

RECENTLY PATENTED INVENTIONS. Pertaining to Apparel.

GARMENT.—A. BERMAN, New York, N. Y. The object of the invention, which is an improved garment having a special reference to dresses and shirt-waists for children or other like garments, is to so construct the dress or waist that it may be readily and conveniently slipped on and off, especially avoiding the use of buttons or the like attaching devices for holding the garment on the body.

Electrical Devices.

COMBINED LIGHTNING-ARRESTER, FUSE-BOX AND INSULATOR.—R. R. BURRIN and T. F. GAEBLER, Rockville, Ind. This invention relates to electric construction, and its object is to provide a convenient device which will constitute a fuse-box, a lightning arrester and an insulator. By enclosing the fuses and the arrester within a porcelain box, there is no danger from fire in case the fuses burn out or a lightning bolt passes through the device.

PARTY-LINE TELEPHONE SYSTEM.—F. VOLLMER, Winsted, Minn. This improvement relates to telephone systems of the general type represented in that described in Mr. Vollmer's former patent and used for selective signaling between stations. Further, it relates to providing such a system with an automatic time-controlled cut-out, whereby the system after use will return automatically to its normal condition within a predetermined length of time.

KICK-BOARD.—W. H. NICOLAY, New York, N. Y. This board is designed to be applied to a base board adjacent to the floor, and the object of the inventor is to provide means adapted to inclose and protect insulating tubes which extend through the floor boards for the purpose of receiving electric wires passing through the floor, thereby protecting the wood-work from the wires.

SPARK-ARRESTER.—C. S. CHALFANT, El Paso, Texas. The design in this case is to provide a device which will enforce the economical consumption of fuel, eliminate danger and discomfort caused by escaping sparks and cinders, and increase the efficiency of the locomotive by dispensing with the usual obstructing screens, nettings, etc., detrimental to good steaming qualities. The invention provides an arrester which will not choke the draught in the smoke box and thereby cause the blowing of smoke and fire out through the fire-box door into the cab.

ELECTRIC SIGNAL.—E. LIONAIS and W. T. SUTTON, Montreal, Quebec, Canada. In this patent the invention has reference to electric signals, and more particularly to a system for ringing one or more electric bells from a distance. It further relates to a system in which a relay is employed for controlling a bell and in which a single battery is used for energizing the relay and for operating the bell.

KEYBOARD TELEGRAPH-TRANSMITTER.—G. M. GODDARD, Rutland, Vt. The invention consists in the construction and arrangement of the train of mechanism which by the operation of the keys causes the proper opening and closing of the circuit to produce dots and dashes representing the particular key struck. The mechanism may be applied to a typewriter, whereby at the same time a Morse signal-message may be sent and a duplicate of it in type-printed letters may be made at one operation, means permitting the transmitter to be used without printing on the typewriter or the latter used without the transmitter, or both used together.

Of Interest to Farmers.

COTTON CHOPPER AND CULTIVATOR.—J. B. FARRAR, Wilmington, N. C. The invention is an improvement in the class of cotton-choppers in which a disk, or wheel, provided with knives is rotated for cutting out and thus spacing the planted cotton. The inventor has devised improvements in the chopper proper and in attachments for breaking or pulverizing the earth about the roots of the plants.

Of General Interest.

COMBINED SETTEE AND BERTH.—G. S. SHERMAN, Nyack, N. Y. This combination is particularly adapted for use on yachts or other water craft, or, it may be used under other conditions, the object being to provide a device that will take up no more room than the usual settee or bed, the construction being such that the apparatus may be easily and quickly converted from one use to the other.

RECORD-CALENDAR.—F. H. RICE, Oakland, Cal. The purpose of the inventor is to provide a calendar adapted to serve as a reminder of transactions to be attended to in the future, and which takes the place of the customary daily journal, the advantage being that in entering any subject requiring attention at a certain time of the month, one entry will carry for all time, whereas in a daily journal twelve entries are required each year for monthly matters.

PILE STRUCTURE.—J. T. PYLE, Amarillo, Texas. The invention pertains to improvements in structure formed of sheet piling driven into sand or soft earth and having the inclosed material removed, whereby the pile may be filled with concrete to serve as a foundation for bridges, buildings, and the like. The walls of the structure are made up of a large number of sections which are driven into the

sand or soft earth one at a time and each succeeding one upon being driven becomes locked to the last one inserted.

BALE-TIE.—A. K. KLINGENDER and DEW. M. CORNER, Statesville, N. C. The invention is especially designed for use in securing small packages of papers, such as a series of checks, together. It is also applicable as an improved tie binder for cotton and other heavy materials in bales, the buckle being made of sufficient weight to supply the necessary strength for such service.

FENCE OR DIKE.—J. W. HUMPHREY, St. Johns, Ore. This invention has reference to fences and dikes, and the object in view is to construct a fence or dike in a simple manner, so that it may be readily erected, and to arrange the parts so as to allow for contractions and expansions due to temperature changes and other causes.

APPARATUS FOR PROCESSING SUGAR-CORN.—L. S. FLECKENSTEIN, Easton, Md. In the present patent the invention is an apparatus designed and adapted for processing canned sugar-corn, or like products, by a continuous method whereby the result is effected much more quickly and economically than by the apparatus and methods ordinarily employed. By the use of this apparatus, sugar-corn and like products may be processed without the aid of hand labor.

EGG-LIFTER.—C. F. SWANSON, Eagle Bend, Minn. The invention pertains to improvements in devices for lifting eggs from a crate for the purpose of transferring the eggs to a tester, and returning the same to the crate after testing, the object being to provide a device by means of which all of the eggs in a layer in the crate may be simultaneously picked up.

CHAIN-LINK SHACKLE.—G. A. H. DRESLER, 25 Karlstrasse, Kiel, Germany. The object in this invention is to so construct the parts of the connecting shackle that the means for fastening the closing part to the link will be subjected to but little strain, speedy release and opening is possible, and shocks exerted upon the closing member from outside are kept from the stud ends of the links.

RECEPTACLE FOR POWDER.—F. H. ARNOTT, Crystal Falls, Mich. The purpose of this invention is to provide an efficient and inexpensive device which will securely retain the powder or like substance when not in use, and at the same time permit the contents to be readily dispensed therefrom in small quantities. It is especially useful in connection with cans for tooth powder.

MOLD FOR CONCRETE POSTS.—J. P. DONOVAN, Georgetown, Ky. The object in this improvement is to provide a mold for making concrete posts, such as are more especially used in the construction of fences, the mold being arranged to permit the production of posts in an economical manner, the posts combining strength with lightness, and not likely to warp or crack.

MOISTENING ATTACHMENT FOR DENTAL ENGINES.—G. BARTLETT, Lenape, Ind. Ter. The invention relates to improvements in dental engines, and more particularly to means for moistening the disks, burrs, or drills while they are being used. By slightly opening a valve, water is delivered to the tool and the ground material washed away from the tooth operated upon, and the tool may be prevented from becoming heated to an uncomfortable temperature.

VAGINAL DOUCHE.—E. J. LAMPORT, Cape Town, Cape Colony. This douche can be inserted in the canal in a collapsed state and then inflated so as to straighten out and render the folds of the parts smooth, whereby the liquid introduced through the instrument and flowing under pressure between the inflated wall of the instrument and opposing wall of the organ will thoroughly wash and disinfect all of the membranes.

BOTTLE-STOPPER.—H. MORGAN, Cripple Creek, Col. This invention has reference to a closure for beer-bottles, mineral-water bottles, etc., and has for its object the provision of an inexpensive device easy to apply to the bottle and easy to remove, but in which there is no liability of its being accidentally displaced by internal pressure or rough handling.

TEMPORARY HOLDER FOR SAFETY-RAZOR BLADES.—D. A. MACBETH, New York, N. Y. One purpose of this invention is to so construct the device that the holder proper will be practically in one piece, the only other factor employed being a clamp mounted upon the jaw-section of the holder, and, further, to so construct the section that the blade can be quickly and conveniently introduced between the jaws in such manner that the blade will remain in set position while the clamp is being applied.

ADJUSTING CLOCKS AND WATCHES TO CHANGES IN TEMPERATURE.—S. KAHAN, New York, N. Y. The object in this instance is to provide means for varying the length of the suspension-feather of a pendulum, or the hair-spring of a watch, or the oscillating member of any other form of timepiece, so as to offset the variation in length caused by changes in temperature.

FENCE-POST.—E. D. MINER, Rathdrum, Idaho. Among the objects of this inventor is the provision of a device both strong and durable, on which fence-wires are to be strung, and which can be easily and readily set in position and the wires assembled therewith or disassembled, and the post dismantled when

the fence is to be removed or shifted to a different position.

MAKING CONCRETE WALLS.—F. M. JACKSON, Akron, N. Y. The inventor provides improvements in making concrete walls for buildings, whereby the wall can be quickly and cheaply constructed and when finished is provided with an airspace at the back, and the front face of the wall has an ornamental appearance, thus rendering the wall very desirable for use in the construction of chimneys, fireplaces, and the like.

METHOD OF TREATING GLASS.—W. E. HEAL, Coffeyville, Kan. In the present patent the improvement has reference to a system for treating glass, Mr. Heal's more particular object being to draw the glass into flat sheets suitable for commercial use, and to enable the sheets to be made cheaply, and yet to be comparatively free from imperfections.

CIRCULAR-DISTRIBUTER.—R. G. FRASER, Philadelphia, Pa. The principal objects here are to provide for effectively pressing circulars and the like into such a position that they can be readily abstracted from the distributor by the public without necessitating any complicated manipulation of the parts, and especially to provide means whereby only one circular can be removed at a time. For this purpose a special form of envelope has been designed for containing the circulars, which can be used with the remainder of the device with advantage.

VALVE.—A. L. DOW, Lyons, Col. This invention pertains to improvements in valves, and especially in hydrant-valves, whereby the valve and valve-seat may be removed from the casing without disconnecting the latter, should it become necessary to repair or replace any working parts. This is of particular value around hydrant-valves, which are usually so located that it is very difficult to get at the valve to repair it.

COUNTER-STOOL.—W. G. WINANS, Spokane, Wash. The inventor seeks to avoid some of the objections incident to stools in common use—such, for instance, which are permanently fastened to the floor, where they cannot be readily removed, and others fastened to the front of the counters, where the weight of persons sitting on them exerts a certain strain on the counter sufficient sometimes to tilt the counter. He provides a revolving stool which can be adjusted as to height, easily removed, adjusted to position for use or up against the counter out of the way.

GATE.—W. M. WATSON, Brantford, Ontario, Canada. The gate may be operated in a vehicle without dismounting and similarly closed after the person has driven through. It may be raised to swing over stones or obstructions, but when closed may rest close to prevent small animals from crawling under. It may open in either direction, but be automatically prevented from swinging past the closed portion when being shut.

Hardware.

BELT-TOOL.—E. E. BARNETT, Kremlin, Oklahoma Ter. The improvement is a belt tool having means for punching and cutting holes in the ends of a belt such as are generally provided to receive the lacing; also embodying in its construction a device for drawing the lacing through these holes in the belt, and lacing the ends thereof together.

PUNCHING IMPLEMENT.—J. W. SPENA, Wakeeney, Kan. The object of this invention among others, is the provision of a strong, powerful, hand-operated punch for punching holes in sheet metal and other materials. The punching or cutting tool is mounted in the implement in a manner to at all times remain normal to the work during the punching operation.

PLIERS.—G. G. WORSTALL, Toms River, N. J. The object of the improvement is the provision of a pair of pliers, more especially designed for the use of jewelers, and arranged to permit convenient and quick drawing out and shaping of the claws on new or old settings of the Tiffany, skeleton, or other type.

Heating and Lighting.

GAS AND AIR BURNER.—D. COOLEY, Galena, Kan. This burner is designed for use in heaters, furnaces, and the like arranged to cause a thorough mixing of the gas and air previous to ignition of the mixture with a view to insure a complete combustion of the mixture, the arrangement also permitting independent regulation of the supply of gas and air according to the richness of the gas.

Household Utilities.

WASHBOARD.—S. B. COOK, Laurel, Miss. Mr. Cook's invention is in that class of boards whose scrubbing surface is formed of a series of rectangular bars arranged transversely and held detachably in the side bars of the frame. One of the washboards of this invention is equivalent to four of the ordinary kind. A new set of bars can be supplied at trifling cost when the four corners of the scrub bars are worn off, rendering the board practically new.

SAD-IRON.—J. E. AUSTIN, Binghamton, N. Y. This iron is heated by burning gas, and the design is to provide an iron which is simple and arranged to insure a uniform heating with a minimum consumption of gas and to produce a complete combustion of the gas, to render the use of the iron very economical and practically odorless.

WASTE FOR BATH-TUBS, BASINS, AND LIKE FIXTURES.—P. F. GUTHRIE and T. HAYES, Nutley, N. J. The invention provides a waste or outlet for bath tubs, basins, etc., arranged to insure a free outflow of the water from the tub, basin or like fixture, and without danger of the outflowing water becoming air-bound, and prevents foul air rising in the waste and passing into the room in which the fixture is located, thus rendering the fixture completely sanitary.

MOP-WRINGER.—J. L. POTTS, Ithaca, Mich. This improvement pertains to washing and scrubbing; and its object is the provision of a new and improved mop-wringer arranged to permit of conveniently and quickly placing the mop in position between the mop-wringing rolls to insure a proper wringing of the mop.

STOVE OR FURNACE ATTACHMENT.—L. D. MOHLER, McPherson, Kan. This inventor provides an unfailing draft from the grate of a stove or furnace upward into and through fuel, effectually preventing smothering of the fire in the use of slack, coal dust, or similar fuel; also conducts air above the fuel to carry away surplus gas, and thus prevent an explosion, and, further, operates to deflect air conducted above the fuel across the top of the fire, with such clearance above the fuel as to employ the air for combustion of gas and smoke in the combustion chamber and hold the heat downward and so spread the products of combustion for the purpose of warming the floor.

BED.—L. H. FLANDERS, Memphis, Tenn. The mattress-frame being in position and each bevel-gear in mesh with respective bevel-gears, rotation of a shaft will move all the slides upward, thus moving the frame in its entirety and with sections in aligned position. To raise the head-section to bring the patient into sitting position with legs extended, the gears actuating the slides connected with two frame sections are moved out of mesh by means of levers, when rotation of the shaft will move the head-section into angular position with respect to other sections.

STEAM-COOKER.—C. S. EPPLEY and M. E. STONESIFER, York, Pa. The cooker comprises a casing divided into an upper steaming compartment and a lower baking compartment. Doors give ready access to the compartments. The bottom of the baking compartment is raised above the casing bottom, affording boiler space beneath it for the heating branch of the boiler and bottom plate of the casing, which forms, with the bottom of the baking compartment, the boiler chamber at the casing bottom in which the heat accumulates surrounding the heating branch of the boiler.

IRON-HOLDER.—MARIE AGNESESSENS, New York, N. Y. In ironing certain materials an objectionable glossy appearance is given. This has been overcome by holding the iron in an inverted position and drawing the material back and forth across its face. The invention provides a simple device for sustaining the iron in an inverted position, leaving the handle easily accessible in placing the iron on the holder or removing it.

Machines and Mechanical Devices.

CASH-REGISTER.—T. H. HARRIS, Fredericksburg, Va. This apparatus is for use in shops, stores, warehouses, etc., for registering sales of goods and the amount paid therefor, and also for receiving and holding the cash or vouchers deposited in payment. It is a simple and effective substitute for the expensive cash registers which are in general use, and has marked advantages over them in respect to furnishing a complete record of sales or other transactions.

MACHINE-ROLLS.—C. F. STEIBER, New York, N. Y. This invention relates to machine rolls, and the object is to produce a machine which is especially adapted for rolling the parts of metal stair cases. In this connection, the invention is most useful in forming stringers, risers, and similar parts having flanges which project in opposite directions.

CONCRETE-MEASURING MACHINE.—A. F. NIMS, Philadelphia, Pa. One purpose of the inventor is to provide a machine for measuring concrete or concrete mixtures, or the like, and for delivering the measured material to any desired receiver; which machine is portable and low, enabling material to be easily shoveled into it or dumped therein from wheel-barrow with the assistance of low platforms.

CONCRETE-MIXING MACHINE.—A. F. NIMS, Philadelphia, Pa. Of the several purposes of this improvement, one is to provide a machine which will thoroughly mix material in a very short time and one in which the material may be permitted to remain in the machine for any desired length of time, or be released at intervals, or at any proper time.

WAVE-MOTOR.—J. W. NEAL, Kalia, Ter. of Hawaii. This invention relates to wave motors particularly adapted for use in deep seas, the object being to provide a deep sea motor so constructed as to respond readily to the movements of the water, such as waves and swells coming from every possible direction, and by means of which air is compressed and conducted to machinery on shore as a motive agent.

MECHANISM FOR PROPELING VEHICLES OVER LAND AND WATER.—J. A. HILDEBRAND, Olympia, Wash. The invention

pertains to certain improvements in mechanism adapted to be applied to boats, vehicles, and the like, whereby they may be propelled with equal facility over the surface of land or water. The intervention of streams or lakes would in no way impede the progress of a traveler were his vehicle equipped with this device.

CONTRACTIBLE MOLD.—G. GEORGENSON and J. E. HENNEN, Fond du Lac, Wis. This flexible mold is for use in the construction of arches, culverts, sewers, or the like in which a temporary support is required for the cement, brick, or stone employed in the construction. In carrying out the invention what may be termed a "cylinder" is employed, the same being formed of sheet metal and provided interiorly with means for expanding and contracting it.

AIR-SHIP.—J. SHUKWECH, New York, N. Y. The ship has a main deck mounted on a supporting means for sustaining the weight of the ship when on the ground and maintaining it in an upright position when in flight. Wings are pivoted at each side of the ship, connected with suitable means for oscillating them, and propellers are journaled at each side of the bow of the ship and act to direct a current of air under each of the wings in driving the ship forward, which currents tend to force the wings upwardly.

LAWN-CLEANER.—C. H. MOSHER, Salisbury Mills, N. Y. The object of this invention is to produce a machine which is of simple construction and which can be readily moved across a lawn in the manner of a lawnmower, operating at the same time to pick up any articles which may pass under it and which may be operated by horse or motor power.

FABRIC-TESTER.—R. C. HARRIS, Roselle, N. J. The invention relates to improvements in devices particularly designed for testing the strength of paper, the object being to provide an instrument of this character that will be of comparatively small and compact form, so that it may be carried in a person's pocket and operated by hand pressure.

Prime Movers and Their Accessories.

VALVE.—A. SIMPSON, New York, N. Y. In this instance the invention relates to valves such as used in pipe systems. The valve is intended to be used for water, steam, gas or other fluids. The object is to produce a valve of simple construction which will be well adapted to maintain heavy pressures and which will reduce tendency to leakage.

AUTOMATIC STEAM-TRAP.—W. AUSTIN, Scranton, Pa. The aim of this inventor is to produce a device which may constitute an accessory for a steam pipe system, and which will operate to collect the water of condensation, and expel the same automatically and periodically without allowing any escape of steam.

Railways and Their Accessories.

CAR-WHEEL.—R. P. WILLIAMS, Santa Barbara, Cal. The invention consists of a cast metal wheel having the flange thereof so formed that in case it becomes broken the broken part will not become dissevered but will present a ragged edge extending outward at an angle to the normal plane of the wheel, whereby an air valve of the brake system may be operated. The valve is so constructed that should the car wheel become broken the brakes will operate to immediately stop the train.

AIR-BRAKE ATTACHMENT.—R. P. WILLIAMS, Santa Barbara, Cal. This invention relates to improvements in air brakes for railway cars, and more particularly to means for automatically operating the brake in case that the truck of any one of the cars becomes derailed. The object is to provide means whereby any variation in the plane of the car track in respect to the car body will automatically open a valve of the air brake system and cause the instant application of the air brakes throughout the train.

RAILWAY-SWITCH MECHANISM.—O. A. KUG, Cincinnati, Ohio. In this patent the invention has reference to improvements in railway switch mechanism, the object being the provision of a simple means whereby an open switch may be automatically closed by an approaching train in either direction, thus preventing possible accident.

RAILWAY-TIE AND RAIL-FASTENING.—A. NEWELL, Guadalupe, Mexico. The improvements are in ties for railways and rail fastenings, and the object of the inventor is to provide a metal tie that will be comparatively light, yet strong and serviceable, and further to provide a fastener that may be readily adjusted to the rail and normally hold the same from any lateral movement with relation to the tie.

STANDARD FOR LOGGING-CARS.—C. H. ALLEN, Aycock, Fla. The design in this case is to provide a standard which is to be arranged on the ends of the transverse bolsters of the car to prevent the logs from rolling off when in transit, but which is capable of adjustment to permit the easy loading or unloading of the log.

BLOCK-SIGNAL SYSTEM.—J. VAN ZANDWEGHE and L. VIBERTI, Rosario De Sante Fco, Argentina. In this patent the invention refers to block signal systems, the more particular objects being to provide efficient means for

stopping trains automatically when they approach each other within certain limits, and also for stopping them if desired when they approach a station.

Pertaining to Recreation.

GAME APPARATUS.—L. J. CASTONGUAY, Thompsonville, Conn. The object in view is to provide in this invention a game apparatus, more especially designed for playing parlor base ball, and arranged to require considerable skill on the part of the players to successfully play the game, and to afford amusement for the players as well as the onlookers.

Pertaining to Vehicles.

WHEEL-HUB.—F. F. UNKRICH, Gallion, Ohio. In the present patent the invention has reference to an improvement in wheel hubs, and it has for its object the provision of a metallic shell and the means for securing the shell in a fixed position upon the hub in a most efficient manner.

VEHICLE RUNNING-GEAR.—P. RICHARDSON, Kennebago Lake, Maine. Withstanding the shock of very rough roads and avoiding its transmission to the occupants, in this case, is accomplished by providing for the yielding in all directions of an upper frame on which the body of the vehicle is mounted, as by a system of springs comprising upright springs for yieldingly maintaining the weight of the body and the occupants and diagonally-extending longitudinal and transverse springs for admitting of a yielding end and side movement of the body, respectively.

TRACTION-ENGINE STEERING-GEAR.—R. RICHARDSON, Yates Center, Kan. The gear is designed particularly for use in connection with traction engines, but applicable in other ways. It may be applied to automobiles and all motor vehicles with equal ease, the shaft being either the crankshaft of the engine or some continuously rotating shaft driven from the engine.

DUST COLLECTOR FOR WHEELED VEHICLES.—J. M. WEAVER, New Oxford, Pa. The invention relates particularly to improvements in attachments for automobiles or similar vehicles for receiving dust rising from the vehicle wheels and discharging the same in a wet or condensed condition, thus obviating the annoyance from the spread of dust incident to such vehicles as ordinarily equipped.

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.



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.

(10521) O. J. S. says: 1. Which telephone lines do you consider to give the best service in rural districts—ground or metallic? Can you advise me a good book on practical ground line telephony? A. A metallic circuit is best for all telephone lines, but the cost is so much greater that the grounded circuit is usually employed upon rural circuits. Long-distance lines are always metallic. The best book upon the telephone is Miller's "American Telephone Practice," which we send for \$4. 2. How do you find the distance between the earth and the sun? Give me a simple formula for calculating that distance. A. It is a long story to tell how the distance of the sun from the earth is found. Consult any college astronomy in the University library. The distance is computed from the parallax of the sun. 3. If the radius of a certain pulley is 4 inches and of another is 12 inches, and the distance between their centers is 6 feet, how would you calculate the length of a belt running around these two pulleys? A. The length of the belt you desire will be given with sufficient exactness by adding to 12 feet one-half the circumference of each of the pulleys. 4. Where, for good ventilation, should a ventilator be situated—near the top or the bottom of a wall? Is it better to have two ventilators one in one corner and another diagonally across? A. There are all sorts of opinions upon the location of ventilators. The usual practice is to place them both at the top and bottom of the room, so that either register may be opened. We do not think one ventilator in one corner and another in a diagonally opposite

corner should be preferred. 5. How do you find the horse-power of a common steam engine? A. To find horse-power of a steam engine, multiply the mean effective pressure in pounds per square inch by the length of stroke in feet and by the area of the piston in square inches, and by the number of single strokes per minute. If the piston passes through one end of the cylinder head, subtract one-half of the area of the piston rod from the area of the piston; but if it goes through both ends of the cylinder head, subtract the whole area of the rod from the area of the piston. Divide the product of these numbers by 33,000.

(10522) E. B. S. says: To render theaters safe from fire, a policeman should be on the stage near the curtain, having in his hands or close by one hose containing water under pressure and another hose with carbonic acid gas under pressure. Either one can be instantly used if necessary. A scientific book says one quart of water resolved into its elements gives 1,200 quarts of hydrogen and 600 quarts of oxygen. Is it correct? If not, how much gas will result of each kind? A. With reference to the suggestion you make that a policeman should be in a theater to guard against fire, we would say that in all New York theaters firemen are on duty all the time when an audience is in the building, ready to turn on the water and use the appliances for extinguishing a fire. A fireproof curtain would be dropped in an instant, and a rope cut, which would open large scuttles above the stage, so that any smoke upon the stage would be drawn up as by a chimney into the open air, and no fire or smoke would or could be drawn out into the house where the audience is seated. The statement is correct that two quarts of water contain 1,200 quarts of hydrogen and 600 quarts of oxygen, when the barometer is at 30 inches and the thermometer is at the freezing point, or 32 deg. Fahr. Unless the pressure and temperature are stated, any statement of quantity of the gases is meaningless.

(10523) L. A. C. asks: Why does not a submarine boat sink all the way to the bottom of the ocean? I understand the method used in plunging submarines is to admit water into tanks, so as to give the boat more weight, weight enough to cause the boat to sink only 50 or 60 feet. It sinks at the surface. Why does it not sink to the bottom? Would a hollow steel ball weighing 65 pounds and having a displacement of one cubic foot (when under a pressure of 4,600 pounds per square inch) sink to the bottom of the ocean, where a cubic foot of water weighs 66.56 pounds (27.366 feet below surface)? I should say that such a ball would sink to a depth of approximately 10,300 feet and there remain suspended. Am I right or wrong? What is the principle involved in the toy known to schoolboys as "the devil in the bottle"? This toy is a bottle filled with water, in which is contained a small hollow image, which image can be made to sink or float in the water, or even to remain suspended half way between the surface of the liquid and the bottom, by manipulating a diaphragm closing over the neck of the bottle. A recent controversy leads me to these questions. A. The submarine and the "devil in a bottle" are instances of the application of Archimedes's principle. The little imp in the bottle is known in science by the name "Cartesian diver." Archimedes stated the principle that a body immersed in a liquid loses as much weight as the weight of the liquid it displaces. If the liquid displaced weighs less than the body, the body sinks; if it weighs more than the body, the body rises and floats partly out of the liquid; if it weighs the same as the body, the body neither sinks nor rises, but remains just where the weight of the displaced liquid is exactly equal to the weight of the body. The Cartesian diver has a little opening into the lower part of its body. When pressure is put upon the air in the top of the bottle, that pressure is transmitted through the water in the bottle to the air in the imp, and compresses the air so that water flows into the imp and makes it heavier. It then sinks. By relaxing the pressure, the imp may be stopped at some point and kept there. If the pressure is however maintained as at first, the imp sinks to the bottom without stopping, since the water has the same density in all parts of the bottle. The submarine is intended to act upon exactly the same principle in the same manner. They usually do so, but once in a while one continues to the bottom, with disastrous results to all on board. The steel ball, which you suppose, would do exactly the same as you state, if it could retain its volume unchanged, and displace a cubic foot of water at a depth such that its weight were exactly the same as that cubic foot of water. But this is not possible. Under the pressure of the water as it sinks the steel will be compressed more than the water, as we showed, even if it were solid, and when it reached the theoretical depth its volume would be less than a cubic foot and it would sink still farther, and be compressed still more till it reached the bottom. There is no place such as you suppose. There is still another impossibility. A steel ball whose volume is one cubic foot and whose weight is 65 pounds must be made of steel plate about a third of an inch thick. This would be in worse shape than the proverbial "cocked hat" long before it reached a depth of 10,000 feet, by the pressure of the water.

NEW BOOKS, ETC.

THE STONE IMPLEMENTS OF SOUTH AFRICA. By J. P. JOHNSON. 258 illustrations. New York: Longmans, Green & Co. 8vo.; cloth. Price, \$2.50.

There is much work to be done in investigating the prehistoric races of South Africa, and in fixing them in their proper places as regards their advancement. Mr. Johnson has collected some interesting material, but it is to be hoped that he will find opportunity to investigate more thoroughly the ground that he has broken. However, his reasoning is quite in accordance with the facts, and places his finds beyond doubt in the periods to which they belong.

A POCKET-BOOK OF MECHANICAL ENGINEERING. Tables, Data, Formulas, Theory, and Examples for Engineers and Students. By Charles M. SAMES. Revised and enlarged. Published by the author at 542 Bramhall Avenue, Jersey City, N. J. 195 pages, 41 figures; flexible leather. Price, \$2.

The author has increased the scope of his first edition, adding much valuable matter, without adding materially to the bulk of the book. As a pocket reference book it cannot be too highly recommended. The field covered is extensive and closely covered, yet there are no unnecessary facts to hinder the practical worker.

THE COAST MANUAL OF LETTERING AND DESIGNS. Los Angeles, Cal.: The Coast Manual Publishing Company. Quarto; cloth; 106 pages. Price, \$5.

Now that advertising is accepted without hesitation as a vital part of commercial routine, a book of letterings and designs, selected especially for their value to the "display artist," will find the readiest appreciation. The handbook published by Fred Knopf and J. M. Mahaffey is full of successful combinations that will be found most serviceable in their promptings to the experienced designer as well as to the novice.

MODERN AMERICAN MACHINE TOOLS. By C. H. BENJAMIN. New York: E. P. Dutton & Co. 8vo.; cloth; 134 illustrations, 320 pages. Price, \$5.

The object of this treatise is to show to the buyer and user the prominent characteristics of modern machine tools as now manufactured in the United States, the various points in which they differ, and some recent data as to their capacity and performance.

To the buyer in Great Britain or on the Continent, this work should be a help, as it brings together in one volume facts from a variety of sources and furnishes information which might otherwise need to be sought at much expenditure of time and trouble.

While the present work is in no sense an advertising medium, it illustrates as large a variety of machines and of makes as the space allows, giving the reader as comprehensive a view as possible, and in all cases allowing an uninfluenced opinion to be formed.

ALTERNATING CURRENTS. A Text-Book for Students of Engineering. By C. G. LAMB. New York: Longmans, Green & Co. London: Edward Arnold. 8vo.; cloth; 325 pages, illustrated. Price, \$3.

Many treatises on this subject have been written, but Mr. Lamb's work fills the need for a text-book for beginners that without being too cumbersome covers the subject of alternating currents in all its aspects.

The treatment of the question is based largely on the use of vectors, supplemented by simple analytical methods when it is desired to obtain numerical results. The symbolic treatment does not appeal to students, and has for that reason not been used. Also no attempt has been made to distinguish in the formulæ whether absolute or practical units are employed, since the unwieldy results are perplexing to beginners.

SPACE AND GEOMETRY IN THE LIGHT OF PHYSIOLOGICAL, PSYCHOLOGICAL, AND PHYSICAL INQUIRY. By Dr. ERNST MACH. From the German by Thomas J. McCormack. Chicago: The Open Court Publishing Co. London: Kegan Paul, Trench, Trübner & Co., Ltd. 12mo.; cloth; 148 pages. Price, \$1.

The three essays which form the present volume were written for the Monist some four years ago. Last year they were in great part incorporated in their original German in Prof. Mach's latest published work, "Erkenntnis und Irrthum; Skizzen zur Psychologie der Forschung." In them Prof. Mach discusses the questions of the nature, origin, and development of our concepts of space from the three points of view of the physiology and psychology of the senses, of history, and of physics, in all of which departments his profound researches have gained for him a most exalted position.

SMALL ELECTRICAL MEASURING INSTRUMENTS. How to Make and Use Them. By Percival MARSHALL. New York: Spon & Chamberlain. 12mo.; paper covers, 90 pages, illustrated. Price, 25 cents.

A clearly-written and freely-illustrated handbook for the experimenter and investigator. By its use many instruments of equal efficiency to those sold by the regular makers can be made at very low cost.