ENGINEERING INVENTIONS.

A balanced slide valve has been patented by Mr. Ashbel Welch, of Lambertville, N. J. This invention covers a simple, practical, and economical arrangement whereby all sticking of the valve is prevented, the cylinder may be relieved of water of condensation, and the uniform wear of the valve face and seat

A car coupling has been patented by Mr. Edward L. Raynsford, of Susquehanna, Pa. The coupling hook and drawbar are supported by a bearing plate kept in place by a collar and provided with cross head ends sliding in bearings attached to the car frame the whole making an improved device to promote con venience and safety in coupling and uncoupling,

A coal chute has been patented by Mr. Joseph E. Clifton, of Geneseo, Ill. The invention covers an improved arrangement of the latch for fastening up the balanced apron of the coal chute, also of a brace attachment to the door in connection with the balanced apron, and an attachment to facilitate and insure the latching of the door, etc., the whole making an improved arrangement for coal chutes used for coaling loco-

A car brake attachment has been patented by Messrs. Eli M. Holcomb, of Bay Springs, and Fred erick E. Miller, of Eveline, Mich. The invention consists in the combination with a ratchet wheel and a beveled pawl pressed against the wheel of a vertically movable plate with a downwardly projecting wedge and a prong surrounded by a spring, which presses the wedge plate upward, the parts being protected from rain and snow, and the device enabling the brake to be quickly released.

A marine engine governor has been patented by Messrs, Alexander H. Bell and Aspinwall Fuller, of New York city. A two part spherical valve seat is placed in the shell, provided with flanges to keep it in place, and with perforations for the passage of steam and the valve stem, a spherical valve with perforations for the passage of steam and a weighted valve stem to control the valve, with a stuffing box and flexible connecting base to prevent steam from escaping around

MECHANICAL INVENTIONS.

A lifting jack has been patented by Mr. Erick J. Qvarnstrom, of Norway, Mich. The invention consists of improvements in the construction of screw jacks arranged to shift the hoisting screw after the load is raised, to move the load while supported on the screw to simplify the parts, and make jacks that are substantial and reliable.

A vise attachment has been patented by Mr. Charles H. Eddy, of Auburn, N. Y. The under side of the vise has two jaws, one stationary and the other adjustable, both connected by a swiveled adjusting bolt, and with their inner surfaces suitably made to bite or hold on the opposite sides of the rim of the wheel it is desired to attach the vise to.

An oil cup feeder has been patented by Mr. James E. Worswick, of Montgomery, Ala. The motion of the machine where the lubricator is fixed causes a feeding pin to reciprocate in a tube, where it is loosely arranged, there being a removable collar at the upper end of the tube, and a removable perforated disk within the collar to form a bearing for the upper end of the

A lumber trimming machine has been patented by Mr. Edward Heyde, of East Saginaw, Mich. It is an improved apparatus for raising and holding in position any one of a series of cutting off saws arranged in a bench over which boards are carried to have the ends trimmed square and to specified lengths, the saws being arranged for trimming to several different standard

A motor has been patented by Mr. Jacob Heckeulively, of Eureka, Kan. A weight is so suspended from a drum that, in descending by gravity, motion is given to a train of gears, which drive a shaft carrying a cam wheel, with which a machine may be connected by a pitman, a governor device pressing a brake lever against the cam wheel to control the speed of the motor.

A lubricator has been patented by Mr. Henry R. A. Boys, of Barrie, Ontario, Canada. The invention consists of an arrangement of an oil feeding cylinder and piston and a gauge cylinder and piston, so the outward movement of the piston to feed the oil from the oil cylinder shall cause a corresponding outflow of the gauging liquid from the gauge cylinder to measure the rate of feed of the oil.

A pressure regulator has been patented by Mr. Francis J. Freese, of Manchester, N. H. The object of the invention is to make an improved device for automatically regulating the pressure of liquids, gases steam, etc., a plunger moving in a specially constructed cylindrical casing, so as to enlarge or diminish the openings by which the flow of gas, steam, etc., will be automatically controlled.

An oil cup has been patented by Mr. Perry Small, of Guaymas, Mexico. It is an improved oil cup with glass drip chamber, the latter being made by a partition plate, which is integral with the glass cup, the frame surrounding the cup having openings above and below the partition plate, and having at its upper end a suitable cap, the whole being simple, cheap, and not liable to get out of order.

AGRICULTURAL INVENTIONS.

A potato digger has been patented by Mr. Hans Nelson. of Waupaca, Wis. A scoop is connected with the rear end of a downwardly and inwardly curved beam, with which is combined a clearer, and cleare vibrating cams or wings on the axle of supporting wheels, the scoop being readily adapted to work deeper or shallower in the ground, as may be desired.

A grain header and harvester has been patented by Mr. Peter E. Drouet, of New Orleans, La. The front board of the cart is made in adjustable parts, the side bars are pivoted at their rear ends on a

bar to which are secured the scraper roller, comb, reel, and driving mechanism, and as the machine is drawn forward the grain is removed from the heads of the stalks and received in the cart body.

A tongue rest, for supporting the tongue of a harvester and self-binder, has been patented by Mr. John Fisher, of Riley, Ind. In combination with the tongue is an unright frame in which is a slide with an inwardly projecting rod, around which a spiral spring is coiled, the whole making a device to relieve the horses from holding up the tongue and the weight thereon.

MISCELLANEOUS INVENTIONS.

A catamenial sack of improved form and construction has been patented by Mr. Charles H. Levy, of New York city. The frame can be made of metal, rubber, or bone, covered, and the pocket and pouch of rubber, leather, or waterproof fabric.

A telephone call and switch box has been patented by Mr. Edwin H. McFall, of Memphis, Tenn. This is a novel arrangement of switch and circuit in telephone boxes, having the object to maintain closed circuit at all times on lines connecting three or more instruments.

A hoisting device for vessels has been patented by Mr. Richard H. Purnell, of Rosedale, Miss, This invention relates more particularly to a special form of brake for use in combination with hoisting devices used on steamboats for lifting and adjusting the gangway or stage planks.

A velocipede has been patented by Mr. Charles M. Schaffer, of Louisville, Ky. The wheel and frame are madewith one open side, to facilitate ingress and egress and give better views of surroundings, to facilitate mounting and starting, and to improve the appearance of the machine.

A leather and cloth varnish has been paented by Mr. Walter C. Gifford, of Brooks, Mich. It is waterproof and gives a polish, the composition consisting of alcohol, gum shellac, white resin, oil of turpentine, kerosene oil, oil of cinnamon, and lamp black in certain specified proportions.

A mucilage cup or holder has been patented by Mr. Stephen S. Harman, of New York city. The invention consists principally of a handle or stick fitted in the cover, provided at its lower or inner end with a sponge fitted in a socket, or otherwise attached to the stick or handle.

A reflector holder for lamps has been patented by Mr. Daniel R. Williams, of Dallas, Texas. Different forms of clamp and clasp are so made that the reflector may be held in any desired position, and may be turned around the lamp as desired, while yet it will be firmly held.

A device for attaching and detaching horses nas been patented by Mr. Cicero C. Ferrill, of Shubuta, Texas. It is intended to make it possible to dispense with the ordinary harness except a collar and a pair of hames, and for this purpose the thills have ferrules and pring actuated pins, and the hameshave specially contrived loops and guards.

A watch protector attachment has been patented by Mr. Julius C. Grimmell, of Brooklyn, N. Y. The invention consists in a casing with two swing ing stirrups, thrown from each other by springs, and from the free ends of which a hooked fork is suspended, the stirrups preventing the withdrawal of the watch from the casing.

An extensible clasp for books has been pa tented by Mr. Jacob Monch, of Offenbach-on-the-Main Germany. The clasp is formed of two plates, one adapted to slide under the other, the lower one having a diagonal slot, into which a stud of a 'nut or block passes, so the clasp can be easily lengthened or shortened according to the thickness of the book

A fountain pen has been patented by Messrs. Albert J. Kletzker, of New York city, and Charles H. Court, of Jersey City, N. J. The pen has a point sec tion with an aperture below the pen, the aperture being closed by a loosely fitting plug with a tongue, and adapted to be vibrated by the pen during writing, and thus cause a flow of ink.

A saddle seat has patented by Mr. Peter B. Hirsch, of Denver, Colo. This invention consists in dispensing with the bridge plate and the layers of leather, and employing in lieu thereof a single plate of metal shaped in dies to the desired form, and thus "building up" on the saddle tree a seat of such shape as wished

A thill coupling has been patented by Messrs. Lorenzo D. Rundell and Perry Van Valkenburgh, of South Westerlo, N. Y. The invention consists of an axle clip with two projecting jaws or lugs, each having inwardly projecting flanges on the ends, a fork being secured on the inner end of the thill, and having a recess in each side edge of the front prong.

A pocket knife has been patented by Mr. miners' use, to facilitate the cutting and capping of a fuse; the knife has a notch in the handle case and one in the blade, the latter having a screwthread formed on its bottom to press a screwthread in the end of a fuse placed in the notch in the handle.

A clothes hanger has been patented by Mr. Lonis Barkany, of Baltimore, Md. The hanger consists of a notched arm with a cross bar hinged at its free end, and a prop supporting the arm, the arm and prop being pivoted to a support, the contrivance being especially adapted to hold clothes open, while it can be folded compactly when not in use.

An umbrella and parasol rib has been patented by Mr. Asher T. Meyer, of New York city. The rib is made hollow, and re-enforced at its outer end by a bar, with a head and flattened portion, and having an eve passing through both the rib and bar, the object being to simplifythe construction of the lower or outer end of the paragonrib.

A pendulum scale has been patented by Mr. Henry C. Keeler, of Ogden, Utah Ter. This is an improved form of weighing scales in which pendulums address Munn & Co., SCIENTIFIC AMERICAN Patent with removable weights may be substituted for the balproved form of weighing scales in which pendulums

ancing ball and weight, or the construction may be such that one of the beams and dials may be graduated for the, scoop and the other beam and dial for the platform.

A flying target has been patented by Mr. Charles F. Stock, of Peoria, Ill. Combined with a fragile ring, having a flange on its lower inner edge, is an infrangible carrier ring, to be inserted within the fragilering, and held there by the flange, so the fragile portion will break more easily than solid targets, and there will be no failure to indicate a well directed shot.

An automatic winding signal for spring clocks has been patented by Mr. Edward Jungerman of Gettysburg, Pa. The invention consists in combining with the main spring of a clock a shoe or yielding bar. which, when the spring expands from uncoiling, is struck by the spring and made to bring a signalinto view, on the face of the clock or elsewhere, to give notice that the clock should be wound.

A hame clip has been patented by Mr. Charles W. Massenheimer, of Allentown, Pa. The invention consists principally in making the clip with a hook and hinged tongue or section, the book being made integral with the side plates of the clip, the side plates being joined with a solid shoulder or bridge at their forward ends, so the traces may be easily attached and detached without ripping the tug.

A lumber rack has been patented by Mr. Joseph A. Aycock, of Whitesburg, Ga. The rack is formed of a series of vertical sticks held movably between top, bottom, and intermediate pieces of a frame, between which vertical sticks the planks or pieces of lumber are held a distance apart equal to the thickness of the stick, thus permitting the air such access as will season the lumber in a short time.

A churn has been patented by Mr. Anson M. Otis, of York, Neb. The churn body has a projecting screw at the center of its bottom, and a stationary shaft with a radially expanding and contracting dasher connected by hinged bars, a sliding tube, and a pitman with a crank shaft, gear wheels, and a hand crank, so the dasher is expanded and contracted radially by the revolution of a crank shaft.

A wiping and polishing apparatus for plate printing machines has been patented by Mr. Alexander Reid, of Brooklyn, N.Y. Combined with the reciprocating bed of the press is a roller having slots, webs, paying off spools, receiving spools, and means for rotating the spools and vertically reciprocating the roller, the whole being an improved device for wiping off surplus ink and polishing the plate before taking an im-

A mercury vacuum pump hasbeen patented by Mr. Charles G. E. Neveux, of New York city. A bulb is made near the top of one of two vertical pipes united at their upper end, this bulb having valves arranged to connect it with the vessel to be exhausted; then by a special construction the mercury can be made to drive all the air out of the bulb, when the valves will so open as to connect with the air vessel to be exhausted, and this operation can be repeated several times with little trouble, there being no loss of mercury, and the whole construction being simple and rapidly worked.

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No attention will be paid to communications unless sccompanied with the full name and address of the

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondeuts whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from \$1 to \$5, according to the subject. as we cannot be expected to spend time and lahor to obtain such information without remuneration.

Any numbers of the Scientific American Supplie-MENT referred to in these columns may be had at the office. Price 10 cents each.

Correspondents sending samples of minerals, etc., for examination, should be careful to distinctly mark or label their specimens so as to avoid error in their identi-

(1) T. M.—It is almost impossible to identify a fiber botanically without specimens of its leaves and flower. We presume that the fiher comes from a variety of nettle called ramie (Urtica neva).

(2) W. A. C. asks for a correct analysis of suint. This is a fat, greasy, substance which is washed off of sheep's wool while getting it ready for manufacturing. A. Suint, according to Fuchs, consists of:

Potassium sulphate..... 25 per cent. carbonate..... 44.5 chloride..... 3 0 Organic matter.... 50.0

100 The amount of potash salts depends upon the soil on which the food of the sheep grows. Other things being equal, it has been found that the merino wool con-

tains the greatest amount of potassium salts, ranging as high as 30 per cent. (3) F. S. S. asks: What is the difference between common bone black (animal charcoal) and ivory black? A. Properly speaking, ivory black should be derived from burning ivory chips or dust, in dis-

instances is simply a better quality of bone black. (4) A. O. writes: I had the handles of a fine alabaster vase broken in several pieces. Will you please inform me of a cement or glue that will unite the pieces? A. Use the following: Add half a pint vinegar to half a pint skimmed milk. Mix the curd with the whites of five eggs well beaten, and sufficient powdered quicklime sifted in with constant stirring.

tinction from bone black, which is obtained from

bones; but we believe the commercial article in most

(5) Mrs. L. F. D.—Brass work can be polished by rubbing the metal with finely powdered tripoli mixed with linseed oil and applied with a rubber made from a piece of an old hat or felt. Or else a mixture of glycerine, stearine, naphthaline, or creosote mixed with dilute sulphuric acid can be used.

so as to form a paste.

(6) L. M. W. writes: I have a very expensive linoleum carpet on my office, which is mopped every day, but soon becomes dingy. What can I varnish or cost it with which will stand a good deal of wear, and look bright all the time? A. Rub the oil cloth every two or three months with boiled linseed oil; rub it well in with a rag, and polish it with a piece of silk. Or else as it becomes hard rub it well with a small portion of a mixture of beeswax softened with a minute quantity of turnentine, using for this purpose a soft furniture polishing brush. In cleansing the oil cloth do not

- (7) T. F. asks the difference between quicklime and common building lime. A. Lime or quicklime is obtained by burning calcareous stones in kilns by a 14 horse power boiler which will heat it well with or furnaces. It is the anhydrous calcium oxide, or 20 pounds steam. Is it practicable to heat the primary oxide of lime. This when exposed to the air absorbs is chiefly employed in the preparation of mortar for building purposes.
- (8) H. D. P. asks for receipt for lacquering tin different colors. A. The following will probably meet your desires: Put 4 ounces best gum gamboge into 32 ounces spirits of turpentine; 4 ounces dragon's blood into the same quantity of turpentine as the gamboge, and 1 ounce annatto into 8 ounces of the same spirit. These three mixtures should be made in different vessels. They should then be kept for about two weeks in a warm place, and as much exposed to the sun as possible. At the end of that time they will be fit for use, and any desired tints may be obtained by for the purpose, can you suggest a simple method of making a composition from them with such proportiou of each liquor as the nature of the color desired will point out. Or the coloring matter may be produced by dissolving any suitable aniline color in alcohol, and adding it to the conventional tin lacquer.
- (9) C. A. N. asks the best method of rethe bath to dryness and then treating the residue, or by precipitating the silver by means of dilute hydrochloric acid or salt solution; in either case the residue is poured in a crucible with equal parts of borax and carbonate of soda. The metallic button which will form at the bottom of the crucible will be silver.
- (10) R. P. B. writes: I have two boilers 15 inches in diameter, 8 feet long, three 3 inch flews in each. Fire box 3 feet by 2 feet, return flue; it won't draw the flames in the flues, and not the length of the boiler sometimes. The stack is 8 inches in diameter, 20 feet high above boilers; the ash pit door is 18x6 inches, close to the ground. What is the best to stop a leak in a boiler? A. If the fire box you give dimensions of is for each boiler, you have not more thau one-fifth the area of return tubes you should have, and of the smoke chimney (8 inches diameter) is for both boilers, it should be 17 inches or 18 inches dlameter instead of 8 inches.
- (11) E. E. P. asks: 1. What is the combination or commercial name. if any, of the metal which expands in cooling? A. Bismuth, cast iron, and antimony expand in cooling. The first mentioned expands one thirty-second in solidifying. 2. Is it chemically treated, orcan it be mixed in any ordinary melting pot? A. Reference is made to the pure metal. 3. Does it lose this property of expansion by repeated heating and cooling if not melted? A. The property is not altogether constant; the molecular change brought about by repeated heating and cooling will, we think, interfere somewhat with its expansion, 4. Can you give its ratio of variation as compared with iron or steel? A. Its ratio of variation is greater than that of iron and steel. but we cannot give any exact figures on this subject.
- (12) C. C. M. writes: I saw an instrument maker use a yellow substance put in a cotton cloth and dipped in water, for blacking banjo handles. Can you name it or something that will dye light wood black instantly? Would you give a receipt for a cheap and quick polish to be rubbed on with a pad? A. We infer from your description that you have reference to the following: Pour two quarts boiling water over one ounce of powdered extract of logwood, and, when the is produced. See also page 1994 of Scientific Ameri-CAN SUPPLEMENT, No. 125. Ground pumice stone mixed with linseed oil makes an excellent polish
- (13) F. De W. P.—Fluorine has never been isolated. The compound obtained was hydrofluoric acid. We would recommend you to avoid experimenting with fluorine, as the burns obtained with the compounds of this element are not only exceedingly painful, but also very dangerous.
- (14) N. F. of Australia wishes to know the cle is probably made from green walnut shells. Only the outside green portion should be used, cut small, and macerated for three or four weeks, then pressed and filtered and put in a bottle with spirit at 56° o. p.
- (15) M. B. C. asks: How many horse power does it require to manufacture one barrel of flour in one hour? A. It is usual to allow one horse power per bushel of grain per hour, for the power required to grind the grain, and an additional horse power for driving the balance of the machinery of a flour mill. To simply reduce the grain required for a goods. barrel of flonr, to chop, in one hour, say five bushels, would therefore require five horse power. The conditions vary so much, that no exact rule can be laid
- article that will thicken oils without destroying the lubricating qualities. A. We would suggest powdered
- (17) A. S. asks at what rate light travels. A. About 185,000 miles a second.
- gasoline and generated by the Springfield gas machine troleum? A. It is used in some of the gas motors, and purpose that can be used dry. appears to be as "strong" as other gas.

- building here is 18 rods from the primary, and is heated also, and in what manner? A. If your boiler is below water, and crumbles into a powder, which is commonly the area to be heated, all you need do is to convey the known as slaked lime, or hydrate of lime. The latter steam to the primary and return the drip water in well protected pipes. If the boiler is above any of the rooms to be heated, a steam trap must be employed to let off the water or return it to the boiler. 2. What is a cheap How long should the operation of polishing a lens one mode of making a cylindrical or plate electrical ma. inch in diameter last under ordinary circumstances? chine? A. Consult the back numbers of the Supple-MENT. You will find in them descriptions of a num-
 - (21) H. H. W. writes: I have a thermostat placed over a gas burner. The electrodes are of steel and brass, brazed. I want some metals which will heat and cool more quickly, i. e., I want the thermostat to act more quickly. If you cannot suggest better metals cooling these more quickly? A. You can employ a very thin strip or wire of brass and multiply its expansion by levers, such a strip may be made to heat and cool very rapidly.
- (22) C. G. asks for a non-poisonous liquid glue to take the place of a gum arabic mucilage, one water is running into the jar. From the pound of shaft, so that if it slips you can set it in place by the ducing the precipitate to metallic silver, as the that will not thicken in bottles when cold. A. Fill a flour emery, wash over about one ounce for the finest. methods that he is familiar with fail to give good re- | glass jar with broken up glue of best quality, then fill | Then in another dish about two ounces for the next sults. A. The silver is reduced by either evaporating it with acetic acid. Keep it in hot water for a few hours until the glue is all melted, and you will have an excellent glue always ready.
 - (23) J. E., Jr.—The answer was intended for you. You must adapt your battery to the purpose for which you use it. If you want to run single incandescent lamp, you must use a large number of cells connected in series. If you take the current through a small resistance, the battery will run down very quickly.
 - (24) M. I.-You can deaden the noise between rooms by nailing wall strips on the side of the beams and filling in with boards, and plastering with common mortar about two inches thick on top of the board filling. You will have to take up the floor to do this. You may accomplish the same thing by lathing between the beams from below, and plastering. Then lath and plaster upon the face of the beams. making two thicknesses of plaster. A second ceiling will answer the same purpose if you do not wish to disturb the ceiling or floor. This can he put on by nailing wall strips to the ceiling, and lath and plaster. Another way is to lay an entirely new floor with a second set of beams above the original floor, beams not touching the old floor.
- (25) J. J. L. asks for information concerning the manufacture of milk sugar from the whey which is produced in cheese factories. A. Milk sugar, or lactine, is largely manufactured in Switzerland. It is also made in the United States to a limited extent. The process is to strain or filter the fresh whey to remove all traces of curd. Then evaporate in pans at a moderate temperature, 150° to 175° Fab., until crystals begin to form, place in the pans small clean sticks for facilitating the process while the liquor is cooling. Let the cooling be carried as far as possible without freezing. Then draw off the liquor, and wash the crystallate with clear cold water by placing in a filter cloth and sprinkling the water over the crystals just enough to wash off the whey. Spread the crystallized crude sugar upon cloths to dry. For purification and bleaching, dissolve the crude sugar in boiling water considerably under saturation, and filter, through animal charcoal (bone coal), and also through a cloth filter, to remove all traces of bone black. Evaporatethe filtrate at 150° to 170° Fah. solution is effected, one drachm of yellow chromate of to saturation, continuing the evaporation under a lowerpotassium is added and the whole well stirred. When ing temperature until the entire crystallate is deposited. rubbed on wood, it produces a pure black. Repeat Use small sticks of wood, preferably willow, to faciliwith two, three, or four applications, till a deep black tate crystallization. Draw off the liquor, and dry on linen cloth.
- belt 6 inches wide and 125 feet long, 4 ply. Will a 5 or 6 ply 5 inches wide, same length, give as much power as illustrated sheet he gave me. A. The trial took place the 6 inch? I would like to use as narrow belt as possion 28th of August, 1830, in a run from Baltimore to ble on account of the wind affecting it. A. The heavy $5\,\mathrm{inch}$ belt will transmit as much power as the light $\,6\,$ inch belt. It must be also ruu proportionally tighter than the wide belt. The thick belt under the greater straiu will not wear as well as the thin one. You may best dye for the hair. A. The least objectionable artiused. The journals also suffer with very tight belts. Better make all the pulleys larger by 20 per cent and use a 4 ply 5 inch best.
 - (27) C. P. asks what ingredients to use for stamping on dark and light goods, from paper patterns, that will not rnb off. A. Raw starch with a very small it stick; for dark goods. The same mixed with indigo blue will make a good stamping mixture for white with not less than 58 square feet of heating surface.
 - (28) P. J. F. asks: Can you inform me how bichromate battery with porous cell. The Leclanche ing. is not adapted to electroplating.
 - of a preparation, which if applied to paper will render (18) R. M. C. asks: Is the gas made from the following: in nitrate of ammonia, ferricyanide, glyceriue, gum tragacanth, and water, but it does not give
- (30) J. D. R. asks about the largest loco-(19) R. H. J. asks how the wires on the tive in the New World-its weight, dimensions, when armature of the Brush machine are connected to the made, its running time, number of cars it draws, and commutator. Are both terminals of each bobbin connected to the commutator, or only one? A. One terthe country are on the Central Pacific Railroad. Cylinminal of each bobbin is connected with the commutator, inder 19 inches diameter by 30 inches stroke, 8 driving ings, radiation of cylinder, pipes, etc. the other terminal being connected with that of the wheels 54 inches diameter, weight in working order bobbin located on the diametrically opposite side of the 123,000 pounds; built at railroad shops. Engines now

57 inches diameter, weight in working order 146,000 pounds.

Scientific American.

- (31) J. E. J. writes: I have been grinding lenses according to directions given in one of your Sur-PLEMENTS, but find trouble in polishing. Is the rouge that comes prepared for the face the proper substance to use? (It is all I could get.) How long should the last emery used in grinding be suspended in water? Would the lenses known in optical catalogues as cosmorama lenses if silvered one side be of any service as 72 inch focus as a reflector have a focus of 36 inch lens, being doubly convex? Would it be achromatic? Could it be conveniently silvered by the process given in Sci-ENTIFIC AMERICAN of July 31, 1880? A. Face rouge is adulterated. Use the finest jeweler's rouge, which you may obtain from any jeweler or watch maker. The washing of the emery for fine grinding is very difficult. It should be washed from the finest flour emery. Place a pound in a glass jar (preserve jar), fill it with water, stir gentlywith a small stick made like a paddle, allow a little water to trickle into the jar, let the top scum run away, set the jar in a dish, and slowly stir while the finest. The balance will be useful for a third quality. The time required for polishing a lens of 1 inch diameter depends entirely upon the fineness of the last emery finish. Half an hour to two and a half hours may be required. A cosmorama lens is unfit for an object glass or a reflector, and will not be achromatic in either case. It can be easily silvered, as stated in SCIENTIFIC AMERICAN.
- (32) W. McC. asks if there is anything betterthan a boom derrick for hoisting a weight, say two from the corner of a wooden building that is not over twelve feet high. We have plenty of steam power to
- crayons which are used to work one on top of the other without disturbing the under color. A. The wax crayons or pencils are made with paraffin or spermaceti, pipe clay, and the various colors. The clay must be white; just enough of the paraffin or spermaceti is used to hold the clay and colors, to be decided by experiment; we cannot give the exact details. They are manufactured and imported from France and Germany. 2. Also what is the composition used in making tiles or plates for coal burning stoves? A. Stove linings are fire brick or tiles made of fire clay
- (34) P. C. A. asks: 50 horse power Westnghouse engine using steam at 70 pounds pressure into a 36 inch by 8 foot boiler having twenty-four 3 inch flues 1/4 inch thick, and a rotary exhaust fan in chimney opening. Would the air drawn through the flues by the fan be sufficiently heated for economical use in a lumber dry house? A. According to your statement, we doubt the economy of your proposed arrangement. The temperature of the air delivered by the fan would be too low for rapid drying. If you can give ample time for drying, the arrangement will work well, and the effect on the lumber better than drying very rapidly.
- (35) F. A. W. asks the date and most important facts of the trial of horse power vs. locomotive (26) T. D. writes: I have a rubber thrashing that took place in Baltimore, Md., nearly fifty years ago, with assistance of Mr. Peter Cooper. I lost the Ellicott Mills, distance of 13 miles, time one hour and 15 minutes; shortest time for any one mile, 41/2 minutes. On the return trip, time was 61 minutes for whole distance. Shortest time for any one mile, 3 minutes and 50 seconds; one engine, 3½ inch cylinder and 14½ inch stroke. You will find full account in Brown's History of Locomotive in America.
 - (36) A. F. writes: I have a small vertical ngine, 3x3; is it large enough to run a small boat? 1. How large a boat will it drive? A. With plenty of 2. Can I drive direct on shaft, or will I have to gear off? would the dimensions of boiler have to be? A. Boiler
- cam is generally opposite the crank when on dead cento construct a small battery sufficient to use for plating ter. Now, what is the object in having it set behind in silver, nickel, etc.? Have heard the Leclanche bat- the crank instead of the front? A. Probably to cut off tery was best for this purpose, that is, for plating small later in the cylinder. We could not say positively (16) J. E. B. writes: We cannot find an articles, such as buttons, knife blades, etc. A. Use a without knowing the arrangement of your cut-off gear-
- (38) E. E. R. writes: If one has an engine (29) A. H. D.asks: Have you any knowledge | (slide valve) larger than he needs for his work, which is the more economical-to take off pressure from an electrical current visible on the paper? I have 'tried | boiler, or to keep the pressure as usual and slack the speed on the engine? And is there much difference between these two ways? A. Keep up the pressure, as strong, when used for producing power in a gas the desired results, as the paper must be wet, or it will and arrange your valves to work more expansively, 8x6 inches, I require to produce incandescence in a motor, as the ordinary coal gas or that made from penot produce a color. A. We know of nothing for this will be most economical. 2. And, taking any comlamp similar to Edison's? A. Six cells will operate a mon slide valve enginerun to its rated power and using 3 candle incandescent lamp. 2. Also, how to make a a certain amount of fuel per horse power, what part medical magneto electric machine for family use? A. more fuel (approximately) would it take per horse Consult any work on physics or electricity, or the back power when running the same engine to one-half its numbers of the Scientific American Supplement. capacity? A. When running at one-half capacity, it The subject is too extensive for our Note and Query will take a trifle more fuel per horse power, but the columns. amount of difference will depend upon the surround
 - j building at the shops of same company: Cylinder 21 what kind of questions are asked in examination? A. A. Dissolve bichromate of potash to saturation in hot

- (20) H. K. G. asks: 1. The main school inches diameter by 36 inches stroke, 10 driving wheels We cannot say, as it is entirely with the examiners. 2. How many kinds of boiler iron are there, and what pressure will each kind stand to the square inch? A. There are various qualities of boiler iron made. Their tensional strength will run from 40,000 to 60,000 pounds per square inch. 3. How can a very small leak in a boiler, in the seams, be calked best without going to a boiler maker? A. By careful use of the calking tool, 4. How many square inches ought a boiler of the following size to contain: Six feet high, single flue, and about 3 feet in diameter? A. We do not understand your question about square inches in a boiler. 5. I have charge of a double piston engine, and hoist brick. I a reflector for a telescope? If so, would a 4 inch lens of pull an average load of 500 pounds a trip. To do this 72 inch focus as a reflector have a focus of 36 inch lens, I must carry between 70 and 90 pounds of steam. The engines are very powerful, though small, being 4x8. I want to make the engines do the same work with eixty pounds. A. You can only make the engines do the work with 60 pounds steam by changing gearing (if you have gearing) soas to increase the speed of the engines without increasing speed of drum. 6. What kind of oil is best? I use black oil. A. There are so many kinds of oil in market, that we cannot say which is best. 7. What is best to do, and how can a slipped eccentric be remedied immediately without losing time? A. Set your eccentric right and mark eccentric and
 - (40) W. M. S. asks: Can an engine, having to draw its water, and thereby expending some of its own power, throw a more effective stream than when the water is forced into the pumps by outside forces? A. No; whatever pressure is thrown on the suction by an outside force is so much relief to the power required to work the engine under similar conditions.
 - (41) Azof, of Russia, writes: 1. a. I am putting down a cupola, using an old boiler shell. 3 feet 6 inches diameter; inside measure after lining will be 2 feet. I have two rows of tuyeres, 15 in each row, 41/2 tons. I want to swing it in a radius of twenty-four feet | inches by 3 inches, made by leaving out third | brick in each row. What wind shall I require to work most advantageously? b. How much iron ought I to melt per work with, and would like to get something cheap. A. hour? What should be the charges? Fuel anthracite. We doubt if you can do better than to use boom der- c. I have an English fan 25 inches diameter with 12 rick. It is made with a mast, and a braced boom for inchesround discharge, calculated by the maker to run lightness, using two sets of tackle for swinging in or down 3 tons per hour at 2,500 revolutions. With this out from the center. Drawings of a 30 foot haud der- fan I wish to blow cupola and three smiths' fires. What rick, which we think would answer your purpose, were speed should the fan have for smithy and cupola topublished in Scientific American Supplement, No. gether, and what speed for smithy alone, and what arrangements of tubing would suit? A. a. A pressure (33) T. G. asks (1) how to make those wax of 7 or 8 ounces per square inch of coke is used, and with coal 12 to 16 ounces. b. Average not over 11/2 tons per hour with your dimensious of cupola. This may be increased by careful manipulation to 2 or 21/2 tons. Your blower is sufficient for three tons if the cupola were large enough. c. Your fan is ample for both cupola and three forge fires; 2,500 revolutions will be fast enough for all your work, and might be reduced one-quarter or one-third when forge fires only are in use, but the blast to fires should be regulated by a valve at or near the forge. 2. In using emery wheels, should the upper side of the wheel run to or from the workman? A. Run top of emery wheel from the workman. 3. What will be the horse power of a horizontal engine whose cylinder is 91/2 inches by 16 inches, revofrom 60 horse power, 12 flue boiler. Cylinder exhausts lutions 95 per minute, and will a boiler with one flue ouly 14 feet 6 inches by 4 feet 3 inches be large enough for this engine? A. With 50 pounds average pressure on piston,21 horse power. If fired underneath shell and return through flue, it would answer; but if the furnace is inside the flue, it is too small. It would be better if increased in length 4 feet or 5 feet. We think you have at least three times the amount of tuyere opening into cupola that you should have, though in this respect much depends upon the kind of fuel. In respect to charging, we cannot advise you, as much depends upon shape and height of cupola and character of fuel. We recommend you to obtain a copy of Spretson on Casting and Founding, published by Spon, London, and West on American Foundry Practice. They will give you much information on the subject.
 - (42) S. F. H. asks: 1. What is the size that book binders use for putting on gold leaf? A. It is albumen, the white of an egg. 2. How is an electrotype made from a relief plate in photo-engraving, or is the electrotype made from a plaster cast, and how? A. A wax mould is taken from the relief plate, and then covered with very fine plumbago by means of a brush or air blast. The copper is deposited on the plumbago | by means of a battery. When the shell is sufficiently thick, it is removed from the wax and filled in at the back with type metal.
- (43) G. H. J. asks: 1. Will 3 cells of the boiler, a boat 16 or 18 feet in length and 41/4 feet beam. Law battery answer for plating small articles, say a watch case? A. Better use a continuous current batportion of gum sugar or even cooked starch mixed A. Drive direct. 3. How fast would the engine have tery, like the Daniell or gravity. 2. Can I increase the with it, with enough water to make it pasty, will make to run? A. 350 to 380 revolutions per minute. 4. What power by using larger zince? A. Not to any great extent in the battery referred to. 3. Can I increase the intensity by using some other liquid in the place of the (37) J. T. writes: A propeller engine cut-off salammoniac solution, and at the same time make the battery more constant? If so, what liquid? A. Better use some other form of battery.
 - (44) L. P. Jr., asks (1) if there is any cement that can be used on glass and is not soluble in bisulphide of carbon. A. Gelatin dissolved in acetic acid makes a cement insoluble in bisulphide of carbon. 2. Also, if there is any way to insulate a steel magnet so that it will retain its strength, if inserted in a piece of cast iron? A. There is no way to insulate the magnet.
 - (45) H. R. E. asks (1) how many cells of the plunge bichromate battery, size of carbons and zincs
 - (46) A. J. N. asks how the supersaturated solution of bichromate of potassium is made, the same (39) W. F. asks: 1. About how many and as is used by M. G. Trouve in his illuminated jewelry?

water. Let the solution cool. When the sulphuric acid is added, the solution will become hot, and redissolve most of the crystals formed on cooling.

(47) W. K. R. writes: Supposing that a man had the power to fly through space at the rate of 1046.55 statute miles per hour, in same direction that the world revolves, starting from New York city at 12 M., and having flown one hour, would stop and ask was 12 o'clock? He flew another hour, and asked the until he came to his starting point, New York. He has traveled all through day time, but when he gets to New York he is told a night has passed. How do you account for the day gone by and the difference in time?

A. As you have put the proposition, why not place the man on top of some high steeple? In this case he will be passing through space at a rate of 1046.55 miles an hour in same direction as revolution of earth. His relation to objects below him will remain unchanged, but sun, and midnight when he is in exactly the opposite face of earth. If. however, he flies at rate stated in opposite direction of rotation of earth, which is probably what you wish, he will remain on midday line, while whichhe may have started which has found the midnight line, and which therefore counts one day as having elapsed.

(48) S. A. R. asks: 1. What is the power and probable cost of a dynamo capable of running a dozen incandescent lamps? A. Probably \$200. 2. What power of motor would be necessary for running such dynamo? A. 1½ to 2 horse power. 3. What size lamp is most suitable for an ordinary sized dwelling, more than one lamp per room being preferred? A. 15 candle power.

(49) G. W. L. asks (1) how to change the surface of iron and steel to a black color. A. See answer to query 48 in Scientific American for March 29, 1883. 2. Is there anything that will protect finished iron from rusting? A. See Scientific American Sup-PLEMENT, No. 226, for recipes of Varnishes for Protect-

(50) G. P. W. asks how to treat fence posts to make them last longer in the ground. Some boil in coal tar, others char the ends with fire, others say out the top end down. A. We would recommend the coal tar treatment, and why not at same time put top end downward? You would then have a very good combination. 2. I want a recipe for an embalming fluid, to use as an undertaker upon human bodies. A. See A New Method of Embalming Bodies and Preserving Tissues, page 69. SCIENTIFIC AMERICAN, for February 4, 1882. Also, Brunelli's Process of Embalming, page 169, Scientific American, March 18, 1882, and Embalming in Italy, page 52, Scientific AMERICAN, July 22, 1882.

(51) W. H. writes: 1. When celluloid collars have been worn a short time, they turn yellow. Can they be restored to their original color? A. If the coloring does not disappear when the affected portions are rubbed with a woolen cloth and a little tripoli, and then polished with a clean woolen rag, the injury is a permanent one. 2. How are the sticky fly papers made that are sold by drugstores? A. Boil 1/2 ounce small chips of quassia in 1 pint of water, and add 4 ounces glycerine. 3. What metal is it that mixed with tin prevents it turning lead color, but makes it look whiter and more like silver when the article has been used some time? A. An imitation of silver is made by combining 3 ounces tin with 4 pounds copper. So that it is possible that by adding copper in suitable quantities the desired result will be obtained.

(52) R. S. B. writes: 1. I want to make caustic sodaliquor for boiling goods. I know that carbonate of soda boiled in lime and allowed to settle will produce the liquor. What is the best way to do this? A. The most convenient way for you will be the best It is immaterial in what kind of vessel the operation be performed. 2. Will the liquor be as strong this way as by putting in 70 per cent soda? A. We believe it will be. 3. Will it be free of lime, as the lime will spoil the goods I want to cook? A. Unless exactly the hardwrapping paper and glue. Roughen the surface right amount of lime is used to satisfy the sodium carof the pulley with a coarse file. Then draw the paper obviate any difficulty of this sort, the utmost care must be used to employ the proper proportions of each.

(53) R. B. R. writes: In my letter to you suggesting what seemed to me to be the natural rangement of the colors of the spectrum as applied to the musical scale, the order of colors should have been reversed in the list given, so as to read:

Notes.	Colors.	Sound vibrations.	Light vibrations
A	Red	$106\frac{2}{8}$	458 trillions.
В	Orange	120	506
	Semitone	. Semitone.	Semitone.
C	Yellow	128	535
D	Green	144	577 •
\mathbf{E}	Blue	160	622 **
F	Indigo	170%	658 **
G	Violet	192	727 **

The vibrations per second in this list increase in the same direction; and you will observe that the difference in both series of vibrations between B and C shows the semitones. This is evidently no accident on the part of nature, but clearly an indication that she inin connection, and not as separate arts. Will you that excellent effects may be obtained by coating glass

aniline colors. One part of shellac to eight of alcohol is a good proportion. The varnish should be poured on and placed evenly over the glass, and the superfluor quantity returned to the bottle. It must not be painted

(54) L. V. T. writes: 1. I send a piece of wallpaper, and would like to know if there is any arsemic contained in the green color, and what are what time it was, would be not get the reply that it the symptoms of arsenic poisoning? A. The green spots on the paper are so small and so few that we time; he was told it was still 12 o'clock, and so on | thinkthere is very little danger of poisoning from this source. To determine the quantity of arsenic in the wall paper sent, a chemical examination would be necessary. The symptoms of arsenical poisoning, according to Taylor, are first faintness, depression, nausea, and sickness, with an intense burning pain in the region of the stomach, increased by pressure. The pain in the abdomen becomes more and more severe, and there is a violent vomiting. In chronic cases there will be inflammation of the conjuctive, with suffusion of the his relation to time will be ever changing. It will be eyes and intolerance of light; also with more or less midday when he is on the nearest approximate side to irritation of the skin. 2. Can you tell us of a sub-tance irritation of the skin. 2. Can you tell us of a sub-tance to mix with Portland cement that will set middling quick and stand weather, and become hard and durable? Sharp sand and Portland cement with plaster of Paris, we have tried, but the plaster freezes and swells the earth will be rotating constantly below him. Durin winter and bursts the socket. Is there anything we ing the mean time it is New York or any point from could mix with the sand and cement to improve it? A. The following cement will probably suit your wants: 63 parts well burned brick and 7 parts litharge pulverized and moistened with linseed oil. Moisten the surfaces to which it is to be applied. Also see article on Cements, page 2110 of Scientific American Supple-MENT, No. 133.

(55) W. R. S. asks whether or not any one has succeeded in photographing in natural colors. If it has been done, what was the modus operandi? A. Not very successfully. See back Nos. of the Scien-TIFIC AMERICAN and Scientific American Supple-MENT for information. We send you catalogue. 2. In Supplement No. 149, under the heading Simple ElectricLight, four or six bichromate cells of the size given are said to be necessary. Would a single cell, four or six times as large as the one recommended answer the purpose just as well? A. No. 3. Where, and by whom, is the Chemical News published? A. Editor, William Crookes, Boy Court, Ludgate Hill, London, Eng.

(56) W. L. T. asks: What is crocus? A. The term, as employed in the mechanic arts, usually refers to a preparation of the oxide of iron used forpolishing metals andgems. But the term is generic and not specific, and means, from the Greek, "saffron," a color. It is applied also to an oxide of copper and an oxide of antimony.

(57) D. S. asks: 1. Are all kinds of small castings made to any extent direct from the Bessemer converter into the ordinary sand moulds? If not, why A. Bessemer steel demands so high a heat for fluidity sufficient to pour small castings that ordinary sand moulds will not contain the metal in shape Ground silica is used for Bessemer steel moulds. 2. As I understand, malleable castings are simply ordinary castings put through a process to extract a part of the carbon. If this is so, and the Bessemer converter decarbonizes the fluid metal to begin with, why should not all kinds of castings be made direct into sand moulds from the converter? A. The material of Besemer steel and that of malleable cast iron is radically different, fully as much soas brass and bronze, or lead and Britannia metal. Not only is the resultant material different, but the materials of the compositions are different. Treatment appropriate to the one is entirely unfitted to the other.

(58) N. D. T. asks for a recipe for making soap bubbles, such as are used for chemical experiments. A. One gramme dry Marseilles soap is dissolved in 100 grammes warm Water; this is filtered, and to every 100 cubic centimeters of this solution 40 grammes white sugar is added. Bubbles made with this liquid will last several hours.

(59) E. S. A. asks how the cement is manufactured, or where I can obtain it, which is used to paper iron pulleys to prevent the belts from slipping? Also the kind of paper used for the same. A. Use bonate, there will be danger of an excess of lime. To tightly around the pulley, brushing the glue quickly upon the pulley and upon the paper, so that every layer will be perfectly glued together; put on eight or ten

> (60) E. D. L. asks if there is any preparation that you can put on a wall that has been whitewashed, to make paper adhere to it, and thus avoid the trouble of scraping the walls. A. The whitewash must be scratched with a stiff brush, to remove every particle of loose lime from the surface, after which it should be thoroughly swept down with a broom and then coated with glue size prepared by breaking up glue into small pieces, putting them in a vessel with sufficient cold water to just cover them, and in the morning the glue will be soft enough to melt readily with a moderate heat; then reduce to desired consisttency by adding suitable amount of water.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

Mrs. J. A. H.—The mineral is simply a very pretty tended we should study sound music and color music piece of crystallized quartz, and is of no value except as a curiosity.—E. A. B.—Realgar is found principally kindly inform me how I can obtain seven distinct in Europe, in Austria and in Saxony. It is valuable as transparent shades of each color? I cannot get the in- a mineral, being worth 25 ceuts to \$2.00 per specimen. formation from the painters. Would gelatine paper Theease with which it could be produced artificially enable me to do it? A. Your investigation, if novel, would prevent it from ever becoming commercially is an extremely interesting one. We would suggest valuable.—A. O.—The specimen appears to be clay colored with oxide of iron or decomposed iron ore. Its with ordinary shellac varnish (made with bleached nature cannot be positively determined unless it be shellac) tinted with aniline dyes. The dyes you can chemically examined.—L. F. K.—The brown specimen easily select of the shade that seems to you most desiration a close grained silicious material colored by iron, and ble. The glass must be slightly warmed before apply- is of no value as an ore. The other specimen is horning the varnish. The strongest alcohol should be used | blende and mica.-G. A. S.-The specimen is simply or dissolving the shellacand the powdered (not liquid) clay (aluminum silicate) colored with a little iron oxide. | Crane, traveling Barnhars & Huber (r)............. 10,470

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