

**RECENTLY PATENTED INVENTIONS.****Apparatus for Special Purposes.**

**COMBINED HOISTING AND DUMPING APPARATUS.**—W. F. WEBER, New York, N. Y. The improvements in this invention are intended more especially for use in hoisting quantities of coal or other loose material to a suitable height and automatically dumping or delivering the same to a receiver therefor—as an elevator, for instance—by which the material may be conveyed to any desired place.

**APPARATUS FOR HEATING LIQUOR.**—J. P. ROCHE, Louisville, Ky. Means are provided in this instance for the introduction of a looped steam-pipe within a bung-hole in an air-tight manner. Also means of attaching such pipe to stationary steam supply and exhaust pipes at fixed points without requiring the barrel to occupy an exact position in relation to fixed points of connection whereby steam circulation is effected through the looped pipe in a safe manner for uniformly raising the temperature of liquor confined in the sealed receptacle.

**GAS-RETORT.**—W. E. HARTMAN, Norfolk, Va. The object in this improvement is to provide a retort involving peculiar details of construction, whereby overheating of its upper-wall portion is obviated. The invention comprehends novel means forming a part of the retort-furnace whereby drafts of air through an air-passage within the retort's wall may be regulated. Formation of lamp-black is prevented or materially reduced.

**METHOD OF TREATING AND CLEAVING SLATE.**—W. A. MCLAUGHLIN, Delta, Pa. Through defective cleavage only a certain portion of blocks can be split into serviceable plates. The inventor in this case has practically applied a method of treatment and cleavage of such "bad blocks" whereby the loss is frequently but 15 per cent. Thus he works at a profit the unprofitable quarries and greatly increases the output of those of the best class.

**COAL-LOADING APPARATUS.**—C. ALLISON, Pocatello, Idaho. Mr. Allison's invention is an improvement in apparatus for use in the handling of coal, and has for an object, among others, to provide a construction whereby coal may be dumped from the cars directly into buckets and the latter being elevated to dump into the tender of a locomotive or other receptacle.

**MOLASSES-BURNER.**—J. ANDERSON, Kealia, Hawaii. In this patent the invention refers to improvements in devices for burning waste molasses in bagasse or other furnaces, the object being to provide a device for utilizing waste molasses as a furnace fuel in lieu of coal, wood, oil, or the like. For complete combustion the molasses must be sprayed into the furnace.

**Electrical Apparatus.**

**ELECTRIC GENERATOR FOR INTERMITTENT CURRENTS.**—M. P. RYDER, Whiteplains, N. Y. In this instance the invention relates to an electric generator capable of general use, but especially adapted for service upon locomotives, gas-engines, etc., in which it is desirable to supply a powerful spark for the purpose of igniting an explosive charge. The apparatus may be made in various forms and is susceptible to divers applications.

**INCANDESCENT-LAMP SOCKET.**—C. WAGNER, Brooklyn, N. Y. This invention pertains to improvements in lamp-sockets, particularly small lamps used in candelabras, the object being the provision of a socket of simple construction and with which no exterior binding-posts are used, the several contacts or binding devices being arranged within the socket-body.

**Engineering Improvements.**

**SPARK-ARRESTER.**—J. WHITEHOUSE, Waihi, Upper Thames, Auckland, New Zealand. The principal object of this invention is the provision of means for arresting or preventing the escape of sparks or live cinders from locomotive and other stacks or chimneys and also to provide a contrivance thoroughly effective under varying conditions of use and which performs its intended functions without interfering with the draft or exhaust operations of the locomotive or other engine in connection with which the same may be employed.

**PUMP.**—D. McSTRAVICK, New Orleans, La. In this case the object is not only to produce a pump operating with less friction in the shaft-bearings, to reduce the resistance met by the water in its passage upward through the pump box, but also to provide means whereby the pump will operate and lift water until the source of supply is exhausted and a means whereby the water once brought into the box will be prevented from falling backward upon the stoppage of the pump machinery and whereby the pump will be ready for operation upon application of motive power and without preliminary "priming."

**PRODUCT FOR PREVENTION OF FURRING IN BOILERS.**—P. BEZ, Lérans, Ariège Dept., France. The present improvement refers to a product intended not only to prevent furring in boilers containing natural or purified waters, but also to allow of heating under pressure in ordinary boilers a dense solution of various salts or their equivalents,

thereby keeping the boiler clean and making a better use of heat generated, without the formation of adhesive deposits and without disassociating of the chlorides.

**Harness Accessories.**

**SNAP-HOOK.**—H. R. MEILICKE, Dundurn, Canada. The purpose of this improvement is to provide novel details of construction for a snap-hook which afford a neat, simple, convenient, and perfectly safe device that may be employed for connection of bridles, reins, or halters to the driving-bit or for any purpose where it may be availably used as a detachable connecting-hook.

**HAME-FASTENER.**—G. B. HOCH, Freeland, Pa. The aim in this case is to provide a mechanism wherein all parts of the locking device are exteriorly located upon the hames and secured so that the hames and the device or mechanism will not be unduly weakened, as but a single groove is made in one of the hames to which the device is applied and but a single slot is made in the body of the device independent of the openings required to admit of said body being attached to a hame.

**BUCKLE.**—J. A. GAVITT, Pendleton, Ore. Mr. Gavitt's invention pertains to an improved form of buckle for connecting the traces with the hame-tugs in harness. In a former patent granted this inventor a buckle of this class had disadvantages, which the present article overcomes. In the new construction, owing to the peculiar form of the main and tug frames and the disposition of the spur, the pin is always kept in engagement with the trace, and yet upon relaxation of strain on the parts they may be readily disengaged.

**Heating and Lighting Apparatus.**

**HEATING-STOVE.**—H. BEACH, Carthage, and J. B. COE, Clayton, Ill. In this instance the object is to so construct a stove that the evolved gases are driven through the live coals in the fire-pot into the space below the same, where the gases are burned to give out heat instead of consuming the gases in the pot. By this arrangement the inventors find that such perfect combustion is attained that there are practically no cinders, and smoke and soot are practically eliminated, and fuel economized.

**FEED-WATER HEATER.**—W. THURMOND, Denver, Col. The objects of this invention are to provide a novel, simple apparatus which will afford effective means for the utilizing of exhaust-steam, to heat the water-supply for a steam-boiler, separate oily matter therefrom, and also purify the feed-water by elimination of acids or alkalies that may pervade the water when it enters the improved heater and purifier.

**AIR-FEEDING APPARATUS FOR STOVES.**—L. BRANDT, JR., and A. F. BRANDT, Spokane, Wash. The invention involves peculiar means whereby a draft of air is fed into a stove at the combustion-exit therefrom through the uptake. With the special draft devices the products of combustion are retarded and forced back into the fire-chamber and more thoroughly consumed than is now effected in any stove or furnace or hot-water heater known to these inventors.

**INCANDESCENT VAPOR-BURNER.**—G. A. BONELLI, Kingman, Ariz. In this patent the invention relates to a combined hydrocarbon-gas generator and gallery and mantle support, and further relates to an improved form of hydrocarbon-valve for use more particularly with the generator and to certain details of construction. The invention is used in connection with burners for heating, illuminating, etc.

**FIREPLACE.**—A. W. HALL, Hayneville, Ala. The primary object the inventor has in view is to provide means adapted to be used for cooking purposes or for heating a bed-room without interference with or change of fireplace or grate or heat from the same, these being secured by the easy adjustment or connection above the grate-basket of a cook-stove, which is arranged to serve as an apron to the grate when the fireplace is employed for heating the bed or other room alone, the novel and economic features of the stove being in part, primarily, the arranging the apron of the fireplace so as to form a stove when placed above the grate and connected to the same.

**Household Utilities.**

**COFFEE-POT.**—J. HEINRICH, New York, N. Y. This pot belongs to that class of device in which the water is passed through a filter containing coffee or tea continuously by the action of the steam generated by means of heat beneath the lower water-compartment. The object is the provision of a device which will be quick in action, embody economy in cost of manufacture, and properly filter the water in the course of operation.

**MUFFLER COOKING ATTACHMENT.**—J. H. FOX, New York, N. Y. The purpose of the invention is to provide an attachment designed for use in connection with the exhaust of hot-air engines, gasoline-engines, or engines of like type and to so construct the device that it will be economic and effective, and readily applied to any hot-air or steam-exhaust pipe.

**WRENCH.**—C. F. BLISS, Carbondale, Col. This wrench, preferably of one piece of material, comprises a handle and clamping section fitted with teeth or roughened surface for gripping engagement with the cap to be screwed upon

or unscrewed from any receptacle, so that the clamping section will embrace the article with a firm grip and uniform pressure and so that when the clamping section is adjusted and pressure applied to the handle-section the cover may be turned with little effort and without mutilation of the article.

**Machines and Mechanical Devices.**

**HORSE-POWER.**—J. VAVRA and C. VAVRA, Park River, N. D. In this instance the invention has reference to improvements in horse-power devices, and has particular application to one especially adapted for use in loading hay and elevating material from the ground to a desired point at a height above the same. It will be found very convenient for builders and contractors for raising mortar and bricks to the upper stories of buildings.

**FEEDING MECHANISM FOR SEWING-MACHINES.**—W. A. SMITH, New York, N. Y. A salient feature of this invention is a reversible feed mechanism under the direct control of the operator and is effective to feed the work in either a forward or backward direction at his will, such reversibility of the feed mechanism being obtainable instantly and without stopping the machine and slackening its speed, thus obviating stopping the machine, lifting the pressure foot, and turning or shifting the work.

**PASTING-MACHINE.**—A. SIMONSON, New York, N. Y. The machine is provided with opposing pasting members and an operating mechanism for the members, whereby one member will be receiving adhesive material while the other is depositing it, and whereby at each operation of the machine the means provided cause the opposing members to be alternately shifted, the depositing member at the upward movement of a support being placed in position to receive a fresh supply of material, while the member just applied will be placed in position to deposit the material upon an object placed to receive it.

**MACHINE FOR PERFORATING CHECKS AND PRINTING THEREON.**—G. F. ROBERTSON, Paris, Texas. The purpose of this improvement is to provide a machine for repeating on the face or on the back of a check, or upon both surfaces, the figure in numerals or in letters representing the amount of dollars called for by the written portion of the check, so as to render it impossible to change the amount first expressed without commercially destroying the check.

**Of Interest to Farmers.**

**ANIMAL-SHEARS.**—W. M. CAHILL, Winona, Minn. This improvement is in that class of shears known as "clippers." The object is to provide an instrument wherein the friction of the working parts is minimized. A further object is to simplify the construction of the shears by the elimination of certain friction parts present in some prior kinds of shears, and to thereby promote the efficiency of the instrument and decrease cost of manufacture.

**Pertaining to Vehicles.**

**AUTOMOBILE SLEIGH.**—E. S. WEAVER, Jersey City, N. J. The inventor has in view the provision of a sleigh which will be self-propelling, the mechanism being so arranged and of such character that the sleigh may be driven easily over snow or ice. He provides a sleigh with driving-wheels or propelling devices which will enable it to travel over rough or uneven ground covered with snow or ice, the devices also assisting in the steering operation. Means are supplied to obviate jars or shocks.

**FIFTH-WHEEL.**—W. B. FLETCHER, Cameron, W. Va. Mr. Fletcher's invention relates to an improvement in fifth-wheels for vehicles, wherein the friction between the various parts is reduced to a minimum, the dust excluded from the working parts, and the strain equalized and practically removed from the king-bolt, thus materially lessening the liability of breakage from any cause. The device is susceptible of adaptation to various forms of vehicles and running-gear.

**BRAKE.**—G. E. BABCOCK, Coronado, Cal. One object in this case is to provide a construction of detent mechanism by which to hold the brake set. In operation the driver can press the ball of his foot against a foot-plate without affecting the position of the lever, so the brake can be set to any extent without being locked in position. If desirable to set the brake and lock the same in such position, he can, while pressing with his foot against the plate, press his heel against the treadle portion of the lever and set the rack-teeth into engagement with the pawl-point.

**Railways and Their Accessories.**

**RAIL-JOINT.**—J. F. SUMMIT, LaFollette, Tenn. Mr. Summit's invention is an improvement in rail-joints, having for an object, among others, to provide means for preventing any swinging of the ends of the rails out of alignment, which is a fertile cause of derailment and wrecks. The invention securely braces and reinforces the joint and prevents the nuts from becoming loose. The construction is simple, cheap, and can be easily embodied in the rail-joints.

**RAILWAY-TIE.**—G. F. JENCKS, Limerock, R. I. Means for supporting the customary

form of rail used in a railway are furnished in this invention. One of the objects is to provide a railway-tie or a rail-chair or a combined tie and chair with a resilient support for a rail. Another object is to provide a form of combined railway tie and chair comprising a plurality of parts economically constructed and quickly and easily assembled.

**Miscellaneous.**

**DRAWER.**—W. H. COYE, Stevens Point, Wis. In this improved drawer the inventor employs sole-strips made separate from the sides and bottom and serving as a means for solidly and rigidly joining the bottom and side walls together. These shoes afford antifriction bearing-surfaces at the lower side edges of the drawer, the surfaces being disposed at the side edges and sole edge of the shoe, whereby the frictional engagement of the drawer at the side and bottom portion with the framework is minimized and the drawer made to run freely in the article of furniture.

**PROCESS OF TREATING LIME.**—J. J. FEELY, Whiteplains, N. Y. The difficulties and objections met in the storage, transportation, and use of common quicklime are caused by its tendency to heat, slake, swell, and shrink. These changes occur after the lime has been made up into mortar and mixed with plaster upon walls and ceilings, in many cases causing walls and ceilings to pit, crack, and chip off. The purpose in this case is the production and manufacture of lime which overcome these objections.

**MAIL-CRANE.**—J. M. HOUGH, Woodbine, Iowa. This invention refers to improvements in cranes for holding mail-bags in position to be taken up by catches carried by passing trains, an object being to provide a crane of simple construction that will be light, yet strong, having no parts liable to get out of order, and that may be constructed at a small cost.

**EDUCATIONAL APPLIANCE.**—L. M. HOLLINGSWORTH, Fresno, Cal. In carrying out the present improvement the inventor has particularly in contemplation as an object the use of a number of members which are constructed and shaped to form geometrical figures and are capable of being so arranged and assembled that various propositions or theorems of solid geometry may be easily explained and demonstrated without the necessity of long and complicated mathematical computation.

**DECOY-DUCK.**—A. KREMER, Sacramento, Cal. One of Mr. Kremer's principal objects in view is to construct a decoy easily folded to occupy little space when not in use, but may be distended or inflated, so as to have the appearance of life-size fowl when brought into use. The duck when resting on the water has a perfectly natural appearance.

**SHOULDER-PAD.**—H. LAVINE, New York, N. Y. Mr. Lavine's invention relates to improvements in shoulder-pads for coats or like garments, an object being to provide a pad so constructed as to maintain a gradually-increasing thickness from one edge to the other, thus preventing any abrupt depressions in the shoulder portion of a coat or the like in which the pad may be placed.

**SUSPENDERS.**—M. MURRY, Morristown, N. J. In this case the invention refers to certain improvements in the construction of suspender-buckles and in the arrangement of these buckles with respect to the straps and suspender-ends. The suspender-straps are constructed of cloth or other fabric, as is usual, and the ends are made of metal in U-shaped form. These ends are provided with spring-clasps, which engage them with the trowsers without the use of buttons.

**PORTABLE DISPLAY-STAND.**—J. A. MARSH, New York, N. Y. The object of this invention is to provide a new and improved portable display-stand more especially designed for displaying newspapers, periodicals, and like articles in a very attractive manner and to allow of conveniently storing the articles in the stand and locking the latter up when not in use.

**SELF-PLAYING MUSICAL INSTRUMENT.**—J. SUTER and W. LENK, Jersey City, N. J. In this instance the invention relates to instruments of the zither type, and the object is to provide an instrument arranged to pick the strings, actuate bells, or other sounding devices, and to insure a proper gradation of the tones according to the requirements of the music produced and indicated on the note-sheet.

**BOAT-PROPELLER.**—H. W. STURGES, Wilton, Conn. One of the principal features of the invention lies in the arrangement of the motor so that the cylinder is cooled by the water in which the boat floats. This avoids the necessity of a water-jacket and circulating-pump. A tiller turns the propeller at different positions, so as to steer the boat, and is employed to actuate the reversing-gear of the propeller or to actuate devices for "turning over" the engine preparatory to starting the same.

**PLAITING-MACHINE.**—MARY F. HAVENS, New York, N. Y. By this machine the inventor lays the fabric in plaits or folds, steams and dries the plaits, and subjects the prepared fabric to pressure during its progress through the machine, so that it emerges in a set and finished condition, these steps in the treatment of the fabric being carried out in a manner which does not expose the fabric to injury from overheated rollers or other devices which have a tendency to burn or scorch the goods.

**EXPANSION-JOINT.**—R. E. VAIL, Mount Vernon, Ohio. Mr. Vail's invention refers to pipe-lines; and his object is the provision of an improved expansion-joint arranged to allow free expansion and contraction of the pipe-line without danger of leakage and to allow of readily coupling the adjacent ends of a broken line together.

**GARDEN IMPLEMENT.**—R. TWOHIG, Salina, Kan. In this patent the invention has particular application to means for securing pitchforks, hoes, rakes, and similar tools to their handles. The particular object is to provide means for securing the tools to the handle in such manner that there will be no possibility of the parts separating accidentally, thereby obviating the loss of time and liability to injury.

**POCKET-BALL-BEARING DOOR AND HANGER THEREFOR.**—J. K. THOMA, Cooperstown, N. Y. The purpose here is particularly to provide a top and bottom ball-bearing for sliding cased doors and a ball-bearing for the upper portion of hanging doors, such as barn or car doors, and to so confine the balls that their travel on the door will be limited, while their traveling engagement with either the overhead or the lower track will be unobstructed.

**ORGAN-PEDAL.**—E. M. HUGHES, Ashland, Ky. Definitely stated, this invention relates to pedal-keys for pipe-organs. The object is to provide a pedal or key which will work permanently and absolutely without noise. The pedal-keys for organs and other instruments work free from friction and obviate noise and lost motion common with similar pedals.

**WHISK-BROOM.**—H. L. HARRIS, New York, N. Y. The invention is an improvement in brooms, being in the nature of a rubbing attachment for use in removing spots and the like from garments. On the handle of the broom a pad of absorbent material is secured. The pad includes a core and wrapper, both made of felt, cloth, canvas, or like suitable fabric. In use the pad may be saturated with benzine or other cleaning materials. By combining the pad with the broom a convenient form of handle for the broom is provided.

**UMBRELLA.**—O. L. FOGLE, Columbus, Ohio. The object in this case is to furnish details of construction for the frame and stick, convenient to manipulate for folding or expansion of the umbrella, adapt the frame and stick for cheap manufacture, and enable the close folding of parts of the frame, so as to reduce the same, forming a short, compact package, which will be readily packed in a trunk, valise, or other receptacle.

**AWNING-HOOK.**—D. W. CARR, New York, N. Y. The invention relates to hooks especially designed for attachment to awnings, whereby to hang the awning and permit it to be taken down in a more convenient and expeditious manner than ordinarily and at the same time when attached to a support to insure its remaining so under ordinary conditions of weather until purposely released, the hooks, however, being also adapted for hanging curtains and garments on fixed hooks, eyes, rods, or bars.

**PARCEL-FASTENER.**—B. COHN, New York, N. Y. In this instance the object is to provide a new and improved parcel-fastener arranged to securely tie the wrapper of a box or like receptacle in position without the use of strings and the like and to give the parcel a fine and neat appearance. The device can be easily applied and cheaply manufactured.

**HOLDER FOR MINERS' LAMP.**—J. A. BROWN, Pocahontas, Va. In this patent the invention has for its object the provision of novel, simple, and reliable means for detachably securing a miner's lamp upon the cap worn by the miner, so that the lamp will remain in place until designedly removed, in spite of any accidental displacement therefrom.

**COMBINED BODY-BRACE AND TRUSS.**—S. R. SHEPARD, Louisville, Ky. One of the principal objects of the invention is to provide means adapted to be readily applied to the body for strengthening and supporting the back and spine and also the chest and shoulders, as well as to provide means whereby the abdominal region may be held in position with comfort and ease. The device is simple, and not likely to get out of order. It will not interfere with the free action of joints, muscles, or any other part of the body, and overcomes all tendencies toward abnormal stooping or bending.

**PROCESS OF HARVESTING AND CURING TOBACCO.**—J. B. UNDERWOOD, Fayetteville, N. C. This invention has for its object a quick method of curing and preparing tobacco for manufacturing and of improving the color and stem of the leaf. It is put in operation by the use of a V-shaped knife attached to a pistol-grip handle. The blade severs the leaf portion from the stem, leaving it attached to the stalk while the leaf is cured or dried out and freed from the stem at a much lower temperature and in shorter time, with more perfect color and without danger of sap coloring after curing. Expensive stemming is done away with and the taste and value of the product improved.

**FOLDABLE PAPER BOX.**—M. HIRSCH, Newark, N. J. The present invention relates to improvements in paper boxes; and the object of the inventor is to provide an improved box, the blank of which is cut from a single piece of paper stock and is adapted for assemblage into a complete article without the use of unclaginous material.

**COMBINED BUTTON AND TIE-HOLDER.**—E. STEMPER, Buffalo, N. Y. The object of this invention, relating to garment fasteners, is to provide an improved combination button and tie-holder arranged to securely hold a scarf, necktie, or other similar neckwear in place to prevent sidewise movement or creeping of the neckwear and to give a dressy appearance to the wearer.

**Designs.**

**DESIGN FOR A GLOVE.**—F. SCHMIDT, New York, N. Y. The ornamental design in this glove consists of two bands of herring-bone of triple stitching on the back of the glove not quite parallel and coming together to a V-shaped point at the bottom. Between the two outer bands, equidistant a middle band is stitched. It makes no connection with the other bands. The design is open at the top.

**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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**Inquiry No. 4987.** For a machine for grinding pea flour and a soap mold or presser.

**Inquiry No. 4988.** For makers of paper board 4 feet wide and from 8 to 14 feet long.

**Inquiry No. 4989.** For firms handling the button and shell mountings.

**Inquiry No. 4990.** For machinery for making celluloid or horn combs.

**Inquiry No. 4991.** For a pneumatic saw lately invented in the Northwest, wanted, address of patentee or manufacturer.

**Inquiry No. 4992.** For makers of entire machinery used in making sulphur matches, including splitting and preparing of stock.



**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.

(9271) W. C. R. asks: Will you please tell me in your query column whether the following problem can be solved by plane geometry, and if so, how? Through the middle point (O, Fig. 2) of a chord draw two chords AD and BC. Connect AC and BD. Prove OR = OS. A. The problem may be solved as follows:

In Fig. 1, A D and B C any two chords cutting in O. M N any secant cutting A C in R, B C in P, A D in Q, and B D in S.  $\angle C = \angle D$ .  $\triangle C R G$  similar  $\triangle S H D$ ,  $\triangle R G P$  similar  $\triangle O P L$ ,  $\triangle Q H S$  similar  $\triangle O L Q$ .

$$\frac{CR}{Z} = \frac{SD}{X}, \frac{RP}{Z} = \frac{OP}{Y}, \frac{QS}{X} = \frac{QO}{Y}$$

Eliminate X, Y, Z from these equations:  
 $CR \cdot QS \cdot OP = SD \cdot QO \cdot RP$

Similarly,  $RQ \cdot SB \cdot OP = AR \cdot PS \cdot OQ$

$$\text{Divide } CR \cdot AR \cdot RQ \cdot RP \\ SD \cdot SB = PS \cdot SQ$$

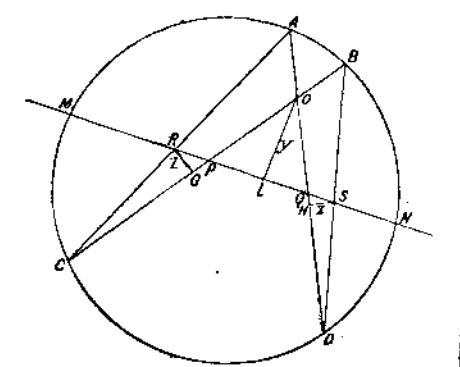


Fig. 1.

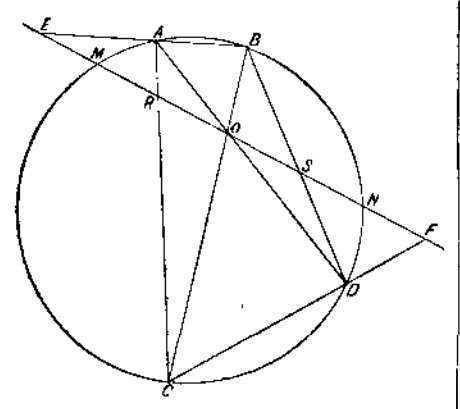


Fig. 2.

$CR \cdot AR = MR \cdot RN$ , products of segments of  $CD$ .  $SB = MS \cdot SN$ , chords of a circle. Substitute:

$$a) \frac{MR \cdot RN}{MS \cdot SN} = \frac{RP \cdot RQ}{PS \cdot SQ}$$

Fig. 2 is a special case of Fig. 1.

MN is bisected by O. P and Q vanish in O.

$RP = RQ = RO$ ,  $SP = SQ = SO$ ,  $MO = NO$ , to prove  $RO = OS$ .

Equation a) becomes

$$\frac{MR \cdot RN}{MS \cdot SN} = \frac{RO^2}{SO^2} = \frac{(MO - RO)(NO + RO)}{(MO + SO)(NO - SO)}$$

$$\frac{(MO - RO)(MO + RO)}{(MO + SO)(MO - SO)} = \frac{MO^2 - RO^2}{MO^2 - SO^2}$$

$$\frac{RO^2}{SO^2} = \frac{MO^2 - RO^2}{MO^2 - SO^2}$$

By composition

$$\frac{MO^2}{RO^2} = \frac{MO^2}{SO^2}$$

$$\frac{RO^2}{SO^2} = \frac{SO^2}{RO^2}$$

$$RO = SO$$

$$Q. E. D.$$

Similarly  $EM = FN$ .

Solution by L. Leland Locke, Instructor in Mathematics, Adelphi College, Brooklyn, N. Y.

Since the above solution was completed, we notice a number of other solutions, different from the one given above, in Amer. Math. Monthly, January, 1901.

(9272) E. E. B. asks: I wish to purchase the cheapest and most efficient opaque attachment for the lantern. Refer to some dealer. Is it possible to use the film of the kodak for projection in the lantern without transferring it to glass? In other words to use the negative film in the lantern. Is there any preparation with which wood-cuts,

half-tones, etc., may be treated and projected on the screen? That is, make a paper sufficiently transparent for projection purposes. Where can I purchase an attachment to throw soap-bubble films, etc., on the screen? I wish to project the vibrations of the human voice. A traveling lecturer partly told me of an experiment to show what he called the formation of the clouds and cyclones, etc. As near as he could remember they used sulphuric acid and potassium bichromate, iron filings, and two other things that he could not remember. From this indefinite statement can you suggest the nature of this experiment or refer me to some work where I can find it described? As near as I could gather from his description it was to be projected with a stereopticon. A. The best and cheapest way to get a microscopic and vertical attachment for a stereopticon is to have the people who made the stereopticon furnish you with it. Makers usually have a complete outfit for their instruments. To get one made at a distance would result in a misfit, to a certainty. Failing in getting one from the makers you can have the attachments made by a machinist in your neighborhood, and fitted to the instrument. You can obtain good cuts of these instruments from the books on projection: Wright's "Light," price \$2.00; Wright's "Optical Projection," price \$2.25; Dolbear's "Art of Projection," price \$2.00; Mayer's "Light," price \$1.50. All these are excellent and you can profitably get them all. They contain nearly all that one requires to learn to do good work with the lantern and descriptions of all the best experiments. These, with G. M. Hopkins's work, will equip you for service. Many optical illusions are described in "Experimental Science," which you have. "Magic," by A. A. Hopkins, contains many tricks which are of the nature of optical illusions; price \$2.50. No opaque attachment for the lantern is on the market so far as we know. Any mechanic can make one from the description in Dolbear's "Art of Projection," or from Hopkins's "Experimental Science," Vol. II, page 249; it presents no difficulty. Kodak films are not adapted for optical projection. A positive on glass should be made. For this, full directions are given in Hopkins's "Experimental Science," Vol. I, page 319. Special lantern slide plates can be bought for making them. Pictures from books cannot be made transparent enough to project in a lantern. They should be copied by photography, first making a negative and then a positive on glass as with any other subject. The method of projecting soap films is shown by a cut in Wright's "Optical Projection," page 326. The only apparatus required is a ring of wire 2 to 4 inches in diameter and a soap-bubble mixture which is described in all the books we have mentioned. The method of projecting clouds on the screen by chemical action is given in Dolbear's "Art of Projection." It is done by unequal chemical action forming absorbent layers in the cell.

(9273) J. P. R. says: In order to settle an argument would you please answer the following question in your "Notes and Queries" column: Is it safe to burn coke under a boiler, particularly an upright? A. Where the grates are properly arranged, coke makes the most admirable boiler fuel.

(9274) E. S. P. says: Please reply in "Notes and Queries": 1. Is the Texas boll weevil a flying beetle at any stage of its development? A. The cotton-boll weevil exists in four stages, namely, egg, larva, pupa, and adult. In the adult stage the insect has wings and is capable of flying to some extent. 2. If not, why cannot it be reduced by substituting upon infested fields other crops than cotton, thus depriving it of food and breeding place, or by letting the ground lie fallow? A. In view of the fact noted above that the weevil can fly, it is impossible to eradicate it by allowing land to lie fallow. Nevertheless, the powers of flight of the insect are so limited that many Texas cotton planters find it of great advantage to rotate their cotton with other crops. 3. If it is winged, why has it not been spread by winds, etc., more rapidly? Does it go from field to field? A. As a matter of fact, the weevil is spread to a considerable extent by the wind. The new territory invaded each year, under normal conditions, is about sixty miles. There is no doubt, however, that exceptional conditions, like the storms preceding the Galveston cyclone of September 8, 1900, have caused a great deal more than this normal spread. 4. If it simply crawls, does it gain access to the boll from the ground by climbing the stalk, and can it pass from one plant to another on their branches? A. The insect reaches the fruit of the plant, either boll or square, almost altogether by flying from one plant to another. 5. Will it attack in preference plants at some certain stage of growth, thus avoiding adjacent plants, either older or younger in growth? A. As during the growing season the cotton plant has all stages of the fruit upon it, it cannot be said that the weevil has any preference as far as the stages of the growth of the plant are concerned. 6. At what stage of growth is the plant most attractive? A. This question is partially answered under No. 5. There is no preference of the weevil for any particular stage of the plant, but there is a preference for the stage of development of the fruit. They prefer the forms or squares (immature bolls), and will always work upon them to the exclusion of the bolls as long as the supply is sufficient.—F. H. Chittenden, Acting Entomologist, U. S. Department of Agriculture, Washington, D. C.