

ENGINEERING INVENTIONS.

A rotary engine has been patented by Messrs. Charles H. Melville and Thomas W. Brown, of Chattanooga, Tenn. It has a radially operating abutment with an eccentric revolving steam actuated hub for utilizing steam pressure to maintain steam tight contact of the abutment with the hub, and also has an improved contrivance for an automatic variable cut-off.

A sextant has been patented by Philippe Leuba, of Rue der Nord, No. 4, Aigle, Canton of Vaud, Switzerland. This invention covers a novel construction in which there are two artificial horizons, one for taking elevations and the other for taking depressions, and in which provision is made for the use of the sextant in the dark or at night.

A valve gear has been patented by Mr. James A. Stout, of Belleville, Ill. This invention covers novel combinations of mechanisms whereby the engineer has to control but two instead of three handles to give three movements, and dispenses with one of the eccentrics, its strap and connecting rod, also the link and link block with its rock shaft and connections.

A leveling rod has been patented by Mr. Robert B. Seymour, of Willet's Point, N. Y. It is made with a friction roller connected with the keeper that connects the target with the rod, so that the target can be easily and accurately adjusted upon the rod, the friction roller being so arranged that it can be readily adjusted to bear with any desired force against the rod.

A car coupling has been patented by Mr. David C. Barton, of Rocheport, Mo. This invention covers a combination of drawhead and coupling pin, with levers pivoted to the car on either side of the coupling pin, and forked at their adjacent ends, with other novel features of construction and arrangement of parts.

AGRICULTURAL INVENTIONS.

A sulky cultivator has been patented by Mr. Edward F. Husk, of Malden, Mo. This invention covers novel features in a machine on which a driver may ride while the machine straddles a row of growing corn, to plow or cultivate the earth on both sides of the corn, and to cut the corn stalks into short pieces after the corn has been gathered.

A grain separator and cleaner has been patented by Mr. Edward Sherman, of New Pendington, Ind. This invention covers novel features in a machine for separating grain and seeds, and for grading wheat so as to obtain the seed wheat separately, all the seed wheat being saved and separated from the grain passed through as it comes from the thrashing machine.

A hilling plow has been patented by Mr. Rudolph Schuster, of Waldeck, Texas. This invention covers special features of construction for plows with a double or right and left hand mould board for throwing soil from both sides of a furrow to form beds or hills, and the plow point is held securely in position with the use of only one bolt.

A corn planter has been patented by Mr. William L. Rucker, of Martinsville, Mo. The object of this invention is to provide a mechanism which may be easily controlled by the driver from his seat for allowing or preventing the dropping of seed, and for setting the mechanism to insure planting in accurate check row, the machine being also adapted for planting in drills.

A hay carrier has been patented by Mr. Thomas C. McNichols, of Belmont, Ohio. A self-acting brake is provided for retaining the carrier in place at any desired point while a load is being raised or discharged, and by a combination of levers the brake is made self-regulating in its action, while the carrier can be reversed so as to be operated in either direction from any point of the track.

A combined band cutter and feeder for thrashing machines has been patented by Mr. Richard Harding, of McGaheysville, Va. The object of this invention is to facilitate the feeding of grain to thrashing machines, and it covers an angular vibrating feed spout, a rotary band cutter; one or more grain spreads, an endless apron, and a rotating reel, with various novel features of construction and arrangement.

An adjustable cultivator shovel has been patented by Mr. Myron A. Twitchell, of Kingsley, Iowa. This invention provides a shovel or tooth for cultivators capable of doing service with all of its four sides or four corners forward, or with any side set at any desired inclination to the line of travel, so the plow is adapted to do a great variety of work in both right and left handed plowing.

A combined cotton chopper and cultivator has been patented by Mr. Lemuel Z. Grigsby, of Minden, La. The frame carries a cylinder with central annular groove, with adjustable knives on its face and can concave in its ends, operating levers connected at their rear ends by a crossbar pivoted to a crank carrying the chopping hoe and its standard, whereby stalks, vines, etc., at the sides of the plants will be cut up, the soil mellowed, and the plants brought to a stand by the passage of the machine along the rows.

MISCELLANEOUS INVENTIONS.

A culinary vessel has been patented by Mr. Thomas G. Beaham, of Zanesville, O. This invention covers a special construction of an earthenware vessel supported by a metal base in such a manner that both can contract and expand independently.

A hitching strap has been patented by Mr. Samuel Birdsall, of Susquehanna, Pa. This invention covers a coupling device of novel construction for attachment of the brace strap, and is an improvement on a former patented invention of the same inventor.

An album clasp has been patented by Mr. Ernst P. Hinkel, of Offenbach-on-the-Main, Germany. This invention covers a novel device of grooved disk and slide to render the clasp extensible, so that it can be lengthened and adjusted according to the thickness of the album.

An envelope has been patented by Mr. George W. Crane, of Topeka, Kan. The free edge of

the flap is inclined from one corner to the transverse center line, and from this point extends to the opposite side of the envelope in a line parallel with the longitudinal edges.

A button has been patented by Mr. Edward Berman, of London, Middlesex County, England. It has an apertured head, with its under surface recessed, a shank held in the recess, and an ornamental disk between the head and shank, so that a material of a different nature from that of which the button is made is held in the button and shows in its face.

A corner iron for wagon bodies has been patented by Mr. Edward Hutchinson, of New York city. It is designed to be made of Russia iron struck up in a novel form to give a firmer hold upon the body, with increased strength, while it can be made lighter than when made flat in the ordinary way, and is also applicable for corners of wagon seats.

A combined spring jack and annunciator has been patented by Messrs. Louis Townsend and Robert W. Moore, of Evansville, Ind. This invention consists in the combination of these two features on the same frame, to make them both occupy only the space of one, thereby saving half the space in the telephone switchboard.

A tricycle has been patented by Messrs. Thomas P. Hall and James B. Hall, of Toronto, Canada. Combined with a frame is a shaft journaled in its rear, on which are the driving wheels, the shaft and wheels being revolved by gearing from levers pivoted to the front of the frame, and there is provided a novel device for steering.

A binding attachment for sewing machines has been patented by Mr. Robert Hilgner, of New Orleans, La. This invention relates to a former patented invention of the same inventor, and covers several features of improvement thereon designed to secure better work and a more convenient and complete system of adjustment.

A combined truck and ladder has been patented by Mr. John C. Lowen, of Titusville, Pa. The ladder, as formed in connection with the truck, is easily moved when needed in the form of a truck, and then readily adjusted so as to form a step ladder, a combination which may be quickly reversed, so as to form a truck on which to convey goods.

A folding wardrobe and chiffonier has been patented by Henrietta L. Mehrer, of New Rochelle, N. Y. The invention combines with a chiffonier a detachable folding wardrobe provided with spring catches adapted to catch on slotted plates on the chiffonier, so the chiffonier and wardrobe can easily be united or detached.

A combined annunciator and spring jack has been patented by Mr. Louis Townsend, of Evansville, Ind. This invention consists chiefly in constructing the magnet which operates the annunciator drop with a hollow core and placing in this hollow core the spring jack, the combination being such as to make a single compact device, which will economize space.

A clockwork for mechanical lamps has been patented by Messrs. Frederick Cook and John H. Pomeroy, of New Haven, Conn. It is made with the fan shaft connected with the gear wheels of the clockwork by an elastic driving band of rubber or similar material, to prevent the fan driving band from exerting an injurious side draught upon the fan post.

A post hole auger has been patented by Mr. Alexander C. Osborn, of Clarksburg, West Va. Combined with the central stem are separate blades, with fixed and adjustable connections with the stem, there being also an adjustable disk, braces, and nuts, whereby the dirt may be withdrawn from the hole made by the auger and prevented from falling back.

A game has been patented by Mr. Paul K. Dealy, of Brandon, Manitoba, Canada. Combined with a plate or disk having recesses in its upper surface is a standard in the top of which a lever is pivoted, on one end of which a cup is formed; by striking a lever a marble or pellet in the cup is thrown up, and as it drops or not in the recesses of the disk the game is counted.

A machine for grading shot has been patented by Mr. Christopher C. Tracy, of New York city. It has plain cylinder drums with perforations all of the same size in each drum, there being as many drums as there are separate sizes of shot to be separated, and it is feasible to set the drums at any desired pitch to increase or diminish the speed with which the shot pass through.

A washing machine has been patented by Andrew J. Guffin and Matilda C. Guffin, of Rushville, Ind. A wash boiler of two or more sections has independent drums or wash wheels journaled therein, with a clutch mechanism for engaging and holding the shafts together, so the wheels may be operated separately or together, and two batches of different kinds of clothes may be washed together.

A composing stick for type setters has been patented by Mr. William Hendrickson, of Brooklyn, N. Y. It is made with a recessed knee, with lever clamps having their inner arms overlapped and their outer arms bent to overlap the under side of the bottom of the stick, and made to clasp the bottom by a hand screw, so the knee can be readily adjusted in any desired position.

The manufacture of wire coated articles forms the subject of a patent issued to Mr. Emil Kellermann, of Cincinnati, O. This invention consists in coating the ends of wires in the form of bulbs, by repeated dipping in an adhesive substance, and covering the same with a granular or flocculent material, in order to give an ornamental appearance to vases, baskets, and similar articles.

A rope socket has been patented by Mr. John H. Banser, of North Clarendon, Pa. It is a clamping socket of novel construction, affording increased facility for coupling and uncoupling of the rope by which the drill used in boring oil and other wells is raised and lowered, the screwing or unscrewing of certain parts serving to secure or release the hold of the socket upon the rope.

A corkscrew has been patented by Mr. Bartholomy Wilhelm, of Appleton, Wis. This inven-

tion consists in the combination, with a corkscrew, of two loose prongs between which the screw is adapted to revolve, and of a sliding ring surrounding the prongs and serving to hold their lower ends a greater or less distance apart, according to the size of the head of the bottle.

A doubling spooler has been patented by Mr. Leonard V. Richmond, of Sand Lake, N. Y. This invention is for facilitating the doubling of yarn upon upright and drum spoolers from cops, spools, and bobbins, by providing a mechanism that will stop the receiving spool automatically should one of the threads break or one of the spools become empty, thereby economizing time and preventing waste.

A curtain pole knob has been patented by Mr. David B. Olmstead, of New York city. This invention covers, as an improved article of manufacture, a curtain pole knob cast in metal or metal composition, and having its exterior surface metal plated, whereby elaborate designs may be made easily, and such as cannot be readily made in stamped, spun, or hammered work.

A saw filing machine has been patented by Mr. Hamilton Sherman, of Waverly, Pa. This invention consists in particular constructions of the machine frame to allow its dismemberment, and of the file frame guide, with a base plate sliding on a guide bar and with a head piece pivoted to the base plate, so as to be movable in horizontal plane, with other novel features.

A shawl strap has been patented by Laura A. Beatty, of Galesburg, Ill. With two bars having handles, straps are secured to one bar and passed through loops on the other bar, the bars being provided with means for holding them together, the shawl, etc., being held by the straps, the device also holding parcels firmly, and permitting of readily removing and replacing the shawl.

A trunk has been patented by Messrs. Oliver R. Meredith, James I. Gallacher, and Charles F. Jones, of Salt Lake City, Utah Ter. This invention covers a trunk corner piece provided with a hasp, and a corner piece with a hook lug over which the hasp can be passed, the first mentioned corner piece being secured on the corner of the trunk body and the other on the cover.

A fire escape has been patented by Mr. Thomas P. Hall, of Toronto, Canada. Combined with a reel or pulley, on which is wound a cable or wire, is a frame on which the pulley is pivoted, and a brake lever pivoted in the bottom of the frame, a belt being suspended from one end of the lever, making a fire escape which is compact, strong, and durable, and one which can be carried in the pocket.

A drawer has been patented by Mr. Michael Meyer, of Waukesha, Wis. The invention consists of a pair of intermeshing toothed sectors pivoted to fixed cleats or crossbars of the drawer frame and to the drawer by links, so a parallelism of movement of the drawer is secured, so the drawers will be compelled to move alike at both ends as they are drawn out from and slid back into closed position.

A machine for making and twisting chain links has been patented by Mr. Charles H. Reinisch, of New York city. It comprises a revolving mandrel, over which the links are shaped, stationary and movable cutting edges for cutting the links, and means for grasping and holding and at the same time twisting the links, the holding bar automatically adjusting itself to any irregularity in the rod or wire from which the links are being formed.

A baling press has been patented by Mr. William T. Anderson, of Rock Hill, S. C. The upper part of the press box is made vertically adjustable, and there is an arrangement of the pull ropes or chains of the follower to wind on tapering drums, to lessen the downward movement of the follower for each successive stroke of the operating levers as the compression increases in forming the bale, and to correspondingly increase the leverage of the levers, with other novel features.

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Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 62.

Shipman Steam Engine.—Small power practical engines burning kerosene. Shipman Engine Co., Boston. See page 61.

Notes & Queries

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters, or no attention will be paid thereto. This is for our information, and not for publication. References to former articles or answers should give date of paper and page or number of question. Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all, either by letter or in this department, each must take his turn. Special Information requests on matters of personal rather than general interest, and requests for Prompt Answers by Letter, should be accompanied with remittance of \$1 to \$5, according to the subject, as we cannot be expected to perform such service without remuneration. Scientific American Supplements referred to may be had at the office. Price 10 cents each. Minerals sent for examination should be distinctly marked or labeled.

(1) E. J. C.—In the reports for 1883, locomotives upon the following railroads and branches were for—  
D., L., and Western..... 436  
Pennsylvania..... 1105  
N. Y. Central..... 632  
N. Y., L., E., and Western..... 564  
Baltimore and Ohio..... 571  
Denver and Rio Grande..... 222  
Northern Pacific..... 230  
The Pennsylvania Railroad has the heaviest passenger locomotives.

(2) J. S. asks how cosmétique is made, colored black, and perfumed. I want it to be pretty hard, and so that it will not wipe off of the hair easy. Please give me the component parts of it. A. The following are recipes for white cosmétiques:

1. Benzoinated suet.....1 pound.  
White wax.....1 "  
Jasmine pomatum.....8 ounces.  
Tuberose pomatum.....8 "  
Otto of roses.....1 drachm.  
Melt at a gentle heat, and cast into moulds.
2. Suet.....1 pound.  
Paraffin.....8 ounces.  
White wax.....2 "  
Oil of bergamot.....1 "  
" "cassia..... $\frac{1}{2}$  drachm.  
" "lavender.....1 "

To make black or brown cosmétiques, the appropriate pigment, finely ground in the smallest possible quantity of oil, is added to the melted grease just before it is poured into the moulds. Lampblack or ivory black is used for the first, and burnt umber for the second color.

(3) A. E. M. writes: 1. How is it that sunrise and sunset do not occur on the same day at equal distances from 6 o'clock? I always had a general idea that the first took place just as much before 6 A.M. as the second did after 6 P.M., and *vice versa*, till actual observation and subsequent reference to an almanac convinced me of my error. A. The sun does not always keep time with the clock or mean time. This is caused mainly by the elliptic orbit of the earth, and apparent time is faster or slower than the true time, as you will see indicated in the almanac. 2. Would this fact influence the accuracy of a N. and S. line found by bisecting the angle between the shadows cast by a pole when the sun is at equal heights above the horizon before and after noon? And, if so, can this be remedied? A. The shadow of a north and south line is influenced by as much as the difference in time indicated by the almanac, which should be allowed for; or observe and mark the shadows as much earlier as the sun is fast, or later than the sun is slow. The bisection of the shadows will then give the true meridian. 3. I used a small quantity of a solution of chloride of iron for purifying turbid water, but obtained no result. The iron gathered into flake-like particles of a rusty color. Why was this? A. Iron perchloride and sodium carbonate, in the proportion of 10 parts by weight of the former salt and  $2\frac{1}{2}$  of the latter to a quantity of water equal to 20,000 parts, is the best compound for purifying water. The salts alluded to are best previously dissolved in some pure water, and the solutions, that of iron first, poured into the tank containing the water intended to be operated on. The soda solution is not added until a few moments, the water being first vigorously stirred. The soda solution having been added, the fluid is stirred again, and then left quiet for the purpose of allowing the very bulky and flocculent sediment to deposit; this takes considerable time—from 24 to 36 hours. Such in brief is the outline of the process used to clarify the water of the Mississippi, one of the most turbid rivers known. 4. I wish to dam up a small valley to collect rain water in. In dry weather, there will be no flow in it, though its surface will be continually agitated by the breeze. Is there any danger of its becoming stagnant and unhealthy? A. Your pond will no doubt become covered with vegetable growth, and harbor a variety of animalcules and insect larvæ. The mere growth of vegetable matter such as water plants, algae, desmids, etc., does not imply unhealthiness. If by filth fermentation sets in, we should consider the water unfit for use. This you can readily know by the smell.

(4) D. P. H. asks for a receipt for some solution which can be used to write on "blue prints," and which will take out the color, so that the writing will appear white or nearly so. A. Use dilute hydrochloric acid. It is probable that the vegetable acids will also act.

(5) E. F. McI. asks how to make an article to be used in mending and sticking torn bank notes together. A. Take thin tissue paper, and coat it with a dilute solution of gum arabic. Let the paper dry, and then by moistening it with the lips it can be readily affixed to the torn portions of the bill.

(6) C. N. asks the best way to paint wire and tin birdcages, and what kind of paint and varnish to use, and state if it must be done by heat. A. Paint with zinc. Do not use lead. The zinc can be given any desired tint. It is then coated with light polishing copal varnish, after which it is baked or heated at from 100° to 150° Fah. The varnish known in the trade as "extra light polishing varnish" is used by several of the prominent birdcage makers.

(7) T. C. asks if there is a cement for mending or sticking a leather sole to what is called the gum boot. A. Use equal parts pitch and gutta-percha fused together, and apply hot, or else take 1 pound gutta-percha, 4 ounces caoutchouc, pitch 2 ounces, shellac 1 ounce, linseed oil 2 ounces, and melt together. This cement must be melted before using.

(8) J. T. I. writes: Will you please inform me how to prepare cotton sheeting on canvas or linen, that it may be written upon without the ink spreading? A. Apply to the fabric a preparation of gum (gum arabic and water) and allow it to dry, then press the place with a moderately hot iron. If the fabric is glazed or starchy, it is best to wash out the starch before applying the preparation.

(9) C. C. B. asks: What will prevent soreness from shaving, and toughen the skin. A. The following is frequently used: Take of potassium cyanide 6 grains avoirdupois, glycerine  $\frac{1}{2}$  ounce, strongest camphor water  $2\frac{1}{2}$  ounces; mix. The foregoing is poisonous, and it must only be very cautiously used. The white powder or cake frequently used by barbers is magnesia and can readily be procured from a druggist. Bay rum is also used.

(10) G. A. R. asks: 1. What sort of potash is used to burn warts and corns off? A. Potassium hydroxide, or, as it is commonly called, caustic potash. 2. What sort of potash should be used with tartaric acid, so as to form a bitartrate of potash? A. The bitartrate can be formed by adding tartaric acid in

excess to any soluble potassium salt. 3. In what number or numbers of the SCIENTIFIC AMERICAN does it describe electrotyping? A. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 310.

(11) G. D.—In order to render glue insoluble in water, even hot water, it is only necessary when dissolving the glue for use to add a little potassium bichromate, to the water and to expose the glued part to light. The proportion of potassium bichromate will vary with circumstances; but for most purposes about one-fiftieth of the amount of glue used will suffice. In other words, glue containing potassium bichromate, when exposed to the light, becomes insoluble.

(12) A. E. L.—1. The cores of your magnets should be as soft as possible. The size of wire with which they should be wound depends upon the kind of current you propose to use; if it is a quantity current, No. 14 will be right; but if it is an intensity current, you should use a smaller wire, say No. 16 or No. 18. 2. Shellac is a better insulator than sealing wax. The depth of winding magnets should not exceed the diameter of the core. All of the cores may be wound in the same direction.

(13) M. E. H.—The porous cell of the regular Leclanche battery is charged with granulated black oxide of manganese. Makers of similar batteries sometimes employ a mixture of equal parts of black oxide of manganese and granulated carbon, and others use the carbon alone, but the manganese produces the best results. Porous cells are made of unglazed pottery.

(14) O. G.—CS<sub>2</sub> (disulphide of carbon) is a liquid, insoluble in water and will not mix; will mix with alcohol. Cannot be deodorized. It is its strong odor that gives it its power as an insecticide.

(15) B. W. S.—One of the best means of guarding against burglars that we know of is the ordinary well-known electric burglar alarm.

(16) R. B. C.—Several writing telegraphs have been patented, but none of them are now in practical use. You will find several of them described in back numbers of our SCIENTIFIC AMERICAN and SUPPLEMENT.

(17) T. B.—We believe that the usual gas pressure is equivalent to a column of water two inches high, but much depends on the various heights of service and supply and extent of the mains.

(18) W. P. H.—Nothing can be added to kerosene to alter its character. Whether powders are harmless or not depends upon their composition.

(19) J. E. H.—The Bell telephone company claims to control all electric speaking telephones. If we understand your diagram, your proposed improvement is not new; wind the armature with No. 18 wire, and the field magnets with No. 16 wire.

(20) E. C. C. asks with what substances phosphorus has to be combined, and in what proportions, and to be placed on glass so as to make an illuminator? I have an illuminating match safe, but I want to make one larger and more powerful. A. The article you refer to is not a combination of phosphorus, but of calcium and sulphur, known as luminous paint.

(21) L. H. S. writes: Can you tell me of any way to bleach hair of any color white? A. Use hydrogen peroxide. A full description of its properties and methods of preparation and use are given on page 5408 of SCIENTIFIC AMERICAN SUPPLEMENT, No. 339.

(22) P. H. R.—We are not familiar with the composition of the dog powder mentioned. It can doubtless be obtained by submitting samples of it to some competent chemist for analysis. The imitation stained glass consists of very thin sheets of porous paper felt. The colors are probably first printed on the paper, which then is made transparent by being waxed. The exact process of manufacture is kept secret by the owners of the process.

(23) H. R. C.—Ink stains are removed by bringing the constituents of the ink into solution, and then washing the solution away. Most inks are compounds of iron, and solutions in which iron is soluble are therefore used. As to the glaze, even cold water will injure that. A little gum water will sometimes restore the glaze.

(24) W. M. asks: What size carbon pencil will I require to make electric lamp of the Werdermann's electric lamp pattern, to give about 50 candle power? Also how many cells of Grove batteries will give such light, and if the Grove is the best for such purpose? A. The carbon should be about three-sixteenths of an inch in diameter. It will take about 25 cells of Grove or Bunsen battery. The latter is preferable.

(25) C. W. S.—Brass is generally used with iron for a compound expansion bar.

(26) T. W. K. asks the cause of a battery called "the American Electricizer" failing to impart any electrical current when the conditions mentioned have been complied with? Bisulphide of mercury is put in the battery to produce the current. It is used simply for imparting electricity to any person holding the handles. A. Write to the manufacturer of the battery. 2. How thick is treacle? A. Treacle is molasses; judge for yourself. 3. If an egg be placed in a warm place, will it hatch? A. Yes, if it is fertile, and the temperature is well regulated. 4. Can a magic lantern be of any use or good if it cost only \$1? A. We have seen very good magic lanterns for \$1.00.

(27) J. W. S. asks (1) how to make a ground connection for a telegraph line where there are no water pipes to connect on. A. This is generally done by burying a plate of copper, having an area of about 10 square feet, in earth that is constantly moist, and connecting the ground wire to it. 2. Does it have to be any particular kind of metal? A. Other metals might answer, but copper is the best, both on account of its conductivity and durability.

(28) Kanoum.—You can use batteries to generate the current required to light your house, but it

would be very expensive and troublesome; better purchase a steam engine and dynamo electric machine. Possibly you might use secondary batteries, and charge them with a voltaic battery. Crocodile skins are not used in this country. The alligator skins from the native swamps and lagoons of Florida and Louisiana furnish supplies for several tanners.

(29) O. D. W.—It is supposed that in applying creosote and paraffine for the preservation of buildings, the creosote acts as an antiseptic to any fungoid growth in the pores of the stone, preventing both decay and growth of organic matter, the proportion of creosote varying according to the conditions.

(30) A. V. R. and many others.—It will not be satisfactory to attempt to make liquid shoe polish solely from a formula which any chemist can furnish. There are many details in the manufacture which a simple knowledge of the original ingredients throws no light upon, and these details can only be worked up to a practical success by careful study and intelligent application. One of the largest manufacturers of shoe dressing in the United States lost thousands of dollars some three years ago by putting out an article, notwithstanding his long experience in the business, which he failed to make "all right," though the chemical formula seemed perfect.

(31) A. P.—To render aniline inks indelible on paper, it will be necessary to coat the reproduction with some preparation. An excellent compound consists of collodion dissolved to the consistency used by photographers with two per cent of stearine added. The following ink is recommended for marking linen: Triturate 175 drachms aniline black with 240 drops strong hydrochloric acid and 42 drachms strong alcohol. The mixture is diluted with a hot solution of 2.5 drachms gum arabic in 170 drachms water. We would recommend experimenting on the above formula with the various colors used by you. It is impossible to furnish any positive information on such matters without first engaging the services of an expert dyer to experiment on the matter. Rosin and salt are added to soap mixtures in order to produce a harder compound.

(32) H. R. W.—It is possible to supply 25 incandescent lamps by means of a battery; the number of cells required will depend upon the size or resistance of the lamp. When the lamps fail, nothing remains of them that is of any value. Light produced by incandescent lamps fed by batteries is much more expensive than gas, and very unreliable and troublesome.

(33) Q. P.—We think your tin foil is too heavy. It is possible also that there may be some imperfection in your needle point; the needle should be capable of longitudinal vibrations only, and its point should be like that of a leather-sewing needle, and quite sharp. You would be likely to find a phonograph at some of the stores where optical and philosophical instruments are sold. The SUPPLEMENT referred to contains the most elaborate description that we know of.

(34) O. C. R.—If you desire to go into electric lighting to the extent indicated by your letter, we advise you not to follow the description of a small dynamo referred to, but to copy some of the later machines—Edison's, Weston's, or Siemens'. You can obtain full information on construction of dynamos by consulting back numbers of the SUPPLEMENT, or Gordon on Electric Lighting, Schelling on Dynamo Electric Machines, or Prescott on Dynamo Electricity. You can employ the water pipe for a ground or return; we do not think the current from a small dynamo such as you propose to make would be liable to injure any one. It would probably have no effect on incrustations of the pipes. You can get the materials you require or the machine itself from the Western Electric Company, of Chicago, Illinois. Bare wire will do for your conductor.

(35) B. F. N. writes: I require for my work a glue or cement that is as nearly waterproof as possible. I have tried several kinds of glue, and have at last, after nearly seven years, found a cement that is better than anything I have yet been able to buy, which I make myself. It is composed of Cooper's best white glue (I am obliged to have it light colored), dry white lead, shellac and alcohol, and ammonia. I am obliged to use heat to dissolve it. Can you tell me of anything to add to this solution to keep it in a dissolved condition when not exposed to the air, or can you name a solution that is waterproof and in a liquid state that will answer my purpose. I also would like it to cement leather together, etc.; those now in the market do not answer my purpose. A. A waterproof glue may be prepared by adding a small proportion of potassium bichromate to the glue before it is melted, and then exposing the glued portions of the article to the light. The liquid glues are produced by the action of nitric acid. Thus white glue, 16 ounces; dry white lead, 4 ounces; soft water, 2 pints; alcohol, 11 ounces; stir together and bottle well hot. The leather cements consist of shreds of gutta-percha dissolved in some suitable substance, generally carbon disulphide or ether, until the consistency of honey is reached. The surfaces to be united are pared down, heated, and the cement applied. See the receipts given for various cements in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158.

(36) A. M. S. writes: What material or lining for tanks and their discharge pipes will enable them to resist for some years the action of acids and other chemicals employed in metal working manufacturing where iron, copper, lead, stoneware, and tarred wood have failed? Or of what material should a tank be made to resist action of a pickle for steel forgings, composed of dilute muriatic acid and zinc? A. We know of nothing but glass and paraffine that will stand when the articles named have failed. There is no reason why hard glazed stoneware will not stand (not salt glazed); perhaps part of your difficulty arises from abrasion by contact from the pieces of steel. Stoneware tanks are made for our chemical companies that hold strong acids.

(37) J. E. writes: I have two wooden rollers covered with leather which I use for running wool through, and am troubled with the loose fibers lapping and sticking to the roller. I am troubled the most in dry frosty weather; in wet weather they run all

right. I think it is all caused by electricity; can you tell me of anything that would be of benefit, or would help me? A. This difficulty, we think, has been remedied by others, by making the air damp in the room, which may be done by introducing a little steam jet in or around the machine to keep the air moist, but not to wet anything. The moisture tends to dissipate the electricity.

(38) M. E. O. asks for a formula for a blackboard paint. The formula that I am using does not give satisfaction. The chalk rubs into the board instead of erasing, as it should. A. One of the best preparations for this purpose consists of 1 gallon 95 per cent alcohol, 1 pound shellac, 8 ounces best ivory black, 5 ounces finest flour emery, 4 ounces ultramarine blue. Make a perfect solution of the shellac in the alcohol before adding the other articles. To apply the slating have the surface smooth and perfectly free from grease; well shake the bottle containing the preparation, and pour out a small quantity only into the dish, and apply it with a new flat varnish brush as rapidly as possible. Keep the bottle well corked, and shake it up each time before pouring out the liquid.

(39) J. S. O'B. asks (1) for a receipt for a good strong cement or glue for wood. A. You will find in SCIENTIFIC AMERICAN SUPPLEMENT, No. 158, a number of recipes for cements. Among these there are several suited to your wants. 2. Also a waterproof varnish. A. Let 4 ounces of India rubber in small pieces soften in 8 ounces oil of turpentine, then add 2 pounds of boiled oil, and boil for two hours over a slow fire. When dissolved add 6 pounds of boiled linseed oil and 1 pound of litharge, and boil until an even liquid is obtained. Apply warm. 3. What liquids are the best non-conductors of electricity? A. Water and solutions of neutral salts have the lowest conductivity.

(40) An Honest Workman writes, asking information concerning the coloring of cabinet photos. A. In outline, it consists simply of first carefully separating the photograph from the cardboard, then coating the face of the print with tragacanth paste. The picture is next attached to the glass, and then made transparent by immersing in the transparent compound, which must be purchased. Finally the picture is painted, and last of all backed, etc.

(41) J. W. L. writes: My Canada balsam has become oxidated on the top, and when melted on the side has innumerable air bubbles in it, which are next to impossible to remove. Is benzole the best liquid to reduce it with? A. The Canada balsam is too high to be reduced with benzole. It is also soluble in rectified oil of turpentine and in warm alcohol. For your purpose it will probably be best to first melt it and then add the benzol.

(42) O. C. D. asks (1) if it is dangerous to work over a boiling solution of sulphide of potash heated in a moving sink heated with a coil of wrought iron pipe. I sometimes feel a bloatedness in my stomach after it, as though I was filled with a gas. A. In all probability the gases emanating from the mixture, such as hydrogen sulphide, are poisonous, and the ill effects experienced by you are due to them. 2. Can aniline colors be used to color spirit lacquers? If so, how? A. Aniline colors are as general things soluble in alcohol, and therefore can be directly incorporated in the spirit with which the lacquer is made.

(43) W. S.—The tone of steam whistles depends on quality of the metal, thickness of the wall of the bell, and size (diameter and height) of the bell. Position in regard to the annular aperture for the escape of the steam does not affect the tone.

(44) G. M. V. has a gun barrel that has been defaced by being indented by a charge of buckshot; how shall he get the dents out? A. Filing around the depressions, and repolishing. The old time gunsmith's trade is of the past; we know of no manual on the subject.

(45) O. T. H. asks: How are gun mountings colored different shades? A. By heating them in a hot sand bath, after being polished, and quenching in water when the desired shade is attained. Barrels are colored (browned) by rusting with acid. The Damascus mottling comes from the coils of different colored wire of which the barrels are made. 2. Are breech loading guns (barrels) made of iron casehardened or of steel? A. Shotgun barrels are usually of iron—never casehardened. Rifle barrels are of steel—never hardened.

(46) A. K. C. asks: Does steel rolled into sheets, rods, shafts, and rails, and drawn into wire, acquire a fiber by its working? A. Yes.

(47) C. G. T. M.—We think you will succeed very well in plating articles by adding to tin a very small proportion of bismuth and antimony. The articles to be plated are first to be thoroughly cleaned by dipping them in a solution of caustic potash, then scouring them with washed emery, then thoroughly cleansing them with clean water, then brushing them with a solution of zinc chloride or soldering fluid, after which they are washed with a clean cloth and dried and plunged into the melted alloy, which should be covered with tallow to prevent the oxidation of the surface of the metal. With these few hints we think you will have no trouble in applying the tin to the articles you desire to plate.

(48) G. B.—We have no knowledge of any newly discovered metal that is of a silver color that is likely to come into general use. Most of the newly discovered metals have fabulous values. See values in SCIENTIFIC AMERICAN, January 3, 1885, page 7. Aluminum is the only metal likely to come into general use that is white like silver, and may take a valuable place in the arts. A company in Philadelphia attempted to manufacture it by a new process which it was supposed would bring its value to a working basis. So far as we are informed, they have not yet made it cheap enough to be widely used.

(49) W. D. G. asks how the rubber covering on band saw wheels is ground or turned true. A. The wheels are turned true, but the bands are made true in a mould, stretched upon the wheels, and fastened with cement. Any truing that may be necessary is done by turning the wheel slowly against a quick revolving sand paper wheel.



(50) J. E. M. says: Will you please let me know in your next issue, what is the cheapest article that will remove the smell of coal oil from clothing? A. Evaporate the oil by placing the clothing for a sufficient time before an open coal fire. The higher the heat the better, taking care not to inflame the goods.

(51) A. L. J.—A turbine exactly suited to your supply and height of fall is said to give the largest percentage of power.

(52) J. Y. S.—The impinging of feed water upon the flue or tube head subjects it to changes of temperature, and consequently, by local expansion and contraction, disturbs the joint. We recommend the feed pipe placed so as to terminate near the surface of the water, preferably at the side near the center of the tube space.

(53) J. A. R. asks a good plan for refining ordinary "refined solder," or half and half, so that it will make a good smooth wiped joint. Every now and then the metal gets coarse, the joints look rough and sweat. A. The metal gets coarse from the absorption of lead in wiping the joints. Keep the sulphur away, and add more tin until the quality is restored.

(54) W. A. A. asks where magnetic sand can be obtained, and the prices, if it be an article of commerce, also where loadstone can be obtained. A. Magnetic sand is not a commercial article, and probably can only be procured locally. It is found along the St. Lawrence River. Loadstone comes principally from Arkansas and can be purchased of mineral dealers.

(55) P. B. R.—Britannia metal consists of 1 part tin, 2 parts antimony, 1 part bismuth. Your spelter or zinc will not run well in iron moulds. Use moulding sand. Or for iron moulds, mix with tin until the required fluidity is found.

(56) P. C. C.—Raw hide is made into masses sufficiently thick for spindle bearings, by soaking in water until soft, and then moulding with pressure and drying.

(57) H. W. C.—There is nothing but galvanizing that will prevent pump chains and iron pipe imparting the disagreeable taste of iron rust to water. Any painting or bronzing is impracticable.

(58) D. C. B. asks (1) if the production of barytes is now equal or more than the demand. A. The production of crude barytes in 1882 is estimated to have been 20,000 tons, and "the production could be largely increased to meet an augmented demand." 2. Also where it is mainly produced? A. In 1880 according to the census returns:

Connecticut produced.....	6,000
Maine.....	2,200
Missouri.....	4,425
Pennsylvania.....	1,500
Tennessee.....	465
Virginia.....	4,575

3. If in your judgment an increased production of 10,000 tons would find a ready market at nearly the present price? A. We cannot express an opinion on this point. A New Haven firm imported during 1882, 4,000 tons of German barytes. We would recommend you to first canvas the market.

(59) J. E. B.—Fusible alloy melting at 212°, tin 3, lead 5, bismuth 8. Fusible alloy melting at 203°, tin 1, lead 1, bismuth 4.

(60) A. D.—Black crocus is not known in the market. Crocus is a crude kind of rouge and is much darker than rouge. Both are made by calcining coppers or sulphate of iron. The crocus not being so highly oxidized as rouge gives it a sharper cut as a polishing powder.

(61) W. S. P.—The corrosion of water gauge glasses takes place to a slight extent under the most favorable circumstances, but in some parts of the United States the water has an excessively corroding power over what are called the Scotch glasses, which are made of lead or the ash of sea weed and sand. The glass contains much potash, which is quickly attacked by water that is slightly acid, and at the temperature and pressure at which you are steaming your boiler, viz., 90 to 110 pounds pressure, becomes a solvent of silicate of potash. A very small quantity of soda in your feed water, a half ounce to a hogshead or less, will probably neutralize its corroding properties.

(62) W. H. S. asks: 1. What would be correct exposure of a dry plate at 9 A.M., on an object lighted by bright sunlight in December, when the correct exposure at noon would be 10 seconds, all other conditions being the same? A. About one-fourth longer or twelve to thirteen seconds. 2. Would the exposure, under the same conditions, be the same at 3 P.M. as at 9 A.M., and if not what would be the difference? A. Fifteen seconds would be correct, as the light in the afternoon is not as strong as in morning. The noon December sun is as powerful as the June sun at six o'clock P.M. 3. Give length of exposure, same conditions, at noon in June. A. One to two seconds. The time of exposure varies greatly, according to the sensitiveness of the plate, the brilliancy of the lens, and the state of the atmosphere. A thick hazy atmosphere requires more time than one which is clear and crisp.

(63) S. W.—Venus as morning star is sometimes alluded to as the star of Bethlehem. The general opinion among astronomers is that the star of Bethlehem was one of the variable stars that have been seen to expand to great brilliancy for a short time and then disappear. A few such have been seen during the centuries of the Christian Era. The bright morning star now seen is Venus.

(64) T. D. M.—If ball and cartridge are free to move in opposite directions, they will, on exposure of the cartridge, partake of a velocity due to their relative weights for a short distance. If the cartridge is confined so as not to move, the ball will be projected with considerable force, but not in any wise equal to the force as projected from a barrel. Its direction will be very uncertain. We know of no regular manufacturers of gun cotton in the United States. We understand that it was started here, but was not found suitable for general use, and has been superseded by other high explosives, as nitroglycerine, dynamite, etc.

(65) A. C.—Over 50 years ago both Britannia ware and good crockery were made in the United States. It is our opinion that the manufacture of these goods was started during the war of 1812. The composition of Britannia ware has not changed to our knowledge, except for the better, there being now, as of old, several grades or qualities. The first glass made in this country is said to have been at Jamestown, Va., in 1615.

(66) H. F. M.—Rubber goods are vulcanized at a temperature ranging from 250° to 300° Fahr. If you use a steam vulcanizing chamber with direct steam, give 25 to 35 pounds pressure in the vulcanizer, but, in order to insure its proper working, the steam should be much higher in the boiler; and the pressure adjusted in the vulcanizer by a safety valve.

(67) S. T. writes: I wish to use soluble glass as a mineral glue. What can I mix with it to make it more sticky and agglutinative? Which is best for the purpose—silicate of soda, or silicate of potassa? A. Soluble glass is of value as a glue only when it combines with lime, thereby forming an insoluble calcium silicate. The sodium silicate is the cheaper, and therefore more commonly used. The difference in solubility is slight, the potassium silicate being the more soluble. An excellent description of this substance is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 317.

(68) F. S. W. asks what materials are used, and how are they used, in a Babcock fire extinguisher. A. The principal liquid used is a solution of sodium carbonate; when the extinguisher is brought into active service, a smaller receptacle containing sulphuric acid is opened, so that these two solutions generate carbonic acid gas when they meet.

(69) H. N. writes: Our wards and hall floors (Soldier's Home), Washington, D. C., have been stained with Vandyke brown and waxed; they are five or six years old; near the doors where the tread has been heavy the boards are worn and the stain is worn away, but by continually waxing the wood is so impregnated that I cannot make these places dark again. Is there anything that will go through the wax and sink into the wood and stain the boards again? I have tried Vandyke brown and vinegar put on hot, but it only washes the wax from the surface and will not sink into the wood. A. We would recommend you to wash the locality with turpentine until as much wax as possible has been dissolved away, then apply a mixture of turpentine and asphaltum. This, you will find, will darken the wood work in harmony with that previously stained.

(70) H. S. asks how to ink ribbons for the type writer, and the materials for the colors or dyes. A. An ink for the type writer ribbons can be made as follows:

Aniline black or violet.....	3/4 oz.
Pure alcohol.....	15 "
Concentrated glycerine.....	15 "

Dissolve the aniline in the alcohol and add the glycerine.

(71) S. & E. C. H. asks for recipes for making the so-called "patent rubber composition." A. The following will probably prove satisfactory:

Cooper's best glue.....	8 1/2 lbs.
Extra sirup.....	.2 gals.
Glycerin.....	1 pint.
Venice turpentine.....	.2 oz.

Steep the glue in rain water until pliant and drain it well. Then melt it over a moderate fire, but do not "cook it." This will take 15 to 25 minutes. Next put in the sirup, and boil for three-quarters of an hour, stirring it occasionally and skimming off impurities rising to the surface. Add the glycerine and turpentine a few minutes before removing from the fire, and pour slowly. Slightly reduce or increase the glue as the weather becomes colder or warmer.

(72) C. F. A. asks: (1) How may eight or ten ounce duck be waterproofed and colored a dead grass color, suitable for hunting coats or suits? A. For waterproofing, use a solution of rubber in coal tar benzol, and suspend in this mixture a small quantity of burnt umber (in proportion to produce the desired shade). In applying to the duck stir it up thoroughly. 2. Will chilled shot wear the choke of a Damascus barrel shot gun worse than soft shot? A. No. 3. By what process are chilled shot made? A. The chilled shot are produced by adding a greater amount of tin to the composition with which the shot are coated than is the case with soft shot. 4. How much lighter in weight are chilled than soft shot? A. As far as we are able to ascertain there is not any difference. 5. What is the diameter of 10, 12, and 16 bore guns?

A No. 10 equals.....	3 1/2 of an inch.
No. 12 ".....	3 1/4 " "
No. 16 ".....	3 1/8 " "

(73) W. A. P. writes: 1. Give me a simple receipt for telling oleomargarine from butter? A. There is no very satisfactory test by the use of which butter can be distinguished from the genuine article. Determinations of the melting points of the two articles are sometimes employed. Microscopic examination is frequently resorted to. It is said that fresh genuine butter which has been melted appears under the microscope composed of ovoid granules, and contains no crystals. The artificial product contains crystals. Artificial butter does not melt at once, like genuine butter, to a clear oil, but fuses gradually, a whitish sauce being first formed. 2. Tell me if there is anything you can put in white lead to give it a permanent gloss, as oil soon loses its gloss? Will oil and varnish answer for outside work? A. Old heavy oil is the only thing that can be used to produce the gloss. Varnish is sometimes used, but will not stand.

(74) G. W. R. asks: What size engine and boiler will be required for a boat 15 feet long and 5 feet wide, a paddle wheel boat? Also, how thick the shell of boiler and head should be, and how many pounds of steam it will hold, and what power engine it would be? A. It is a very rare thing to see a paddle wheel boat so small as you name. We think an engine 3 inches diameter of cylinder and 5 or 6 inches stroke would suit. About 2 1/2 horse power. Boiler should have about 30 feet heating surface. After fixing the dimensions of the boiler, apply to the steamboat inspectors for the thickness of iron required.

(75) A. O.—The only device that we can suggest to ignite by a blow is a bit of phosphorus wrapped up in a piece of paper. This, if struck by a hammer, will, under proper conditions, spring into flame. The handling of phosphorus is exceedingly dangerous, so that we hesitate to advise its use. A Doelreiner's lamp, which by the action of dilute sulphuric acid on zinc generates a hydrogen gas, which, if a current be directed on a bit of platinum sponge, produces light, would, we think, be more suitable to your wants.

(76) B. W. S. writes: Several gentlemen and myself have had a dispute on hydraulics relative to the workings of a pump, and have decided to leave the decision to you. These parties claimed to have seen a pump that would work any depth, a hundred feet if necessary, with a cylinder only twenty-five feet from the pump, provided there are valves every twenty feet in the pipe below the cylinder. Now, they admit, according to the teachings of hydraulics, that a pump will not lift theoretically more than thirty-two feet, and practically about twenty-eight, and yet they make that claim and the only explanation they can give is that, as you create a vacuum from one valve to the other, the water from the lower next section will fill that vacuum, and so on down to the last one. A. We have seen the same statement in the papers, but the thing is a fallacy. What is to sustain the column of water, when the valves open? Water can be lifted from no greater depth with, than without these valves; their only effect would be to reduce the shock when the valves close, even if they were made to work by having the supply of sufficient head, or within, say, 20 or 27 feet the height of pump.

(77) A. S. L. asks: 1. What will best cleanse brass chandeliers soiled by flies? A. Oxalic acid and whiting, mixed and applied wet with a brush, and brushed again when dry with a soft plate brush, to polish with dry whiting. 2. What will take the stain from a marble mantel caused by water in which flowers have been standing? A. 2 parts sodium carbonate, 1 of pumice stone, and 1 of finely powdered chalk. Mix into a fine paste with water. Rub this over the marble, and the stains will be removed, then wash with soap and water. 3. What is the best varnish for black straw hats, and how made? A. Best black sealing wax, 1/2 ounce; rectified alcohol, 2 ounces; powder the sealing wax, and put it in with the alcohol into a bottle; digest them in a sand bath or near the fire till the wax is dissolved; lay on warm with a fine soft hair brush before the fire or in the sun. 4. Is the earth attracted by a body however large falling through its atmosphere? A. The attraction between any two bodies is directly proportional to the product of their masses, and inversely proportional to the square of their distances asunder.

(78) H. J. M. H. asks if in the slide valve of an engine the lock nuts on the valve rod want to hold the valve perfectly firm, or should there be some play for the valve between the nuts? What is the best work on engineering? A. They should not, yet should not be rigidly tight. Usually leave the nuts so close to the bearings that there shall be no loose play of the valve lug. See "Roper's Engineer's Handy Book," \$3.50.

(79) A. M. C. writes: We wish to protect our buildings against fire, by building a reservoir on the hillside, and bring the water down in a pipe to hydrants, etc. At what height shall we have to place the reservoir, and what size pipe shall we have to use to throw a stream of water one inch in diameter, fifty feet high? For efficient service the reservoir should be 100 feet above the ground floor of the building, 4 inch service pipe from reservoir to and through buildings with 2 1/2 inch hose and 1/2 inch nozzles, outside hydrants to be well protected from frost, and provided with 2 1/2 hose with 1/2 nozzles.

(80) L. R.—We have never heard of a case of resuscitation from drowning after the individual had been hours under water, but can conceive of possible instances of suspended animation, such as has sometimes led to people being buried alive, and that led to the supposition that one had been dead for hours. The longest quoted instance of immersion and subsequent recovery is twenty minutes, and then it was supposed the immersion had not been complete, as from one to two minutes almost always causes death.

(81) A. G. asks (1) the weight of the heaviest locomotives, including tender, in use? A. A "consolidation" of the Atchison, Pacific and Santa Fe Railroad, weighing 115,000 pounds. 2. Would it require greater or less power to draw a wagon over a plane of glass than over a plane of iron or any substance? A. The hardest and most perfect track has the least friction. Glass is too brittle for a track. Steel is the most perfect track in use.

(82) E. C. N. writes: 1. Given two grinding cylinders or rollers, one seven inches diameter and ten inches face, the other ten inches diameter by seven inches face, the shaft of each running at the same speed, do they each require the same power, and each grind the same quantity in the same time? The above to be used for grinding apples. A. At the same speed of shaft the roller of larger diameter requires the most power and does the most work. 2. How can molasses sirup be converted into good vinegar, or can a better use be made of it? The heat of the past season has soured it just enough to render it unfit for ordinary use. A. Vinegar can be made from the sour molasses by adding water and yeast, and exposure to air by leaving out the bung.

(83) A. D. asks where he can find something more about vaseline or cosmoline. A. The manufacture of vaseline is quite simple. When the lighter liquids, gases, etc., of the petroleum oil have been distilled over, the remaining product, the tar, is placed in a large open iron boiler, which is suspended over a hot fire in the open air until decolorized, when it is filtered through bone black at such a temperature as to keep it in a liquid state. This is all there is to it. Further details must be acquired from practical experience.

(84) T. F. H. writes: Can you give a recipe for dissolving crude rubber, so as to make a paste or cement such as printers and stationers use in making paper tabs? We are using a preparation made by dissolving rubber in bisulphuret of carbon, but we

find it objectionable on account of the unpleasant odor arising from the carbon, and want to know in what other way a cement can be prepared? A. Rubber is likewise soluble in benzol, in ether, in naphtha, etc. See also answers to query 2, SCIENTIFIC AMERICAN, July 14, 1883. Common glue with about five per cent glycerine is likewise used.

(85) M. I. writes from Texas: This country for miles is covered with a mineral commonly called lignite, it resembles coal very much, but it is very soft and when laid in the air it crumbles up into very small pieces, and when put in the fire it burns, but seems to give very little heat. It is found in places about 3 or 4 feet below the ground, and is only about 12 inches thick, while in other places it is about 3 feet thick. Is the presence of lignite any indication that there is any stone coal deeper in the ground, and, if so, which would be the cheapest plan of probing for it? A. It is presumed that throughout Texas the geological strata containing coal lie beneath the surface, and from the occasional outcroppings that have been found it is inferred that a very extensive deposit of coal lies throughout the State. The superficial presence of lignite does not, however, suggest the existence of coal beneath. Digging and boring are the only methods of determining its existence.

(86) F. T. D.—Gun barrels to be blued are first thoroughly polished, and then packed in charcoal in a cast iron box which is sealed air tight. The case is then heated till just below red heat, and afterwards gradually cooled.

(87) A. B.—We know of no formula for a gravity grade except the limiting one of least traction as approaching a level, and the point of safety in the application of brakes. The practice covers all angles between a dead level for short distances after a descent, and one to twenty for short grades. The steepest gradient known that is worked with brakes for any distance is a branch to the mines near Leadville, which has grades of over 400 feet to the mile. We recommend you to obtain some standard engineering works.

(88) D. Bros.—Supposing that your compound engine is running at 100 revolutions, and that you have an exhaust pressure of about 5 pounds. Each cylinder is developing about 30 horse power, or 60 horse power for the compound engine. The nominal horse power is supposed to designate the size of an engine at some received standard of pressure and speed, while the indicated horse power is variable according to pressure and speed, and may, in your case, be any horse power from 30 to 80. You cannot pulverize bones in a steam digester to any advantage. A mill is universally used.

(89) H. R. C. asks: 1. Is there enough of assaying to make it profitable as a business? A. There are many persons, especially in the West, who use only source of income from their assaying. 2. What prices are charged? A. The prices vary according to competition and number of assays. The price in New York is generally \$5.00. 3. How long would it require for one conversant with chemical manipulations to learn it, if his whole time were devoted to the study? A. Three to six months. 4. What prices do chemists charge for analyzing substances, such as articles of food, water, etc.? A. From \$10.00 upward according to the number of ingredients to be determined. Write to Professor C. F. Chandler, of New York, for his price list. This will give you specific information on this point.

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January 13, 1885,

AND EACH BEARING THAT DATE.

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