

RECENTLY PATENTED INVENTIONS.

Engineering.

STEAM PRESSURE GAGE.—Henry Rausser, Charles Wieber, and Alexis Sokoleff, Moscow, Russia. This gage consists of two communicating tubes open at their upper ends and partially filled with mercury or other suitable liquid, while a float-controlled valve of peculiar construction is adapted to regulate the admission of steam to one of the communicating tubes, whereby a pressure is exerted at intervals upon the surface of the liquid, causing the latter to rise in the other communicating tube and indicate the steam pressure on a properly graduated scale. The parts of the gage are designed to be subjected to slight pressure, while the gage will be very reliable and sensitive in operation.

HYDRAULIC STEERING APPARATUS.—Charles S. Irwin, St. Joseph, Mo. This apparatus comprises two single-acting pumps mounted on the boat, and having inlet and discharge pipes leading to common openings in opposite sides of the boat, one pump discharging on one side while the other is drawing in water from the opposite side, whereby the ejection as well as the suction will assist in the steering. The apparatus is designed to be of simple and durable construction and most effective in operation.

Railway Appliances.

SAFETY FENDER FOR STREET CARS.—Henry S. Robins, Philadelphia, Pa. This device consists of a frame adapted for pivotal connection with the car, a yielding body portion having a spring connection with the frame, the forward portion of the body extending beyond the front edge of the frame, and the front edge of the body having a cushion, while a yielding partition extends across the body. The improvement is especially designed for cable and electric cars, and is capable of application to the front or the rear of the car. It is adapted to catch up and sustain without injury a person who may be standing in the track of a moving car, and when not in use may be folded up to occupy but little space.

SAFETY ATTACHMENT FOR STREET CARS.—Carl E. Baggesen, New York City. This is a fender, guard, or track cleaner, which may be folded beneath the end of the car when not in use. It consists of a swinging operating frame, swinging from the dashboard, in combination with an extensible and contractible carrier apron beneath the end of the car and connected with the frame. The carrier apron comprises a lazy-long frame and fabric cover, with springs for operating the frame and a spring roller to wind the fabric. The carrier apron is projected forward when the operating frame is touched by a person or object on the track, one being thus caught and carried in front of the moving car.

RAILWAY SYSTEM.—Lina Beecher, Batavia, N. Y. This system comprises longitudinal sleepers supporting a single line of track rails, on which run vertical wheels journaled on the car, while flanged horizontal wheels run upon the faces of guard rails extending outwardly from the sleepers. The construction is designed to be very strong and inexpensive, permitting also of the use of rolling stock of low cost, while providing for the running of the cars with absolute safety.

FLUID PRESSURE BRAKE.—Alexander H. Moyes, Ogden, Utah. This invention relates to the Westinghouse type of air brakes, providing a quick and positive action for applying and releasing the brakes. The improvement comprises an auxiliary air cylinder and air reservoir, through the ends of which extends a brake rod having pistons on its ends, a pipe connecting the train pipe with the outer end of the cylinder, with various other novel features. The arrangement is such that the auxiliary reservoir is always charged with air pressure to actuate the brake mechanism, to apply the brakes quickly as soon as air is released from the train pipe.

SAFETY HINGE SWITCH FROG.—Joseph E. Dunlevy (care of Dr. J. M. Reynolds), Memphis, Ind. The frog switch devices proper, according to this invention, comprise two base sections, one at each side of the main rail, one being a long and the other a short section, the upper faces of which are in different horizontal planes. The construction is such that the main track is at all times left free from joints or splices at the frog, permitting trains to pass at as high a rate of speed and with as much safety as at any other point on the line. The improvement also facilitates the siding of trains in a safer and simpler manner than is now customary.

Electrical.

ELECTRODE.—Farnham M. Lyte, 60 Tinborough Road, London, England. This invention relates to the carbon electrodes used in the electrolytic decomposition of metallic chlorides or other metallic haloids in a fused condition. Combined with a hollow carbon electrode closed at the bottom and open at the top is a core of metal or alloy which is fusible at the same or a lower temperature than the salt to be decomposed, so that the core will melt, and in the fluid state make intimate electrical contact with the carbon of the electrode, but will exert no bursting strain thereon. The terminal of the electrode is put in electrical communication with the fusible core by a conducting rod dipping into the fusible core, but entirely free from the carbon. By this means the thickness of the carbon to be traversed may be so much reduced, and the resistance so diminished, that the current will easily traverse the carbon throughout its whole area, thereby enabling electrodes of considerable length to be used.

CONNECTOR.—Charles Bell, Stroudsburg, Pa. This is a device for mechanically and electrically connecting the ends of electric light and telegraph wires, etc. It consists of two longitudinally grooved pieces connected by a clamping screw, one of the pieces having holes coincident with the groove for receiving the angled ends of the wires, and the other piece having a notch for the release of such ends.

Mechanical.

PLANE GUIDE.—John McKnight, Fredericton, Canada. This device has jaws by which it may be readily attached to a plane of any size, and one of the jaws is an adjustable arm carrying a longitudinally and laterally adjustable guide block, by which the plane may be made to edge a board perfectly true and square, or plane the edge on any desired bevel. The device is very simple and cheap, and its parts may be cast.

SANDPAPER WHEEL OR ROLLER.—Frederick H. Stubbe, New York City. This invention comprises a cylindrical shell with a longitudinal slot, and two clamping bars in the heads of the shell to clamp the sides of the paper, the bars having at their ends beveled heads to be engaged by nuts screwing at the end of one of the bars to move the latter toward each other for clamping the paper. The improvement permits of conveniently spacing the sandpaper in position and drawing it tight around the shell, while also allowing of its ready removal when worn out.

Miscellaneous.

NEGATIVE AND SCREEN HOLDER.—James Scouler, San Francisco, Cal. A simple yet effective invention for holding and adjusting a screen plate used in making half-tone photo-negatives for printing purposes, with reference to the sensitive plate. The usual rabbeted frame for holding the sensitive plate is provided with special wires and pins for preventing the glass sensitive plate from coming in contact with the wood, while on the opposite side or face at each corner are pivoted spring buttons, which, after the screen plate has been placed in position in front of the sensitive plate, are rotated inward, and held the screen securely at each of its four corners. The screen can be readily adjusted at different distances from the plate by means of bars or rods inserted in special recesses provided therefor. The quick adjustment of the screen and the facility with which it is held in position are the chief merits of the invention.

AIR VALVE.—Alfred T. Neilson, Jersey City, N. J. This is a device especially adapted for use on pneumatic bicycle tires. It has a valve casing to screw on the nipple, the casing having conical chambers in opposite ends connected by a bore, a conical valve being held in the inner chamber, and having ports in its base, while there is a conical valve in the outer chamber and a screw cap to close the outer end of the casing. By this improvement air may be easily pumped into the tire, a temporary check preventing any escape while the pump is being disconnected, and when finally adjusted the valve is absolutely airtight.

STREET SWEEPER.—Charles Gurney, Brooklyn, N. Y. This is a machine which is adjustable in its working parts, convenient to control, and designed to be especially reliable and effective in service. By its forward movement over a roadbed, when the brushes are in contact therewith and adjusted to remove the dirt is first swept from the gutter toward the center of the road, and the windrow thus produced is swept upon elevator buckets and discharged into a car held on the machine, the car being carried upon the sweeper to some point for removal to be unloaded or dumped.

STAMP VENDING MACHINE.—William H. Kaltenbeck, Middlesborough, Ky. This is a machine especially designed to sell postage stamps. It is not likely to get out of repair, and upon dropping in its slot certain coins delivers a quantity of postage stamps of equal value, the machine being also arranged to make and return change when necessary. The machine has a holder for a ribbon of stamps, in connection with a coin-controlled feed mechanism for forcing the stamps through a delivery slot, a number of coin chutes delivering their coin on the controlling mechanism of the feed, and various other novel features.

REPEATING AIR GUN.—Elmer E. Bailey, Philadelphia, Pa. This is an improvement upon guns whose magazine tube is traversed by a small firing tube or barrel through which large shot or small bullets are projected by an air jet, the air being compressed in a chamber by a reciprocating spring-actuated piston. The invention covers a novel mechanism adapting the air compression cylinder to reciprocate, to alternately open and close the passage into which the shot are delivered from the magazine, and to force the shot into the firing tube preliminary to their ejection by the air blast. The improvement is designed to lessen the cost and improve the efficiency of this class of guns.

FACING BUILDINGS.—James W. Graham, Old Port, N. C. For the facing of the walls of buildings with ashlar tiling, terra cotta, etc., this invention provides simple and inexpensive means of securing thin plates or tiles in place, consisting of a metal-holding strip having a pointer flange and a base flange, the latter having a number of slots to receive fastening nails or screws.

STOVE.—Albert W. Alger, Kansas City, Mo. This is a stove which is cheap to make, and designed to be very economical of fuel, while affording greatly increased heat radiation. It is preferably cylindrical in shape, with a fire box at one end and a smoke exit at the other, its body being traversed by longitudinal and transverse heat-radiating flues, with end and side discharging apertures. It is adapted for use with any kind of fuel, and a gasoline or coal oil burner may be set on the grate.

LABELING MACHINE.—William H. Leister, Westminster, Md. A label holder or box is, according to this invention, arranged at the foot of an inclined bed on which is a paste pad, an inclined or curved depressible label-holding plate extending across the foot of the label box, while there is a curved rolling table behind the label holder. A very simple device is thus provided for nicely labeling cans, which are rolled over the paste pad to be coated with paste, and then over a bunch of labels, the upper one of which adheres to the can.

ADJUSTABLE WINDOW SEAT.—William Kruppenbacher, Yonkers, N. Y. This is an improvement

in devices to facilitate the cleaning of windows on the outside, affording a seat adapted for ready attachment to or removal from a window casement, and having considerable range of lateral adjustment. The device has a base board with a guard railing, and laterally adjustable wings which slide in boxes and engage the window casement, flexible devices retaining the wings at different degrees of projection.

WATERPROOF SUIT.—Otte Van Oostrum, Portland, Oregon. This suit is mainly made of waterproof goods, and consists of a jacket and trousers joined at the waistband in a waterproof manner, both garments when on having the appearance of the usual articles of their class. The sleeves have elastic inner cuffs, and the shoes are permanently secured to the trousers legs, or made separate with an elastic waterproof connection.

DUMPING WAGON.—George W. Harrington, Pullman, Ill. An endless apron, journaled on rollers at the ends, forms the bottom of the wagon body, and from a hook on the bottom portion of the apron a chain extends to the whiffletree, so that when the whiffletree is detached from the vehicle and the horse moves forward, the top portion of the apron, forming the bottom of the wagon body, will be moved backward, and the load will be dumped at the rear, where the apron passes around the rear roller.

DRIVING REIN AND TAIL HOLDER.—Burdine Blake, London, Ohio. This is an attachment, preferably made of a single piece of stout leather, and forming part of the harness, constituting a rein holder and preventing the horse from getting his tail over the reins. It is saddle-shaped, and has a front tongue connecting with the back strap, and side tongues for the breech strap, an aperture through which the reins are passed, and a curved guard surface covering the tail.

APPLIANCE FOR SPINAL COMPLAINTS.—Philo B. Sheldon, Erie, Pa. This is mainly an adjustable brace or corset, with steel-stayed back pad, adjustable crutches also having combined with them steel body bands or rests, while an abdominal pad or belt is held in place by suspension attachments, and bands or webs are adapted to pass around the legs half way between the knees and hip joints. The improvement is designed to facilitate the remedying of deformities and curing of affections of the spine, relieving the spine of the weight of the upper portion of the body, and avoiding the use of stiff jackets and the objections found in other forms of spinal corsets.

TEMPORARY BINDER.—Charles T. Rosenthal, Batesville, Ark. The covers of the book are connected by the usual concave back, adjacent to which this binding device is located, consisting of rods sliding in bearings attached to opposite sides of the back section, while straps are arranged in pairs, so that one strap of each pair is rigidly attached to the bearings and the other strap of each pair is attached to the rods and actuated thereby. By this means any number of leaves may be introduced and bound between the covers or readily removed therefrom without disturbing the adjacent leaves.

RENOVATOR.—Charles Karlson, Red Bank, N. J. This is a simple and convenient device to facilitate the quick and thorough removal of dust from upholstered furniture and carpets on floors. It comprises a receiving box having an open lower end engaging with the fibrous material to be cleaned, an inlet valve at the lower side within the box, an outlet valve, and a bellows. It is designed to remove dust, previously loosened by beating, by exhaustion of the air where it is applied, thus drawing the dust from the material to be cleaned and discharging it into a receptacle or at a point exterior to the room.

BUST SUPPORTER.—Ludwig Lerdy, New York City. This is a waist-like garment, preferably made of a woven or knit fabric, and having integral front pockets to fit the form, shoulder straps, an elastic waist band and straps, and a fastening device.

CURLING IRON.—William M. Cleeland, Great Falls, Montana. This is a device permitting the hair to be wrapped around the tube before the heat is applied, thereby avoiding danger of burning. It has a long, tapering, conical tube, at one end of which are pivoted two wire arms and a tongue adapted to lie between them, the wire arms clamping the hair as it is wound around the tube and tongue, when a tapering heating iron with non-conducting handle is inserted in the tube to heat the latter to the desired temperature.

POTATO SLICER.—Henry B. O'Connell, New York City. This is a simple device designed especially to facilitate the cutting of peeled potatoes into such shapes as used for making "French fried potatoes." It consists of a table in which are set longitudinal and transverse knife blades, over which operates a plunger head reciprocated by a handle lever, the head having on its under side blocks arranged to pass into the openings formed by the intersecting sets of knife blades.

WIRE HANGER.—William Trehwella, Newbury, Victoria. A single piece of wire is bent at one end to form a hook adapted to be hung on a chimney crane, and at its other end it is bent to form a hook completed at its point by a right angular bend, for engagement with the handle of a saucepan or other article, to facilitate holding the saucepan over a fire any required height.

TOY OR ORNAMENT.—George H. Newton, Menon, Mass. This is a device in the shape of a bird, the body having at its lower end a pin turning in a support, as in the upper end of a flagstaff, and the body having a cross spindle carrying wings curved to form propeller blades. The body is made as flat as possible to hold the wings to the wind, whereby they may be revolved. As a toy, children may rotate the body and wings by moving the device back and forth.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.

NEW BOOKS AND PUBLICATIONS.

HOW TO THINK IN GERMAN. By Charles F. Kroeh, A. M., Professor of Languages in the Stevens Institute of Technology. Hoboken, N. J.: Published by the author.

The fundamental ideas are the same as in "How to Think in French" by the same author. The learner associates with his own actions day after day, as he performs them, the correct German sentences that describe them. No English comes between him and what he wishes to say in German. Then he is taught to vary the sentences according to the genius of the language. They serve as patterns or formulas of speech in which he gradually substitutes the rest of his vocabulary. Finally he connects sentences together in all possible ways. All the grammatical difficulties of German (the declensions, the order of words, the command of verb form, indirect discourse, etc.) are taught practically in an entirely original way, by which the learner gradually emancipates himself from his dependence on English for the expression of his thoughts. Especial attention is called to the chapter on reading for a speaking vocabulary and on learning short stories. As a practical book to aid in quickly acquiring the power of correct and fluent speaking of the German language, this work has no equal. Every learner should procure it. Professor Kroeh is one of the ablest of instructors and this book is the concrete result of many years of active experience in his profession.

UNIVERSAL BIMETALLISM AND AN INTERNATIONAL MONETARY CLEARING HOUSE, TOGETHER WITH A RECORD OF THE WORLD'S MONEY, STATISTICS OF GOLD AND SILVER, ETC. By Richard P. Rothwell. New York: The Scientific Publishing Company. 1893. Pp. 53. Price 75 cents.

Coming from the editor of the leading mining journal of the United States, the above work is a plea for the continuation of silver coinage. The author believes that the problem with which the United States is now confronted could be solved by an international system of bimetalism. An immense amount of labor is indicated by the statistics and data contained in the text and tables. One interesting feature is a chronology of the gold and silver industry for the last 450 years. It is not, of course, quite up to date, owing to recent events in British India and in this country, and quite possibly within the next few months may fall in chronicling some very important changes.

BRITISH LOCOMOTIVES, THEIR HISTORY, CONSTRUCTION, AND MODERN DEVELOPMENT. By C. J. Bowen Cooke. With numerous illustrations from sketches and diagrams by C. E. Jones and R. A. McLellan. London: Whittaker & Co. 1893. Pp. xvi, 381. Price \$2.

The American railroad engineer has become fully awakened to the value of several details of English locomotive practice. From the work under review numerous illustrations, in addition to the text, excellently present the field described. It is written, of course, entirely from the English standpoint. The chapters on the running of engines, touching on the duties of the crews, lubrication, packing and other details, giving the English practice, will be of special interest to our engineers.

MISSOURI STATE MEDICAL DIRECTORY. Containing a carefully prepared list of physicians, dentists, and druggists, together with colleges, hospitals, medical associations and societies throughout the State. St. Louis and Chicago: The Medical Fortnightly Press. 1893. Pp. 119.

ESTIMATE BLANKS FOR STEAM AND HOT WATER FITTERS. Adapted more particularly for dwellings and apartment houses, small stores, and general low pressure work by either steam or hot water. New York City: Nason Manufacturing Co. Pp. 100. Price \$1.50.

This excellent series of blanks, dedicated to the steam and hot water warming fraternity, will be found very useful for contractors. It consists of a series of two pages of a repeated blank, containing the titles of the different measurements to be taken and noted and other particulars referring to the heating of dwellings. It is, without question, something which, for those engaged in such a business on an extensive scale, would not only conduce to the saving of a great deal of clerical labor but would also tend greatly to the accuracy of the labor with which such work must be done.

PALLISER'S COMMON SENSE SCHOOL ARCHITECTURE, ILLUSTRATING THE PRACTICAL AND ECONOMICAL WARMING AND VENTILATION AND THE CORRECT PLANNING, ARRANGEMENT AND SANITARY CONSTRUCTION OF SCHOOL BUILDINGS FOR AMERICAN CITIES, TOWNS AND VILLAGES. By Palliser, Palliser & Co., architects. New York: J. S. Ogilvie. Pp. 110. Price \$1.

In this series of illustrations of school houses, for the book is little more than that, we find indicated a strongly accentuated departure from the old system of plain and unattractive school buildings. The variety of structure exhibited in this volume is quite striking, and for many of the plans quite elaborate specifications are given. The elevations and perspectives are in many cases very artistic. There is a certain amount of text on general topics in the line of the work, other than specifications.

DAS ATELIER UND LABORATORIUM DES PHOTOGRAPHEN. By Dr. Josef Maria Eder, Director of the Imperial Institute for Photography, etc. Halle a. S., Germany: Wilhelm Knapp. 1893. 325 engravings. Pp. 172.

The book forms a supplementary volume to the Handbuch der Photographie by the same author, and treats in

a very exhaustive manner on the special construction and arrangement of photographers' studios, their dark rooms, washing arrangements, etc., and other furnishings and utensils necessary for proper working. Portable dark rooms, such as tents, wagons, developing hoods, etc., are also described and illustrated. A chapter on printing, and finishing concludes the interesting book.

PHOTOGRAPHISCHES TASCHEN LEXIKON. By Dr. Julius Schnauss. Halle a. S., Germany: Wilhelm Knapp, 1893. Pp. 157.

This valuable pocket dictionary gives the technical terms used in photography in German, English, French, and Latin. The explanation of the terms is in German, is concise and correct. The vocabulary contains the terms in English-German, French-German, and Latin-German.

THE BOOK OF THE FAIR. Chicago and San Francisco: Bancroft & Co.

Those who desire to crystallize their recollections of the Columbian Exposition will be interested in this publication, which, from an artistic point of view, is of high order. The views are not confined to the beautiful exteriors of the buildings, nor to the classical splendor of the lagoons, but include the many art treasures, both sculptures and frescoes, and also many of the individual exhibits. The views are principally photographic "half tones" and the letterpress is bold and clean. This work is published in quarto folios, there being in all 25 parts, at \$1 each. Messrs. Rhule, Thomas & Co., 24 Park Place, New York City, are agents for this section.

AN ELEMENTARY TREATISE ON THEORETICAL MECHANICS. By Alexander Ziwet. New York: Macmillan & Co. 1893. 8vo. cloth. Pp. 181, 76 diagrams. Price \$2.25.

The present work owes its existence mainly to the difficulty of finding a good modern text book suited to the requirements of the American student. The author is assistant professor of mathematics in the University of Michigan, and his aim has been to produce a text book for use after the student has acquired a knowledge of the elements of the higher mathematics; so no attempt is made to treat the subject other than mathematically.

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SCIENTIFIC AMERICAN BUILDING EDITION.

NOVEMBER, 1893.—(No. 97.)

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2. Plate in colors showing the residence of Clarence M. Burch, Esq., at Philadelphia, Pa. Two perspective views and floor plans. A very attractive design. Messrs. Moses & King, architects, Philadelphia.
3. A dwelling erected at Joliet, Ill. Perspective views and floor plans. An excellent design. Cost \$6,000 complete. Mr. J. C. Weece, architect, Joliet, Ill.
4. A suburban cottage erected at Glenbrook, Conn., at a cost of \$3,500 complete. Floor plans, perspective view, etc. Mr. E. H. Waterbury, Stamford, Conn., architect. An excellent design.
5. Engravings and floor plans of a suburban residence erected for Mr. George H. Barton, at Hartford, Conn. Messrs. Hapgood & Hapgood, architects, Hartford, Conn. A very attractive design.
6. Very excellent design for a two-family house, erected at Bridgeport, Conn., at a cost of \$4,500. Floor plans and perspective elevation. Mr. A. H. Beers, architect, Bridgeport, Conn.
7. St. Peter's Chapel at Springfield, Mass. Perspective and ground plan. Cost \$7,100 complete. Mr. W. P. Wentworth, architect, Boston, Mass.
8. Engraving showing some city dwellings of modern design at Washington Heights, New York City. Plans and perspective views. Mr. W. E. Mowbray, architect, New York.
9. Residence of Mr. C. T. Hemstead at Glenbrook, Conn. Plans and perspective. An excellent design.
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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. 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.

(5461) B. A. C. writes: Encircling the sun this morning is one of those rings which I believe are called sun dogs. I believe they are said to foretell a storm, and in fact I have noticed that storms develop after one of these dogs appears. Will you tell me why this is so, and why the larger the ring the greater the storm? A. Halos, coronas, and parhelia with sun dogs, are the various designations for the different phenomena of the sun's light as refracted and reflected by the vesicles of water as fog or incipient cloud formation, or by the crystals of snow in its various forms as existing in the upper air. The various forms of these phenomena are supposed to be due to the varying forms of snow crystals as they commence forming and before clouds are manifest to the eye, but are generally followed immediately by cirrus clouds indicating an approaching storm. The extent and complexity of the phenomena may in a measure indicate the intensity of the coming storm, but like other meteorological indications, little reliance can be placed upon such indications.

(5462) W. R. S. writes: I would like to know the best and most durable cement that will stick to iron or steel? A. Much depends upon the use that the cement is required for and the condition of the surface of iron or steel. There are but few compositions that will hold to polished iron or steel surfaces. Roughness of surface, especially if it has been treated with acid, will give almost any cement a sticking property. Good glue with a few drops of glycerine to a pint and a tablespoon of extract of oak bark applied quickly is an excellent cement for fastening leather and wood to iron. For many purposes the thick varnishes mixed with metallic oxides to a thin putty make good cements for iron. See "Cyclopedia of Receipts" for more than 600 receipts for various kinds of cement and for all purposes, \$5 by mail.

(5463) L. H. D. asks: What thickness should the ice be to move a frame cottage 23x27, three rooms on lower floor, two rooms upstairs, thoroughly built, braced, plastered, and finished, shingle roof, chimney 25 inches by 32 inches, across a lake about one-third of a mile wide? What is the cheapest way and the best

to prevent a 2 inch plank, Michigan pine tank 6 feet high 9 feet diameter, from freezing in a barn 35 x 75 where only three cows are kept? The tank is under the roof, on the east end of it, supplied by a windmill. Would simply banking up hay around and underneath be sufficient? What is the best packing to use on a windmill force pump? Is Selden piston rod packing good for that purpose? Ordinary cotton packing requires too much attention. A. The ice should be not less than 12 inches thick, with means provided for keeping the house moving on a large base or bearing upon the ice. Inclose the tank sides and bottom in a board box with 1 foot of space all around and pack the space with hay. Make a tight cover for the top and batten all openings at the top of the barn, near the tank, to prevent too much circulation of air around the tank in cold windy weather. Any linen packing soaked with clear tallow makes a good water packing.

(5464) M. T. W. asks what the difference is between a square foot and a foot square. A. There is no difference in the superficial area of the two expressions. A square foot may be of any form of surface, provided it contains an area of one square foot. A foot square is of the same area, but must be one foot in length on each of its four sides, or in other words, a square foot is a unit of area, while a foot square is a unit of fixed dimensions.

(5465) O. B. asks the best oil to use in a trainman's lamp, as it requires to stand unlimited shaking without going out, and not form a crust on the wick, or as little as possible, and also an oil that will not freeze. A. The best oil will not fill all the requirements of our correspondent, but a very good oil for lamps may be made from pure sweet lard oil mixed with 10 per cent of astral oil.

(5466) A. P. J. says: I have some squashes in fine condition and would like to preserve them as long as possible. I am told to heat them for a few seconds in an oven at a high temperature, also that varnishing serves to keep them longer. Please state if either treatment is a benefit and the best way to preserve them. A. Varnish might favor the squashes unfavorably unless melted paraffine is used. Whitewashing has been used with good results.

(5467) W. R. J. asks how phosphide of tin is made. How is the phosphorus kept in the tin while cooling down? A. The following process is given: Precipitate tin by placing a bar of zinc in a solution of tin chloride. Remove the metallic tin and place it in a crucible while still moist, along with some sticks of phosphorus. Expose to a gentle heat until flames no longer appear. The phosphide of tin remains as a crystalline mass at the bottom of the crucible. All operations connected with phosphorus are very dangerous.

(5468) L. C. S. writes: I have two barrels of strong red wine vinegar; how can I change the color and make it a white or light vinegar without injuring it? A. Filtering through bone black may effect your purpose. There is danger of impairing its flavor. Try on a small sample.

(5469) W. H. B. asks: Can I magnetize short steel bars, suitable for telephones, at power generator of electric street car or electric light plants? If so, how is it done? A. Simply touch one end to a pole of the dynamo when in action.

(5470) C. H. McD. asks if white cotton cloth will in any way be injurious to the plates of a storage battery, or would it be better to remove same after forming, or still better not to use it at all? A. It is better to remove the cloth after forming. It may tend to clog up the cell, and will in any case soon decay.

(5471) M. B. says: Can you give me a receipt for bluing gun barrels other than heating and pouring oil on? Please tell how to clean leather belts that have become soiled by handling? How can I take rust from a polished steel surface without scratching it? A. The bluing of gun barrels, with many useful points in regard to guns, are described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 830, article "Gun Wrinkles." Leather belts may be cleaned with Castile soap and water or benzine, dried, and softened by working in the hands. Rust on polished steel should be polished off with wet rouge on a buff stick; finish with dry rouge.

(5472) A. M. B. asks for the proper size of wire to use in winding an Edison dynamo about one-half size of the one in SCIENTIFIC AMERICAN SUPPLEMENT, No. 844. A. The size of wire depends on the voltage and amperage desired. You might use wire of one-half the sectional area of that specified.

(5473) J. G. asks the origin of the center board or sliding keel as used on American yachts. Is it an American idea or simply an adoption? A. The center board was derived from the old Dutch side board or lee board. The center board is an American invention, as far as our record goes.

(5474) T. S. H. says: It may not be generally known that glycerine is the best for the oil stone for sharpening edge tools. It does not dry into the stone as do other oils and harden the surface. The stone is easily cleaned with water.

(5475) A. J. H. asks: 1. I have an 8 light 16 candle power dynamo, shunt wound, which I wish to use as a motor for running a 9 inch by 25 inch foot lathe, and what I wish to know is if it is practicable to cut out part of the wire in field magnets and armature so that it will not require so much current to operate it, as I shall not need quite 1/4 horse power? A. We advise you not to alter your dynamo if its winding suits the potential of your circuit. An excess of size is a good error. 2. What would be the best form of primary battery to use, how large it one should I require, and would it cost much to run it say 2 hours a day? A. We do not advise primary batteries. A simple bichromate plungebattery, such as described in the SCIENTIFIC AMERICAN SUPPLEMENT, No. 792, is about the best. It will be rather expensive and troublesome to run. 3. I wish to make a small vapor engine of about 1/4 horse power, and should be pleased if you would tell me if there has ever been a paper published in SCIENTIFIC AMERICAN SUPPLEMENT on how to make one. What I wish to know is how to make an electrical coil to produce the necessary spark to explode the charge, how it should be connected, and

what should be the proper quantity of air and vapor for a charge. A. For gas engines we refer you to the following books: "Clerk on the Gas Engine," \$2; Robinson's "Gas and Petroleum Engines," \$5.50, which we can supply by mail. A simple spark coil of five pounds No. 18 or 20 wire, wound on a core of soft iron wire and actuated by 4 or 5 cells, is enough. It is very difficult to determine the design for a new engine.

(5476) W. J. M. asks: 1. How to tell the positive or negative pole of a storage battery by looking at it. A. The positive or oxidized plates have a reddish brown color, the negative or reduced plates have a gray color. The latter correspond to the zinc plates of a primary battery. 2. How often does the solution require to be renewed? A. No time can be stated. Water has to be added from time to time to keep the plates covered, and sometimes, if the specific gravity falls, sulphuric acid of 1.140 (about) specific gravity is used instead of water as above. 3. What precautions are necessary when plates become buckled? A. Introduce glass strips or rods to prevent the plates from touching. You may be able to straighten them by hand. 4. What is the life of storage batteries when carefully handled? A. No limit can be assigned? They may last many years. 5. Is there a mechanical device to indicate when a battery is sufficiently charged? A. The hydrometer. They should be charged until gas is evolved. 6. How should four such cells be coupled up—all positive poles together or vice versa? A. The positive plate of one to the negative of the next, and so all through as a rule. 7. How to detect sulphating? A. By the color of the positive plates. These show white patches if sulphated. 8. In setting up with fresh solution, should the solution be allowed to cool before the charging current is put on? A. Yes. 9. How often should a battery of four cells be charged when used heavily 10 hours a week (on an electric organ), and how long should the charging current be left on? A. Do not let it E. M. F. fall below 2 volts per cell. Charge until the solution bubbles. 10. Can you inform me how to solder aluminum, also what flux is used? A. For working aluminum see our SUPPLEMENT, No. 602, also SCIENTIFIC AMERICAN, vol. 65, No. 2, and vol. 62, No. 26. 11. What transparent solution is used in tube pole indicators? A. Use potassium iodide. 12. What metal are the thin springs in the Blake transmitter made of? A. Watch spring. 13. How are the faces of the carbon buttons hardened? A. If French carbon of fine quality is used, hardening is unnecessary. To harden, soak in a hot solution of ammonium carbonate, dry, and recarbonize. Repeat several times. This formula is given by one of our large electrical companies. You may also boil in sirup, wash the surface off, and recarbonize under charcoal dust in a tightly closed vessel. 14. How many volts are in an ampere? A. None; they are separate and distinct units. 15. What is meant by ampere turns? Does it mean one turn of a certain size of wire? A. The product of amperes of current by the net number of convolutions in one direction in the conductor. We recommend and can supply you with the following books relating especially, the subject you refer to: Reynier's "Voltaic Accumulator," price \$3; Salomon's "Electric Light Installations and Management of Accumulator," price \$2; Niblett's "Secondary Batteries," price \$1.50.

Answer to E. J. P., No. 5407, contained an error as to distance. The answer should have been 11' 17 feet.

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INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted.

October 31, 1893, AND EACH BEARING THAT DATE.

[See note at end of list about copies of these patents.]

Table listing various inventions and their patent numbers, including items like acid manufacture, adding machine, air purifier, air ship, burglar alarm, artificial composition, ash pan, ash shovel, asphalt purifying apparatus, atomizer, automatic register, automatic elevator, awning frame, axle washer, bag holder, bale ties, ball, band cutter and feeder, bathometer, bearing shaft, bearing, Bell bicycle, Bell hammer, belt fastener, belt tightener, billiard table, blast holes apparatus, blind apparatus, boiler, boiler cleaning apparatus, boiler feeder, boiler furnace, bolting flour, book account, book finishing machine, boot or shoe, bottle labeling machine, bottle stopper, bottles, and various mechanical devices.