RECENTLY PATENTED INVENTIONS.

Agricultural Implements.

CULTIVATOR AND HARROW.—MICHAEL SMITH, Asotin, Wash. This agricultural machine will act as a weed-exterminator, pulverizer, and cultivator. The machine has a series of frames coupled together so that they may yield. The frames are provided with vertically-adjustable caster-wheels, serving to regulate the depth to which the shovels enter the ground. An arrangement of shovels upon the various sections is provided, by which the ground is effectually cleared of weeds. The draft can be quickly shifted to the right or to the left to keep the implement straight, especially when work is to be performed upon a hillside.

Boilers and Furnaces.

ASH-PAN.—WILLIAM S. ANDERSON, Jasper, Tenn. The ash-pan is so made that it can be conveniently handled without fear of accidentally spilling its contents and without permitting dust and sparks to fly with the wind. The novel feature of the construction is a cover which is fitted with devices removably engaging the pan and by which the pan may be carried from one place to another and the cover disengaged when it is desired to empty the pan.

FURNACE.—JOHN L. POSLIN, Chicago, Ill. On opposite sides of a combustion-chamber gas-flues are arranged. Independent fireboxes are provided for these gas-flues, which fireboxes open into the rear ends of the flues so that the products of combustion from the fireboxes pass into the gas-flues at the rear ends, in order then to travel forward and pass into the forward end of the combustion-chamber. A mixing device in the rear portion of the combustion-chamber serves the purpose of mixing the products of combustion from the gas-flues. Any kind of fuel or different kinds of fuel can be used. Cold air is prevented from striking the boiler when the charging-doors are opened for introducing fuel.

BOILER.—THOMAS P. CONNELLY, Jersey City, N. J. The boiler has a steam-compartment provided with a manhole in its top; a water-compartment; and tubes connecting the compartments with each other. These tubes are curved to permit their removal through the manhole. The bottom of the steam-compartment and the top of the water-compartment are dished toward each other; and the ends of the tubes extend approximately at right angles to the top and bottom. Baffle-plates deflect the smoke and gases. The boiler has a large heating-surface. The means for removing a defective boiler-tube without disturbing any of its neighbors are noteworthy.

PORTABLE STEAM-GENERATOR.—JOSEPH SCHOETTL AND CHRISTIAN JAEGER, Brooklyn, New York city. Through a boiler a vertically-disposed flue passes. A jacket incloses the boiler. At its lower edge the jacket has a skirt which projects below the boiler. From the upper part of the boiler a tube passes which serves the purpose of conducting away the steam. The tube extends downward between the boiler and the jacket and is coiled below the bottom of the boiler and then projected through the flue and beyond it. The generator is designed for the purpose of superheating steam for domestic uses. The inventor has shown in his patent one use to which his invention can be applied, namely, the cleaning of beer-pipes.

BOILER-FURNACE.—WILLIAM F. BEECHER, Cleveland, O. The gases arising from the fuel burning on the grate are mingled with air. In this manner perfect combustion is insured in the combustion-chamber, and the smoke consumed. The air which is fed to the gases has been previously heated, and is, therefore, in a proper condition to secure highly efficient combustion. Horizontal circulating-tubes are connected with the boiler, which tubes serve in a measure to protect the surfaces of the furnace-walls against the high heat of the combustion-gases.

Electrical Apparatus.

TELEGRAPH OR TELEPHONE CALL MECHANISM.—EDGAR E. SALISBURY, Chicago, Ill. This improvement in telegraph and telephone call devices comprises a simple mechanism for releasing the break-wheel on an upward movement of the receiver-supporting arm, and also for locking the arm in its upper position and releasing it after the rotation of the break-wheel. The winding and releasing of the call mechanism can be accomplished without removing the receiver or disturbing its supporting-arm.

Mechanical Devices.

TOBACCO-STEMMING MACHINE.—MILTON C. BAUGHAN, Barton Heights, Va. The body of the leaf is seized and held by one pair of belts, the runs of which are in close proximity, so that they may feed the body of the tobacco leaf lengthwise between them. Alongside this first pair of belts is a second pair of opposing belts, adapted to feed the stem lengthwise between them. In the operation of the machine under certain circumstances, the arrangement whereby the belts for carrying the body of the leaf are caused to diverge, operates to strip the stem from the body of the leaf without the necessity of employing separate stem-cutting devices. Nevertheless the inventor prefers to employ rotary cutters to sever the stems.

SCISSORS.—JONATHAN BADGER, Manhattan, New York city. The shanks of the scissors-blades are connected by a spring which acts as a handle and normally holds the blades apart or in a position to receive an object. The blades may be quickly brought into cutting action by pressing the end portions of the spring toward each other.

PIPE-WRENCH.—EDWIN F. COMBER, Selkirk, Manitoba, Canada. The pipe-wrench comprises a fixed jaw having an integral arm extending rearwardly, and a movable jaw pivoted on the fixed jaw. A cam-lever is fulcrumed on the arm and engages the movable jaw to swing it toward the fixed jaw. The cam-lever is operated by a handle. By means of this wrench a pipe can be firmly gripped. The jaws can be adjusted to accommodate pipes of different sizes.

MATRIX AND SPACE-BAND CLEANING MECHANISM FOR TYPE-SETTING MACHINES.—DAVID A. HENSLEY, Vicksburg, Miss. It is the purpose of this invention to provide means by which the type-matrices and space-bands will be automatically cleaned during their ordinary travel through the linotype. By thus keeping the matrix and space-bands clean the necessity of frequently renewing them is avoided. Opposing matrix-brushes are located in vertical alinement with the discharge-point of the matrix-belt, so that the matrices discharged from the belt will fall between the brushes and will thus be cleaned.

INTEREST-COMPUTING MACHINE.—LARS M. LANDING, Glenwood, Minn. Mr. Landing has invented an ingenious machine for computing interest and time. By its means an operator can readily figure the interest on various principals at various rates and for various times, and ascertain the time (number of days) between two given dates. The improved machine can also be used for solving, at least approximately, various other problems, such as finding the time during which the interest on a given principal will become equal to a given amount at a given rate.

BORING-MACHINE. WILLIAM R. ABRAMS, Portland, Ore. To provide a machine for boring into wood without danger of clogging or breaking the tool is the purpose of this invention. The machine comprises a revoluble boring-tool having a hollow shank at the forward end of which a bit is carried. From the boring-tool a stationary discharge-pipe leads. In order to draw the chips or cuttings longitudinally through the tool and convey them away through the discharge-pipe a fluid-pressure pipe is used which creates the necessary suction. By the arrangement described the chips are removed from the bore as quickly as formed; and, consequently, there is no danger of the boring-tool's becoming clogged, or bent, or broken.

WASHING-MACHINE.—CALEB T. REEDER, Stewardson, Ill. The washing-machine has a plunger which creates a suction through the clothes so as to accelerate the process of washing them. The plunger works in a pan and carries a number or rigid strips, which serve as beaters for the clothes. The plunger, when forced downward upon the clothes, presses them against the bottom of the pan. Upon the return of the plunger, a suction is created which tends materially to assist in the process of cleaning the clothes. The plunger keeps the water in constant circulation.

HAT-SHAPING MACHINE.—MARI A. CUMING, Manhattan, New York city. On a steam-basin, a perforated die is placed. With this perforated die a movable die coacts to hold a hat. By reason of this coaction, the hat is subjected to the action of steam during the operation of the dies, to render the material sufficiently pliable to be readily molded or pressed. A crown-die is mounted to move toward and from the first two dies to form the crown of the hat. The first named dies have central openings through which the crown is enabled to pass.

SHAFT-BENDING MACHINE.—JAMES N. CHAPMAN, Memphis, Tenn. It is the purpose of the invention to provide a machine for bending carriage or buggy shafts of different lengths and thickness, and also for bending shaft-heels of different length and curvature, and at the same time to perform the work in less time than has usually been required for the purpose. By means of this machine two shafts are bent simultaneously; and the heels are formed on any required radius. The time required for bending a shaft is about one minute.

STAPLING DEVICE.—JOHN C. LARY, Clintonville, Ky. This device is used for the purpose of setting staples in position to be driven, especially in wire fence construction, and for fixing the staples in place without the possibility of injuring the hands or the fingers. The device carries a number of staples of any desired size, which staples are delivered one after the other to the fixing section of the device and automatically placed in position to be driven. The staples may be placed in any desired quantities on a magazine or collecting device, from which they are quickly transferred to the setting device in the field.

EXHIBITING DEVICE.—BERNHARD TROPP, Manhattan, New York city. This exhibiting device is to be used for advertising and for other purposes, and is provided with mechanism of improved construction by which a strip of material, carrying a series of advertisements or other matter to be exhibited successively, is moved intermittently in one direction and then caused to travel intermittently in the opposite direction. The interruptions or stoppages of the movement are long enough to permit the reading of advertisements.

Metallurgical Apparatus.

ORE-SEPARATOR.—AUGUSTUS C. HARTUNG, Galena, Kans. This separator is particularly adapted for the treatment of lead and zinc ores. The ore, mingled sand or ore, gangue and water are deposited upon a rotary table and spread out so that the heaviest material remains near the center. Canvas sweeps pack and spread the material evenly. An adjustable scraper takes up from the table different grades of material; and by the higher or lower adjustment of the scraper any desired quantity or grade of material can be removed and deposited in separate receptacles. Novel mechanism is provided to adapt the scraper thus to deliver into separate receptacles.

MACHINE FOR COLLECTING PRECIOUS METALS FROM RIVER-BEDS.—JAMES R. DAKE, Merrill, Wis. The machine comprises a frame in which a shaft is mounted. A current-pressure wheel is attached to the shaft, the wheel having laterally-swinging blades and being adapted to be entirely submerged. From the shaft an endless carrier is operated on which buckets are carried. The bucket-carrier is set in motion by the current-wheels. The buckets scoop up the sand containing gold or other metal and deposit it in the sluice. The water flowing through the sluice carries the sand and gold, the sand being discharged at the outer end of the sluice, while the gold settles in the pockets at the bottom of the sluice.

GOLD-GRADING AMALGAMATOR.—ALFONSO Z. BALDENEBRO, Mexico, Mexico. The object of the machine is to produce a current of pulp of uniform and constant velocity from the first receptacle to the last, and also to facilitate the deposit by gravity of the mineral particles at the bottom of each receptacle. Thus the heaviest particles are to be deposited in the first receptacle, the lightest or finest in the last. The current of pulp is passed through a gradually-increasing body of water as it travels from receptacle to receptacle. The agitation of the water is most violent in the first receptacle and least apparent in the last.

Railway Appliances.

FROG.—JAMES BARRY, Galveston, Texas. Situated at the outer sides of crossing rails are chairs or brace-blocks. U-bolts extend between the chairs and pass under the rails. A connecting-plate is fastened to the rails beneath the chairs and extends from one U-bolt to the other. It is claimed for this construction that it is more secure and durable than that at present employed.

GRAIN-DOOR.—JOSEPH E. BROWN AND HENRY H. WINTERS, Victoria, Kans. The object of the invention is to provide a door for freight-cars which is designed to prevent leakage of grain. A novel fastening is employed comprising cleat with an overhangi portion, the inner face of which is formed with transverse ribs for engagement by the grain-door to hold one end in place. The cleat is fastened rigidly to the railway-car at one side of the door-opening. A bar is arranged at the other side of the door-opening and has its lower end turned laterally to form a foot. A keeper is fastened on the floor of the car loosely to receive the foot of the bar. The upper end of the bar is drawn toward the car-body to clamp the grain-door between the bar and the car.

Vehicles and Their Accessories.

CART.—JOHN J. MCNULTY, Carmel, N. Y. This invention is a "jogging-cart" used for exercising horses, the object being to provide a light, strong vehicle and to give the driver the comfort which cannot be had in racing-sulkies. So light is the construction that the inventor has been able to produce a complete cart weighing not more than seventy-five pounds and yet capable of enduring all the strains to which it can possibly be subjected in ordinary use.

VEHICLE AXLE AND BOX.—JOHN G. ANDERSON, Rock Hill, S. C. To provide a new axle and box arranged to insure free circulation of the lubricant is the purpose of this invention. The axle has its spindle formed with a return oil-groove extending partly longitudinally on the top from the inner end toward the outer end. The outer portion of the groove turns downwardly and forwardly to the under side of the spindle. The box for the spindle has at its outer end an oil-chamber for the lubricant. The forward portion of the return groove opens into the bottom of the chamber.

VEHICLE-HUB.—EDWIN B. JONES, Hornellsville, N. Y. By means of this vehicle-hub the use of a spindle-bar or nut at the free end of the spindle is dispensed with. The vehicle-hub is detachably held on the spindle of the vehicle-axle. The connection of parts is dust-proof. The escape of lubricant is prevented; and the hub of the vehicle-wheel is held upon the axle-spindle in a manner which is both more simple and more efficient than that which has heretofore been known.

HAME-FASTENER.—SILAS T. MARLETTE, 27 Garner Avenue, Buffalo, N. Y. The hame-fastener is designed for quickly and securely connecting the lower ends of the hame sections about the collar with a tightening action, and is intended to be used in connection with any of the ordinary forms of hames. The hame-fastener is made in three parts. One of the end sections is made with a large, upturned hook, opening upwardly and containing locking devices. The middle section is formed with a concave seat fitting up against the lower convex side of the hook and co-operating with locking devices.

VEHICLE-REACH.—PETER S. WITHINGTON, Slack, Wyo. The improved reach rocks readily in the front axle, and allows a wheel to pass over an obstruction or to drop in a hole or rut without breaking or twisting the reach or coupling-pole. Either end of the vehicle may be tipped over without injuring the other end of the reach. The draft of the vehicle, moreover, is lightened, since there is no friction or binding on the reach. The axle is not weakened; because no hole is employed for a king bolt.

Miscellaneous Inventions.

EARTH-AUGER.—WILLIAM B. GIBSON, Morrilton, Ark. The invention, briefly described, comprises a hollow cylindrical boring-head, in the bottom wall of which an inlet-opening is formed, closed by a gate. A scoop-like excavator-blade extends below the bottom of the head at one side of the opening. Teeth are projected from the bottom of the boring-head to loosen soil subsequently cut by the excavator-blade. For a diametrical enlargement of the hole bored by the excavator-blade, a counter-boring attachment is provided. A handle rod or bar is adapted to rotate the boring-head and also to open and close the gate. The counter-boring device is opened and closed from above the surface of the earth.

PROCESS OF WASHING GAS.—RICHARD E. PIPPIG AND OTTO F. TRACHMANN, Kiel, Germany. The present invention relates to a process for treating illuminating-gas obtained from coal, wood, peat, coke, or other similar substances with certain washing ingredients in such a way that gas escaping from leaks in the mains cannot injuriously affect vegetation. The process consists in extracting from the gas the vaporous substances (carbon bisulfid, carbonic oxysulfid, oil of mustard, mercaptane, thiophene, phenol, phenates, and the like), by means of washing ingredients among which are an amin capable of combining with bisulfid of carbon.

BOOK OR COPY HOLDER.—BURGESS T. MONTGOMERY, T'sr'y Dept., Washington, D. C. This invention is an improvement in holders or stands for books, loose sheets, documents, or the like, to be used by public speakers, copyists, and others. The holder is arranged to hold any of the articles mentioned of any reasonable thickness, and is so constructed that it can be adjusted to different elevations and inclinations and arranged for different articles as desired.

BINDING-STRIP FOR BOX-CORNERS.—WALLACE J. PIERRPONT, Savannah, Ga. The improved construction provides a box-corner strip the opposite edges of which are formed with alternating projections and recesses, the recesses and projections being of the same form, so that a number of the corner-strips can be cut from a plate of metal without any loss of material. The projections of one strip are formed in cutting the recesses of adjoining strips. The projections can be easily driven into any kind of wood without danger of splitting the wood. By forming the projections with the same angle on both edges they can be readily driven through veneer stuff in line with the grain; and the strip can thus be made of comparatively thin metal.

CURTAIN-FIXTURE.—JOHN B. BERNIER, Spencer, Mass. Mr. Bernier has devised a fixture for hanging shades and lace curtains, together or separately, and has so constructed his device that it can be very easily secured to or detached from the upper member of a window-frame of any transverse dimensions without using screws, nails, or like fastening devices which would lacerate a surface.

CALF OR COLT WEANER.—ALVY N. GOFF, Rocky Ford, Colo. By means of this appliance the calf or colt is prevented from sucking milk, but is permitted to graze, feed, and drink without interference. The appliance is attached to the animal's head so that it projects forward from the nose and yet, so that it will annoy the mother when the calf endeavors to take nourishment.

FIRE AND WATER PROOF REMOVABLE WALL, FLOOR, ETC.—JOHN MASSARO, Frankfort-on-the-Main, Germany. An iron floor-plate is used consisting of rows of upright plates set at convenient distances and provided with holes through which iron bars are drawn. The middle bars are vaulted to give strength to the floors. Upon these longitudinal bars cross-plates are tied up. The iron floor-plate is then brought in a mold of convenient size, filled up, covered with a layer of cement so that the floor-plates obtained bear on the iron as well as on the cement. The construction is fire and water proof.

WIRE STRETCHER.—FRANK J. OLMSTED, Beaver City, Neb. The wire-stretcher has a lever adapted to be engaged with and to be

moved around a post. In one of its edges the post has notches. A stretcher-head comprising a ring moves along the lever and is adapted to engage any one of the notches. A bar is arranged at right angles to the lever and has connection with the ring. Hook-bolts are mounted in the bar; and tightening-nuts are carried by the bolts. The device can be conveniently employed for stretching and twisting the ends of a broken wire.

ENVELOP.—James A. Ullman, Manhattan, New York city. The purpose of this invention is to provide an envelop which can be opened very much more readily than the ordinary envelop. To this end an orifice is formed in the sealing-flap, through which orifice the blade of a knife may be inserted to cut the envelop open. In order to render the insertion of the knife-blade easy, a notch is cut in the back of the envelop just under the opening, so that the blade will have a clear passage into the interior of the envelop.

ADJUSTABLE DRESS-CHART.—Harry C. Wilson, Manhattan, New York city. The inventor has devised a series of adjustable patterns which can be readily set according to measurements, so as to obtain proper patterns for ladies' waists. The principal aims of the invention are to simplify the adjusting operations, to provide a construction that will positively give the full outline of each piece, and to enable the dressmaker to vary the pattern.

BOTTLE.—William A. Fries, Sr., Brooklyn, New York city. This invention relates to non-refillable bottles. Mr. Fries has been chiefly concerned with providing a bottle which is both practical and cheap and which is so constructed that the refilling of the bottle will be effectively prevented by means of a novel valve inserted in the neck. Many non-refillable bottles cannot be made by the ordinary methods of blowing and molding. The present invention, however, is primarily designed to overcome these difficulties of manufacture.

DRAWING AND MEASURING INSTRUMENT.—Celestia E. Kerr, Decatur, Ga. The invention relates to an instrument for use in drawing, measuring, and working with various sorts of materials. The instrument comprises a scaled ruler, a T-square, a protractor, and a compass.

SILK-CLAMP.—James J. McGrath, Brookhaven, Miss. The clamp is adapted to bind a bolt of silk and to retain the folds in proper position for exhibiting the goods. Main clamp-arms and auxiliary inner clamp-arms exert a clamping action at two distant points. The inner clamp-arms are of such form as to prevent them from making an impression on the silk when several bolts are superposed.

PIPE-ELBOW BRACE.—Samuel C. Brownfield, Elmo, Mo. The pipe-elbow brace is formed in two sections adjustably connected, each section further comprising a clamp to engage the pipe, such clamps lying at angles to the sections so as properly to dispose the brace. By this construction a brace is provided which is adjustable to suit the form of the elbow.

TOOL-HANDLE.—Antrim L. White, Springville, Iowa. Mr. White has provided a hammer or like tool to which a handle may be conveniently attached. Engaging the head is a metallic tube, into which a plug is forced to grip the interior walls, so that it is held in the head. A hand-piece is fastened to the outer end of the tube; the tube and the hand-piece jointly form the tool-handle.

TROUSERS-STRETCHER.—John C. Tatman, Victor, Colo. The trousers-stretcher consists of two cross-pieces, between which the legs of the trousers are clamped, and a central piece connecting the two cross-pieces. The central piece can be so adjusted that the cross-pieces are forced apart to stretch the trousers.

DISPLAY-STAND.—Isaac Steinau, Manhattan, New York city. The inventor has received both a mechanical patent and a design patent for a portable display-stand, which is intended to receive collar-buttons. The mechanical patent shows a bowl-body together with a transparent sectional cover for the body, the sections being capable of sliding one over the other. A stem serves to hold the parts of the cover loosely in position, and to prevent them from leaving the body. The design patent shows the bowl formed as a turned-down collar and the stem as a collar-button.

TACK-PULLER.—Charles A. Evans, Haverhill, Mass. The tack-puller comprises a handled fork having spring arms, and a pair of spring-jaws fulcrumed between the arms and normally open. The spring-jaws are arranged to close by applying pressure and to open automatically upon removing the pressure, so that the tack pulled may drop out to permit the tool to be used again.

Designs.

VIOLIN-BRIDGE.—Samuel G. Donnelly, Augusta, Ga. The leading feature of the design is an arched hook-shaped upper or head section of the bridge, which head-section at its left hand is connected by a shank with the base-section of the bridge.

BELT.—Louis Sanders, Brooklyn, N. Y. The design provides an ornamentation resembling a collar located at the central or back portion of the belt.

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.

Notes & 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.

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Minerals sent for examination should be distinctly marked or labeled.

(8026) W. H. T. asks: 1. Is the voltage of a circuit reduced by inserting resistance in series with the source of energy? A. No. 2. How is the voltmeter to be read—in series, or as a shunt with the resistance? A. The voltmeter is always connected as a shunt upon the circuit whose voltage is to be measured. 3. As I maintain the voltage is reduced, am I not right in saying: If the voltage is not reduced by passing the current through resistance, an unlimited number of lamps could be run, for in that case the amperage would not fall (by Ohm's law), therefore the current would remain constant, no matter what resistance was in the circuit? Suppose in a circuit carrying 5 amperes at a pressure of 500 volts, five 100-volt lamps are introduced in series; one lamp will take one-fifth of the pressure, while five lamps all, or 500 volts at 5 amperes? A. The resistance in a circuit has no control over the voltage. The drop between two sides of a circuit is the same, whatever the resistance may be. In a circuit with 500 volts pressure there is a drop of 500 volts between the positive and the negative side, under all circumstances. If across this there be put a wire with 500 ohms resistance, a current of 1 ampere will flow, according to Ohm's law, C equals E/R. If the wire have 100 ohms the current will be 5 amperes, etc., for any other resistance. Now, if you divide the wire into 500 equal parts, starting at the positive side, you will find a drop of one volt for each of the 500 divisions. This is just like going down a flight of 500 steps. You illustrate by the five 100-volt lamps across a circuit. Each of these lamps takes 100 volts drop in itself. The current for such a lamp is about one-half ampere. You cannot get five amperes through five such lamps in series. A current much in excess of a half ampere will burn the lamps out. The resistance of these lamps holds back the current, so that the lamp is not overheated. It is the increase of the resistance which produces the result which you ascribe to the reduction of the voltage, and in the usual direct current system the voltage is not affected by any other element of the current. 4. If this be so, what pressure and current are we going to get on the return (leaving out its resistance) to the dynamo? Will you kindly prove to me whether my statements are right or wrong? A. There must be enough pressure provided to force the current back to the dynamo. This is proportional to the resistance of the return wires. These wires are large and have a small resistance, hence but a few volts are needed to do this work. You must know that in every circuit a drop of voltage is provided for along the line, so that the lamps, motors, etc., get the proper voltage for their resistance, so that they may have amperes sufficient for their work. There are many people who think volts are the working factor of Ohm's law. On the contrary, amperes do the work: volts furnish the pressure to overcome the resistance. We get the expression very frequently: "A current of so many volts." The statement is entirely wrong. A current is measured in amperes, not in volts. Now the drop in voltage along the feeders, both in going from the dynamo to the lamps and the return from the lamps to the dynamo, is given to the circuit in excess of the voltage needed by the lamps. In a large system this excess is furnished by another generator, called a "booster," because it lifts the voltage enough to supply the loss due to the long line. If it were not for this the lamps remote from the station would not get their proper voltage and would not be properly lighted. 5. Also is there any explanation of the fact that when a voltmeter is placed in series with resistance, it reads practically the same voltage as when it is connected with the terminals of the dynamo? A. This statement is not true except when the resistance is so small as to be practically negligible as compared with the resistance of the voltmeter. A voltmeter is wound so that its resistance is enormously greater than that of any line to which it will be attached, so that it may consume but an insignificant fraction of the current. For a current of 110 volts pressure the voltmeter would have perhaps 10,000 to 15,000 ohms resistance. It would then take only about 1-150 ampere. The voltmeter indicates the drop of voltage between the points to which it is connected. If these are the poles of a dynamo, this is the whole voltage of the circuit; if there is a large resistance in series with the voltmeter, then the voltmeter will not indicate the entire voltage of the circuit. For illustration, suppose the added resistance were just equal to that of the voltmeter. The circuit now has a total resistance twice as great as that of the voltmeter; hence the drop of voltage through the voltmeter will be one-half and through the resistance it will be the other half of the voltage of the entire circuit.

(8027) C. P. says: I would be very thankful to you if you could only supply me with the following information, namely: What is the quantity of material that enters into the construction of a modern first-class battleship? Kindly give quantity in weight. You may also give exact dimensions. A. In such a battleship as the new "Pennsylvania," to be built for the United States navy, whose total weight is about 15,000 tons, 1,200 tons represents the weight of the guns and ammunition, etc.; 1,830 tons the motive power; 1,000 tons the weight of the boats, masts, anchors, chains, provisions, personal belongings of officers and crew, etc., leaving say from 5,000 to 5,500 tons as the weight of the hull. This ship is 435 feet long, 76 feet 10 inches in beam, and draws at greatest draught 26 feet; her freeboard above the water is about 20 feet.

(8028) B. O. asks how to give any article made of copper the appearance of old bronze. A. You can treat your copper article with the following:

Vinegar	1	quart.
Ammonia chloride	250	grains.
Common salt	250	grains.
Liquid ammonia	½	ounce.

The salts are first dissolved in the vinegar, and ammonia is added to the solution when it is ready for use. Small articles may be immersed in the solution, then removed, and when one part becomes too dry a paint brush is drawn over it so as to keep all parts uniform. The color should be carefully and uniformly spread. When the copper has taken the desired tint and the liquid begins to dry and to thicken, the wet parts should be dried with another brush having long bristles or hairs, and when this is too wet to use, another is applied, and so on till the whole is dry. The article is then allowed to rest in a warm place till the next day, when a second coating is given in the same manner as the first. The color now assumes a deep tone, and it may be necessary to repeat the operation several times to get a desired shade. After allowing the article to remain twenty-four hours after imparting the last coat, it is finished by well brushing with a soft brush which has been rubbed on a cake of white wax.

(8029) H. B. asks for a little help concerning the formula for the "Toning of Bromide Prints," found on page 408 of the Scientific American of December 29, 1900. 1. How shall I make the solution of "neutral citrate of potassium?" If, on mixing, it is found to be either acid or alkaline, what shall I add to neutralize it? A. You may be able to purchase neutral citrate of potassium. Test the solution with red or blue litmus paper. If it changes the color slightly from red to blue, the solution is neutral. If it changes it to blue, the solution is alkaline, and may be made neutral by adding citric acid. If solution turns blue litmus paper red, it is too acid, and may be neutralized by adding a solution of potassium carbonate. 2. Further, it says: "Add the sulphate to the citrate. *mix*, and add the ferricyanide," etc. Does this mean to add the sulphate to the citrate before they are in solution, or after? A. All. After.

(8030) S. D. H. writes: In one or two of his articles Mr. Hopkins speaks of tinning the ends of metals so that they may be more easily soldered. How is this operation performed? Also, will you kindly give me directions for making a flux or soldering solution to be used in soldering copper, brass, tin, iron, etc.? A. To tin copper, for making electrical connections, scrape the surface, or clean it with a piece of fine sandpaper, rub it over with pulverized rosin, and apply solder with a hot soldering-iron. Rosin is a good flux for joints between copper, copper and brass, and copper or brass and tinned iron. A flux for iron or steel is made as follows: Dissolve zinc in hydrochloric acid until it will take no more. Add an equal quantity of water. As the fumes of the acid and gas are very corrosive and pungent, this solution should be made in the open air. After a joint is made with the aid of this solution it should be thoroughly washed to prevent corrosion. It should not be used on fine copper wires.

NEW BOOKS, ETC.

Ottawa, Capital of the Dominion of Canada. Ottawa: The Ottawa Free Press. 1899. 4to. Pp. 79. Price 50 cents.

A charming little booklet filled with interesting views of Canada's capital. It is profusely illustrated, and no feature of the city is omitted. An excellent map shows the water powers near Ottawa.

Annual Report of the State Geologist for the Year 1899. Geological Survey of New Jersey. 8vo. Pp. 327.

The admirable reports of the State of New Jersey are very valuable. The forests of the State have been considered as coming within the limits of the investigations and surveys of the Geological Survey, consequently a considerable part of the report is given up to forest matters.

A Manual of Assaying. By Alfred Stanley Miller. New York: John Wiley & Sons. 1900. 12mo. Pp. 91. Price $1.

The student is taught his subject by easy grades. The book appears to be a good elementary treatise.

Studies, Scientific and Social. By Alfred Russel Wallace. Two volumes. London and New York: The Macmillan Company. 1900. 12mo. Pp. 532 and 535. Price $5.

These volumes will charm all who are interested in science. Space forbids to give even an outline of the chapters. The first section is devoted to "Earth Studies," with six chapters, then comes "Descriptive Zoology," "Plant Distribution," "Animal Distribution," "Theory of Evolution," "Anthropology," "Special Problems," "Educational," "Political," "The Land Problem," "Ethical" and "Sociological." The essays appeared in the leading reviews of the world. The versatility of the thoroughly trained scientist is admirably displayed in these volumes.

Botany. An Elementary Text-Book for Schools. By L. H. Bailey. New York: The Macmillan Company. 1900. 12mo. Pp. 355. Price $1.10.

A most admirable text-book. The author seems to have a great gift for book-making. Botany can be easily made a very dreary subject, but not with the aid of such books as these. The illustrations are very fine and are numerous. Persons desiring to obtain an elementary knowledge of botany would do well to buy this book.

Electric Wiring Tables. By W. Perren Maycock, M. I. E. E. London: Whittaker & Company. New York: The Macmillan Company. 1900. 24mo. Pp. 144. Price $1.50.

The book can be carried in the vest-pocket, and for this reason will be found very useful. It is chiefly intended for those engaged in electric light wiring and fitting, but will be found generally serviceable to electrical engineers. The tables while fine are clearly printed.

The Human Frame and the Laws of Health. By Drs. Rebmann and Seiler. Translated from the German by F. W. Kieble, M. A. London: J. M. Dent & Company. New York: The Macmillan Company. 1900. 16mo. Pp. 147. Price 40 cents.

Three people have collaborated to bring forth this little vest-pocket book. The subject seems to be well treated within the rather severe limitations.

Things a Boy Should Know About Electricity. By Thomas M. St. John, Met. E. New York: The Author. 1900. 12mo. Pp. 179. Price $1.

Many of the time-honored cuts make their appearance as usual. The author deals more with the uses of electricity than with experiments.

Contributions to Photographic Optics. By Otto Lummer. Translated and augmented by Silvanus P. Thompson. London: Macmillan & Company. New York: The Macmillan Company. 1900. 8vo. Pp. 139. Price $1.90.

A splendid treatise on the subject by a physicist of note and translated by another of equally great fame. All who are interested in photographic optics should possess a copy of this book, which will certainly prove a standard treatise on the subject.

Plant Life and Structure. By Dr. E. Dennert. London: J. M. Dent & Company. New York: The Macmillan Company. 1900. 18mo. Pp. 115. Price 40 cents.

A volume of the "Temple Primers." Many of the essentials of botany are interestingly told. It would make a good introduction to the science.

Chemical Technology; or, Chemistry in its Applications to Arts and Manufactures. Vol. III., Gas Lighting. By Charles Hunt. Philadelphia: P. Blakiston's Sons & Company. 1900. 8vo. Pp. 312. Price $3.50.

The third volume of Grove's and Thorp's well-known book has been written by an English gas engineer. It deals with the subject in a very thorough manner, and the latest phases of the subject are dealt with. While