top moves farthest. If it is not overturned, we should suppose the bottom would move farther than the top. Inertia would hold the top still, while the sudden motion of the earth would move the bottom. This is often seen in monuments in cemeteries. See illustrations on motions of cemetery monuments in SCIENTIFIC AMERICAN, Vol. 94, No. 20. The base moves away from the upper part of the monument.

(10006) C. M. asks: 1. Can you give me any advice how to vulcanize bicycle tires? A. The process of vulcanizing rubber is described in the SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 251, 252, 731, and 895, price 10 cents each by mail. 2. Will a fan motor, having permanent magnetic fields, need the same number of batteries to drive it, as the same motor with electro-magnet fields? A. The power is less with permanent magnets by the small amount of current to magnetize the field, of course. 3. Is telephoning allowed during a thunder storm, and why are the lights turned on during the same on a trolley car? A. The telephone exchanges do not cut off subscribers during a thunder storm. They depend upon the lightning arresters for protection. For the same reason the trolley service is not interrupted. Once in a while a burn-out occurs, but very rarely in comparison with the number of telephones and cars. Lamps are only lighted when it is dark enough to require their light.

(10007) W. W. S. asks: Does a piece of iron have more or less cubical contents when magnetized? I have tried to find out by using water and hair tubes, but I can see no change whatever. A. We should not expect to demonstrate any change in contents of an iron bar by magnetizing it. The change is of an infinitesimal order at the largest. The question has at most a theoretical interest. According to theory, the molecules are turned with their lengths in the same direction while the magnetizing current flows. They occupy no more space in this condition. We should, therefore, think that the bar as a whole would occupy no more.

(10008) L. C. S. writes: 1. As I understand it the resistance is what makes the field coil get hot. In order to avoid the heating more wire is added; now, if resistance is what heats the coil, how do you account for the coolness of the fields after adding more wire, consequently more resistance? A. Your statement that resistance causes the heating of an electric circuit is less than half right. The exact statement is that the heat developed in a circuit is directly proportional (1) to its resistance in ohms, (2) to the square of the current in amperes, (3) to the time that the current flows in seconds. Now one ampere flowing through one ohm develops 0.24 calorie in one second. Putting these facts in a formula we have: Heat in calories = $0.24 C^2 R t$. It can now be seen why the heating of a coil can be remedied by adding more wire. The increase of resistance cuts down the amperes in the same ratio as the increase. But the reduction of the amperes affects the heating power in the ratio of the squares of the amperes. Thus, if the resistance were doubled the amperes would be halved, but the heat produced would be reduced to one-fourth of what it was, since the square of ½ is ¼. 2. What is the cause of the humming in the field coils and pole pieces of an induction motor when the armature does not revolve, but the current is passing through the fields? A. The alterations of an electric current produce vibrations which are heard as sound. These can be heard near an arc light run by an alternating current, or near an alternating electro-magnet. 3. What changes are necessary to reverse the running of an induction motor? Crossing the positive and negative wires at the binding posts will not do it. A. Of course, merely reversing the main wires will produce no effect upon the direction of rotation of a motor. If the induction motor is two phase, the direction of rotation will be reversed by changing the two leads of either phase. If it is three phase, it will be reversed by changing any two of the leads. The different phases are a fraction of a period behind each other, and the direction of rotation depends upon the direction in which the phases lag behind around the rotating part of the motor, whether clock-wise or contra-clock-wise. To reverse the motor the direction of the lag in phase must be reversed. 4. Would it be possible to illustrate and explain the induction motor in the SCIENTIFIC AMERICAN some time in the future? A. The induction motor has been fully treated in several books recently published: Oudin's "Polyphase Apparatus," price \$3 by mail; Thompson's "Polyphase Currents," price \$5 by mail. These, with Thompson's "Elementary Lessons," price \$1.40, will put you in possession of quite a complete library of the subject at present.

(10009) C. B. M. writes: I have a small motor which has a magnet in place of field winding. An electrical engineer told me if I put it on a large machine it would give greater power I did so, and it does not give any power at all. It will run without a load, but will not run backward when current is reversed as it did before. A. A motor requires the proper current, that is, a current of the number of volts for which its winding was made. It will then develop under this pressure the power it was intended to yield, for the reason that it will take the proper number of amperes from the line. A current less than this will not run the motor up to its limit, one greater than this will overheat its coils. It would appear that you must have put the motor upon an alternating current, when it was intended for a direct current, since it would not reverse nor develop power.

(10010) E. H. W. writes: I read with much interest the article of M. Tommasina's automatic coherer, in your issue of June 16, 1906, page 376, and would like to ask if it is