

RECENTLY PATENTED INVENTIONS.
Engineering.

STEAM BOILER.—Samuel P. Hedges, Greenport, N. Y. Combined with opposing series of horizontally non-aligning manifolds or headers are inclined concentric tubes connecting the corresponding manifolds of each series, with other novel features designed to secure perfect circulation, and whereby a single tube or section of tubes may be readily removed and replaced, and the tubes be conveniently cleaned.

PRESSURE REGULATOR.—Charles Dubois, Leadville, Col. The valve casing is provided with inlet and outlet apertures, and a hollow piston valve having a spiral port extends through its walls, a spring being arranged to bear upon the piston valve, and a valve-operating cap connected with the valve spindle, making a simple and efficient valve for regulating the pressure of steam or air.

STUFFING BOX.—William E. Brockett, Berlin, Wis. This invention covers a novel construction and arrangement of parts whereby the packing prevents the escape of steam along the piston rod or stem, while the casing is mounted yieldingly upon a spring or springs to permit a vibrating motion of the stem or rod, thus preventing the breaking or bending of the stem or parts of the stuffing box.

Electrical.

REGULATING ELECTRIC CURRENTS.—Joseph W. Balet, New York City. This invention provides a method of regulating the current in dynamo and motor circuits by which any surplus will be sent into storage batteries for use as needed, and to control the charging of the secondary batteries, so that the charging current shall cease in a particular battery when the maximum charge is reached and be returned to the battery when it is discharged.

Railway Appliances.

LOCOMOTIVE AXLE BOX.—Ransford T. Chase, Houston, Texas. Combined with a pedestal is an axle box mounted to slide vertically therein, a second axle box being mounted with one side in a bearing in the pedestal, and a connecting rod secured to the latter axle box and pivotally connected with the first named axle box, whereby the centers of the axles will always remain the same distance apart.

RAILROAD SNOW PLOW.—Charles A. McCarthy and John P. Moran, Sault de Ste. Marie, Mich. The body of the plow is made similar to a box car, and has a vertical wedge-shaped mould board at its front end, in combination with vertically rotating snow wheels on the two faces of the mould board, and smaller vertically rotating snow wheels in front of and above the lower wheels, the mechanism being driven by an independent engine, and designed to throw the snow a great distance from the track.

CAR COUPLING.—Isaac L. Whiddon and Julian S. Bashaw, Chipley, Fla. The drawheads are made with overlapping portions, and have laterally sliding and rotary catches mounted therein, with springs for holding the catches in engagement, and other novel features, the object being to provide a coupling which will couple automatically, and which may be uncoupled from either side of a car.

CAR COUPLING.—Wiley M. Grisham, Winchester, Ill. In this coupling the drawhead has a way for the coupling hook formed with an incline, so which to direct the hook, with a transverse horizontal opening for the coupling pin, the latter having a flange or wing arranged in the closed position of the pin to form an extension or continuation of the incline for the coupling hook, the coupling pin having a rack operated by a toothed wheel.

RAIL TIE AND FASTENING.—Jacob Frysinger, Milan, Ill. This tie consists of upper and lower plate-like bars and an intermediate edgewise disposed plate-like bar let into grooves or channels of the upper and lower bars, the chairs consisting of clamp plates resting upon the upper bar and held in place by bolts passing through the upper and lower bars.

CAR SEAT.—Edward B. Goelet, Fort Worth, Texas. This is a car seat of simple construction, wherein the parts are so arranged that the back of the seat may be adjusted to almost any angle desired, while the seat is also provided with a leg or foot rest adapted to be adjusted to the convenience of the occupant of the seat.

CAR DOOR.—Edward B. Goelet, Fort Worth, Texas. This is a sliding door for use on the side of a car, there being at each side of the door opening vertical posts, and a rail or track below and above the opening on which the door is supported by hangers, the tracks having an inclined surface and extending outwardly in a horizontal line with the car, in such way that when the door is opened it is carried a distance outward from the car, and when closed it comes quickly and conveniently to place.

Agricultural.

CORN PLOW.—William Quillen and Francis A. Dake, Almota, Kansas. This is a machine designed to cultivate both sides of a row of corn or other plants at one passage, and is made with upwardly arched end frames, longitudinal side bars, standards with runners at their lower ends, longitudinal guard frames and shovels, with other novel features, the plow being designed to run steadily and stay in the ground, cleaning out all weeds and grass in the row, and loosening up the dirt close to the corn.

HARROW FOR LAND ROLLERS.—James W. Weir, Princeton, Ind. This is a device for harrowing adapted to be attached to land rollers of ordinary construction, being readily attachable to the front of the rollers, and designed to pulverize the larger particles of dirt clods, that the roller may more effectually do its work, a lever permitting the driver to lift the harrow out of operative position as desired.

Mechanical.

CUTTER HEAD.—Henry L. Haskell, Ludington, Mich. In this device the knife holder has a flanged base and a head with a transverse knife-receiving slot, a threaded aperture extending up through the base and head into the knife slot, and enlarged at its lower end, the invention relating especially to the knives and manner of securing them to the cutter heads of moiding machines.

ORE CRUSHER.—Jacob Rodermond, New York City. In a suitable receptacle, to which the ore to be crushed is fed, is journaled a vertical shaft with bifurcated upper end, crushing rollers with independent axes being pivoted in the bifurcated shaftend, while opposing horizontal arms carrying adjustable shovels to follow the rollers are secured to the shaft between the rollers, the apparatus being designed as an improvement upon the Chilean mill.

RICE HULLER.—Henry Scholfield, New York City. This machine has a tubular sectional body with vertical angular grooves, combined with a rotary hub and a series of flexible and spaced rubbers, each section being secured in an arc of a circle to the hub, with guide plates between each set of rubbers, whereby the hull will be completely removed from the grain, and each grain will be rubbed or scoured.

MIDDINGS PURIFIER.—George W. Bell, River Falls, Wis. This machine is designed to purify middings or flour by means of currents of air, and the invention covers novel features of construction and arrangement of parts whereby all the finer and heavier particles of dust are designed to be removed.

PRINTING PRESSES.—Touro Robertson, New York City. This invention provides a numbering attachment for printing presses, whereby bonds, checks, tickets, etc., may be numbered consecutively, or one or more units may be skipped, as desired, without changing the numbering head or essentially altering its mechanism.

Miscellaneous.

GATE VALVE.—Charles H. Shepherd, New York City. This is a removable gate valve for temporary application to drain and sewer pipes, and is made with a transversely slotted pipe having a collar formed integrally therewith with apertured ears, a cover adapted to close the slot of the pipe, and a gate valve adapted to the bore and slot of the pipe, the improvement being intended to avoid the difficulty from ordinary forms of corrosion.

TAG FASTENER.—William H. D. Ludlow, Tecumseh, Neb. This device is somewhat like a pair of scissors, having at the end of one of its blades a bent tagging extension, pointed, and with an eye for carrying the tag, thread or cord, for putting tags on goods of light and heavy texture, and drawing the string through the goods for the attachment of the tag.

SUSPENDER BUCKLE.—Louis Steinberger, New York City. The body of the buckle is in the form of a flat plate bent over at its sides to form grooved guides to receive margins of the strap, and also slotted to receive crosswise a loose spring gripping plate or bar, between the inner face of which and the back surface of the body the main strap passes, the buckle being readily slid in either direction and automatically effecting its own engagement.

LETTER CLASP.—Louis Steinberger, New York City. This is a clasp made of a piece of spring wire bent and crossed upon itself to form opening and closing frames, to be used for holding letters or loose papers in the pocket or elsewhere, for carrying attached single or double tablets, or for holding books open while being read, etc.

POISON DISTRIBUTER.—Wiley P. Towne, Delta, La. This is a machine having a powder receptacle, with openings connected with flexible tubes or hose having rose nozzles, and a blower entering the receptacle, whereby the powder is distributed in close proximity to the plants to be treated, the wind not blowing it either in the direction of the driver or horses.

SOFA AND BED.—Charles T. Hard, East Liverpool, Ohio. This is an article of furniture adapted to be conveniently and expeditiously converted from one use to another, and is so constructed that when used as a bed the bottom will beamply supported and elevated essentially the same distance from the floor as the equivalent portion of an ordinary bed.

EGG COUNT REGISTER.—Alvin F. Harrison, Greeley, Kansas. This register consists of a case with toothed and numbered disks slightly overlapping each other, the disks having a pin and pivoted lever with spring arm, with other novel features, whereby a party counting eggs can leave the work of counting at any time and will always have an accurate register of his count.

FIGURED WOODEN PLATES.—Robert Himmel, Berlin, Germany. This invention covers a method of producing fancy figured wooden plates, for use instead of inlaid work in furniture, etc., and consists in first burning and pressing the wooden plate between metallic surfaces having patterns on them, and then smoothing and polishing the embossed surface of the plate.

HACK SAW.—George N. Clemson, Middletown, N. Y. This saw has every third tooth arranged in the same plane as the body of the saw, the remaining teeth being set in the usual way to give the saw clearance and prevent it from pinching in the kerf, whereby lateral vibration will be prevented, more perfect work secured, and the usefulness of the saw prolonged.

MEDICATED BOUGIE.—Thomas Christy, London, England. This is a wire instrument, with stem of straight wire bent at one end to form a ring handle, and having a wire extend beyond the straight end and bulging in the middle, the instrument being designed to facilitate the local treatment of various diseases.

UMBRELLA HOLDER.—August Denhard, Bonn, Germany. This holder consists of a main frame of hinged sections which may be folded into small compass, and is adapted to be attached to the clothing, and formed with a fastening device or projection at its upper end, combined with a clamp for grasping and firmly holding an umbrella handle.

HAMMOCK.—Herbert M. Small, Baldwinville, Mass. This hammock has a seat and back portion, with hooks at the upper end of the latter and a looped rope secured to the forward corners of the seat, with adjustable hooks on the parallel parts of the rope, etc., whereby passengers who have to travel in ordinary passenger cars at night may be able to sleep with ease and comfort.

INDEX.—John P. Findley, Blanchard, Pa. This index is formed in sections on opposite sides of a central starting point of the book, the leaves of the sections being cut away from this point to expose portions of the leaves corresponding to each desired division of the subject matter, making an improved method of forming the index of books.

BILLIARD TABLE.—Charles G. Brockway, Pine Bluff, Ark. This improvement covers a special construction of the table rail and cushion, whereby a better ventilation and adjustment is secured between the bed, the rail, and the cushion, while a solid bearing is obtained for the rail to hold the parts firmly to the adjustment to which they are set.

TELESCOPIC MIRROR.—August Janzon, Iron Mountain, Mich. This is an attachment consisting of a metal or other suitable plate, having a central constructed aperture, a clamp being attached to the plate to hold it upon the outer end of the telescope, with its contracted aperture over or on the outside of the object lens, while a mirror is hinged to one side of the plate, the device being also intended for use with opera glasses, etc.

SCIENTIFIC AMERICAN
BUILDING EDITION.

APRIL NUMBER.—(No. 42.)

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Tight and Slack Barrel Machinery a specialty. John Greenwood & Co., Rochester, N. Y. See illus. adv., p. 28.

Rotary veneer basket and fruit package machinery. I. E. Merritt Co., Lockport, N. Y.

Beiting.—A good lot of second hand beiting for sale cheap. Samuel Roberts, 363 Pearl St., New York.

Patent swing cut-off saw, with patent shield for saw. Rollstone Machine Co., Fitchburg, Mass.

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NEW BOOKS AND PUBLICATIONS.

TRANSACTIONS OF THE AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS. Vol. V. Meetings of September 20, 1887, October 11, 1887, November 9 and 15, 1887, December 6, 1887, December 20, 1887, January 10, 1888, February 14, 1888, April 10, 1888, May 16, 1888, June 19, 1888, and October 9, 1888. New York City: published by the Institute. Pp. xii, 435.

In the present age of electrical engineering it is imperatively necessary to keep abreast of the times by reading the proceedings of the societies devoted to the subject. In this volume the proceedings of ten meetings held in 1887 and 1888 are given. It is needless to emphasize their value. Illustrations are given when necessary. The concluding section of the work is devoted to an index of current electrical literature, divided into months, beginning with December, 1887, and ending with September, 1888. The volume has as a frontispiece an excellent photograph of F. L. Pope, the well known electrical expert.

SEA SIDE AND WAY SIDE. No. 3. By Julia McNair Wright. Boston: D. C. Heath & Co., publishers. 1889. Pp. x, 297. Price 55 cents.

This is the third of the well known nature readers, which have won such popularity in our schools. It is gotten up very handsomely, and from the interest of its topics and the pleasing way in which they are set forth may be recommended to teachers.

SUGAR: A HANDBOOK FOR PLANTERS AND REFINERS. By Charles G. Warnford Lock, F. L. S., Benjamin E. R. Newlands, F.I.C., F.C.S., and John A. R. Newlands, F.I.C., F.C.S. E. & F. N. Spon, London and New York. 1888. Pp. xxiv, 920. Price \$10.

This exhaustive work treats of the titian subject in all its phases. Beginning with the cultivation of the sugar cane, the work is carried down through the processes of the extraction and purification of the juice, the reduction of sugar therefrom, the analytical methods, and patented and other processes. The mechanical treat-

ment, as for the production of cube sugar, is given, with appropriate illustrations. The polariscope receives full consideration, and the concluding portion of the work is given to alcohol, its production and distillation. The commercial aspect fills the concluding chapters. The work is well indexed, and forms a standard contribution to the technical knowledge required in the making of sugar.

A NEW PRINCIPLE IN HELIOCHROMY. By Frederic E. Ives. Philadelphia: printed by the author. 1889.

This is an *édition de luxe* among photographic works. It treats of the possibility of producing photographs in natural colors. It is prefaced by the portrait of the author, which, in view of the reputation he enjoys in the photographic world, will be considered an interesting feature of the work. A comparison and criticism of the method used, by Dr. H. W. Vogel, completes the book.

THE VOLTAIC ACCUMULATOR. By Emile Reynier. Translated from the French by J. A. Berly. E. & F. N. Spon, 125 Strand, London; New York: 12 Cortlandt Street. 1889. Pp. xv, 202. Price \$4.

The title of this book, brief as it is, describes its contents. It is a treatise on storage batteries, and gives in much detail the theory of their action, their merits, their defects, and a large amount of valuable practical information. A thorough review of the book would be impossible in the space at disposal, but it is enough to say that the subject is admirably treated, and the contents rearranged in the systematic manner that so admirably distinguishes French scientific works.

A LABORATORY GUIDE IN CHEMICAL ANALYSIS. By David O'Brine, E.M., M.D., D.Sc., Professor of Chemistry and Geology in Colorado State Agricultural College. Second edition. Entirely rewritten and revised. New York: John Wiley & Sons. 1889. Pp. 237. Price \$2.

This work is intended for the use of students, and is an abstract of qualitative analytical work. The logical way in which it is put forth and its general arrangement are most praiseworthy. A very valuable section is that devoted to poisons, ptomaines, etc., to which 36 pages are devoted; general stoichiometry is the matter of the concluding chapter.

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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.

(651) H. H. A.—Salt water does not freeze as readily as fresh water, but in the case of shallow running water, whether it be salt or fresh, freezing will sometimes take place first on the bottom, whereas if the water be still the ice particles are ordinarily first formed on the surface.

(652) J. R. N.—We know of nothing practical but chisel and hammer for taking clinkers from fire brick. Butting oyster shells in the fire is sometimes recommended.

(653) W. J. S. asks for receipt for gumming labels. A. Try following:

1. Dextrine.....	2 parts.
Acetic acid.....	1 "
Water.....	5 "
Alcohol.....	1 "
Or 2. Gelatine.....	2 parts.
Rock candy.....	1 "
Water.....	3 "

(654) J. W. H.—The largest built-up all-steel guns now in actual use in the United States navy are 8 inches. Some 10 inch all-steel guns are now finished or partially finished at the Washington navy yard. The guns on the Boston are 8 inches; 12 inch guns are in course of construction with cast iron shell, steel tubed and steel hooped. See *SCIENTIFIC AMERICAN SUPPLEMENT*, No. 684, for the "Progress of Our New Navy."

(655) J. J. B. asks: What material, and how applied, is used to coat tin dishes, to withstand the action of chemicals used in developing and toning photos? A. Use a quick-drying asphalt varnish, such as sold for bicycles.

(656) W. F. L. writes for a receipt for a floor varnish that will stand hard wear. What shall I put in to make it a cherry color? A. Use good hard drying varnish from a reputable maker. Color with dragon's blood.

(657) N. C.—Good machinists that are honest and faithful always stand high in the estimation of employers. The country has never had too many of them. The idling, slipshod sort are in excess. We advise you to enter a small shop making any kind of machinery, near a town.

(658) C. H. asks: 1. What is lock jaw and what are its causes? A. Lock jaw or tetanus is a spasmodic disease, characterized by painful, involuntary, and protracted contraction of the muscles. It is almost invariably consequent upon a wound or injury, although in hot climates and particular localities it may occur without such injury. 2. What are considered the ten greatest works of fiction? A. Opinions differ. Almost all would include "Les Misérables," "Pensées," "Vanity Fair," "Robinson Crusoe," and some of Balzac's, Dickens', and Fielding's novels in such a list. 3. Who is considered the world's greatest novelist? A. Here opinions also differ. Victor Hugo, Thackeray, Dickens, Fielding or Balzac might be named.

(659) G. W. S. asks a formula for white paint for boat work, also for house work inside. A. Zinc white with a little varnish makes the best finish, and does not turn yellow.

(660) C. H. S. asks: Can you inform me how long it takes electricity to go through the Atlantic cable? A. Practically instantaneously or in a fraction of a second.

(661) G. H. asks: 1. What is the cheapest and easiest process to convert crude pyroligneous acid into commercial acetic acid? A. Neutralize with sodium carbonate, evaporate to crystallization, drain the crystals, heat just enough to decompose any tar matter, and distill with excess of sulphuric acid. The distillate will be comparatively pure acetic acid. 2. How is crude creosote, as produced by distilling wood, converted into commercial creosote? A. The United States Dispensary gives the following method of preparation: Creosote is obtained either from wood tar or from crude pyroligneous acid. When wood tar is used, it is distilled until it has attained the consistency of pitch. The distilled liquid divides itself into three layers, an aqueous between two oily layers. The inferior oily layer, which alone contains the creosote, is separated, and saturated with carbonate of potassium to remove acetic acid. The liquid is allowed to rest, and the new oil which separates is decanted from it. This oil is distilled, and yields products lighter than water and a liquid heavier. The latter alone is preserved, and after having been agitated repeatedly with weak phosphoric acid to neutralize ammonia, is allowed to remain at rest for some time. It is next washed as long as acidity is removed, and then distilled with a fresh portion of weak phosphoric acid, care being taken to cobobate from time to time. The oily liquid thus rectified is colorless, and contains much creosote, but also a portion of eupion, or light oil distillate. To separate the latter, the liquid is mixed with a solution of caustic potassa of the density 1.12, which dissolves the creosote, but not the eupion. The eupion, which floats above from its levity, is then separated, and the alkaline solution of the creosote is exposed to the air until it becomes brown, in consequence of the decomposition of a foreign matter, and is then saturated with sulphuric acid. This sets free the creosote, which is decanted, and again distilled. The treatment by solution of potassa, sulphuric acid, etc., is to be repeated until the creosote no longer becomes brown by exposure to the air, but only slightly reddish. It is then dissolved in a stronger solution of potassa and distilled again, and finally redistilled for the last time, rejecting the first portion which comes over on account of its containing much water, collecting the next portion, and avoiding to push the distillation too far. The product collected in this distillation is creosote. When creosote is extracted from pyroligneous acid, the first step is to dissolve sulphate of sodium in it to saturation. The oil which separates and floats about is decanted, and, having been allowed to remain at rest for a few days, is saturated by carbonate of potassium with the assistance of heat, and distilled with water. The oleaginous liquid obtained is of a pale yellow color, and is to be treated with phosphoric acid, etc., as above detailed, in relation to the treatment of the corresponding oil obtained from wood tar. 3. How is acetate of lime made and what is it used for? A. By neutralizing pyroligneous acid with lime. It is used as a source of acetic acid. The literature of the subject is scattered and limited. We can supply you with the part of Spon's Encyclopedia treating of it for 75 cents. In *Ure's Dictionary* and similar works you will find references to it.

(662) C. W. A. asks: What are the ingredients used and by what process is compressed yeast made, such as is sold in small cubes wrapped in tin foil? A. Previously malted barley and rye are ground up and mixed, next put into water at a temperature of 65° to 75°; after a few hours the saccharine liquid is decanted from the dregs, and the clear liquid brought into the state of fermentation by the aid of some yeast. The fermentation becomes very strong, and by the force of the carbonic acid which is evolved, the yeast globules are carried to the surface of the liquid, and, forming a thick scum, are removed by a skimmer, then placed on cloth filters, drained, washed with a little distilled water, and next pressed into any desired shape by means of hydraulic pressure, and covered with a strong and well woven canvas. It keeps from eight to fourteen days, according to the season, and is said to be excellent.

(663) H. B. L. asks (1) the standard railroad gauge of England. A. English railroad gauge 4' 8 3/4", same as American gauge. 2. Diameter of largest locomotive drivers. A. 78 inches is the largest that we know of in the United States. 3. Why property is leased for 99 years in Illinois. A. The leasing of property for 99 years is not confined to Illinois. It is a very old custom, in use in all the States, derived from English practice. 4. How shellac is bleached. A. Shellac is bleached by exposure in thin strips to the sun. There is a chemical process for bleaching in solution, somewhat complex, described in the "Techno-Chemical Receipt Book," which we can mail for \$2.

(664) W. G. C. asks: 1. What is the best way to ventilate a store show window to prevent steaming of the glass without letting in dust on the goods? A. For a closed window, where lights are burning, ventilation that shall be as free from dust as possible should be provided by drawing air from above the roof. 4 inch tin pipes from the top of the window, carried up inside of the building through the roof or to a near-by flue, will carry off the moist foul air, while similar tubes from the roof to the bottom of the window

will supply fresh air. 2. What is the best way to ventilate a bedroom with ordinary open grate, windows, and doors without causing an unpleasant draught? A. Bedrooms with doors, windows, and grates need no special ventilation when there is a fire in the room. There is leakage of air through imperfect window casings and door crevices to keep the fire burning and supply chimney draught for ventilating purposes without noticeable draught in the room. At all other times, dropping the upper sash equal to requirements is all that may be needed. If a direct draught is felt, the curtain or a shield may be easily arranged to prevent ill effects.

(665) F. Mfg. Co. ask: Please give a few suggestions as to gluing wood on metal, for strength and durability. A. Glue with a small percentage of glycerine added adheres well to metals. A small amount of molasses added to glue will act in the same way. Tannin added to glue makes it strong and adherent. Bichromate of potash renders glue waterproof.

(666) A. S. writes: 1. What is the red light used on stage made of? I find some shellac in it. Also give the formula for the green light. A. Mix 4 parts nitrate of strontium with 1 part of pulverized shellac; do not pulverize together. For green use nitrate of baryta. If you substitute an equal weight of chlorate of potash for one or two parts of the nitrate, it will be more vivid. 2. Where can I get seven call bells tuned, or how could I tune them? A. To raise the pitch, turn off near the lip; to lower, turn off the central zone.

(667) R. K.—The emery strap is made by brushing good, strong glue upon the leather and quickly sprinkling the surface with flour emery; when dry, the loose emery is brushed off. Crocus is mixed with a little oil and rubbed into the leather. Smooth on piece of glass.

(668) G. D. D. asks: 1. Can core of armature of simple electric motor be made of Swedish iron, welded and turned, instead of using iron wire, and yet be as good? A. Swedish iron will answer, but not quite as well as the iron wire. 2. Will common iron answer as well as Swedish? A. No.

(669) J. M.—For hardening thin sheet steel, heat in an iron box or pan packed in sand and charcoal equal parts; dip edgewise as nearly vertical as possible. After drawing the temper, the warp can be taken out with a hammer. The charcoal will keep the surface from oxidation, but if necessary to clean the surface, use a bath of murlatic acid 1 part, water 3 parts. A half hour's immersion will clean the surface. You cannot harden satisfactorily by tying the sheets together. Polish with flour emery on a buff or brush wheel wet with oil, gloss with crocus on a buff wet with alcohol. The diamond is easily burned, but fused with much difficulty, losing its transparency and really ceasing to be a diamond.

(670) J. B. S.—A system of Bunsen burners may be arranged under a boiler for house heating. Such are used under small boilers for experimental purposes. The small jet system has also been tried. The cost for heating buildings in this way with other than natural gas has heretofore been a bar to its success.

(671) E. S. K. asks for a good recipe for making a first-class hard lubricant, suitable for heavy or light work, out of the residuum obtained by refining petroleum, and also of a means of removing the disagreeable odor connected with it. A. We fear that you will have trouble in removing the odor you speak of. If it is not very bad, filter through boneblack, or apply the following more complicated process: Heat with steam to 88° Fah. and treat with 10 per cent of sulphuric acid of 60° B. After standing and decanting treat with bichromate of potash dissolved in water. Heat after decanting to 176° Fah. with 10 per cent boneblack, settle and filter. You may mix sperm oil with the residue, but it would be well to wash the petroleum oil with warm dilute solution of soda or lime and afterward with water, before adding the sperm oil.

(672) G. W. T.—The power of a bicycle depends a grade depends upon the comparative length of the crank and diameter of the wheel. A short crank on a large wheel does well on level grades, but for hill riding the long crank and smaller wheel is needed.

(673) R. A. C. cannot succeed in changing blue prints to a brown according to formula given in vol. iv., No. 8, page 113. Try the following instead:

Borax.....	2 1/2 oz.
Hot water.....	38 "

When cool add sulphuric acid in small quantities until blue litmus paper turns slightly red, then add a few drops of ammonia until the alkaline reaction appears and red litmus paper turns blue. Then add to the solution 154 grains of red crude gum catechu. Allow it to dissolve with occasional stirring. The solution will keep indefinitely. After the print has been washed out in the usual way, immerse it in the above bath amine or so longer than it appears when the desired tone is reached. An olive brown or a blackish brown is the result.

(674) J. A. G.—The lactometer is used by placing in a vessel of the milk to be tested at a temperature of 60°. If it floats with the 100° mark even with the surface or a little above it, the milk is considered pure. The cream gauge is used by filling with milk and observing what per cent of cream rises to the top. Its indications are of little value. The lactometer is so graduated that as it sinks, the degrees are assumed to indicate the percentage of pure milk. The 100 mark corresponds to a specific gravity of 1.029.

(675) A. S. asks for something better than putty to fill up cracks in a boat. A. Melt equal parts of pitch and gutta percha in an iron pot; thoroughly mix by stirring. Make up in sticks and melt into the cracks with a warm iron.

(676) H. H. asks how to make a small telephone out of baking powder boxes. A. Remove the bottoms. Tie firmly a piece of parchment over the end of each, and attach the end of a string to the center of each parchment by passing it through a hole in

the center and knotting it. On stretching the string between the two cans, a species of acoustic telephone system will be formed.

(677) G. M. C.—After 4 to 6 days, when desquamation begins, scarlet fever is especially contagious. Anointing of the patient with vaseline is recommended as a protection against contagion from this cause. As disinfectant for clothes and other dangerous sources of infection, 1 part sulphate of zinc dissolved in 10 parts of water may be used. It is a strong poison. Fumigation with burning sulphur, with bromine, or with chloride of lime and vinegar mixed, are excellent as after treatment of the room, curtains, etc. These chemicals, however, tend to fade or bleach tissues.

(678) G. B. S. asks (1) the lifting power of one cubic yard of best gas for balloon purpose. A. A cubic yard of hydrogen gas will lift 1 3/4 pounds. 2. The breaking strain of 1 1/2 inch best steel cable, and what would a mile length of the same weigh? A. Breaking strain of 1 1/2 inches diameter steel rope, 65,000 to 70,000 pounds. Weight per foot 3'14 pounds, or 16,579 pounds to a mile.

(679) A. L. writes: Can the SCIENTIFIC AMERICAN or any of its readers inform me if there is any other way to smooth down the tones of a new violin than by using the bow upon it? A. Give it time and plenty of playing. Many violins have been ruined by being tampered with to improve their tone, when a little patience would have effected the same result. If the violins of originally poor quality, nothing will perfect the tone.

(680) C. J. C. asks: What method is used in transferring printed matter to glass? A. Soak print in water, varnish glass with dammar varnish or Canada balsam; while still tacky place the print smoothly against it and allow it to dry. When dry, rub off most of the paper with the wet finger and revarnish. The trouble is that printed matter is generally deficient in ink and gives a weak transfer.

(681) J. B. P. writes: In a recent issue, in answer to what will change the odor of turpentine, it gives as changing the odor of naphtha: "Bichromate of potash and sulphuric acid." Can you give me the proportion of each substance used for say one gallon of naphtha or kerosene, and how mixed with the oil, and also whether the mixture is to be warm or cold? A. No fixed quantities can be given. To one pound of oil of vitriol add two ounces pulverized bichromate of potash, and agitate the cold solution with the benzine. After standing long enough to settle, decant the benzine. Use care in pulverizing the bichromate, as inhalation of the dust produces ulcers. Distillation from quicklime with rejection of first and last distillates is recommended also.

(682) G. J. G. asks: Is the vapor of carbolic acid injurious to the lungs? A. It is not generally considered so.

(683) W. J. H. asks: How steel-cased lead rifle balls are made? A. The shells are pressed into shape from thin sheets of soft steel in the same manner as in the making of cartridge shells. The lead is then forced into the shell by a powerful press.

(684) J. F. H. writes: Please give a receipt for preserving eggs, suitable after several months' keeping for food. A. We refer you to *SUPPLEMENT*, Nos. 65, 107, 308, and 317, which we can supply for 10 cents each.

(685) W. W. G. writes: I want to know if there is any cement made that will withstand the action of sulphuric acid, a light greenish blue color, or how to make it, or if such a cement is made, but of a different color, how to color it? A. Much depends on the heat and concentration of the acid. Sealing wax will stand it under ordinary conditions, but concentrated acid might affect it. The surest thing would be enamel, if you could heat the objects enough to melt it. Generally such cements are dark colored. For blue sealing wax, ultramarine and any dry white such as barytes may be used as coloring matter.

(686) I. E. asks: Is there any means, besides the common method of dry scraping, by which the old paint on furniture may be removed, leaving the natural surface of the wood exposed and uninjured? A. A solution of caustic potash applied to the paint will loosen it in a few hours, or it may be burned off by blistering with a gas jet and small bellows or blower, and scraping before it cools off. An alcohol blowpipe is sometimes used.

(687) G. O. asks: 1. In winding the armature of the simple electric motor with No. 20 wire (motor to be used as a dynamo), should I wind more layers to make up the required thickness, or should I make the polar section of the field magnets smaller? A. If the space to be filled is slight, you might add more wire, otherwise reduce the bore of the field magnet. 2. Also, how many sixteen-candle power lamps would the dynamo light? A. It will probably light one such lamp.

(688) H. G.—As manuals of shorthand we recommend and can supply Burns' Fonic Shorthand, \$1. Munson's Complete Phonographer, \$1.50.

(689) W. N. G. asks for some reliable recipe that will take lime stains from California redwood? A. Try dilute acid, such as vinegar or lemon juice, or one part hydrochloric acid in fifty parts of water. Experiment on useless pieces of wood until you hit it.

(690) E. S. & S. ask for mixture that will remain sticky on paper exposed to the weather out of doors. A. Use a mixture of raw linseed oil and resin melted together. Vary the proportions until you obtain a suitable consistency.

(691) C. W. B. asks at what temperature water separates into hydrogen and oxygen. A. It depends on the pressure. Water begins to decompose at 1,760° to 1,832° F. It proceeds to a limited extent and stops, and begins again at 2,192° F. The trouble in these investigations is to separate the gases, as otherwise they recombine in cooling. By passing them through a porous tube, the hydrogen diffuses through the pores the quickest, and is thus partially