ENGINEERING INVENTIONS.

A steam actuated valve has been patented by Mr. Walter S. Phelps, of Wortendyke, N. J. This invention consists in the combination, with the steam cylinder and pistons, of a steam chest containing a series of pistons operated by the live steam in the cylinder at the end of each stroke, which live steam, after being admitted into the chest, works under expansion and shifts the pistons.

A railroad rail joint has been patented by Mr. John A. Foley, of New York city. According to this invention, the joints are made by the adjacent ends of rails having the ends of their bases square, and the ends of their webs and heads beveled and projecting beyond the square ends of the bases, and connected by fish plates and bolts and nuts, to form a smooth joint and prevent hammering of the ends of rail heads by the car wheels.

AGRICULTURAL INVENTIONS.

A potato-digger has been patented by Mr. Samuel Huber, of Danville, Pa. The standard has side plates braced to a central shoe, and there are shares secured to the side plates, with lugs upon their lower sides and upwardly curved rear corners, making a digger which runs very steady in the ground, is easy to hold, and is very cheap and durable.

A weeding and thinning device for growing plants has been patented by Mr. James N. Stevenson, of Salvisa, Ky. This invention consists in a hand implement of tongs-like construction, with two cross limbs pivoted, the forward portions of which have lips arranged to face each other, preferably faced with rubber or flexible material, and the extreme end of one limb having a cutting blade.

MISCELLANEOUS INVENTIONS.

A faucet has been patented by Mr. Nicholas Styne, of Brooklyn, N. Y. This invention covers a special construction and arrangement of parts to promote convenience and reliability in the use of faucets, and to facilitate taking them apart for repacking and other repairs.

A can opener has been patented by Mr. Caleb S. Lobdell, of Stormville, Miss. This invention consists in various parts and details forming a new and improved apparatus to be used for cutting out the tops of cans, the blade making a clean circular cut along the edge of the top of the can, or cutting out a smaller opening if desired.

A stump puller has been patented by Mr. Peter Hansen, of Waupaca, Wis. This invention covers a peculiar construction and arrangement of parts in a lever device for the pulling of stumps and small trees, and to promote simplicity in the construction, convenience in the use, and efficiency in the operation of stump pullers.

A rubber heel has been patented by Mr. Henry V. Deemar, of St. Charles, Mo. It has in its sides a groove, forming a tongue at the top edge, the heel being passed through an aperture in the heel part of the sole, and the tongue of the heel held therein, thus making a heel which is very elastic and springy, strong, and durable.

A water elevating bucket has been patented by Mr. Christopher C. Coffee, of Memphis, Tenn. It is formed of a body blank and two side blanks, the side blanks having wings which form the front of the bucket, the blanks being made of small pieces or scraps of sheet metal, but united in series to form a bucket chain for elevating water.

A shoe lace fastener has been patented by Mr. Charles J. Johnson, of Lone Pine, Cal. The invention consists in the combination, with a plate, of a lever pivoted thereon, and having an aperture, and with a hook on its free end, with a link pivoted on the plate, for the purpose of holding the free end of the lever to the plate, to hold securely the ends of a shoe lace.

A thermo-electric battery has been patented by Mr. Daniel Lautensack, of Vienna, Austria-Hungary. The object is to make a more durable battery than at present made with the antimonial alloys for the positive electrodes, so these electrodes are cast on a core of tenacious metal covered with an insulating coating, the core also serving as the negative electrode.

A gate has been patented by Mr. George C. Milgate, of Folsom, Cal. This invention covers a peculiar construction and arrangements for the making of a gate by the use of certain levers pivoted in the posts, so that by pulling one cord the gate may be entirely folded up, or by pulling another cord it will be unfolded in its proper position.

A sealskin sack, dolman, and ulster block has been patented by Messrs. Phillip Weinberg, Louis Clark, Jr., and Egbert Winkler, of New York city. It is made of two boards secured to each other at an angle at their forward edges and recessed at their angle and at the rear edge of the front board, so that by its use the labor of making the garment will be lessened and a better shaped garment will be produced.

A hydrant has been patented by Mr. George A. Warner, of Des Moines, Iowa. This invention covers a special construction and arrangement of parts for making a new and improved hydrant, the valve for opening and closing the passage from the service pipe consisting of a stuffing box with packing rings of suitable material, and the device including many novel features.

A composite tiling, paving, and flooring slab, or building block, has been patented by Mr. Robert Marsh, of Brooklyn, N. Y. It is composed of Portland cement, asphaltum concrete, or other suitable artificial stone or cement material moulded in conjunction with pieces of tiling, glass, or other suitable material embedded in its face, for ornamenting the slab or block or forming a par of the main body thereof.

A ladder has been patented by Mr. James M. Trimble, of Sedan, Kan. It is of that class which are adapted to be extended or retracted at will, and made portable, more particularly for the use of firemen, and the ladder may be wound upon a reel or extended therefrom, and its joints be automatically secured in the act of extension or released in the act of retraction.

A spring motor has been patented by Mr. Matthias H. Howell, of Jersey City, N. Y. It has a tubular spring wound on a drum, with one end secured to the drum and the other end to a disk or wheel for winding it, the disk being rigidly mounted on a shaft, and having clutch dogs or pawls for locking it in place, the motor being designed for sewing machines, gig saws, fans, etc.

A power hoist has been patented by Mr. Charles W. Baldwin, of Denver, Col. Combined with a hoisting drum is a shaft, to be operated by hand or steam power, with means for revolving the drum from the shaft, there being also a brake pulley and clutching devices for automatically engaging it with the drum, with other novel features for raising buckets, elevator cages, etc., out of wells and shafts.

A fire place and chimney have been patented by Mr. Theodore C. Nativel, of Oakland, Cal. The fireplace is made of horizontal sections of burnt clay made in semicircular form, with tongue and grooved joints, and is combined with a chimney and ventilating flue made up of circular sections of burnt clay, with tongued and grooved joints, and having peculiarly constructed ventilating hot air chambers.

A folding book and paper rack has been patented by Mr. Marion E. McMaster, of Shelbyville, Mo. The invention consists in a special construction of the supporting end brackets of the shelves, so they can be folded compactly with the shelves when not in use, the paper rack being below the book, and its brackets being constructed for support from the book shelf pivots.

A rudder attachment has been patented by Mr. William Johnson, of East Moulsey, Surrey, England. This invention provides a rudder attachment for small boats, which, while securely holding the rudder in position, will allow it to rise without becoming absolutely unshipped in case it comes in contact with the ground, while the rudder can also be shipped and unshipped with facility in any position.

A finger ring has been patented by Mr. Robert A. Kullmann, of Jersey City, N. J. This invention consists principally in forming the ring with a screw threaded socket or stud, and in providing a face screw adapted to pass through the initial or ornament and screw into the screw threaded socket or stud from the front of the ring, so that initials or ornaments may be easily attached to rings to suit customers.

A knife for miners has been patented by Mr. George Freund, of Durango, Col. This invention covers an improvement on a former patented invention of the same inventor, and combines with a knife casing, a can opener, a cork screw held in the blade for splitting or cutting the fuse, and various details and parts of construction for an improved miner's knife.

A water closet has been patented by Mr. August F. Blesch, of Columbus, Ohio. This invention covers improvements on former patented inventions of the same inventor, and consists in improved means for lifting the main discharge valve of the closet by a piston working in a cylinder, and controlled by a valve opened by a rise of the seat spindle, with other novel combinations and special features of construction.

A lady's tricycle has been patented by Mr. Louis P. Valiquet, of Mount Kisco, N. Y. This invention consists of a frame in the side arms of which the axle carrying the clutches is journaled, and of the three armed foot levers connected to arms of the frame and to the clutches, the advance of the tricycle being checked by pressure applied to the clutch casings, with other novel features, so these vehicles can be conveniently ridden and operated by ladies.

A fascine binder has been patented by Mr. Abraham M. Kanters, of Buffalo, N. Y. This invention covers a binder with a series of horses or supports, with cross bars to support the brush wood, with pivoted clamping levers, and other novel features, by which such bundles as used in the construction of jetties, dams, breakwaters, or other engineering works may be compressed and bound with economy of time and labor.

A banjo has been patented by Mr. William B. Lomas, of Brooklyn, N. Y. In combination with a banjo is a flat ring held in the top of its circular frame, the ring having a circular raised part on its upper surface; in combination with the ring, also, is a circular wire placed in a circular groove in the top of the ring, whereby the sounding or vibrating surface of the head of a large banjo is reduced, thus giving it a milder and sweeter tone.

A water cup for stove pipes has been patented by Mr. Samuel T. Atkin, of Georgetown, Tex. This invention relates to water holders on the outside of stove pipes, where the heat of the pipe is made to evaporate the water to impart moisture to the air, and consists in a receptacle made to partly encircle the pipe, and with hooks or ears on its sides, whereby it may be readily hung on the protruding ends of the damper spindle, or on studs or pin projections, etc.

A sanitary ice chest pail has been patented by Mr. William W. Woolsey, of Aiken, S. C. This invention consists in a pail provided at its top with a cup on the inner surface, so a trough is formed to receive water and form a seal for the cover, to protect the contents of the pail from contamination, the pail being so made as to take up but little space in the refrigerator, while permitting the cooling of the contents.

An ink grinder has been patented by Mr. William Y. Schmucker, of Reading, Pa. It has a saucer clamp and a chuck adapted to hold the solid ink cakes or sticks and to be revolved above the saucer, and has means to feed the ink cake downward as it wears away by friction on the saucer, the device being adapted to hold ink cakes of various shapes and sizes, and making a simple and inexpensive machine for "rubbing up" India ink to proper liquid consistency, for the use of engineers, architects, draughtsmen, etc.

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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 Information requests on matters of personal rather than general interest, and requests for **Prompt Answers by Letter,** should be accompanied with remittance of $1 to $5, according to the subject, as we cannot be expected to perform such service without remuneration.

Scientific American Supplements referred to may be had at the office. Price 10 cents each.

Minerals sent for examination should be distinctly marked or labeled.

(1) E. D. asks (1) what are the adulterations of linseed oil? A. The principal adulterants of linseed oil are cottonseed and fish oil. 2. Also how to detect them? A. The best means of detecting the presence of these substances is experience in handling them. There are no easy chemical tests that can be applied. Determinations of specific gravity and behavior with certain reagents afford clews, but they must be performed by those acquainted with the properties of their various adulterating oils. 3. How white lead is made by the old or slow process. A. The Dutch process is as follows: Conical glazed earthenware pots 8 inches wide are filled to one-fourth of their depth with malt vinegar. At one-third of the height of the pot from the bottom are three projecting points on which a cross piece of wood is laid, and on this are placed vertically a number of leaden plates rolled up into a spiral, and the whole covered with a leaden plate. The pots are then placed under a shed in rows upon horse dung or spent tannery bark covered with boards, another layer of dung or decomposing bark laid upon the boards, and on this another row of pots, many rows of pots being thus placed above one another, and the whole covered by the tan or dung. By the slow decomposition of the dung heat is evolved, which assists the evaporation of the vinegar and causes basic lead acetate to be formed, and this in contact with the carbon dioxide evolved from the putrefaction of the organic matter is converted into white lead. In the course of from 4 to 5 weeks the greater portion of the lead is converted into white lead, the change taking place from without inward. The white lead is then detached, ground into a fine paste while moist, washed well to free it from adhering acetate, and dried in small round pots.

(2) J. M. F.—If you mean to ask which will freeze first, water that has been recently boiled and cooled down to the same temperature as water that has not been boiled, and then both kinds exposed at the same time and under same conditions, the boiled water will freeze faster than the unboiled. The boiled water being deprived of its air seems to give up its heat faster than the aerated water. The evaporation we think has very little to with it, as a corked bottle of boiled water will freeze quicker than a bottle of unboiled water, both alike in condition.

(3) F. J. J.—Old coins cannot be given the same tone and brilliancy as new ones. Silver coins may be boiled in soda water and scoured with brush and whiting. Copper coins may be treated in the same way, and then brushed with plumbago, which gives the surface a bronze effect. This can be heightened by mixing a little rouge with the plumbago.

(4) C. J. R.—There are many receipts for waterproofing boots and shoes. The best is simply an extra dressing of oil or currier's stuffing.

(5) C. W. V. desires a good receipt for making soap powder. or washing powder. A. The soap powders, which for the most part are sold under fancy names, consist of partly effloresced sal soda mixed with its weight of soda ash. Some makers add a little yellow soap coarsely ground, to disguise the appearance of the stuff. and others a little ammonium carbonate or borax. The following liquid is also productive of good results: Pour two pails boiling water on one pound of unslaked lime and three pounds of sal soda. Bottle when clear.

(6) T. H. P. asks: 1. At what elevation must a tank of water be placed to give a pressure of 100 pounds on 1 inch pipe? A. 224 feet. 2. Does pressure vary with size of pipe? A. Pressure per square inch is the same without reference to size of pipe. 3. Is pressure greater if the pipe is more nearly perpendicular? A. Pressure is derived from the vertical height. Length of pipe may vary without affecting pressure. 4. Does size of tank make any difference? A. No. 5. Can you give rule for obtaining pressure given from different heights and sizes of pipe? A. Divide the height in feet by 2·239 for pressure in pounds per square inch.

(7) J. H. W.—Tarred paper for lining house walls has an objectionable odor, which we think would make it a nuisance. Asbestos building felt is not objectionable, but rather expensive. The heavy paper called building boards is much used for ceilings.

(8) E. G.—Leather is the best material to pack hydraulic pistons. Make the leather cupped if possible. The press plunger being 2 inches diameter would have an area of 3·14 inches, and 30 pounds pressure would make its lift equal to 93 pounds.

(9) R. L. G.—For motors, consult articles mentioned in catalogue of SCIENTIFIC AMERICAN SUPPLEMENTS, given in our issue of December 6, 1884. Artificial meerschaum may be made by immersing carbonate of magnesia in a warm solution of silicate of soda or potash for some time, or by precipitating from a solution of Epsom salts by means of the silicates.

(10) L. W. W.—Coal tar is a residue obtained from gas works, and used principally for the manufacture of its distillation products, which in their turn form the basis of the great color industries.

(11) S. W.—An inferior variety of bird lime can be made by boiling linseed oil for some hours until it becomes a viscid mass. The fly paper mixture is prepared as follows: In a tin vessel melt together one pound of resin and add two fluid drachms of linseed oil. While the mixture is warm dip a spatula into it, and spread what adheres to the blade on paper. Different samples of resin require varying proportions of oil to make it spread properly.

(12) J. C.—Strips of sheet steel and sheet brass will make a thermostatic bar. You will have to make an experiment as to the strength, it depending entirely upon the length, thickness, and breadth of the strips.—In desiccating eggs, the eggs are broken and the contents beaten together and slowly dried by suitable machinery, the construction of which is protected by patents.

(13) F. A. W. asks: 1. Will a mixture of hypophosphite of soda and gum arabic mucilage keep? (Say 1 ounce hypophosphite, 2 ounces gum, and 16 ounces water.) If not, what can I add to make it keep from spoiling, moulding, decomposing? A. We would recommend the addition of some antiseptic, such as salicylic acid, oil of cloves, or carbolic acid. 2. Will crystal bicarbonate of soda dissolve more freely in water than the ordinary commercial soda, that is, will more of the soda crystals remain in solution, my object being to make as strong a solution as possible? A. 16·69 parts of the crystallized salt are soluble in 100 parts of water at 70° C.

(14) R. S. writes: Can you give me a cure for baldness, and to make the hair grow? A. The "Treatment of Baldness" is described by Dr. G. H. Rohe in SCIENTIFIC AMERICAN SUPPLEMENT, No. 161. In SCIENTIFIC AMERICAN SUPPLEMENT, No. 173, Dr. Shoemaker writes concerning the "Remedies for Baldness and Proper Treatment of the Hair." Pilocarpine for Baldness" is suggested in SCIENTIFIC AMERICAN SUPPLEMENT, No. 231. O. Lassar describes the "Cause of and Treatment for Premature Baldness" in SCIENTIFIC AMERICAN SUPPLEMENT, No. 416.

(15) D. C. writes: 1. Is there anything that will cover the cracks of patent leather? A. Use the following: Take ½ pound molasses or sugar, 1 ounce gum arabic, and 2 pounds ivory black; boil them well together, then let the vessel stand until quite cooled; after which bottle off. This is an excellent reviver, and may be used as a blacking in the ordinary way, no brushes for polishing being required. 2. Of what does French enamel leather consist? A. The term "enameled" is applied when the leathers are finished with a roughened or grained surface, while "patent" is used to designate the smooth finish. The process in each instance is similar. The greatest perfection in this branch of the leather industry has been achieved in France. 3. What is put on cuffs and collars to make them so smooth and shine so when first bought, and how made? A. See answer to query 77, in SCIENTIFIC AMERICAN for February 7, 1885.

(16) D. C. asks: 1. What is the explosive compound used in railroad torpedoes? The main constituent seems to be sulphur, with broken glass to make it explode, for without the glass no concussion will make it explode. A. The composition of the explosive mixture varies according to different makers. Gunpowder is used in some instances, while fulminating powder is employed in others. Sometimes percussion caps are used in connection with the foregoing. Other mixtures probably consist of phosphorus, sulphur, niter, and potassium chlorate in varying proportions. 2. What will I add to any of the ordinary inks to make them glossy? A. See answer to query 30, in SCIENTIFIC AMERICAN for December 20, 1884.

(17) C. E. F. writes: I make soap by the cold process, but cannot get it hard enough. Is there no way of using something to harden it? What do they use the soapstone for? A. Try the following: A mixture of either 60 pounds tallow, or 30 pounds each of tallow and palm oil, with 40 pounds of cocoanut oil, treated by the cold process with 125 pounds caustic soda lye of 27° Baume and 25 pounds salt water of 12° Baume, will turn out 244 pounds washing soap. A little powdered resin will assist the soap to harden. Soapstone or steatite is a mineral which when finely powdered is added as a "filling." By its use the quantity of water contained in the soap may be increased, but in most instances it is added simply as an adulterant or make-weight.

(18) C. R. P. asks how to make gold writing ink. A. Gold 24 leaves, bronze gold ½ ounce, spirits of wine 30 drops, best honey 30 grains, gum arabic 4 drachms, rain water 4 ounces. Rub the gold with the honey and gum, and having mixed it with the water, add the spirit.

(19) C. W. W.—The method of robbing steam of its oxygen by passing it over red hot iron filings or turnings is old. It is true that the oxygen will unite with the iron, but the great obstacle which has so far stood in the way of the practical application of this idea, has arisen from the impossibility of building a strong and durable retort of a material that would remain unaffected by the passage, when red hot, of steam through it. Generally the retort is destroyed about as rapidly as the filings.

(20) J. R. B. desires information on bronzing for picture frame work; and the burnish bronzing. A. The bronzing of wood, which is what we presume you refer to, consists in first covering it with a uniform coating of glue or of drying oil, and when nearly dry the bronze powder, contained in a small bag, is dusted over it. The surface of the objects is afterward rubbed with a piece of moist rag. Or the bronze powder may be previously mixed with the drying oil, and applied with a brush. The bronzing of plaster is slightly different.

(21) E. C. A. asks how to obtain from wheat bran the gluten which is so highly recommended for dyspepsia. A. It can be obtained by kneading wheat flour or wheat bran in a sieve with water. The starch is washed through, leaving the gluten behind. It consists of various substances known as gluten fibrin, gluten casein, mucedin, and gliadin.

(22) E. B. D. asks how pickles made of cucumbers are put up for the market. A. Small cucumbers, but not too young, are put into a jar, and boiling vinegar with a handful of salt poured on them. Boil up the vinegar every three days, and pour it on them until they become green; then add ginger and pepper, and tie them up close for use, or cover them with salt and water (¼ pound salt to 1 quart water) in a stone jar; cover this and set them on the hearth before the fire for two or three days, till they turn yellow; then put away the water, and cover them with hot vinegar, set them near the fire, and keep them hot for eight or ten days, till they become green; then pour off the vinegar, cover them with hot spiced vinegar, and keep them close. Half a dozen peppers improve a jar of cucumbers, as the heat of the former is absorbed by the latter.

(23) W. P. B. writes: I have a customer who uses large numbers of books; they have to be frequently referred to year after year. Lately rats and mice have invaded his premises, and nothing seems to suit their tastes as his books, and consequently he is put to much annoyance and considerable loss. In the same room that the books are kept in are large numbers of paper boxes covered with green glazed paper, that the rats avoid, on account, I suppose, of the arsenic. Can you suggest any plan by which the books can be bound so as to protect them from rats and mice? Would arsenic mixed in the glue and paste, and having the waste leaves made of green glazed paper, protect the books from being cut to pieces? A. It is perfectly feasible to add arsenic to the paste or glue used in preparing the books, but the use of the adhesive under such circumstances might lead to the poisoning of those using it. The oil of rhodium is said to be very attractive to rats, and by baiting traps sprinkled with a few drops of this substance you would probably be successful in catching a large number of these obnoxious vermin.

(24) W. P. D.—The general process for making zinc plates consists in coating the plate with some substance, such as wax or bitumen, which is not attacked by acids, cutting out the design with a knife or etching instrument, and then treating with acids which eat into the zinc, leaving the part protected untouched. The wax is then removed and the plate electrotyped, and the electro used to print from. The process you will find quite satisfactorily explained in SCIENTIFIC AMERICAN SUPPLEMENT, No. 344.

(25) J. T. writes: I have been troubled these last two years with fatty secretions in the skin of my face, which bear resemblance to white worms. I extract them every day by pressing with my fingers, but they come as fast as I take them out. If you will be kind enough to give me a receipt, I will be very thankful? A. The white bodies to which you refer are simply accumulations of sebaceous matter in the hair follicles of the skin. They are often spoken of as "worms," but not correctly, for they have no organic constitution whatever, and they are of no importance except as they cause pain and annoyance. They are exceedingly common between the ages of 14 and 20 to 22, generally disappearing after that limit. No medicines or appliances are known which really produce any decided effect upon them, except that if the digestion is imperfect, remedies which will improve it will be of service. It is a curious fact that in the sebaceous glands which lie by the side of the hair follicles and open into them a very remarkable entozoon, which might be called in common language a *worm*, has actually its home, but it has nothing to do with the masses to which you refer, for it is microscopic in size, being only one one-hundred-and-twentieth to one sixtieth of an inch long, and about one-sixth part as thick. It apparently causes no trouble. It was first described by Dr. Simon, of Berlin, in Muller's *Archiv* in June, 1842, and in 1844 was described at large with many figures by Erasmus Wilson, in the Philosophical Transactions of the Royal Society of London.

(26) A. E. C. asks: 1. What is the composition of Fehling's solution, mentioned in a recent number of your paper as a test for glucose in cane sugar? A. Dissolve in water sufficient to make a liter 34·64 grammes well formed crystals of cupric sulphate. 173 grammes crystallized Rochelle salts, and lastly 55 grammes of sodium hydroxide. 2. How many volumes of gas can be obtained by electrolysis from one volume of water? A. The electrolysis of water yields two volumes of hydrogen and one of oxygen. Steam is said to be the condensation of these three volumes into two.

(27) C. F. B. asks: 1. Is there any method of using old rubber boots and shoes so as to make rubber cement from them? A. Rubber cements are made as described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 249, using old rubbers chopped fine instead of pure rubber. 2. What is the formula for the making of the celebrated washing compound that is being sold over the country? A. It may be the following: Pour two pails of boiling water on one pound of unslaked lime and three pounds of sal soda; bottle when clear. 3. Formula for making this great grease and stain extractor? A. The following is frequently used: soft soap and fuller's earth, of each half pound; beat well together in a mortar, and form into cakes. The spot first moistened with water is rubbed with a cake, and allowed to dry, when it is well rubbed with a little warm water, and rinsed or rubbed off clean. See also page 2511 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(28) J. C. P. asks: 1. For a receipt for waxing fish bait flies, gang hooks, splices, etc.? A. Use a mixture of beeswax and shoemaker's wax. In winter the quantity of the latter is in excess, while in summer more of the beeswax is used. These two ingredients are mixed together in a suitable vessel over a water bath. 2. Also one for transferring on glass to keep transfer from blistering? A. Triturate 1 drachm powdered gum tragacanth with 6 drachms glycerine; add by degrees, with constant trituration. 10 fluid ounces water. This will produce a mucilage without the objectionable air bubbles incidental to agitation. Add a little antiseptic (oil of cloves or creosote) to prevent decomposition.

(29) J. B. asks for a plan for calcining cork by the quantity? A. The process would be similar to that used in the preparation of charcoal for gun powder. This you will find described in various technical cyclopædias.

(30) J. W. C. writes: I want a very strong mucilage for binding books and papers. Is there anything I can put into gum arabic to make it stick better? A. Four parts by weight of glue are allowed to soften in fifteen parts cold water for some hours, and then moderately heated until the solution becomes quite clear; sixty-five parts boiling water are now added with stirring. In another vessel thirty parts starch paste are stirred up with twenty of cold water, so that a thin milky fluid is obtained without lumps. Into this the boiling glue solution is poured, with constant stirring, and the whole is kept at the boiling temperature. After cooling, ten drops carbolic acid are added to the paste to prevent souring.

(31) A. G. R.—The forward part of an engine is toward the crank. All stationary engines of the horizontal type (unless made for some special purpose) are made to move forward with a rising crank; by this motion the crosshead always bears down on the slides.

(32) P. W. A. asks: What is the microscopic test for bogus butter; also the test by qualitative analysis? A. When pure butter is examined under the microscope, the whole field is filled with extremely fine globules, which are entirely destitute of any approach to crystalline form. If the butter is artificial, or a mixture of both, the field presents numerous angular or acicular particles between the globules. For the chemical examination try the following: The butter to be examined (if in the form of butter) must be first melted and rendered pretty free from water and salt, by filtration if necessary; ten grains are then to be put into a test tube, and liquefied by placing the tube in hot water at about 150 degrees Fahrenheit; remove the tube when ready, and add 30 minims of carbolic acid (Calvert's No. 2 acid, in crystals, one pound; distilled water, two fluid ounces). Shake the mixture, and again place it in the water bath until it is transparent. Set the tube aside for a time. If the sample thus treated be pure butter, a perfect solution will be the result; if beef, mutton, or pork fat, the mixture will resolve itself into two solutions of different densities, with a clear line of demarkation; the denser of the two solutions, if beef fat, will occupy about 49·7, lard 49·6, mutton 44 per cent of the entire volume; when sufficiently cooled, more or less deposit will be observed in the uppermost solution. If olive oil be thus tested, the substratum will occupy about 50 per cent; with castor oil there is no separation. With some solid fats (not likely to be used fraudulently) no separation whatever takes place; the addition of a minute portion of alkanet root will render the reading of the scale extremely distinct by artificial light. The author states that the above method (although not intended to surpass other processes) is capable of wide application; the saving of a large amount of time and the reliability of its results will at once recommend it as a "first step" in butter analysis.

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March 10, 1885,

AND EACH BEARING THAT DATE.

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