RECENTLY PATENTED INVENTIONS.

Pertaining to Apparel.

SEPARABLE FASTENER.—G. E. WRIGHT, New York, N. Y. The principal object of the improvement is to provide a substitute for the various forms of hooks and eyes now employed on garments and the like and so construct it as to provide for a more easy hooking and unhooking of the device; and also to simplify the construction and prevent the displacement of the two parts of the fastener accidentally.

Electrical Devices.

ELECTRIC-LIGHT-BATH CABINET.—H. H. ROBERTS, Lexington, Ky. In this case the invention is in the nature of a novel cabinet, designed to treat the body with the radiant heat and light of electric lamps under variations of different colors of light and the special application of high-frequency currents.

Of Interest to Farmers.

HAY-STACKER.—J. C. HARRIS, Greeley, Neb. In the operation of this stacker the fork-frame being in position such that the horizontal teetb are on the ground a shock of hay is drawn thereon. Power is then applied to the ends of the hoisting-ropes which elevates the frame, and hay. At first the frame travels half as fast as the ends of the rope. When the frame contracts with the sheave-arms, tbe pull is direct, tbis giving a quick jerk of the frame, wbereby to throw the load upon the stack.

Of General Interest.

TELESCOPE-MOUNTING FOR GUNS.—J. WILKINSON, Bridgeport, Conn. In the present patent the invention is a telescopic mounting for guns, the telescope being pivotally attached to a gun by links, and thus adapted to be temporarily elevated to obtain a clear view of the open sights below it when the telescope is not used.

DRUM.—P. BERLINGHOFF, New York, N. Y. The drum is of the kind used in bands, orchestras, or the like, the inventor's object being to provide a drum so constructed tbat it may be compactly folded or reduced in length for convenience in transportation or storage and that when extended will be held rigidly in normal or playing position.

TRY-SQUARE.—J. COLLIE and C. BEAUCHENE, Lake Linden, Mich. The invention relates to try-squares such as used by mechanics and particularly by carpenters in laying out work. The object is to produce a square which will be provided with means enabling two faces of tbe work to be marked simultaneously. It enables a timber to be marked for a square or plumb cut and also a beveled cut.

TRUSS.—F. CRATER, Parsons, Kan. The principal object of the truss is to provide means for equalizing the strain. In this invention a person on assuming a stooping position automatically increases the pad-pressure by the sbortening of the belt, thus guarding against displacement. The self-adjustment of the elements of the improvement greatly adds to the comfort of the user. The necessity of an elastic belt is obviated.

TRACE-BUCKLE.—H. JOHNSON, Edgerton, Mo. The object of the invention is the production of an attachment for a trace-buckle which shall permit the ready fastening, release, or adjustment of straps and bands, and particularly of heavy articles of this nature, such as traces or tugs of harness and one which shall form an additional fastening to the single-tongued buckle in common use.

FOUNTAIN-PEN.—J. J. MEAD, New York, N. Y. Mr. Mead's purpose is to provide a pen of that type which contains a sack as a receiver and container of the writing fluid, so constructed that it will be simple and economic and so that the parts will be few in number and may be assembled and secured in position in a rapid, convenient, and durable manner.

COLORING-MATTER FOR PRODUCING SILK-LIKE OR PEARL-LUSTER EFFECTS.—L. LILIENFELD, Vienna, Austria. The object in this instance is to provide a new and improved coloring-matter for printing, painting, coating, or otherwise treating articles made of wood, metal, paper, leather, textile fabrics, etc., to produce a silky or pearl-luster effect.

SMELTING-FURNACE.—F. L. MCGAHAN, St. Louis, Mo. One purpose of tbe inventor is to provide a furnace in which the heated products of combustion and unconsumed gases are withdrawn from the furnace and after being passed tbrough a carbureter to enrich them are again returned to the furnace, so tbat not only is the heat utilized, but also any unconsumed gases are consumed in their second passage through the furnace.

POLLEN-COLLECTING DEVICE.—E. MOULIÉ, Jacksonville, Fla. By means of this device pollen is collected for use in the manufacture of medicines and the like, and is particularly useful in connection with devices of this character in which severed twigs or branches bearing blossoms from whicb the pollen is to be collected are held with their stems immersed in water or other liquid contained in a vessel.

FOLDING CARPENTER'S SQUARE.—J. TREGELLAS, Goldfield, Nev. The invention is a carpenter's square whose members, arranged in use at right angles to each other, are pivoted together, and thus adapted to be folded one alongside the other, whereby it occupies small space and is adapted to be more conveniently carried, stored, or packed.

Heating and Lighting.

CIRCULATION DEVICE FOR HOT-WATER HEATING PLANTS.—H. V. JÖRGENSEN and C. H. SÖRENSEN, Arrhus, Lille Tory 2, Denmark. Hot water heating plants in which air is blown into a main rising-pipe in order to increase the circulation of water in the pipe system are well known. The object of the existing patents in this line is to produce a circulation as powerful as possible in proportion to energy expanded and in such manner that the system does not lose heat and so that the use of air does not cause special difficulty.

BOILER.—F. S. GULICK, Pittsburg, Pa. The improvement pertains to boilers, and more particularly to those adapted for domestic use and in which the source of heat consists of burners to which a combustible fluid is supplied. Water is quickly heated with comparatively little fuel. The thick heavy bottom of the boiler not only serves to assist in heating the water but also in keeping it hot.

GRATE.—R. V. BRAWLEY, Statesville, N. C. This invention is an improvement especially in grates designed for use in open fireplaces. When desired tbe entire grate may be readily lifted from the front frame of the fireplace so that in summer or other times when a fire is not desired in the grate the entire fireplace may be open and unobstructed.

LANTERN.—A. ROSENBERG, 259 High Holborn, London, England. This invention refers to improvements in optical signaling and searchlight operations, and is especially designed for use in connection with the signaling apparatus for which application for Letters Patent, of which this is a division, was formerly made by Mr. Rosenberg. Besides oil or gas, otber sources of illumination may be used with the lantern—as, for example, the so-called "oxyhydrogen" combustion of lime-light apparatus or electric light apparatus.

Household Utilities.

HANGER FOR SHADES.—J. K. PUTNAM, Montpelier, Ind. Tbe object of the invention is to provide a hanger which may be readily attached in position and which will operate as an efficient guide for the supporting-cord passing therethrough and afford means at the same time for locking tbe cord quickly, so as to support the shade at any desired height.

DUST-PAN.—W. N. STEELE, New York, N. Y. The aim of the inventor is to provide a pan arranged to permit convenient sweeping of the dust, crumbs, and tbe like into the pan, to securely retain the sweepings, and to allow ready dumping of the accumulated sweepings whenever it is desired to do so and without danger of spilling any of the sweepings while carrying the pan and contents from the room to a place of discharge.

Machines and Mechanical Devices.

VALVE.—J. J. WILBER, Perth Amboy, N. J. In tbis case tbe invention relates particularly to combined gate and check valves, the object being to provide a valve mechanism that may be readily reversed, depending upon the direction of the flow of liquid through the pipes and also constructed so that it may be easily repaired.

WIRE-STRETCHER.—W. ELLIS, Penfield, Ill. The stretcher is particularly designed and adapted for stretching woven-wire fence fabric, and there are novel means for supporting the device in convenient and effective position for applying the power necessary to operate the same and for clamping and straining all of tbe line-wires of tbe fence simultaneously.

HYDRAULIC ELEVATOR.—W. L. LELAND, San Francisco, Cal. Water passing up tbrough the nozzle creates a suction in the annular chamber, drawing air therethrough and carrying it upward with it. The cylindrical ring opening is greater than that of the nozzle, the force of water tending to form around itself a coating of air drawn in from the chamber. In placing the elevator in the pit the casting may be placed for receiving the supply-pipe, and the elbow may be turned witb reference to casting to bring it into better position for connection with the pipe. If tbe jacket opening be not properly placed with respect to material to be excavated and removed it may be rotated with respect to the casting to bring the opening into proper position.

Railways and Their Accessories.

RAIL-JOINT.—E. A. GILLCHRIST, McKeesport, Pa. One purpose of tbe invention is to provide a special rail-joint, primarily intended for use upon steam and electric railways, but which can be used in structural work when conditions will permit, and to so construct the joint that it can be used in connection with any form of rail and in any form of fish-plates adapted to the rail.

CAR-STAKE.—A. W. BAGLEY, Tacoma, Wash. The invention is particularly useful in connection with cars adapted for the transportation of logs, lumber, and the like. Tbe objects are to provide a stake which rigidly holds in position the load upon a flat or other car; and a stake which may be released from an upright position by means of a catch operated from a side of the car opposite to that upon which the stake is pivoted.

Railways and Their Accessories.

CAR-COUPLING.—W. KELSO, Pittsburg, Pa. This coupling enables the trainman, without exposing himself to danger, to control easily tbe connecting and disconnecting of cars. It bas a swinging knuckle which is released by merely lifting a sliding member, and when this member is lowered the coupling is left in such condition that the knuckle becomes locked as soon as tbe cars bump together.

AIR-BRAKE APPLIANCE.—H. C. LUCK, Telluride, Col. The object of the present invention is to provide a brake appliance designed to automatically set the brakes in the train in case any one of the cars in the train moves out of normal position either by derailment or on account of a broken axle, broken arch-bars, or other causes. It relates to such as sbown and described in Letters Patent of the United States formerly granted to Mr. Luck.

AUTOMATIC SAFETY RAILWAY-SWITCH.—J. W. HUBBARD, Eau Claire, Wis. The object of the inventor is to produce simple mechanism for operating a switch automatically and to provide such arrangement as will enable the same switch to be operated manually, if desired. The invention includes also means for locking the switch in its open or closed position and provides a releasing device enabling tbe switch to be operated either manually or automatically.

Pertaining to Recreation.

TOY MARINE VESSEL.—B. C. DEAN, Keene, N. H. The object of the invention is to provide a toy made in sections adapted to be readily assembled and secured in place by cbildren, tbereby serving instruction for children, at the same time producing a vessel, such as a toy or miniature yacht, capable of sailing on the water.

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 tbis paper.

Business and Personal Wants.

READ THIS COLUMN CAREFULLY.—You will find inquiries for certain classes of articles numbered in consecutive order. If you manufacture these goods write us at once and we will send you the name and address of the party desiring the information. **In every case it is necessary to give the number of the inquiry.**

MUNN & CO.

Marine Iron Works. Chicago. Catalogue free.

Inquiry No. 8460.—Wanted, electric motors and cars of the gage of steam railroads, to serve as freight and passenger cars; motors to be of high gage and good pullers.

Pattern Letters. Knight & Son, Seneca Falls, N. Y.

Inquiry No. 8461.—Wanted, iron sheets for covering trunks.

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

Inquiry No. 8462.—Wanted, candle-making machinery.

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

Inquiry No. 8463.—Wanted, manufacturers of motors and parts of automobiles.

Sawmill machinery and outfits manufactured by the Lane Mfg. Co., Box 13, Montpelier, Vt.

Inquiry No. 8464.—Wanted, a Baden Powell walking stick telescope.

Make Alcohol from Farm Products.—New book, $1.00. Spon & Chamberlain, 123 S. A. Liberty Street, N. Y.

Inquiry No. 8465.—Wanted, wholesale dealers in brass gas tubes, to manufacture into air gas barrels, having following requirements: free from kinks, cut 20 inches length, small enough to dress smooth when bored to 14-100 of an inch.

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

Inquiry No. 8466.—Wanted parties to equip a wood alcohol plant.

Headquarters for new and slightly used machinery. Liberty Machinery Mart, 138 Liberty Street, New York.

Inquiry No. 8467.—Wanted, apparatus for reducing the volume of liquids by evaporation under vacuum. also for sealing jars by atmospheric pressure.

The celebrated "Hornsby-Akroyd" safety oil engine. Koerting gas engine and producer. Ice machines. Built by De La Vergne Mch. Co., Ft. E. 138th St. N. Y. C.

Inquiry No. 8468.—Wanted, machinery for making popcorn, bricks, etc., also candy-making machines.

Manufacturers of patent articles, dies, metal stamping, screw machine work, hardware specialties, machine work and special size washers. Quadriga Manufacturing Company, 18 South Canal St., Chicago.

Inquiry No. 8469.—Wanted, makers of slot machines for vending drinking water, other than the Automatic Penny-Drink Machine Co., of New York.

Inquiry No. 8470.—Wanted, a second-hand electric motor, alternating single-phase, 4 or 5 h. p.

Inquiry No. 8471.—Wanted, a machine for extracting the fiber from salt codfish.

Inquiry No. 8472.—Wanted, makers of corn pith cellulose.

Inquiry No. 8473.—Wanted, the name and address of the dealers in pumice stone, made in Germany by Schumacher.

Inquiry No. 8474.—Wanted, manufacturers of alcohol distilling machines.

Inquiry No. 8475.—Wanted, a rock crusher, to be operated with a 2 h. p. gasoline engine.

Inquiry No. 8476.—Wanted a practical burner using alcohol as fuel, for use under the boiler of Locomobile steam carriage.

Inquiry No. 8477.—Wanted, the name and address of manufacturers of electric fountains for parks.

Inquiry No. 8478.—Wanted, a plant for making lath for building; also a planing mill for dressing rough lumber; also machinery for making shingles and staves.

Inquiry No. 8479.—Wanted, makers of gasoline motors of 15 to 25 h. p., weight about 3 pounds per h. p

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.

(10203) G. S. M. asks: Will you kindly let me know through the columns of your paper whether it is necessary for the temperature of the air to become 32 deg. F. or lower in order to produce a "white frost"? If not, please give reasons. A. It is necessary for the air to be at 32 deg. at the point where tbe white frost forms. It is not necessary for it to be at 32 deg. any distance above that point, even one foot above. The air is a non-conductor of beat, and may be several degrees warmer at a very little distance from the place where frost is forming. Vegetation and stones are better conductors of heat than is air, and hence become cooler than the air. Hence the dew is deposited on these, and the dew freezes to ice crystals, which is frost.

(10204) C. E. D. writes: To yours of the 2d it is quite evident you have not tried it. Please keep in mind tbat the ice is cbipped; that the only time when this experiment bas been tried is in the hot weather, when cbipped ice will not stay dry. Also remember that tbe fruit juice and sugar mixed with the ice forms a freezing mixture. A hot spoon is, therefore, not needed for the purpose of melting the ice. A cold spoon has plenty of liquid around it. The ice ought to be just as cold and just as liable to attach to the cold spoon as to the hot one, in fact more so, but it does not do it. The question is, "Why?" Your answer is, therefore, incorrect and I am still in the dark. The spoon does freeze to tbe ice in the liquid. I have never tried it with the ice free from liquid. Kindly try the experiment and then I will be pleased to have your further opinion. I assure you it has been a puzzle to me. A. We have delayed reply to your last letter in order to make some tests regarding the matter of the spoon in sugar and ice. We took your statements in your first letter and gave what seemed a reasonable explanation for them, which you reject with ratber more assurance than we think the case required, since you confess you do not understand it. We have made our tests and can now speak with personal knowledge. We used a thermometer as a testing instrument and not a silver spoon, as you appear to have done. We find that the heat necessary to melt sugar in ice will reduce the temperature of the ice to about 9 deg. F. below the freezing point of water. We do not tbink we are justified for this reason in calling, as you do, a mixture of syrup, sugar, and ice a "freezing mixture." Scientists do not consider tbis a freezing mixture. The presence of the syrup prevents the temperature from going as low as it will with the sugar alone. This should be so, since the sugar in the syrup is already melted and does not take heat from the ice with which to melt. All solution is accomplished by heat, and heat disappears in dissolving anything in water or melting it with ice when the material melts in ice as sugar will do. When there is no chemical action involved the temperature in the act of solution a lways falls; when chemical action accompanies solution there may be so much heat evolved by the chemical action as to overbalance the heat absorbed in the act of solution. Now as to the attachment of pieces of ice to the spoon. Tbere is no mystery in tbis. We, however, dissent from your statement that a hot spoon is necessary, since we froze the ice to the cold spoon without any difficulty. The case is simply tbat of a slight film of water between the cold spoon and a piece of ice. The silver of the spoon is the very best conductor of heat, and so the spoon can easily melt a film of water if the ice is dry or become cooled to the temperature of the sugar and ice, 23 deg. F. about, and then tbe freezing of pieces of ice to the spoon is the matter of a few moments. You might hold ice in your fingers and freeze it to a spoon if you will keep the spoon below 32 deg. F. Tyndall froze pieces of ice together under hot water by the same principle, that of regelation. You may have frozen your (hot) fingers to a piece of cold iron on a cold day in winter. The horse's bits will freeze to his mouth in the same way unless they are warmed in winter. The two actions are quite similar. You may accept it for a certainty that ice cannot freeze to a hot spoon until it has first reduced the temperature of the spoon to 32 deg. F. or lower. It is absurd to claim it.

(10205) H. B. asks: Would you please tell me if the ½-inch Ruhmkorff coil used with the set of wireless telegraph mentioned in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 1363, page 21849, of February 15, 1902, could be made to work the receiving apparatus explained in the same issue to a distance of 1-3 of a mile over land? If not, how large a coil will it require? A. We suppose the ½-inch coil *could* be made to work a wireless receiver at a distance of 1-3 mile over land, else Mr. Hopkins would not have said it could; but we should use a 2-inch coil, or larger, if we were going to put in a set of instruments to have them available under all conditions, or a coil giving even a larger spark than that. A large coil will give a fat, short spark. Any coil near its limit of spark length must give only a thin, blue spark.

(10206) G. B. asks: We have tried different ways in cutting round glass rods of ½ inch to ⅞ inch without good results. Will you kindly advise best way of doing same? A. A glass rod is usually broken by making a cut on one side with a file or diamond and giving a quick bend at the point opposite to the cut. An improvement upon this method, although requiring more work, would be to make a cut entirely around the rod, and apply heat at the place where the cut is made. A red-hot piece of iron ⅜ inch in diameter will be the best for applying the heat to the rod. This may be fitted into a handle and used as a soldering tool is used in the hand.

(10207) W. J. T. writes: I learn through a manufacturer of great numbers of automobile Ruhmkorff coils that by placing the inside terminal of the secondary winding nearest the vibrator a somewhat longer spark may be obtained than when the outside terminal is placed nearest to it. Judging from some coils which I have personally examined (and made by other manufacturers), small Ruhmkorff coils are in general constructed like those of the above manufacturer. Has any reason ever been given as to why the placing of the inner terminal of the secondary nearest the vibrator increases the spark length of the coil? I have found by personal experiments on several small coils that a much longer spark may be picked from the outside than from the inside terminal of the secondary when the knuckle or a conductor is presented thereto. Can you enlighten me on this phenomenon? A. We should consider that more careful experiments would be required than you describe before a generalization could be made that a longer spark can be obtained from one end of a coil of wire than from the other end. It may be so, but data as to voltage, amperes, and mode of producing the spark should be taken. We have no theory to advance, nor do we question in any way the facts as stated.

(10208) J. P. A. asks: Comparing the chemical equivalents (atomic weights) given in Century Dictionary with those stated in text books on this subject, I find considerable difference in the figures. In some cases, the amounts are one-half for those of text books as against the amounts of Century Dictionary, while in other cases the differences of amounts are without definite proportion. If the determination of equivalents of elementary bodies has passed beyond the presumptive state, will you kindly advise me where the truth of this matter may be found? A. We should no more think of going to the Century Dictionary for the chemical equivalents, or atomic weights of elements, than we should think of going to an almanac seventeen years old. The Century Dictionary is most valuable in its field; but surely its field is not to give data which have been made far more correct since its publication seventeen years ago. The American Chemical Society has a committee upon atomic weights, and its figures reported from time to time are received as authority. Probably the most weighty name in connection with this work is that of Prof. F. W. Clarke, the chief chemist for many years of the United States Geological Survey. The determination of atomic weights has passed beyond the "presumptive stage," and the results may be found in any recent chemistry, such as Remsen's "College Chemistry."

(10209) J. E. A. asks: The article describing the dry generation of acetylene in SUPPLEMENT No. 1607. I would like a little information if you can give it to me. The article in question says: "Mix carbide with soda." I have been trying to generate acetylene as described, but with indifferent success. If you can tell me what kind of soda was used, you will oblige me very much. A. It is probable that carbonate of soda is intended in the article upon the dry generation of acetylene, although there would seem to be no objection to using sulphate of soda for the purpose other than that carbonate is cheaper than the sulphate of soda. The smaller sizes of carbide should be used and the sodium carbonate should be crushed so as to render contact between the two more easy. The carbonate of soda has ten parts of water of crystallization, so that in 286 pounds of carbonate of soda crystals there are 180 pounds of water. This water it is which produces the acetylene just as in the ordinary methods of generating acetylene and when the action is over the carbonate of soda is present in the receiver deprived of its water. There will be dry calcium oxide and dry carbonate of soda. From a chemical point of view there seems to be no advantage in using the soda instead of water, since soda costs much more than water. Nor is it apparent that the acetylene generated in this way would be different from that generated by water.

(10210) D. C. D. asks: In order to settle a friendly dispute, will you answer in "Notes and Queries" the following question: Does the moon revolve on its axis? A. The moon rotates on its axis once while it revolves around the earth once. For this reason it presents always the same face to the earth. The face of the moon shows always the same physical markings. If it is not apparent to any one that the moon must rotate upon its axis in order to keep the same face toward the earth, let him take anything round, for example an apple or a ball, and make a plain mark on one side of it. Place a lamp in the middle of a room and hold the ball representing the moon with the mark toward the lamp. Notice which wall of the room the marked side of the ball faces. Now walk a quarter of the way around the lamp, having the lamp on the left hand as you go, and keeping the mark on the ball directed toward the lamp. To do this you will find that you must turn the ball around one-quarter of a turn toward the left, or in the opposite direction to that of the motion of the hands of a clock. Continue this till you have gone quite around the lamp. You will have turned the ball through an entire rotation on its axis, thus imitating the actual rotation of the moon on its axis as it revolves around the earth. You will find this matter fully explained in Todd's "New Astronomy," page 242. We can send you this book for $1.50.

(10211) M. H. asks: A friend of mine makes carbonic acid gas for his aerated waters from bicarbonate of soda and sulphuric acid and the residue left in the gas generator is thrown away daily. I should feel obliged if you would kindly inform me to what profitable use this residue can be put. A. The reaction of sulphuric acid and bicarbonate of soda gives carbon dioxide (carbonic acid) and sulphate of soda, when the ingredients are in proper quantities. The sulphate of soda has little value. We should not advise the use of bicarbonate of soda for this purpose. It is too expensive. Pieces of marble and hydrochloric acid, or sulphuric acid ether, will give the carbon dioxide just as well. The marble chips will cost little or nothing. If sulphuric acid is used calcium sulphate is formed, which is not soluble in water and settles to the bottom. If hydrochloric acid is used calcium chloride is formed, which is soluble in water and leaves little or no sediment.

(10212) H. E. says: Will you please inform me if ice formed from sea water becomes pure or nearly so, how about the ice in the Arctic Ocean? It is all salt. A thin layer of snow on the top of the ice becomes salt. If we want snow to melt to relieve our thirst we must take it off the top of a drift a little above the surface of the ice. A. In saying that ice from sea water is fresh, it is not intended to say that no salt will be on the outside of such ice. Ice frozen from sea water is also very likely to have salt in the mass of the ice in very cold regions where the ice forms rapidly. We quote from Whetham's "Recent Developments of Science," page 80: "If we cool a solution of common salt the ice which freezes out is the solid form of pure water. If the ice be frozen rapidly, some trace of salt may be deposited also; but experiment has shown that it does not enter into the composition of the crystals, and is entangled merely mechanically in their interstices." If a dilute solution of a colored material such as potassium permanganate be taken, and partly frozen, the ice will be clear, and the remaining liquid will be more strongly colored. We are sure every farmer knows that if a barrel of cider freezes the ice forms on the outside of the barrel and is water ice, but the liquid left in the middle of the barrel is very much stronger than the cider was at first. Of course ice in sea water gets salt on its surface very quickly, and so does snow over sea ice.

(10213) A. M. asks: Please let me know what I would need to cause the sound of a clock to be transmitted a distance of, say, 150 feet by electricity. A. A simple device would consist of a telephone transmitter in front of the clock and a receiver at the point at which you would hear the ticking.

(10214) B. F. V. writes: Will it affect the quantity of gas consumed in a building whether the gas is turned on full at the meter and partly turned off at the burners, or partly turned off at the meter and fully turned on at the burners? Assuming the same number of jets burning and the same illuminating power in both cases. A. There is a very slight difference in the volume of gas due to the pressure at the meter and the proper pressure at the burner jet, which indicates a saving of gas by the meter measurement at the higher pressure or by regulating the pressure at the burners instead of at the meter.

(10215) J. W. D. asks: 1. How long does it take to decompose one pound acidified water with a current of 100 volts? A. The time required to decompose a pound of water depends upon the amount of electricity used. If 13½ amperes are used at 100 volts it will require one hour. From this the time for any other current can be found, or the current for any other time. Water is decomposed with any voltage greater than 1.47 volts. You will see then that 100 volts is very much higher than is necessary. 2. How much does it cost to run a dynamo of 1,000 volts annually, including all expenses? A. That depends upon how many amperes the dynamo is to furnish. A dynamo giving 1,000 volts might be lighting a small village, or it might be lighting a large section of your city. The cost would not be the same in both cases.

(10216) G. G. S. asks: Please inform me as to the amount of current used by (1) ½-inch solid carbons, (2) ½-inch soft core carbons, (3) ⅝-inch solid carbons, (4) ⅝-inch soft core carbons, when used in a stereopticon on 110-volt alternating current circuit. A. Stereopticons are usually run with ½-inch carbons. We have never used one with a larger carbon. The ½-inch carbon will carry as high as 25 amperes, but 10 to 15 amperes is the usual current for such a lamp. A ⅝-inch carbon would carry 25-16ths as much current as a ½-inch carbon. The current would be proportional to the area of cross section of the carbon.

(10217) J. V. J. asks: 1. Why are open circuit telegraphs not used as often as closed circuits? A. The calling apparatus requires a closed circuit. 2. Can the duplex be worked on them? A. We do not know as to the possibility. Many things are possible which are not practicable. 3. Does an arc lamp when placed under water decompose? A. No. It heats the water. 4. Can a person get a shock from one carbon-zinc cell? A. Not from the battery alone. 5. Can an electric motor be driven both ways to advantage? A. Yes. Street car motors are reversed very often.

(10218) W. writes: A boiler which has a 2-inch feed pipe and 2-inch check valve reduced to 1½-inch discharge, the size the pump calls for. A 2-inch pipe extends from boiler 4 feet to check valve, and also 2-inch pipe continues from check about 4 feet, when it is reduced to 1½ inches. A claims that there is one-quarter greater resistance on the pump than should be or would be if there was 1½ inch check valve. B claims it has nothing to do with it, but that if even the check valve was larger it would not affect the pump. Who is right? A. B is correct. The larger size of the check valve makes no more work for the pump. If anything, it favors the work of the pump, causing less friction and resistance.

(10219) M. C. A. asks: Will you please inform me what size and how many feet of wire it will take to make an electric heater, 104 volts, say 5 to 7 amperes capacity? A. Seven amperes at 104 volts require 15 ohms of resistance. For a rise of 100 degrees F. the resistance rises 40 per cent. Hence about 5-7 as much wire will be needed if you wish to raise the temperature about to that of boiling water. No. 14 iron wire may be used. This has about 65 feet to an ohm. These are approximate numbers, and you can adjust the quantity to the temperature you wish to maintain.

(10220) J. M. C. asks: 1. Are there transformers made for direct currents? A. Yes. They are called rotary transformers, or converters. 2. Are 500-volt arc lamps made and operated successfully? A. No open arc light uses over 50 volts. It cannot. Inclosed arc lights use about 80 volts. Upon circuits of higher voltage as many arc lamps are put in series as will use up the voltage. On 500 volts ten arc lamps will burn in series. 3. Is there a chemical preparation or the like by which I may be able to clean fiber of oil? A. We do not know anything better than potash. 4. By cutting off a trolley pole, say, two feet, does it increase or decrease the pressure against the trolley wire? A. It will bear harder against the wire the shorter it is. 5. Has copper ever been hardened to any great extent? A. Not in modern times. It is considered one of the "lost arts" to temper copper. 6. Do you consider the best of lightning arresters a success? A. They are considered indispensable. We do not advertise any goods in this column. 7. If there is such, what do you consider a perfect, at all times waterproof insulation? A. India rubber. 8. Has electricity, as yet, been taken from the earth? A. No more than has been put into the earth. No one has drawn it from the earth for doing work.

NEW BOOKS, ETC.

MARS AND ITS MYSTERY. By Edward S. Morse. Illustrated. Boston: Little, Brown & Co., 1906. 12mo.; pp. 192.

Although Mr. Morse's book hardly rises above the dignity of a compilation, and although it is manifestly based on Mr. Percival Lowell's deservedly well-known and popular work on Mars, it has the value of presenting in a clear and readily understood style the salient arguments for considering Mars an inhabited world—arguments which, to anyone who is at all familiar with Mr. Lowell's splendid studies at his Flagstaff Observatory, must seem irrefutable. The single original chapter of the book, that entitled "My Own Work," will probably be of most interest to the man who is used to handling a telescope. The observations there recorded were made largely without the assistance of any of the Flagstaff astronomers and serve to bring out most tellingly the extreme difficulty of seeing the much-discussed "canals" and "oases" without natural aptitude, long training, and favorable atmospheric conditions. Mr. Morse has drawn upon his knowledge of animal and plant life for many a happy and illuminating comparison. His work is valuable primarily because he has viewed Mars with a naturalist's eye, and endeavored to interpret its enigmatic phenomena accordingly, although his interpretations are decidedly colored by Mr. Lowell's own opinions. For a good, straightforward, and accurate account of what we know about Mars, the book is to be commended.

THE DIFFERENTIAL ARCH DAM "D. A. D." An Elementary Treatise on Masonry Dams for the Use of Parties Interested in Water Power Development, including a General History of the Subject. By George E. Ladshaw. Spartansburg: Carolina Spartan, 1906. 8vo.; pp. 77.

EXPERIMENTAL-UNTERSUCHUNG ÜBER DIE MÖGLICHKEIT EINER DOPPELTELEPHONIE MITTELS UNTERBROCHENER KLÄNGE. By J. W. Giltay. Amsterdam: Johannes Muller, 1906.

CARBON BRUSHES. By J. S. Speer. St. Mary's, Pa.: Speer Carbon Company, 1906. 16mo.; pp. 30.

INDEX OF INVENTIONS

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