

## ENGINEERING INVENTIONS.

A car coupling has been patented by Mr. Alfred R. Heath, of Covington, Ind. This invention covers novel connections for car couplers, so constructed and arranged that the coupling will be effected automatically, and the uncoupling may be made from either side or top, or from the cab of the locomotive.

A car coupling has been patented by Mr. John H. Davis, of Wilmington, N. C. The drawbar is made with two jaws having a vertical opening, one of the jaws having a vertically pivoted and horizontally swinging knuckle, on one side of which is a hook and on the other side a locking arm that drops behind a spring-seated tongue to lock the hook in rigid coupled position.

## MISCELLANEOUS INVENTIONS.

A gate has been patented by Mr. Isaac Dutton, of Harbor Springs, Mich. This invention covers a novel construction of gate, which may be hung to swing in both directions, which may be tilted, and which will be self-closing.

An insect powder duster has been patented by Robert E. Clark and Jessie L. Zeigler, of Fort Motte, S. C. This invention covers an apparatus which may be attached to any wheeled vehicle or used alone, as desired, for distributing poison over plants.

A clothes drier has been patented by Mr. Van Rensselaer Ten Broeck, of Jersey City, N. J. All the principal parts are made of wood, the arms being readily raised and lowered, and when not in use the arms may be all removed, and the device placed away in small space.

A trace bearer has been patented by Mr. James H. Brennan, of Shullsburg, Wis. This invention covers an improved construction, whereby the lower end of the round trace-bearing loop is strengthened and re-enforced, and its connection with the supporting strap or skirt rendered more secure.

A combined punching and shearing machine has been patented by Mr. Henry A. Ridley, of Newport, Ark. It has a head mounted to slide by the action of a lever operating the punch and shear, to facilitate the cutting and punching of metal plates, such as boiler iron, etc.

A shoe lace fastener has been patented by Mr. John G. Hart, of New York City. It consists of a head having a concave under surface and provided with a central shank having shoulders and prongs, making a simple and effective device for fastening the end of a shoe lace.

A finger ring has been patented by Mr. John B. Newman, of Milford, Pa. It consists of an inner ring with pictures or ornaments on its face, and a second ring held movably on the face of the first ring, with a transparent cover which permits of viewing one of the pictures at a time.

A cracker box cover has been patented by Messrs. Albert H. Pine and Stephen A. Norton, of Pine Bluff, Ark. It is designed to exclude flies and prevent the drying out of the contents, while still permitting the crackers to be visible from the outside, and to be conveniently removed as they are sold.

A wash boiler has been patented by Mr. Monroe Davis, of Oak Valley, Kansas. It has a removable interior wire framework of a base and cones detachably and adjustably connected, to support the clothes in such manner that the steam may reach every part, and the material will be extended.

A sled brake has been patented by Mr. Hans C. Johnson, of Rhinelander, Wis. It consists of dogs pivoted to the runners and connected with diagonal rods connected to a lever pivoted to the pole, whereby the lower ends of the dogs may be forced into the snow, or readily held up out of the way.

A filter has been patented by Messrs. Emil Fretz and Jacob Waespi, of Dallas, Texas. This invention covers an improvement on a former patented invention of the same inventors, making a filter of simple and durable construction, which can be easily and conveniently cleaned without disturbing the gravel.

A hoisting machine has been patented by Messrs. Alexander and James Robertson, of Welland, Ontario, Canada. This invention covers a novel construction and combination of parts to improve the construction of hoisting machines, so that greater working capacity may be obtained therefrom.

A piano pedal has been patented by Mr. Otto Lestina, of Derby, Conn. It is made with an elastic metallic strip secured to and projecting from its rear end, the pedal not being pivoted, and designed to avoid squeaking and the wear of parts, the elastic plate serving as a spring.

A gate has been patented by Mr. Thomas Tyson, of Mound City, Mo. Its construction is such that it may be adjusted vertically to clear obstructions, as of snow or ice, in connection with a novel arrangement of the latch, and various other details of construction and combinations of parts.

An oil distributor for ships has been patented by Mr. John Ericson, of Sabine Pass, La. This invention covers a novel construction of vessel to be launched upon the sea when the water is rough, to distribute oil thereon in such quantities as may be predetermined, and which can be readily regulated.

A gate has been patented by Mr. John H. Bradford, of Lebanon, Ky. Combined with a horizontally swinging gate and its pivot post are side posts carrying levers, with swinging handles, by pulling on which, through a novel arrangement of lever connections, the gate may be opened from either side.

A sash holder has been patented by Mr. Joseph Clough, of Pawtucket, R. I. This invention covers an improvement in window fasteners, consisting of two pivoted cams simultaneously thrown out of action, or out of contact with the window sash, by means of a pivoted lever, which is connected with both cams.

A machine for winding sewing machine bobbins has been patented by Mr. George Hogg, of Newburg, N. Y. This invention covers a novel construction and arrangement of parts, in a machine in which the bobbins are placed on spindles, the thread being broken as one bobbin is filled, when another bobbin is brought into position.

A hame tug has been patented by Mr. Wallace Boardman, of Harrisonville, Mo. It is made partly of leather and partly of metal, and designed to save leather, being so made that the front or rear part, if broken, may be removed without throwing the other away, or one section can be replaced without opening the whole tug.

A method of making button hole strips has been patented by Messrs. Edward K. Warren and Joseph H. Ames, of Three Oaks, Mich. It consists in making a series of button holes from the same piece of goods, whereby a strip or sheet of ready made button holes suitable for garments of various kinds is produced, to form finished edge button holes.

A creamer has been patented by Mr. Ernst H. Wilke, of Lincoln, Neb. This invention covers a novel construction and combination of parts, including a number of receptacles in which the cream is caused to rise quickly and can be conveniently stored, and in which the butter made from the cream can also be stored, both retaining their qualities and flavor.

An apparatus for varnishing wheels has been patented by Mr. Ernest W. Gerbracht, of Brooklyn, N. Y. It consists of a tank in which the wheels, placed on a spindle, are allowed to remain in a varnish bath, and another similar tank in which the spindle may be revolved, with its wheels, to remove superfluous varnish.

A button fastening machine has been patented by Mr. August Schillmoller, of San Francisco, Cal. It has pivoted arms, on one of which an anvil and button receptacle are supported, a movable button holder being carried on the other arm, with various other novel features, making an improved machine for fastening buttons on shoes, gaiters, etc.

A paper file has been patented by Mr. Augustus C. A. Perkes, of Portland, Oregon. The invention consists of two wire frames hinged together and pressed one on top of the other by a spring, with pins or spikes held on the under frame and adapted to be passed through the paper to be filed between the two frames.

A cant hook has been patented by Mr. Milton N. Rankins, of Willettsville, Ohio. The hook proper is double pivoted, and there are various other novel features of construction, whereby a firm hold, free from slip, is secured upon a log or body to be rolled or turned, obtaining a powerful action for the cant hook.

A flour or meal bin has been patented by Mr. Charles W. Fisher, of Fair Play, Col. Its construction is such that the flour may be sifted as drawn from the bin, and its opened door will constitute a bread board, the bin to be made of convenient size for ordinary household use, and its form permitting of its being readily cleaned.

A baling press has been patented by Mr. Potivert I. Crews, of Meridian, Miss. This invention covers novel features of construction and combinations of parts designed to form a simple and easy working press for baling cotton, hay, straw, etc., and which may be operated to form good bales with economy of time and labor.

A vehicle wheel has been patented by Messrs. Henry M. Rice and John O'Day, of Allegheny, Pa. Its construction is such that any of the spokes may be readily removed for renewal or repairs without disturbing the felly or tire, while automatic lubrication of the axle bearings is provided for, and the wheel is made very strong and light.

An exhibitor for shirts, etc., has been patented by Messrs. George H. Hardy and Rollin A. Baldwin, of Manchester, N. H. This invention covers a novel construction of frame or exhibiting stand, having a simple and neat appearance, adapted to support shirts, collars, cuffs, etc., and exhibit them to the best advantage.

A bitters or medicinal compound has been patented by Messrs. Camillus E. and Ernest Bizozero, of West Quincy, Mass. It is made with alcohol, centaury, yarrow, angelica, calamus, cinnamon, myrrh, aloes, vanilla, cloves, nutmeg, and camphor, in certain proportions, for use for bowel troubles, neuralgia, headaches, fever, etc.

A running gear for vehicles has been patented by Mr. George E. Crutchfield, of English, Ark. It is made of metal, with tubular axles, a tubular reach, and tubular forward and rear hounds, the forward hounds turning with the pole and acting as a fifth wheel, and the construction being simple, durable, and economical.

A pneumatic door opener has been patented by Mr. William R. Ostrander, of New York City. This invention is designed to provide simple and effective means for releasing the bolt of a door lock from the plate in the door jamb, and to impart force for producing the result from a part of the building more or less remote.

A spring bed bottom has been patented by Mr. Edwin F. Tilley, of Brooklyn, N. Y. A fabric is stretched over a main frame, with central reinforcing springs for the fabric, a re-enforcing frame supported by the springs and underlying the central opposite edge portions of the fabric, the structure being designed to be inexpensive, durable, and comfortable.

A shaft tug has been patented by Mr. William Snow, of Waverly, Ill. This invention provides a strap which will be always open to receive the shaft, and ready to tighten down upon it, while it is designed to hold securely under any tension exerted to force it from the proper position, without the aid of extra straps attached to the belly band.

A fence has been patented by Messrs. James Higgins and John Sullivan, of Grand Rapids, Mich. The post is made with a longitudinal rib having open slots for receiving the fence wires and the top guard rail, the design being to afford a structure which can be easily and quickly set up by unskilled labor, and will be firmly braced and stayed.

A bed has been patented by Mr. Samuel R. Millen, of Clarinda, Iowa. This invention covers an improved construction of beds for invalids, in which, by turning a shaft, the back section will be raised and the foot section lowered, to bring the occupant to a sitting position, while, by reversing the shaft, the bed is returned to normal position.

A device for hitching horses has been patented by Mr. Edmund H. Turner, of Fergus Falls, Minn. It consists of a ring piece with a slot and toothed flange, with a fastening device of cross piece and spikes, being especially adapted to be secured to a crack in planking, such as a board fence or sidewalk, in which the device will be firmly and securely held.

A thill holder has also been patented by the same inventor. A loop is attached to the inner surface of the dash board, from which a strap is swung over the dash board having hooks to engage a cross piece of the thills, the latter being partially supported by a spring, which throws up the thills when released, so that they may be held up by the strap.

A drag saw has been patented by Messrs. John Winger and John W. Barger, of Harrison, Ark. This invention covers a novel construction and combination of parts in a machine that will have a force feed, and wherein various styles of toothed saws may be used, and wherein also the power may be readily and conveniently regulated according to the work to be done.

A shutter worker has been patented by Mr. James K. McGukin, of Newark, N. J. Combined with an outer tube or casing is an inner concentric tube having a spiral bore, a radial arm being attached to the inner tube, with other novel features, whereby a shutter may be held partially or entirely open, and conveniently operated from the room with the windows closed.

A grain measuring, registering, and bagging machine has been patented by Mr. George R. Kendrick, of Bucyrus, Ohio. This invention covers an improvement on a former patented invention of the same inventor, of a machine in which the grain delivered from the separator of the thrashing machine is measured, registered, and delivered in any desired quantity to the bags.

A truss frame for ladders has been patented by Mr. Caleb C. Pierson, of Elizabeth, N. J. This invention covers a novel construction and combination of parts whereby ladders may be conveniently and safely used for scaffolds, making a safe and stiff scaffold of any length from 6½ feet up to 42 feet, by adding 6½ foot sections, the material being just as useful for any length of ladder as for scaffolds.

A fence for intercepting insects has been patented by Mr. Emil C. Krause, of Stockbridge, Wis. It is made with boards jointed together at their ends, with a tarred rope at their upper edge, and an outwardly extending board made to form a channel, whereby bugs will be prevented from passing from one field to another, and will be received in a receptacle where they can be destroyed.

The manufacture of starch forms the subject of a patent issued to Mr. Hermann Wiegand, of Danville, Ill. This invention covers a process of mixing or incorporating with the liquid starch a volatile hydrocarbon, such as refined coal oil, then moulding and finally drying the starch, the hydrocarbon being eliminated by the drying process, thus making starch which will not ferment while wet or discolor in drying.

A saw filing machine has been patented by Mr. William J. Lindsay, of Ottumwa, Iowa. It has a mechanism for reciprocating a file and moving it away from the tooth in one direction of its movement, with a mechanism for simultaneously unclamping and conveying the saw forward, and then clamping it, by which no injury can be done to the saw or file, and every tooth will be cut to the same depth.

An oat extractor for grain separators has been patented by Mr. William P. Clifford, of Ottumwa, Iowa. A hopper projects into a casing having an inclined apron and screen, an oat-extracting cylinder attached to a shaft being placed opposite the discharge opening of the hopper, while a brush is fitted to work as closely as desired to the surface of the extracting cylinder.

A harness has been patented by Mr. Cyrus C. Cole, of Albion, Mich. This invention covers improved means for coupling traces to breast collars or to tug attachments of hame collars, the coupling device consisting of a sleeve or frame adapted to receive and slide upon a trace, and having a lever or tongue for engaging the latter, with a lateral hook for engagement with the harness collar.

A machine for coating fabrics has been patented by Mr. Henry G. Bunch, of Rahway, N. J. The fabric is carried by a roller having brakes to prevent its turning too freely, thence under and over cross pieces, one acting as a tentering bar, thence under an adjustable spreader, and through a drawing roller and beater, to distribute various kinds of coating material evenly over a fabric.

Driving reins form the subject of a patent issued to Mr. Matthew S. Dickinson, of Ridgely, Md. This invention covers a novel use of overdraw bits, overdraw straps, and short side rein sections, to dispense with the ordinary check rein, causing the horse to carry a high head, but allowing freedom to stretch out his neck and lower his head when tension on the rein is slackened.

A machine for grooming horses has been patented by Messrs. William Dellinger and John G. McNaughton, of Marion, N. C. It has alternating rotary combined brushes and combs and stationary

combs, each of the latter consisting of a continuous plate bent or folded upon itself, and having divergent side plates provided with toothed lower longitudinal edges.

A flywheel has been patented by Messrs. J. A. Romano and E. A. Barton, of Celajo, Guanajuato, Mexico. This invention covers a fast and loose attachment for sewing machines by which the flywheel may be revolved with the shaft in one direction and independently of it in a contrary direction, or the flywheel may be disconnected from the driving shaft to turn independently in either direction.

A composition for developing ozonized oxygen has been patented by Mr. John E. P. Meyer, of Golden, Col. The constituent parts of the compound are barium permanganate and the acid salts of sulphuric acid in powdered form, to be used in proportions specified in connection with water, forming a ready, safe, and simple means of producing ozonized oxygen in sick rooms.

A curtain or lambrequin support for windows has been patented by Messrs. Charles C. Bauer and Frank H. Frankenberg, of Pueblo, Col. It is made with bars having bearings at their upper ends for the curtain or lambrequin rods combined with links pivoted thereto and adapted to be connected with the upper sash, the curtain or lambrequin being moved away from the opening when the upper sash is lowered.

An apparatus for reproducing copies of writings, drawings, etc., has been patented by Mr. Gustav H. Block, of Penge, Surrey County, England. It is of that class in which a lithographic stone or zinc plate is written or drawn on, and a negative impression taken on a sheet of gelatinous composition, making the printing surface from which impressions are transferred on to paper, the invention providing a portable apparatus which can be employed by an unskilled person.

A spring bed bottom has been patented by Mr. Frank C. Rheubottom, of Union City, Mich. It consists of slats adjustably secured together, coiled springs secured to the slats having their upper ends passed under and around the upper coil of the spring on the adjacent slat and then loosely connected to the spring on the same slat, the springs thus accommodating themselves to the lateral adjustment of the slats, while being connected securely lengthwise, and always forming a continuous bearing surface.

Mosaic wood work and a method of making it form the subject of two patents issued to Mr. William J. Kelley, of Pittsfield, Mass. It is a form of mosaic flooring or wainscoting made in composite strips which are arranged side by side upon the floor base or wall to delineate the desired pattern. Thin, slightly flexible sheets of soft wood are made the base, upon which are glued a series of vari-colored hardwood facing strips, the grain of successive strips being alternately crosswise of and in the direction of their length, and the whole is then sawed through on lines transverse to the length of the facing strips, making strips having a single succession of vari-colored square facing blocks. These strips are then grooved on their side edges, whereby they may be connected by longitudinal splines and conveniently fixed in position on the floor, the facing blocks being free to expand and contract in either direction.

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NOVEMBER NUMBER.—(No. 37.)

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- Full page illustration of the new "Times" building, New York City.
- A Queen Anne house at Richmond Hill, N. Y., costing five thousand dollars, complete. Plans and perspective.
- A residence at Orange, N. J., costing thirteen thousand three hundred dollars complete. Perspective and floor plans.
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## Notes & Queries

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**References** to former articles or answers should give date of paper and page or number of question.

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**Minerals** sent for examination should be distinctly marked or labeled.

(1) G. A. asks for a receipt how to make waterproof writing ink, an ink which will not blur if the writing is exposed to rain. A. Dissolve 2 ounces shellac in 1 pint alcohol (95 per cent), filter through chalk, and mix with best lampblack.

(2) D. H. A. asks: What is the best known substance or preparation that will waterproof canvas and make it mildewproof and proof against rot? What is the best known waterproof cement for canvas, that will make sewed seams in canvas waterproof? A. We recommend paraffine applied to the perfectly dry tissue and melted in with a hot sadiron, for both purposes, or 1 pint linseed oil and 1 ounce beeswax may be mixed and applied with a brush and allowed to dry before use.

(3) C. S.—Any conductor, carbon or metal, is heated by the electric current. Lime is a non-conductor and will not be heated.

(4) W. B. asks what ingredients to use in dissolving gum shellac in water. A. Borax.

(5) W. W. W. seeks information as to the best methods of making magic lantern slides from dry plate negatives. By what is known as the "wet plate process" very good slides are easily made, but it is somewhat messy and is productive of blackened fingers. The glass plate, after being thoroughly cleaned, is coated with collodion, which can be bought ready made from dealers in photographic supplies, and next sensitized by dipping for a minute or two in nitrate of silver bath prepared as follows:

Nitrate of silver.....437 grs.  
Distilled water.....16 oz.  
Nitric acid.....3 drops.

Saturate the solution with iodide of silver and then filter. If the bath is milky, set the bottle in the sun for two days, until the solution clears up. Thendecant, and it will be ready for use. After sensitizing the plate, while wet is at once exposed in the camera, then removed from the plate holder and immediately developed with the following solution:

Protosulphate of iron.....1½ oz.  
Nitrate of baryta.....1 oz.  
Water.....16 oz.  
Alcohol.....1 oz.  
Nitric acid.....40 drops.

After dissolving, filter out the white deposit and keep well corked. When developed, it is washed under the tap and fixed in a solution either of:

Cyanide of potassium.....30 grs.  
Water.....1 oz.

or

Hyposulphite of soda.....50 grs.  
Water.....1 oz.

The cyanide of potassium is a deadly poison, and is only advantageous to employ when it is desired to tone the slide to a blue color soon after fixing. When hyposulphite of soda is used, the plate should be thoroughly washed under the tap for two or three minutes. After fixing, the slide may be toned to a brown color by a solution of chloride of gold 1 gr., dissolved in 10 oz. of water, or instead a purple color, by a solution of ¼ grain of bichloride of palladium to one ounce of water, in a clean porcelain dish or tray. The solution should be strawberry in color. The plate should be left in the tray until the film assumes a black color on both sides, when looked at by reflected light. The tones are more easily obtained when the slide is fixed with cyanide of potassium. Very good slow gelatino-bromide plates can be purchased, known as lantern or transparency plates. These may be exposed in the camera, or by contact with a negative. Then they are developed in solution of hydrochinon 15 grains, sulphite sodium 50 grs., water 1½ ozs., carbonate of potassium 30 grs., and fixed in a solution of hyposulphite of soda 1 oz. to 8 of water. Several plates, 4 or 6, may be developed at one time in this developer, and are then removed as fast as developed.

(6) St. M. I. asks (1) for a simple method of purifying and decolorizing crude bitartrate of potassium as obtained from wine casks. I have a certain quantity on hand and would like to decolorize it. Indicate any method, but the simplest is preferable. A. The tartar, previously pulverized, is boiled with water in copper boilers. The solution when saturated is transferred to earthen pans, where it deposits on cooling a crystalline layer, nearly free from color. This is redissolved in boiling water, and the solution, having been mixed with 4 or 5 per cent of pipe clay, is evaporated to a pellicle. The clay precipitates with the coloring matter, and the clear solution, as it cools, deposits white crystals in crusts, which, upon being exposed to the air on linen for several days, acquire an increased degree of whiteness. These constitute the crystals of tartar of pharmacy. 2. We find some difficulty in working the Toepfer-Holtz frictional machine, and are unable to place the cause; for, a year ago, it worked after turning but a few times, and now it requires quite a length of time to charge it. If the plates are to be varnished, please indicate how to prepare the varnish. A. Wipe off with a warm dry cloth all parts of the ma-

chine. Dust as well as moisture interferes with its action. The varnish for the plates is alcoholic solution of shellac. 3. How many 1 gallon Bunsen cells are required to run two six-candle power lamps? A. About ten cells.

(7) W. J. M. asks: 1. What is the vulcanized fiber washer that clamps the glass disks to the bosses in a Wimshurst influence machine composed of, and how made? A. They are made of India rubber, sulphur, and other substances. You can buy it in large or small pieces of dealers in electrical supplies. 2. I have a Holtz machine, and the amalgam in using is mercury, tin, and zinc. I am told there is a better amalgam which is of an old gold color. Can you tell me how to make it? A. It is bisulphide of tin, the old aurum musivum, formed by sublimation from an amalgam of tin 1 part, mercury 6 parts. Of this amalgam 18 parts are mixed with 6 parts salammoniac and 7 parts sulphur. The bisulphide of tin remains behind in the retort. No amalgam should be used on a Holtz machine. 3. Are dry cells which are made in Germany equal to the Leclanche cell? Can you inform me what they are composed of? A. Dry cells are of rather high resistance. Gelatin or agar-agar jelly is used in them instead of water. 4. What chemical is it you apply to a file so you can file glass? A. Turpentine and camphor, or simple water.—We can give no information as to the gas lighter you speak of.

(8) J. H. K. asks: 1. Will the motor described in SCIENTIFIC AMERICAN, March 17, run an ordinary tricycle and about what speed? A. It should develop a speed of about 8 miles an hour. The trouble would be to get a compact and light battery. 2. Is there any good paste to make paper adhere to a brick wall exposed to the weather? A. Shellac is the best we can recommend, and that is imperfect. Tack muslin over the wall and stick paper to that. 3. I have read with a great deal of interest the articles on speed of railroad trains, and would like to know the fastest time ever made, and where and when? A. On the New York, West Shore and Buffalo Railroad, between Churchville and Geneva Junction, on July 9, 1885, a special train attained a speed of 87 miles per hour. It ran 422.6 miles in 9 hours and 23 minutes.

(9) D. J. B.—You cannot keep the bright color of polished iron on the hot parts of an engine without constant attention and wiping with engine oil. Oxalic acid may help the cleaning, but the acid left on the bright surface favors oxidation. For cleaning, use tripoli, rotten stone, or pulverized pumice stone, with engine or kerosene oil. Neglected or dirty spots may be removed with a scraper and fine emery paper, and afterward rubbed with oil. Every part of bright work around an engine should be wiped with oil. Moisture immediately discolors a clean bright surface. Polish the lubricator with rotten stone and oil only, and only when necessary. Too much polishing soon makes it look old from wear.

(10) G. asks how to make the preparation whereby solder will readily affix itself to other metal than tin; for instance, brass wire, etc. A. Use a solution of chloride of zinc and chloride of ammonium, or what is called tinner's acid, which you can make by dissolving zinc in hydrochloric acid to saturation. Add 10 to 20 per cent water and as much sal-ammoniac as the bulk of zinc dissolved.

(11) C. F. R. asks a formula for giving a green color to finished steel. A. We know of none that will wear well. The sulphide of lead process gives a film of variegated colors, which may be covered with lacquer. The article must be perfectly clean, with a dead finish, then dip in a solution of 1½ ounces hyposulphite of soda in 1 pint water, in porcelain dish, to which add 1½ ounces acetate of lead previously dissolved in 1 pint of water. Mix and heat the whole to nearly boiling, 200°. Boil the article in caustic soda and water strong enough to clear of grease or finger marks, rinse in boiling water. Dip in the hot solution and examine until the desired color is obtained, which may be seconds or minutes. The effect runs through several colors in succession.

(12) Yacht.—The determination of the draught lines of a yacht is not an easy matter for an amateur. The weight of all the materials composing the hull, rigging, ballast, and furniture of the yacht must be computed from the details of the design, and the displacement of an equal weight of water computed within the lines of the boat. For the details of construction we refer you to SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 42 and 67, also "Model Yachts and Model Yacht Sailing," by Walton, which we can mail for \$1.25.

(13) P. H. G. asks (1) why steam exhausted into the atmosphere on a cold day lasts much longer than the same amount exhausted on a hot summer's day. A. In a hot, dry air the steam is instantly absorbed by the air and becomes transparent, warm, dry air having a large capacity for holding moisture. On the contrary, cold, moist air may be saturated with water and has little or no capacity for further absorption. Then the exhaust floats away in clouds. 2. What is the cause of that peculiar roar which often issues from elevated road locomotives? A. The roar you refer to is probably that caused by the vibration of the safety valve in blowing off. As it is held by a spring only, it at times vibrates or chatters when the steam pressure is just enough to barely lift the valve.

(14) V. M. C. writes: 1. Can you describe any process by which drawing paper can be made perfectly transparent temporarily, that is, to have it come back to its regular appearance and condition again after the process, when required? A. Treat with castor oil, and it will be transparent; afterward dissolve out the oil with alcohol. 2. Can you describe something to harden crayon pencil and charcoal drawings and sketches so that they will not fade soon or rub off: something easily applied and able to give satisfaction in general? A. Lay paper in a shallow dish, and pour skimmed milk over it. When well wet all over, raise into a vertical position and allow it to drain, removing with a feather the last drops from bottom edge. Dry carefully. Or wash it over with warm starch solution, thin isinglass water, or rice water, applying it with a broad camel's hair brush.

(15) J. D. B. and E. R. C. ask: 1. The ingredients, and their proportion, for the best cement to attach bicycle tires to their wheels? A. You can make a very strong and tough cement by dissolving 1 part pure India rubber in 12 parts benzine, then adding 20 parts shellac, and heat carefully away from fire until the shellac is dissolved and the benzine has evaporated. 2. Is there any work published treating of the manufacture of bicycles? A. No, except as you will see the different styles described in trade catalogues. 3. Is there a work on japanning or enameling, giving description of best arrangement of drying ovens, etc.? A. You will find an article on japans and japanning in SCIENTIFIC AMERICAN SUPPLEMENT, No. 316. Also see "Workshop Receipts," third series, which we mail for \$2.

(16) B. M. P.—Tell your friend the finest stationary engines made in the world, for economy, durability, and elegance in design, are made in the United States of America. English engines are often bulky and clumsy. French engines are frequently erratic in design and fragile in construction.

(17) D. M. M. asks if there is any way to extract the oil from lamb's wool in alcohol. What proportion of alcohol to wool should be used? Will the result be solid like lard or look more like the alcohol? I have tried the experiment of boiling both together, but it does not seem to change either. Perhaps you will tell me why. A. For extraction of oil we should advise the use of ether and a continuous fat extractor. On exposing the ethereal solution to the open air, the ether will spontaneously evaporate, leaving the oil. We doubt if you extracted much with alcohol, as the latter is readily diluted by any water in the wool. Such an extractor as we refer to is described in SCIENTIFIC AMERICAN SUPPLEMENT, No. 628. The oil will probably be yellow and thick as butter.

(18) D. T. S. asks: 1. Whether or not there is any way of preserving (permanently) the beautiful polish of which copper is susceptible. A. Varnishing with shellac while the metal is warm and absolutely free from the least particle of grease is a good method. 2. Can you give recipes for making gold and silver inks? A. Gold or silver leaf are rubbed up with honey and diluted with water.

(19) A. G. B. asks how to make cake stencil ink, and used by wetting brush with water. A. Mix and dissolve hot, 1 part gelatin in 1 part water, and add and stir in sufficient coloring matter; 3 parts lampblack and a little indigo is a good mixture. To above 1 to 2 parts of glycerin may be added to make it softer.

(20) C. I. M. asks for a receipt for a stove blacking. A. 2 parts copperas, 1 part boneblack, 1 part black lead, mixed to consistency of cream with water. Two applications are recommended.

(21) C. A. B. writes: I should like to know the most simple method of accurately determining the amount of tannin in the various tan liquors used in tanning leathers? A. The determination of tannin is sometimes attempted by the use of the hydrometer. The only correct methods require considerable skill in chemical analysis. Sometimes pieces of raw hide are weighed dry, soaked in the solution, dried, and weighed, and the increase in weight is called tannin. This is not a very accurate method.

(22) S. C.—The outside of finished bells are turned at a slow speed with very hard tools or scrapers. Dipping the castings in water before they are cold (300° to 400° temperature) will throw off the sand. If the metal has been poured very hot and the sand burnt in, an acid bath may be used, of nitric acid 1 part, water 4 parts.

(23) P. P. D.—Steam and the water in the boiler at 95 pounds pressure both have a temperature of 320° Fah. At 125 pounds pressure the temperature of both will be 352° Fah. Water can be heated to any temperature by confining it.

(24) W. H. G.—If you cannot wash off the fly specks with soap and warm water on a cloth, there is no way that an amateur can refinish lamp work with any satisfaction. To do this, the lamp must be taken apart and the brass work boiled in caustic soda to remove all oil and varnish; then rinse in hot water and dip in strong nitric acid for a few seconds only, when it will come out clean and bright, then rinse clean in boiling water. Dry in sawdust, brush off, and lacquer with thin shellac varnish. The metal must be warm and perfectly free from grease.

(25) K. K. W.—The rust on the inside of your shot gun can be removed by rubbing with a perforated cork glued on a stick of wood. The cork is to be trimmed with a sharp knife to fit tightly in the barrel. Then with oil and ground pumice stone, or tripoli, polish the inside of the barrel until it is free from rust.

(26) H. S.—A little pulverized sal-ammoniac sprinkled on tin will make it flow free and clear. There is nothing but an alloy of other metal that will make it melt at less than its normal temperature.

(27) S. C.—The best covering for pulleys is leather. Roughen the pulley with an old file. Use the best glue, with its dry weight of glycerine made in the ordinary way. Glue the leather to the iron pulley and lap from two to three inches. Tough paste board does well while it lasts. Leather is the cheapest by its durability.

(28) H. C. J. asks whether it requires greater velocity for a rifle ball to go through two 1 inch boards nailed together or through one 2 inch board. A. The penetration of shot is favored by a division or lamination of the resisting medium. The two 1 inch boards together require the least velocity for perforation.

(29) G. B. C. asks: Can you tell me of any filter or material for one that will filter lime water and remove every trace of lime from it, leaving it pure? A. Lime cannot always be removed from water by filtration. Sometimes it has to be boiled to secure precipitation, sometimes it cannot be practically removed by any means. It all depends on the form in which it is present. If once precipitated, any good filter will remove it.