RECENTLY PATENTED INVENTIONS.

Electrical Devices.

ELECTRIC PROGRAM-CLOCK. — A. L. RONELL, Forest City, Iowa. Among quite a number of separate objects in the present invention, are the following: to economize battery power; to provide a system in which any desired timing-clock may be employed by making in it comparatively trivial changes; to readily prevent certain alarms from being actuated temporarily without interfering with other alarms, and to provide certain constructional details tending to promote efficiency, simplicity, and reliability in the action of the alarm. This invention constitutes an addition to another described in Mr. Ronell's former Letters Patent for a time-controlled electric alarm.

ART OF SUSPENDING AERIAL CABLES. —L. A. MCNEIL, Maywood, Ill. The principal objects of the invention are to facilitate the erection of electric and like aerial cables. Erecting a cable upon a suspension-wire in which this latter is fixed in supports upon all the poles and in which open hooks are drawn over such wire by action of the capstan is objectionable. This invention obviates this difficulty, there being but one person required to manipulate hangers and close hooked loops, the process of these by the supports being automatically effected. This is done without diminishing security of the supports, the suspension-wire being so held that no amount of vibration can displace it.

ADJUSTER FOR ELECTRIC-LIGHT CORDS.—J. T. HATHERLY and T. H. HATHERLY, New Westminster, Canada. This invention relates to adjusters for electric-light cords, the purpose being to produce a device very simple of construction and which may be readily manipulated in order to dispose of any quantity of slack in the cord resulting from the particular position or height desired for the light carried by the cord. They are made of paper, rubber, glass and light metals.

TELEPHONE-RECEIVER SUPPORT.—F. F. HOWE, Marietta, Ohio. The improvement is in telephone-receiver supports, and in its employment a lower arm and its offset extension are adapted to underlie a wall-board and two clamps faced with felt or other suitable material are adapted to engage the face near one edge and the opposite edge, respectively, thus obviating the necessity of marring the wall-board by screw-holes.

Of Interest to Farmers.

HORSE-HOE.—F. W. ANDERSON, Westfield, N. Y. This disk horse-hoe is for use in cultivating grape-vines, raspberries, shrubbery, and plants of various kinds. The main feature of the novelty is the construction and combination of parts whereby a hoe or cultivating-blade may be adjusted to and held at different vertical and horizontal angles.

HAY RAKE AND STACKER.—O. B. MANN, Meeteetse, Wyo. The purpose in this case is to provide a rake or stacker which will gather up hay as the machine advances and when a load is obtained whereby the rake may be raised so that its load may not trail upon the ground while the machine is being drawn to the stack, and, further, when the stack is reached whereby the rake can be elevated as desired, held elevated, and the load discharged, and, furthermore, wherein the rake-teeth may be given any inclination upward or downward, all under control of the driver seated at the back of the machine.

PLOW.—R. NELSON, San Martin, Cal. This invention relates to plows and especially to the type known as "sulky-plows," the frames of which are mounted upon wheels. The object is to provide improved means for attaching the wheels to the frame to the end that the height of the frame carrying the plowshares may be readily readjusted. An improved arrangement is provided for attaching the tongue or pole of the plow to the frame.

RIDING-HARROW.—P. FLEMING, Burton View, Ill. In the operation of this improvement the central and side harrows would be lowered into contact with the ground and the teeth adjusted at a suitable inclination with respect to the harrows. In moving the machine from place to place the outer end of the side harrows would be elevated and engaged with the hooks on the frame and the central harrow could be elevated out of contact with the ground, thus leaving all parts free from the ground except the wheels. If desired, a tongue may be secured directly to the frame.

MILK-PAIL.—J. LOWE, Hutchinson, Kan. This invention constitutes an improvement on the device formerly patented by Mr. Lowe. It related to an attachment for milk-pails which enabled the pail to present supports on opposite sides of the body of the pail, and adapted to support the pail from the knees. The object of the present improvement is to provide means for attaching the supports to the end that they may be normally held out of the way and against the side of the pail, but enabling them to be readily thrown into the projecting position adapting them for use.

MEDICATED NEST-EGG.—G. H. JONES, Los Angeles, Cal. It is desirable that the eggs used for the purpose of destroying or driving away vermin should not give off fumes too rapidly, which would endanger the lives of the embryo chicks. The inventor's purpose is to produce an egg in which the medicated compound may be placed with facility, and, further, to provide means whereby the exudation from the egg will take place slowly and substantially uniformly.

HOG-TROUGH. — J. CROSSIN, Ava, Ill. Economizing time and labor in feeding hogs and also preventing the animals from getting their feet into the trough while the feeder is feeding, also to arrange it so that each one gets its share of feed by preventing them from fighting each other away is the principal object of the inventor. The trough is formed with separate feeding compartments.

AGRICULTURAL IMPLEMENT. — C. D. ADAMS, Sylvania, Ga. The principal objects in this case are to provide a machine with a motor to be driven by electricity, gas, gasolene, or the like, to connect the motor with traction-wheels so as to propel the machine, and to attach various kinds of implements to it in such a manner that they can be readily operated either by the motor or by forward motion of machine, at same time keeping the dimensions of machine within narrow limits, so that it will be suitable for general use and not require an extraordinarily large expenditure of power in operation.

POTATO DROPPER AND PLANTER.—F. R. ALBRIGHT and J. S. JOSEPH, Norristown, Pa. In operation, the hopper being filled with potatoes, the planter is drawn along with the leg following the furrow. Picker-arms are rotated in reverse direction to the motion of the planter, and the arms pass upwardly through the hopper, the needles transfixing and carrying upward a potato during their passage. Pairs of arms upon a shaft engage the picker-arms and knock the potato therefrom, which drops into the flaring mouth of the leg and passes down into the furrow. The concaved wheel both steadies the potatoes in their place and aids in covering them with dirt.

Of General Interest.

HOLDER FOR STAPLES, ETC.—J. A. BLAKE, Lafayette, Ind. Mr. Blake's invention is an improvement in devices for use in the manufacture of concrete fence-posts, and it is in the nature of a holder of staples and for reinforcing spacers in applying said staples and spacers to the soft concrete in a mold.

PLUMB, LEVEL AND INCLINOMETER.—W. A. DIMICK, Vancouver, Wash. This instrument is adapted for use in construction of roadways and sidewalks or erection of buildings, so as to quickly and accurately determine if structures or parts thereof are level or properly inclined or vertically positioned, as the character of work may require. The object is to provide features of construction which afford a combined "plumb," "level," and "inclinometer" in one small instrument, which may be readily secured upon a straight-edge of suitable length.

BRIDLE.—C. HAY-HAY, Red Lodge, Mont. The object here is to provide details for a driving-bridle to be used for double or single harness which permits an accurate, quick, and convenient adjustment of the crown-straps and check-straps of the bridle, so as to give the latter proper length for connection with the bridle-bit without changing the position of the blinders on the crown-strap, if this is correct, or to raise or lower the blinders without altering the length of the check-straps, so as to give the blinders the proper position, these adjustments enabling speedy fitting of a bridle having the improvements upon heads of different animals that may vary in sizes.

FENCE-POST.—J. A. BLAKE, Wolcott, Ind. Mr. Blake provides a concrete post reinforced from end to end by longitudinal reinforcing-wires, stayed at intervals by brackets, which also operate to support the wires within the mold in the operation of molding the post, the said posts being also provided with simple and effective means for securing the fence-wires in the use of the post in fencing.

SUPPORTER. — SARAH LIPKOWITS, New York, N. Y. The object in this instance is to provide a new and improved supporter for use on children's garments, corsets, suspenders, and the like, and arranged to form a proper support for bands, trousers, hose, and the like garments, and to allow convenient connection or disconnection of the parts, and to prevent the garment parts from becoming entangled and injured in the supporter.

ADJUSTABLE SEAT AND DESK.—J. T. BRENT, Second, Cold Spring, N. Y. This invention relates to a desk and seat for use in schools and similar places. The principal objects of the inventor are to simplify articles of this character by forming the main parts of metal and to so put together the several pieces of metal constituting the article as to afford simplicity of construction and strength, together with lightness, in the finished article.

GRAPHITE-SEPARATOR. — J. H. DAVIS, Glens Falls, N. Y. The principal objects of the invention are to provide means for effectively separating both fine and coarse graphite and retaining practically all of that material which may be in the ore, for collecting sand and other materials which may be included with the graphite in the ore, to produce graphite in the pure marketable form, and to wash it clean from all foreign matters.

SAFETY-RAZOR.—F. A. CLAUBERG, Weehawken Heights, N. J. This type of safety-razor is so constructed that two removable and interchangeable blades are employed which when placed in a body-frame back to back present two opposing cutting edges, the blades being primarily shaped for the purpose intended and made of sufficient thickness to admit of beveling their cutting edges, which bevel is so deep that the blades can be repeatedly honed, ground, and stropped with the best results.

GUN-STOCK.—W. F. COLE, Waco, Texas. In constructing the ordinary gun-stock the wood composing it is cut across the grain at the grip or narrowest portion adjacent to the breech, where it is consequently vitally weak, whereas in the present improvement the stock grain is preferably continuous or uncut, and the stock therefore possesses as great strength at one point as another, besides being lighter than the old form and adapted for advantageous use in handling the gun.

SWEAT-BAND.—R. H. CURTIS, Long Branch, and H. D. CURTIS, Red Bank, N. J. One purpose of this invention is to provide a band having folding flexible members or leaves upon its inner face so arranged that when folded up in direction of the free edge of the band in a hat the band will represent a given normal size, and wherein when the said members are folded in direction of the edge of the band which is attached to the hat the interior measure of the sweat-band will be reduced about a half-size.

REVOLVING DRUM-SCREEN.—J. P. BREW and E. P. SUITER, Basin, Mont. This invention is in the nature of a screen designed to be used for the purpose of screening the slime-water of the concentrator either before or after it is worked on the concentrator-jigs, the slime-water being worked over for whatever value it may still contain. The drum's periphery is formed of screening-wire in which the materials to be screened are applied to the outer surface of the drum and pass through the wire to troughs inside the drum and in which refuse matter clinging to the wire mesh is constantly removed and the screen kept in clean, effective condition.

SHADE.—L. W. HAIGHT, White Plains, and W. E. CHAPMAN, New York, N. Y. The invention refers to a shade intended particularly for electric lights, but useful in connection with other lights. The object is to produce a means by which the light may be subdued and reflected in various colors and figures. Also to produce a shade and reflector which will enable the lights, particularly electric lights, to be hung in fanciful groups, taking the place of the usual chandelier.

STAND FOR LIQUID-CONTAINING VESSELS.—O. HAMMARLUND, New York, N. Y. This improvement has reference more especially to stands or holders for bottles, decanters, and the like of the type comprising glass or other solid stoppers; and one of the principal objects is to provide a structure in which one or more bottles, etc., may be placed so that the removal can only be effected in a certain way or by employment of special means, thereby preventing unauthorized or surreptitious abstraction of any of the liquid contents thereof.

LOG-CHOCK.—J. E. KNIGHT, Blue Canyon, Wash. An object of this invention is to provide a chock for holding logs on cars, trucks, and other means of transportation, which chock may be readily released to enable the logs to be rolled from the car without the necessity of a person going to the side of the car from which the logs are to be rolled.

COMBINED MINNOW BUCKET AND TRAP. —F. PETMECKY, Austin, Texas. An outer bucket of ordinary form is employed, together with an inner one having specially-constructed heads applied to the ends thereof, making of this bucket a trap. Said inner trap-bucket is also of special construction, by which the working capacity thereof may be varied in use.

FLUSH-VALVE.—E. D. BARRETT, Plainfield, N. J. The principal object of the inventor is to provide means for permitting a sudden rush of water through the valve when opened, whether the admission-pipe is the same size as the outlet-pipe or smaller, and to provide for the gradual closing of the valve, so that a constant stream will pass through for some time without the necessity of holding the valve open.

LEDGER.—W. WYLIE, Los Angeles, Cal. The ledger comprises a plurality of sheets transversely perforated, dividing each into a short upper and a long lower portion, and ruled vertically upon each side to divide the sheet into vertical halves, the upper portion ruled upon each side transversely into a series of lines, and each half ruled vertically to form a column headed "meter number," and columns for names and street-number, one-half of lower portion ruled to form column for dates, and columns headed "Statements," etc., the other into columns headed "Statements," "Total," etc., and entire lower portion ruled transversely into spaces for one month's business, said spaces bearing, in date's column, names of the twelve months, respectively.

FIREPROOF FIXTURE. — E. F. FITZPATRICK, New York, N. Y. This patentee's invention has reference to fireproof fixtures—such as partitions, blinds, doors, walls, and the like—his more particular purpose being the provision of an inclosed air-space, sometimes designated as a "vacuum," which acts as a non-conductor of heat.

CONTAINER FOR CIGARS.—S. C. MARUM, New York, N. Y. This container comprises rear and side walls between which the cigars may extend, and separated front bars connecting the side walls and serving to retain the cigars in place, while permitting them to be seen in display. One of said bars has an extension, furnishing a closure with which the inner ends and adjacent sides of the cigars may contact, the side and rear walls being extended at the opposite end to form a closure for the container.

DRAFT ATTACHMENT FOR HAMES.—F. J. MARTIN, Putney, Vt. In animal-harness the point of draft strain should be at a proper distance above the strap connection between the lower ends of the harness, so that such strain is imposed upon the padding of the collar at a point that insures a proper pressure upon the shoulders, and this point for imposing pressure varies in different animals. To enable making a convenient change and adapting the harness for comfortable service, Mr. Martin has devised the attachment for connecting the front ends of tug-straps with the harness.

ROOFING.—H. M. JACKSON, Lancaster, Ohio. This inventor improves means for securing slates on roofs and protecting the edges of the courses laid thereon. In laying slate in single lap in the usual way the first and last rows of nails are exposed and small spaces between the slats and roof are left open along the side edges of the roof. He provides a securing and protecting device which not only adds to the security and efficiency of the roof-covering, but also to its ornamental appearance.

STERILIZING AND ANTISEPTIC CASE WITH STAND FOR SURGICAL INSTRUMENTS.—P. BRIGANTI, New York, N. Y. This invention refers to a case and stand for surgical and dental instruments, the principal objects thereof being to provide means whereby the instruments can be effectively treated by an antiseptic solution and then transported to any place where it may be necessary to use them in an operation without contaminating them in any way; also to provide means for holding the instruments and to provide for introducing and discharging the solution.

MARINE LOCK.—J. DIAMANT, New York, N. Y. In this case the invention refers to hydraulic engineering; and its object is to provide a new and improved lock for canals and other waterways and arranged to permit of raising or lowering marine vessels from one water-level to another without the loss of water and with the expenditure of comparatively little power.

LETTER-CARRIER'S MAIL-DEPOSIT BOX. —T. VAN M. DAVIS, Portland, Ore. In the form of the improvements made by Mr. Davis, he employs a mail-deposit box of special construction having special means for fastening the same to a suitable support therefor, and provided with a door or closure which may be fastened or secured in place by a suitable lock that is to be opened only by the letter-carrier or other person in authority.

ACCOUNT-FILE.—J. O. WILHELM, Limaville, Ohio. A purpose of the invention is to provide a file which will also serve as a registry of the accounts filed therein and to so construct the file that the captions of all of the outermost bills contained in the file and accumulated in one or more days or in a given period of time will be visible at a glance and the underlying bills will be equally visible as the outermost ones are removed.

GARMENT-FORM.—E. T. PALMENBERG, New York, N. Y. In the present patent the invention has reference to apparel apparatus, and its object is the provision of a new and improved garment form arranged to allow convenient and quick interchange of different arms, heads, and shoulders, according to the style of dress to be displayed.

PROPELLER-WHEEL.—A. H. LITTLE, New York, N. Y. The principal object of the inventor is to provide means on the blades of a screw or similar propeller for acting upon the water after the main part of the blade has passed through it, so as to recover some of the power that is lost by the speedy rotation of the blades and cause the boat to attain greater speed and in general give more satisfactory results.

RIBBON-HOLDER.—R. A. GLADNEY, Marion, Ark. The object in this instance is to provide a ribbon-holder for use in retail dry-goods stores, fancy-goods stores, and like places and arranged to permit mounting a coil of ribbon for convenient display and unwinding lengths as desired by purchasers without danger of the roll of ribbon being soiled by unduly handling the same or dropping it to the counter or floor.

LUBRICATOR.—G. SLOAN, North Yakima, Wash. The invention relates to lubricators in which a spring-pressed plunger forces a turgid lubricant or grease to the part to be lubricated. The object is to provide a lubricator arranged to insure a constant feed of the grease to the part to be lubricated and without danger of leakage of the grease past the spring-actuated plunger.

RAZOR-BLADE HOLDER.—J. H. HUNT, Massillon, Ohio. The purpose here is to provide a device for holding razors or like blades during stropping or honing, being particularly adapted for use in connection with the blades of safety-razors, and to so construct the device that it can be conveniently opened and closed and otherwise operated by one hand. The aim

also is to simplify and render more effective construction set forth in Mr. Hunt's improvements formerly allowed.

ADJUSTABLE HORSESHOE-CALK.—T. W. J. McGANN, Washington, D. C. Mr. McGann has made two inventions in the nature of an adjustable horseshoe-calk for rendering the horse rough-shod without removing the shoe. The first relates to that form of adjustable calk in which a plate applied externally to the toe part of the shoe is formed with two hook-shaped claws which hook around the front edge of the shoe and penetrate a short distance between the shoe and hoof and by means of which plate a movable calk-section is secured. He provides a detachable calk easily applied and removed and yet so strongly connected that its parts do not become loosened by hammering action of hoof on the road-bed. In the second he provides a detached calk which shall be easily applied and removed and yet so strongly connected that its parts do not become loosened by hammering action of the hoof on the road-bed. In calks of this character the trouble has been to maintain a rigid connection of the calk to the shoe under the severe strains to which it is subjected.

DETACHABLE HEEL-CALK FOR COMPOSITE RUBBER-PAD HORSESHOES.—T. W. J. McGANN, Washington, D. C. The design in this invention is to provide a detachable heel-calk applicable to that class of composite horseshoes which are known as "three-quarter shoes," which are provided at the heel with a rubber pad. This shoe is rendered rough-shod for slippery roads without having to take off the shoes or send the horse to the blacksmith.

DETACHABLE CALK FOR RUBBER-PAD HORSESHOES.—T. W. J. McGANN, Washington, D. C. A detachable calk is provided for the toe and heel of that form of composite shoe which is made of a skeleton frame of metal having its recesses filled with rubber which forms a full tread-surface of an elastic quality. This form of shoe is well known and while cushioning the blow of the hoof on the road-bed has but little durability and is not effective in preventing slipping when sleet or ice is on the roadway. The invention is especially adapted to this form, but applicable in some features to the metal shoe.

DETACHABLE HEEL-CALK FOR HORSESHOES.—T. W. J. McGANN, Washington, D. C. The invention relates to heel-calks for rough-shod horseshoes; and it is designed to supply a detachable calk which may be easily and quickly applied to or removed from the shoe while on the hoof without any drilling or machine work and without requiring the animal to be sent to the shop. Mr. McGann has invented another detachable heel-calk for horseshoes which relates to detachable heel-calks for the ordinary flat or plain horseshoe; and it is designed to supply a detachable calk which may be easily and quickly applied to or removed from the shoe while on the horse's hoof, so as to give a plain shoe the quality of a rough-shod shoe. The same inventor has made another detachable heel-calk for horseshoes, an invention which relates to that form of detachable heel-calks which is made in the form of a bridge-piece that extends across the rear ends of the shoe from heel to heel. The difficulty has been with this form to insure its firm adherence to the shoe against getting loose and coming off. He provides means for accomplishing this and supplies an efficient heel-calk that can be applied by any one without sending the horse to the blacksmith and which is applicable both to plain and rough-shod shoes. This patentee has also invented another detachable heel-calk for horseshoes and it relates to detachable heel-calks for horseshoes of that form in which the heels of the shoe are enlarged laterally at the ends. This form of heel is common in shoes of a composite character in which a skeleton iron shoe is imbedded in an elastic rubber mat.

DETACHABLE CALK FOR HORSESHOES.—T. W. J. McGANN, Washington, D. C. In this case the invention has for its object to provide a construction which can be readily applied to the ordinary horseshoe when on the horse's hoof and easily removed and will be efficient for the purpose designed when applied.

Hardware.

LOCK.—N. W. WEBB, New York, N. Y. The improvement pertains to locks and latches for doors and the like; and its object is to provide a lock arranged to prevent unauthorized persons from unlocking the door or other part on which the lock is used, the main bolt of the lock being held against retraction when the door is in a closed position unless the operator has the proper key or can turn the knob on the inside of the door.

SASH-CORD FASTENER.—L. H. BROOME, Jersey City, N. J. One purpose of the improvement is to provide a device adapted for use in connection with a sash cord or chain to produce a knot therein for the purpose of removably securing the cord or chain to the window-sash, said cord or chain being especially adapted for attachment to a weight.

REVERSIBLE HANDLE ATTACHMENT FOR PLANES.—R. HUNTER, Spokane, Wash. In the present patent the invention is an improvement in that class of carpenter's or hand planes which are provided with handles adapted to be shifted laterally, so that the plane may be used in angles or corners where it would be otherwise impracticable.

WRENCH.—M. J. McGINN, Proctor, Minn. This wrench firmly grips a pipe with an equal strain on all parts of the same, thus preventing crushing the pipe by extreme pressure applied at one point only. This is done by fitting an intermediately-pivoted jaw on the end of the lever or handle. To this jaw is joined a chain also joined to the lever and engaging intermediate the ends of the chain with a block, to which a second chain is joined, the jaw being adapted to removably engage said second chain, so that after adjusting parts on the pipe by swinging the lever the first chain exerts tension on the second, forcing same against pipe and gripping it firmly.

SNAP-HOOK. — SAMUEL HOAR, Hibbing, Minn. Mr. Hoar provides a snap hook together with a mousing, in which the hook is mounted and with which it co-operates, the hook being provided with means for causing the same to become automatically engaged with an end of the mousing as the bill of the hook is introduced thereinto to secure in place thereon a bit-ring or other device in connection with which the structure is employed.

PLUMBER'S CLAMP.—R. PARKER, Lakewood, N. J. A base-frame is employed, its duplicate members being collapsible, and associated with each member is a clamp comprising a stationary and a movable member, together with means for operating the latter to lighten a section of pipe in place between the jaws of the two said members. Said clamps are collapsible with reference to each other and duplicate members of said frame. Means rigidly secure members of the frame in distended relation to each other for operation. Means rigidly secure clamps in operative relation with frame, each being provided with means for enabling quick adjustment thereof in accordance with pipes of varying diameters.

WIRE-WORKING DIE.—S. E. JACKSON and E. B. LEE, Weston, Mich. The principal objects of the inventor are to provide means for forming a joint or lock in a vertical position and still have an angle in each of the vertical wires which it connects, therefore making it impossible for the lock to slide up and down. Another of additional objects is to cause the lock-wire to wrap around the line and stay once and then again around the line-wire, with each end of the lock-wire lying against the stay-wire. This assists in preventing sliding of parts upon each other.

Heating and Lighting.

ACETYLENE-GAS GENERATOR.—L. C. GILMORE, San Pedro, Cal. The generator is arranged to insure periodic feeding of the carbid according to the consumption of the generated gas, to permit of agitating the carbid in the water-tank from the outside of the apparatus, to allow feeding of the carbid by hand to purify and cool the generated gas, and to provide a ready escape from the generated gas from the water-tank into the outer air whenever the gas is under excessive pressure.

TRAP.—E. J. RYAN, Danville, Ill. Means are provided whereby the air forced from the radiators by the steam-pressure is allowed to discharge into the atmosphere, and the discharge-pipe sealed to prevent inlet of air, thereby causing a vacuum in the entire apparatus whenever water in the boiler arrives at 212 deg. Creating a vacuum at this time in the apparatus allows water to continue boiling and generates steam under a vacuum, thereby making any steam-heating system a combined pressure and vacuum steam-heating system, and providing a means whereby the water of condensation is trapped and carried back to the boiler or steam-generator.

VACUUM HEATING SYSTEM.—C. A. DUNHAM, Marshalltown, Iowa. The object in this case is to provide improvements in vacuum heating systems whereby a thorough and uniform heating is insured, a partial vacuum may be maintained throughout the system, only one pump is employed for returning the water of condensation directly to the boiler, the use of air-escape valves on radiators or like heating mediums is dispensed with, and the air in water of condensation is separated from the water and is discharged at the pump, which latter is kept primed at all times.

WATER-CIRCULATING APPARATUS. — J. N. RUSSELL, 22 Charing Cross, Whitehall, London, England. The invention relates to water-circulation apparatus such as is used for warming buildings, supplying hot-water draw-off taps, or for cooling storage rooms and the like and wherein the water ascends from the point where it takes up the heat. The object is to overcome a difficulty in this arrangement, and the invention consists in means whereby return water does not return directly to the heater, but is forced up a secondary ascension-pipe (by an aerated column-pump or equivalent) to an elevated tank, whereby a head of water is produced. Water passes from tank to heater by a final return-pipe, accelerating natural circulation.

Household Utilities.

ICE-PITCHER.—J. KRAKAUER, New York, N. Y. The particular object of this invention which relates to ice-pitchers and analogous vessels is to provide the body portion of the vessel with a compartment distinct from that used for holding the fluid contents of the vessel, this compartment being for the purpose of holding ice out of contact with the ordinary contents.

GARBAGE-CAN.—J. R. MOLER, H. E. INSLEY, and S. L. PHILLIPS, Denver, Col. The invention is an improvement in the class of receptacles located upon the street or adjacent to houses for the purposes of receiving and temporarily holding garbage, rubbish, etc. The body of the can is oblong and rectangular in form and constructed of sheet metal, preferably thin galvanized iron, and within is suspended a canvas sack. The bottom of the can being open, air has free access to the sack on all sides, so that material deposited in it is constantly subjected to drying action.

Machines and Mechanical Devices.

FREEZING DEVICE.—E. THOMPSON, New Rochelle, N. Y. This patentee's invention is mainly intended as an ice cream freezer and he provides a can spaced from the case by a coil for the freezing mixture, and forms in the bottom of the can an outlet leading to a chute, the opening being controlled by a slide. The agitator is mounted on a shaft extending through the bottom of the case and can, the shaft being designed to be operated by a drive shaft and gearing. The cream having been frozen the slide is withdrawn and the movement of the agitator serves to discharge the cream through the opening, and chute.

CORRUGATING-MACHINE. — G. B. JOHNSON, 8 Victoria street, Westminster, London, England. This invention relates to a machine for producing a plurality of longitudinally-extending corrugations in a sheet of metal. The object is to enable a machine of this type to be employed for producing shapes comprising a plurality of reverse curves and for bringing sheets of metal of any width to a corrugated cross-sectional form—as is commonly required in roofing-sheets—whether the contour of corrugations be regular and symmetrical or otherwise and whether finished sheets be required to be flat or curved longitudinally.

CARPET-CUTTING MACHINE. — R. E. DUBE and W. A. DUBE, Faribault, Minn. Old carpets and similar articles are cut up into strips and reweaved to form carpets, rugs, and the like. In order to provide a nap for such articles, the strips are slashed on their edges. The operation consumes considerable time, and the regularity of slashing is likely to be neglected when cheap labor is employed. The object of the invention is to provide a machine which will simultaneously cut up old carpets and fabrics of all kinds into longitudinal strips and slash the edges thereof regularly and uniformly.

AUTOMATIC WEIGHING-MACHINE. — E. HANAK, San Francisco, Cal. In the present patent the invention has reference to a machine which is especially adapted to accurately weigh or measure with great rapidity substances such as coffee, tea, seeds, spices and all granular and all powdered substances that will flow by gravitation.

STROPPING-MACHINE. — J. R. CURLEY, New York, N. Y. One purpose of the inventor is to provide a machine by means of which a razor is stropped at the same angle as by hand and every stroke at the same angle and the strop is so shaped as to conform to the shape of the razor edge, insuring the entire edge being stropped the full length of the stroke, thereby enabling it to be stropped in fewer strokes than by hand, wherein the different parts of the blade are stropped but for a small portion of each stroke and no part is stropped the entire length of the stroke unless at the expense of some other part.

RAFTER-SCALE.—W. W. DWIGANS and J. M. ADAMS, Arkadelphia, Ark. In this instance the invention refers to mechanics' tools. The object of the improvement is to provide a convenient plumb-scale for finding the lengths of rafters of various pitches and for different widths of buildings. The device may be used in one way, as an ordinary level to show whether a beam or floor is horizontal.

EQUALIZING WEIGHT-FEED FOR DRILL-SHANKS.—K. BROOKS, New York, N. Y. The purpose of the invention is to provide an adjustable automatic weight or core drill feed for drill-shanks designed to furnish a uniform pressure for what is known as "core-drills" from the commencement to the completion of its work and to provide the device with adjustable weights, which serve to maintain perfect equilibrium.

SEWING-MACHINE STAND.—G. D. COOPER, Providence, R. I. The underlying object of the invention is to improve the ordinary cast-iron stand in point of lightness and durability, permitting the machine to be shipped with less freight rates and liability to breakage and producing a lighter machine, which may be moved about with greater ease than those ordinarily constructed. He constructs the stand of iron rods or heavy wire, the parts of which are joined in a peculiar manner, producing a very light and strong structure at diminished cost.

COMBINED REAMER AND DIE-STOCK.—J. J. DELEHANT, Chicago, Ill. The invention relates to mechanism for threading and reaming pipes, and more particularly to a reamer to be connected with a die-stock in such a manner as to accomplish both the threading and reaming at a single operation. Any ordinary die-stock may be employed in this relation.

DECORTICATING-MACHINE.—M. CASTELLON, Merida, Yucatan, Mexico. One purpose of the inventor is to construct a machine for decorticating the leaves of plants, especially sisal hemp, and to provide a machine which will expeditiously remove the pulp from the fiber in a thorough and cleanly manner and without detriment to the fiber.

ADDING-MACHINE.—N. H. KODAMA and A. I. GANCHER, New York, N. Y. The object of the invention is to provide a machine not liable to easily get out of order, and arranged to permit convenient manipulating with a view to add up any desired number of sums and indicate the total, and more particularly to add sums representing money in dollars and cents and other denominations.

PROPELLING MECHANISM. — F. PÉLISSIER, Gonaives, Haiti. The invention relates to mechanism for propelling ships. The object of the inventor is to provide mechanism which will be positive in its action and which will facilitate the steering of a ship as well as its propulsion. Further, to provide an arrangement whereby the propelling mechanism may be readily attached to ships previously completed.

ATTACHMENT FOR CARTON-MAKING MACHINES.—R. SUNDERMAN, Buffalo, N. Y. The present invention embodies several objects, one of which is to slightly open the carton-blank immediately after the same is fed into the machine—that is, where carton-blanks are fed into a machine for the purpose of being formed into complete cartons, and especially where they are to be filled—while in the same machine it is desirable that some means be provided for opening the carton-blanks. It is of peculiar service in connection with carton-making machines described in Mr. Sunderman's pending application previously filed.

UNIVERSAL ADJUSTER FOR PRINTING-FILMS.—B. DAY, West Hoboken, N. J. In the present patent the invention relates to the manipulation of printing-films, one of which is inclosed in an appropriate frame, Mr. Day's more particular object being to secure precision in the handling of the film relatively to the work. It further relates to certain means for adjusting the frame so as to bring it to a predetermined part of the work and for turning the frame and the work to different angles relatively to each other for the purpose of producing various changes in shading.

CUTTING ATTACHMENT FOR PRINTING-PRESSES.—J. W. SMITH and G. U. HARN, JR., Columbus, Ohio. One purpose here is to provide a knife so mounted with reference to the frame of the machine and with relation to the feed for the paper that as the knife and its support approach the cutting position of the knife said parts are automatically fed forward by suitable mechanism at the same rate of speed as that at which the paper travels, thereby insuring a clean cut when the knife is actually in cutting action without danger of buckling the paper. The invention relates to an improvement on the press for which Letters Patent were formerly granted to the above inventors.

COIN-CONTROLLED APPARATUS.—M. F. PRICE, Iowa City, Iowa. The present invention is an improvement over mechanism of Mr. Price's prior patent. In the prior device two stops are employed, the bottom stop working against the lowermost button of a superimposed pile and the upper stop working between the lowermost button and one next adjacent, the stops operating alternately separately to deliver the buttons. The main object of the present improvement is to render the operation of these stops wholly automatic upon the insertion of a proper coin.

BARBER'S APPLIANCE. — G. W. HALE, Norfolk, Va. The aim of this invention is to construct a device for barber's use particularly adapted for shampooing, massaging, and removing loose hair, dust, and dandruff from the head, and furthermore, for invigorating the scalp. The device can be operated manually or from a source of power.

CUTTING-MACHINE. — W. C. QUINLEN, Barre, Vt. In this case the invention relates to stone-cutting, and the object is to provide a new and improved cutting-machine for surfacing or other work and arranged to remove a large amount of stock in a comparatively short time and without unduly heating the cutters or subjecting the same to injurious strains. The machine is designed for cutting both backward and forward with a cross belt. It can accommodate a large number of tools.

MECHANISM FOR CONVERTING ROTARY MOTION INTO RECIPROCATORY MOTION. L. NEUMANN, Gleiwitz, Prussia, Germany. The invention relates to improvements in that kind of mechanism for converting motion in which a reciprocating ring is mounted between two inclined rotary disks. The object is to adapt such mechanism for a greater variety of purposes, and quite particularly to enable it to be used for converting reciprocating into a rotary motion, which was not heretofore possible. Such mechanism comprises two curved or angular disks or the like arranged parallel to each other, but inclined with regard to their axes of rotation and between which an annular part is guided so that during rotary movement of disks the said part is revolved and caused to oscillate in longitudinal direction of the axis.

VENDING DEVICE.—S. C. GILBERT, Jackson, Ohio. Means are provided for holding a series of bags of peanuts or other similar ar-

ticles in a casing and automatically delivering one bag at a time upon manipulation of any desired starting device—such, for instance, as coin-controlled mechanism; also means for preventing the delivery of more than one package at each operation of the controlling device and for heating the packages, to keep the contents warm at all times.

FEEDER FOR SUGAR-CANE CARRIERS.—L. M. Dill, Avoca, La. The purpose of this inventor is to provide a simple and economic machine especially adapted for raking cane from a car upon the carrier which conducts it to the sugar-mill and to so construct the machine that the operator can cause the rake to move forward or backward or be raised or lowered at will.

TRAP.—W. E. Werd, Deer Lodge, Mont. The object of the improvement is to provide details of construction enabling convenient and safe setting of the trap, its easy and rapid release from a captive, which avoids liability of maiming the animal or bird caught, and which enables a person accidentally caught to easily release himself without suffering injury to the member held therein.

MEAT ROLLER OR WRINGER.—B. L. Packard, Denver, Col. The object of this invention is to provide an improved device in which means is provided for regulating the pressure applied to meat when passing through the device and in which means is also provided to permit the separation of the pressure rollers to allow bones to pass between them without crushing and splintering.

Prime Movers and Their Accessories.

CARBURETER FOR EXPLOSIVE-ENGINES.—J. H. Johnston, 145 Rue de la Pompe, Paris, France. In this patent the invention has reference to a carbureter for explosive-engines so equipped as to allow of obtaining an explosive mixture the richness of which will always remain the same whatever may be the speed of the engine. In this case the richness depends on the speed at which the air passes around the orifice of the spray-pipe.

HEAT-SCREEN FOR STEAM-CHESTS.—D. C. Bailly, Real, Minn. The object of the invention is to prevent the condensation of steam in steam-chests, due in part to the reduction in pressure in passing from the governor to the steam-chest and the consequent loss of heat and to the further loss of heat due to the radiation from the steam-chest covering. The invention is intended to prevent this radiation.

LIFT-PUMP.—H. M. Crow, Oakdale, Cal. The aim of this invention is to provide a pump which may be driven by means of an engine or similar motive power, but which is adapted to be altered readily, so as to enable the well-rod to be attached to the rod of a windmill. It is especially useful in localities where windmills are used for raising water, but which cannot be depended upon under all weather conditions.

Railways and Their Accessories.

LATCH DEVICE FOR DUMPING STRUCTURES.—C. F. Shelby, Globe, Ariz. Ter. The purpose of the inventor is to provide a latch device especially designed for normally holding the dumping or rocking body of a car in carrying position on the platform and to so construct the latch that it is simple, durable, economic, and readily applied. It can be quickly and conveniently disconnected from its keeper when the body of the car is brought to its normal or carrying position.

SPIKE-PULLER.—T. W. Harber, Dudenville, Mo. One purpose of the improvement is to provide a device for pulling spikes used in connection with railway-rails or bolts or common nails, even though said articles be headless, and to so construct it that the jaws may be adjusted to close properly on the articles to be drawn, and so that as it is applied the jaws automatically open and then close as the device is put in withdrawing action, tightening their grip correspondingly to the applied withdrawal force.

RAILWAY-SWITCH.—A. A. Shaw, Arkadelphia, Ark. The object in this case is to provide a compact and efficient switch-frog with a view of obtaining a convex track-rail both for the main line and switch or siding, and that will be adapted to all kinds of switching whether the switch is operated from a switch-station or a tower. It embodies all the essential features of a safe and reliable switch frog, yet is simple in construction, having no complicated mechanism to break or get out of working order, thus insuring reliable action at all times, with cost of manufacture reduced to the minimum.

CAR-COUPLING.—F. Keller, Allentown, and D. Bowers, Emaus, Pa. The coupling comprises coupling-heads practically duplicates of each other and constructed interiorly to contain and permit of the working organization of the inner operative devices of the head. A locking-block is used in each coupling-head, combined with which are devices for securely holding same in operative position both when the two heads are in coupled or uncoupled relation, further devices being employed for setting and securing the locking-block in rearward position within the head to enable either one of the coupled cars to be disconnected from the other without the presence of an operator. Action of locking-block of each coupling-head is automatic.

RAILWAY SPIKE AND TIE-PLATE.—T. G. Peterman, Cumberland, Md. The invention relates to improvements in spikes and tie-plates for railway-rails, the object being to provide a spike so constructed as not only to firmly hold the rail, but effectually to prevent the passing of water down the spike to the tie, thus preventing rotting of the wooden tie at this point and consequent loosening of the spike.

RAILROAD-TIE.—J. F. Bailey, Valdosta, Ga. The tie may be formed of a single plate and afterward divided or may be formed of two plates, and a block of wood is made of larger size than the pocket and driven thereinto, thus providing a firm hold for the spike. When the flanges are embedded in the ballast, the tie is restrained both from transverse and from longitudinal movement with respect to road-bed, and by provision of a hinge a tie is formed free from the objections found in the ordinary metallic tie—that is, lack of resiliency. It is resilient and flexible, yet not sufficient to impair alinement of the rails.

CAR-COUPLING.—F. A. Ramey, Woodstock, Va. By this improvement the inventor seeks to provide an oscillating draw-head section and devices for holding the coupling-knuckle in locked position when said section is in normal position and for releasing the locking devices for said knuckle when the oscillating section is moved laterally in either direction out of its normal position.

ANTICREEPER.—C. Lien, Salt Lake City, Utah. The principal object of the invention is not only to check the longitudinally creeping tendency of rails, but also to prevent it entirely. With this and other objects in view the invention comprises a clamp to be secured to the rail and a fastening device for the clamp adapted to engage with a sleeper on the road-bed to prevent movement of the rail transverse to the sleeper.

CAR-COUPLING.—B. J. Cobb, Leesville, La. A coupling is employed of the ordinary link-and-pin type, comprising coupling members, each practically a duplicate of the other. A specially-constructed coupling member is employed for each of the two cars to be coupled together, associated with which is an ordinary coupling-link, together with a specially-constructed pin-fastening therefor, coöperating with which is a controlling-block of special construction, located and operated interiorly of the coupled member.

SIGNAL SYSTEM.—J. H. Lynch, Red Bank, N. J. Principal objects of this invention are to provide means whereby the passage of a train over a certain part of the road can be caused to set signals in the rear for the observation of the crew of any train approaching from behind, and further, to provide means whereby the setting of these signals will not only permit the crew to understand the position of train in advance, but to automatically stop the approaching train.

Pertaining to Recreation.

GAME-CARDS.—C. Warne, Asbury Park, N. J. In the present patent the invention has reference to new and useful improvements in game-cards; and it has for its object to provide a pack of playing-cards with which certain interesting and instructive games may be played. The rules permit of two, four handed, and other styles of games.

Pertaining to Vehicles.

TRUCK.—D. H. Rowe, Oakland, Cal. The object in this case is to provide a truck which will be capable of carrying baggage and freight with the same facility as such loads are carried by the ordinary trucks, but which, in addition, shall be so constructed as to enable a heavy load to be taken up and down a flight of stairs.

VEHICLE-WHEEL.—R. F. Martindale, Memphis, Tenn. More particularly the invention relates to such vehicle-wheels as are portions of draft-wagon running-gears. The object is to provide a wheel very light, durable, and exceedingly strong, well adapted for convenient repair, and not liable to become clogged with clay or the like when the wagon is traversing muddy roads. It is manufactured of metal, and largely from plated metal cut and stamped into form, whereby it is adapted for rapid and perfect production at a low cost.

MOTOR-VEHICLE RUNNING-GEAR.—R. B. Vaughn, Kingston, Pa. The leading object of the invention is to so construct the running-gear and frame of a motor-car or other automobile-vehicle as to dispense wholly or in part with the necessity for pneumatic or other cushion tires on the road-wheels. It is also an object of invention to mount the frame and body so as to permit easy and free movement on the springs, preventing, however, violent and erratic movement.

TIRE.—J. C. Raymond, New York, N. Y. In operation the parts, a circumferential cushion, a tire-frame, and a base plate are assembled. The frame holds the casing, the cushion, and the inner tube and the plate is applied to secure the casing in engagement with the frame and to form a carrier for the parts ready for application to the frame of the wheel. The plate, with the tire in place, can now be slipped laterally over a rim-plate and screws applied to secure the parts in place.

Wearing Apparel.

HAIR-PIN.—G. H. Bigelow, San Francisco, Cal. The purpose in this case is to provide a pin that will be effective to support the hair, will not accidentally slip from place, and is provided with means for readily and quickly removing the pin from the hair, the handle means being so disposed as to secure an arrangement of the legs of the pin in different planes, so one may readily slide back of the other in pressing the pin into the hair and in removing the pin.

COMBINED UNDERGARMENT AND TESTES-SUPPORTER.—W. C. A. Bullock, Jackson, Miss. In the present improvement the object of the inventor is the provision of an undergarment for a man with novel features of construction that coact with supporting-bands for the comfortable support of the scrotum and testes when such treatment is found necessary.

Designs.

DESIGN FOR A PLATE OR SIMILAR DISH.—A. S. Higgins, New York, N. Y. A design patent has been granted to Mr. Higgins for a plate. It is round and the width from the central depression to the outer edge is broadly wreathed by beautiful clover blossoms and fern leaves. An ornamental circle in the center of the dish surrounds the head and neck of a cow.

DESIGN FOR A WOODEN MUG.—R. P. Spooner, Cornwall-on-the-Hudson, N. Y. In this case the mug which is somewhat high for its width is designed with a rustic body, slightly and gracefully widening to the bottom. A rustic handle is inserted at the wooden bands encircling the mug.

DESIGN FOR KNIT FABRIC.—C. H. French, Canton, Mass. This ornamental design comprises a field of fabric alternating with comparatively light and heavy bands. The light bands are the narrowest and quite plain, while the heavier and broader ones are reinforced by clusters of irregular and unpatterned forms. Mr. French has also designed another knit fabric wherein the bands are relatively wider and narrower. The darker and broader have the appearance of ragged and indefinite transverse stripes. The narrow bands are plain.

DESIGN FOR A COOKING-STOVE.—E. C. Cole, Chicago, Ill. This design includes a round fire pot and stove body and a rectangular oven mounted upon suitable supports above the body, the supports being mounted upon the top, the latter being provided with suitable lids and key plates, and the whole presenting an attractive appearance.

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. 8043.—Wanted, address of Paris or United States manufacturer of reconstructed rubies and emeralds

For logging engines. J. S. Mundy, Newark, N. J.

Inquiry No. 8044.—Wanted, address of manufacturer of Cast show case.

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

Inquiry No. 8045.—For manufacturers of fine quality sewing needles.

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

Inquiry No. 8046.—Wanted, address of ivory-carving machine manufacturers.

I sell patents. To buy, or having one to sell, write Chas. A. Scott, 719 Mutual Life Building, Buffalo, N. Y.

Inquiry No. 8047.—For manufacturers of tinfoil rolling mills for foil in endless lengths.

WANTED.—Patents on bed spring constructions. Mebane Bedding Co., Mebane, N. C.

Inquiry No. 8048.—For manufacturers of machine used in vacuum closed jars.

For Sale.—Patent No. 774,043. Self-reversing trolley pole. W. R. Cooper, 640 Morton Ave., Greencastle, Ind.

Inquiry No. 8049.—For manufacturers of 20th Century Gyroscope, also manufacturers of novelties and specialties.

Well gotten up typewritten letters will increase your business. $2 per 1,000. Typewritten Letter Co., St. Louis.

Inquiry No. 8050.—Wanted, address of dealer that sells a machine to cut noodles.

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

Inquiry No. 8051.—For manufacturers of preparation called "Koal Span," which is a powder designed to sprinkle over coal and thus increase the heat given out.

I have for sale the U. S. and all foreign rights of new patent Improvements in Water Tube Types of Boilers. Great economizer. J. M. Colman, Everett, Wash.

Inquiry No. 8052.—For manufacturers of malleable iron thumb screws.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machinery tools, and wood fiber products. Quadriga Manufacturing Company, 18 South Canal St., Chicago.

Inquiry No. 8053.—For manufacturers of skees.

Inquiry No. 8054.—Wanted, address of dealers in Jupiter wire cables of small size.

Inquiry No. 8055.—Wanted, address of firms installing alcohol lighting plants.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

Buyers wishing to purchase any article not advertised in our columns will be furnished with addresses of houses manufacturing or carrying the same.

Special Written Information on matters of personal rather than general interest cannot be expected without remuneration.

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

Books referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(9944) P. J. L. asks how to make tracing cloth. A. 1. Boiled linseed oil (bleached), 10 pounds; lead shavings, ½ pound; zinc oxide, 2½ pounds; Venetian turpentine, ¼ pound. Boil for several hours, then strain, and dissolve in the strained composition 2½ pounds white gum copal. Remove from the fire, and when partly cold, add oil of turpentine (purified), sufficient to bring it to proper consistence. Moisten the cloth thoroughly in benzole and give it a flowing coat of varnish. 2. Varnish the cloth with Canada balsam dissolved in turpentine, to which may be added a few drops of castor oil, but do not add too much, or it will not dry. Try a little piece first with a small quantity of varnish. The kind of cloth to use is fine linen; don't let the varnish be too thick.

(9945) G. O. W. says: I want to build a stereopticon using a 7-inch Mangin mirror, an acetylene illuminant of six or eight 2-foot burners giving 100 candle-power each, bunching the burners together as much as possible. I want to use condensing lenses 7-inch diameter, 12 inch focus, and a two-third size achromatic projecting lens whose equivalent focus is 12 inches. A. We would say in reference to your inquiries regarding the arrangement of lenses, light, and mirror for a stereopticon, that all such instruments are made adjustable, so that the various distances may be altered to adapt the projection to halls of different lengths. You can determine the proper position for each by trial, and make the parts of the apparatus to correspond. It is not possible from the data you give to make any reliable calculations for the various positions. You say "a 7-inch Mangin mirror." If this means the focal length, then 7 inches is the proper distance for the center of the light. If it is the diameter of the mirror, it does not give any information upon the subject. Proceed as follows: In a darkened room place a candle flame, so that the reflected light emerges as nearly parallel as possible, or so that the beam can all of it enter your 7-inch condenser, and come to a focus after it passes the condenser at such a distance from the condenser as to allow the two-thirds lens to take in most or all of the light. These directions are the best we can do, and give the method we use in the same case. 2. How far the center of the flame must be from the mirror? A. The place for the flame of a stereopticon is a short distance beyond the focus for parallel rays. You can find this focus by placing the mirror in the sunlight and measuring the focal length—the distance from the center of the mirror to the focus of the sun's rays. 3. How far the mirror must be from the condensing lens nearest the mirror? A. The mirror should be at such a distance from the condenser that the beam from the mirror may enter the condenser. Find by experiment. 4. Which would be more satisfactory—to place the flames so that they cover the mirror reflector, or place them in line with the axis of the mirror? The Mangin mirror is concave, so as to throw the rays of light parallel. A. Acetylene flames are usually placed in a straight line in the axis of the lenses. We have never seen more than four used. Seven would make too long a line of flame. Perhaps with so large a mirror and lens the lights might be staggered to advantage. 5. Would it interfere with the intensity of the light to place a thin glass over the mirror, so as to protect it from the heat to prevent breaking the same? A. A thin glass or a sheet of mica is frequently used to protect the condensers from the heat of the calcium light. You can use such an arrangement. 6. The condensing lenses are placed so that their convex sides are together. How far apart ought they to be, measuring from the surface of one at the center to the surface of the other at the center? A. The lenses of a condenser are placed with their convex surfaces toward each other, and as close to each other as they can be without touching each other. Distance not important further than this. 7. How far from the plane surface of the condensing lens nearest the objective to the center of the two-thirds size objective? A. The distance of the objective from the condenser depends upon the distance of the screen from the lantern, or the length of the hall in which the lantern is used. The objective