## ENGINEERING INVENTIONS.

A gas engine has been patented by Mr. Johannes Spiel, of Berl n, Germany. It has two e - plosion chambers uni ted by a tube, so that after the explosion in one chamber the burning gases will ignite the gases in the other cylinder or chamber automatically; a perforated metal ball is also arranged in the bottom of each cylinder, and connected with a water pipe for condensing water into these balls, which water is converted into steam to assist in driving the en ne.

## MECHANICAL INVENTIONS.

A hinge mortise ac i e has been patented by Mr. Joseph D. Thurs on, of South Union, Me. The angle plate has a slot and a bracket, and he sliding plate or o l carrier has a stem extending up through a guide socket of the bracket. the carrier also having perpendicular cutters, with other novel devices to facilitate the making of mortises to receive the plates of bu t hinges.

A motor has been patented by Mr. George H. Furman, of New London, Huron County, O. An inner cylinder or drum, having pockets, is combined with an outer drum wi h pockets, the inner cylinder being attached to a shaft and formed wi.h peripheral inclined p ckets, in combination with the independently revolving surrounding cylinder or drum, weights in the pockets causing the shaft to revolve continuously.

## AGRICULTURAL INVENTIONS.

A cot on seed planter has been patented by Mr. Thomas P. Hopper, of Sherman, Texas. This invention covers several novel features of construction, whereby the seed may be fed from the hopper regularly and in uniform quantity, and will be separated before they are dropped to the ground.

A plowshare has been patented by Mr. James C. Pugh, of Ashton, Dakota Ter. The plate forming the cutting edge has its longitudinal center and land side edge thicker than its main part, the plate forming the cutting edge being adjustable, so it can be easily sharpened, and, owing to its shape, the original width of the c t can be maintained.

A low attachment has been patented by Mr. Reuben Jones, of Hogansville, Ga. A guard is atta hed to the plow beam, suspended by in s that are adjustable, so that the g rd may be held in a higher or lower position, for the purpose of au ing the depth of furrow or quantity of soil thrown up around young plants.

A grain thrasher and separator has been patent d by Messrs. Albert J. and Josiah H. Marshall, of Evansville, Wis. The straw carrier and separator is c mb ned with carrier belts, rocking bars, beater fingers, springs for accelerating the c osing action of the fingers, with other novel features, whereby the work is done qui ly and thoroughly, witbou danger of the carrier being clogged by he straw.

A seed planter has been patented by Messrs. Louis Pietzsch, John J. Armstrong, and Joseph R. Lowrey, of Weimar, Texas. This invention covers improve nt on a cotton seed planting machine formerly patented, whereby the dropping apparatus may be arr nge t for corn and or other seeds, and so the machine may he used to better advantage for cultivating the ground.

A potato d ger has been patented by Mr. Reuben R. James, of Rising Sun, Ind. This invention relates to plows for turning potatoes out of the ground, curved bars or fingers being substituted for the mould board for raking out the potatoes, and to turn away weeds, vines, etc., while there is an attachment for raking the soil and laying bare any potatoes that may be covered, with other nove eat res.

## MISCELLANEOUS INVENTIONS.

A d rr ck has been pa uted by Mr. Cornele G. Ross, of Rutland, Vt. The invention covers a novel combination of worm and friction gearing, whereby the mast and boom of a derrick can be readily turned either to the right or left, at the same time a load is being raised or lowered.

A pool and billiard cue chalker has been patented by Mr. Emil T. Mueller, of La Crosse, Wis. It is an improved device for holding a piece of chalk for cbal ing billiard cues, and is adapted to be secured to the side or any other convenient part of the billiard or pool table.

A horse training apparatus has been patented by Mr. Robert R. Parshall, of Westfield, Pa. The invention covers an attachment for harness, consisting of straps, loops, and side pieces, designed more especially to prevent trotting horses from breaking when driven at high speed.

A washing a ine has been patented by Mr. Richard E. Harper, of Butler, Mo. In this invention the construction is such that the tub is rotated only when the pounder is lifted out of contact with the clothes, in order not to tear them, and the construction makes a simple and easily operated device.

A bran duster has been patented by Mr. Joseph W. Wilson, of Brookville, Kansas. Revolving brushes, operating in connection with a fan, rub the annular stream of bran passing through the machine against the cloth of a bolt, and there are several other new features and novel combinations.

A neck wear fastener has been paten ed by Mr. Joseph H. Wri h , of New York city. The invention covers a spring wire frame with two upwardly projecting prongs bent downwardly from their upper parts, and then bent laterally in opposite directions, making a f s n r which can be easily secured on the shield or de acbed therefrom.

A dumping scow has been patented by Mr. Franklin P. Eastman, of New York city. The hinged or pivoted wings ar so connected to the side walls of the well of the scow ha the angle of inclination may be varied, and its capacity increased or decreased according to the nature of the contents with which it is desired to load the scow.

A process and composition for annin and dressing old leather and leather articles has been patented by Mr. Edwin W. Hewi t, of Louisville, Ky. A solution is used of sumac, American water pepper, dog fennel, lye, and carbonate of soda, made and used in a specified way, and the leather is afterward dried, oiled, and finished.

A combin d knife and fork has been patented by Mr. Albert H. Forsyth, of Worcester, Mass. This inven ion covers novel means for fastening the knife and fork to their handles. the blade of the knife and the prongs of the fork being passed into recesses in the handles so they can be readily carried, and there being no rivets visible, as they are within the handle.

A h nd bag has been patented by Mr. Robert Weintraud, of Offenbach-on-the-Main, Germany. The invention provides a device for holding a purse, pocketbook, or like article, so that they can be easily taken from the bag for use, and cannot become detached and get mingled with other articles when the bag is closed.

A hydraulic jack has been patented by Mr. Thomas A. Watson, of Brooklyn, N. Y. The invention covers improvement in the pump cylinder, so the backflow passages for the liquid are removed from the face against which the plunger or piston acts, with improved arran eme ts for the valves of the ram and the pump plunger, with other novel devices.

A trunk has been patented by Messrs. John T. Dupont and William J. Coo e, of New York city. By this invention the front wall of the t unk is removable, and trays are arranged to slide horizontally in the trunk, and with this advantage is secured other novel features of construction; besides, the trunk is strong and durable, and easy to open and close.

A stem holding device for watches has been patented by Mr. George T. B gh an, of Bellefontaine, O. The invention consists mainly of a collet or ring within the pendant, through which the stem having an inner shoulder is permi ted to turn freely, the collet having one or mo e screws or pins arranged to enter the hole or holes in the pendant in which the ends of the bows fit.

A detachabl book cover has been patented by Mr. James Gordon, of Strat o d, Ontario, Canada. Combined with the covers of the holder is a binder formed of two relatively fixed plates between which a strip is clamped, and by which the binder is fastened to the covers, and a pivoted movable clamping plate, to bind the book or articles to be held firmly but removably to the covers.

An educational device has been patented by Mr. Hugh V. Dunn, of Scott's Depot, West Va. On a frame is arranged a series of s ndards, operated by leve s and finger board. by which can be displayed to a class of children the alphabet and various words, or the multiplicat on table and simple problems, so the attention of the chi dren will be easily secured and their lessons quickly learned.

A permutatio lock has been patented by Mr. Charles Tregoning, of Lead City, Dakota Ter. The invention provides means whereby two disks may be operated by one visible dial, and means whereby a series of dials may all be liberated at once to be set relatively to each other. the arrangement of two dis s to be registered by one dial preve tin any one seeing the combination while the lock is unlocked.

An ec ri temperature regulator has been patented by Mr. Charles A. Tucker, of Islip, N. Y. A window frame with slats is so connected with a pivoted lever carrying an armature, an electro magn et, and battery, and the mercury tube of a hermo e er, that the window slats will be opened when the temperature rises to a certain point, and closed as the temperature falls.

A fence has been patented by Mr. John D. Davis, of Wilmingto , Del. It is a durable and o namental fence for ounds, verandas, etc., made mostly of merchant iron, not altered in shape except by perforations, forming our tenons to a panel, and flattening the pickets to shape the heads, the ornaments being cast in form to apply to the fence without machine work, and no screws or bolts being used.

A fireplace stove has been patented by Mr. James D. Richards, of Patriot, Ind. The roof of the stove is formed of a c ed plate loosely supported on walls, the plate being adapt d to slide forward and backward, and by proper adjustment the draught may be made to pass up in front of the plate or behind it, with other novel features to economize hot air and save fuel, as well as to facilitate thorough ventilation.

An apparatus for cooking or steamin fruits, vegetables, etc., has been patented by Mr. James L. Smith, of Milford, Del. There is an elevated cooking or steaming vessel, the cover of the furnace having inwardly projecting flanges, on which the coil is supported in a orizonta position, and pipes connecting the ends of the coil with the steaming ve se , with other novel features.

A hose coupling has been patented by Messrs. Robert A. Brauer and Thomas Roche, of Oshkosh, Wis. It is formed of a female and male part of which the former has a p ng hook with a staple, nd the male part has a notch with a hook adapted to pass into the s ap e; there are also beveled projections on the hose coupling sections to protect the locking de vices.

Improved shelving forms he subject of a patent issued to Mr. John Zerr, of Keokuk, Iowa. Legs having apertured cross bars have shelves held thereon by screws passed through the ends of the shelves into the cross bars, the shelves preferably having angle plates secured on th r ends, and being also supported by intermediate legs between the legs supporting the ends of the shelves.

A window shade b cket has been patented by Mr. John F. Miller, of Newton, Kans s Combined with a bracket arm is a slide, and another slide held on the outer end of the first one, at right angles to it, the transverse side having an arm for holding one end of the roller, constituting a device by which any roller can be used on any window, the roller projecting more or less over the side of the window casing.

A sackin , weighing, and registering machine has been patented by Mr. George H. Caughrean, of Raymore, Mo. It is a comb na ion machine with a vibrating frame having platforms and sack holders, connecting rods, levers, and a slotted scale bar with adjustable slots and a traveling weight, wh reby the weight of the filled sacks will reverse the cut-off, taking the product as it comes from thrashin machines, corn shellers, etc.

A bu to hole cutting attachment for button hole stitching machines has been patented by Mr. Ar hu Felber, of Brooklyn, N. Y. The invention consists principally in applyin a narrow blade to the needle bar for cutting the button hole through the material, the blade being arra ged in line with the needle and adapted to be held out of con act with the goods except when making the edge stitch in stitching the first side of the button hole.

A cartridge loading machine has been patented by Mr. Bryant W. Annin, of Hannibal, Mo. The invention covers a o ding disk with apertures to hold the cartridge shells in up ight position, an adj able loading gauge with receptacles for amm ni ion, a movable canister adapted to fit upon the gauge, a ramming device, with various other novel features, whereby a large number of shells can be loaded simultaneously and expeditiously.

A fisherman's minnow bucket has been patented by Mr. George W. Barton, of Bethlehem, Ky. A central guide rod is secured to the bottom of the bucket, and a false bottom is adapted to slide on this rod, and with a bandle havin spring catches engaging with he guide rod, so the minnows in the bucket may all be raised to the surface of the water and caught in the hand without rolling up the sleeves and feeling in the water for them.

Metal roofing forms the subject of a patent issued to Mr. John H. Dellmon, of Pine Bluff, Ark. This is a novel construction of sheet metal roofing, the strips or sheets of metal being turned and bent on their opposite side edges, so that when fitted to ea h other and supported they will expa and contract without breaking the metal, there will be no leakage at the seams, and the roofing will lie close to the sheathing on which it rests.

An automatic power windlass has been patented by Mr. Reuben G. Cheney, of Atchison, Kan. This ' ention relates to w ndlasses where a shaft and clutch are constantly revolved in one direction, a spool being fitted loosely on the shaft, to engage the clutch at the will of the operator, and by this improvement the spool is engaged with the clutch by a po tl e motion tha ll not cause too sudden a shock in starting and to disengage it at he proper time, adjusting the device when thus disengaged.

## NEW BOOKS AND PUBLICATIONS.

MINE VENTILATION. By Eugene B. Wilson. John Wiley & Sons, New York.

The author treats concisely of the practical as well as the theoretical in mine ventilation, with perhaps rather more use of figures than most miners will appreciate, although the book is stated to be ather for the use of miners than for engineers.

## Business and Personal.

*The Charge for Inser o under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.*



## Notes & Queries

### HINTS TO CORRESPONDENTS.

**Name 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 ar icles 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, thou h we endeavor to reply to all, either by letter or mail, each must take his turn.

**Special Information** requests on matters of personal rather than general interest a d requests for **Prompt Answers by Letter**, should be accompanied with r i tance 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** e t for examination should be distinctly marked or labeled.

(1) N. S. C. asks a recipe for making a waterproof blacking which will give a fi e polish without rubb n , and will ot injure the leather. A. A well known waterproof blacking has he following composition:

| | |
|---|---|
| Beeswax | 18 parts. |
| Spermaceti | 6 " |
| Oil of turpentine | 66 " |
| Asphalt varnish | 5 " |
| Powdered borax | 1 " |
| Vine twig black | 5 " |
| Prussian blue | 2 " |
| Nitro benzol | 1 part. |

Me th wax, add powdered borax, and stir till a kind of jelly has formed. In another pan me t spermaceti, add the asphalt varnish, previously mixed with oil of turpentine; tir well and add to the wax Lastly add the o or previously rubbed smooth with a little of the mass. Perfume with n't benzo . 2. Also a good black varnish which will dry instantaneously. A. A good varnish is prepared by ixin a filtered solution of 80 parts of shellac in 15 parts of alcohol with 3 parts of w x, 2 p rts of castor oil, and a sufficient quantity of pi ment. The mixture is evaporated in a vacuum to a sirup. The a ish is applied to the leather with a brush m oistened with alcohol or with a colorless alcoholic varnish.

(2) H. K. asks how to make a black hectographbink. A. Dis olve one part nigrosine in about five parts water and one of alco ol, and add one part of glycerine. It is impossible to obtain as satisfactory an impression or as large a number of copies with the black ink as with the purple colored one.

(3) D. D. S. wants a process for making iron castings malleable. A. I on castings cannot be made malleable. The making of malleable iron castings is a special process, in which the arb is nearly burned out before the me al is poured.

(4) F. H. W. asks what he can put on sheet brass with a brush that will protect it f o nitric acid A. Melted paraffine.

(5) G. G. P. asks: How are carpet tacks made? Are they struck cold or hot? A. Tacks are made on machines that cut the tack blank off the end of a strip of sheet iron, cold, the width of the strip representing the length necessary for the finished tack. The same machine upsets and forms the head, and for carpet tacks the material is worked cold.

(6) J. P. D.—I wish to plane off a pair of cast iron clamps used for bending sheet iron, but they are too hard; how can I soften them? A. Heat them bright red, sprinkle powdered borax on them, and cool them in ashes. Why not grind them instead of planing them?

(7) T. P. H. asks the length of the Cincinnati suspension bridge. A. The total length, including approaches, is 2,252 feet; there is a single span of 1,057 feet from center to center of towers, and two half spans of 281 feet each.

(8) B. K. asks: 1. Can terra cotta be made from common clay? A. Yes, but it must be free from pebbles and other particles. 2. Can you tell me the name of a book that treats fully on the manufacture of terra cotta and pressed brick, also ordinary brick? A. Davis on Bricks, Tiles, and Terra Cotta, published by Henry Carey Baird & Co., Philadelphia. 3. In what State are the best pressed brick made? A. Pennsylvania. 4. Does not the smooth surface of pressed brick impair its adhesive quality somewhat? A. Yes. 5. Are the brick made the same size in all States? A. There is a slight difference in the sizes. Maine brick average 7·5x3 375x2·375 in.; North River brick, 8x3·5x 2·25 in.; Philadelphia front, 8.25x4·125x2 375 in.; varying somewhat among different manufacturers and for different degrees of intensity in their burning. 6. What is the crushing resistance of pressed and ordinary brick? A. Crushing weight per square inch: Common brick 800 to 4,000 pounds. Hard pressed brick, 2,000 to 4,300 pounds.

(9) H. H. W. asks how to use silver solder. A. Melt silver solder with blow pipe, or in fire the same as brass. Use borax for flux.

(10) F. A. T. Z. says: I would like to know how to melt and run aluminum into a bar. I tried with different kinds of flux, but it seems to burn away instead of melting into a button. Is there any alloy which I could mix with aluminum, in order to produce the so-called aluminum gold? In one of your papers, I see recommended a mixture of ten parts of aluminum with ninety parts of copper; would this metal tarnish when exposed to the air? I am a metal beater by trade; have tried several compositions, but they all seem to tarnish when exposed any length of time. A. To melt alumina, use a black lead crucible. Drive the alumina foil into an iron cone much the same shape as the bottom of the crucible, place the alumina in the crucible, and cover with crude soda and charcoal pulverized together. Heat slowly. To make aluminum gold or bronze, melt 90 parts copper, with soda and borax for a flux, then add ten parts aluminum (all by weight) a little at a time by putting small pieces in a split stick of hard wood and pushing down to the bottom of the crucible. This mixture is of the color of gold, tough and malleable, and does not tarnish.

(11) W. B. R. says: When in Florida last winter, I put up by canning process some lemon juice in Mason jars with Boyd's caps, and shipped same. The acid ate the caps entirely through in many places, and most of the jars were empty. I mention this that others may not meet with same loss. Is metal that lemon juice will corrode so rapidly suitable for canning currants, strawberries, pie plant, etc.? Is the lemon juice left in the jars fit for food, or does it probably hold in solution the metal of the caps to such an amount as to be poisonous? A. The citric acid of the lemon juice absorbs tin, lead, and zinc, or any of their compounds. The specimen cover appears to be an alloy of tin and zinc. It is unfit for jar covers for any fruits containing citric acid. Jars are now made with glass tops which should be used for these fruits.

(12) D. G. asks whether there is anything with which to cut sand paper. A. Cut it with a knife upon the back lightly, and pull apart.

(13) W. A. L. asks as to the best material for the floor of a roller skating rink. A. A roller skating rink should be no more nor less than a good ball room for the size of your town, something that you can use for all purposes. Narrow maple makes a good floor. When used for skating, a little powdered resin, sprinkled upon the floor and swept evenly with a broom, no more used than will prevent slipping, will make this the acme of a skating rink.

(14) J. W. M. asks the proper distance for grate bars from boilers 14 feet long, boiler 42 inches diameter. Smoke stack 33 inches diameter, 52 feet long; bridge wall 7 inches from boilers. A. 24 inches for anthracite coal, 30 to 36 inches for bituminous coal.

(15) R. N. C. asks: Will you please inform me which is the longest and the largest artificial bridge in the world? Also how many crusades were there? A. Parkersburg, W. Va., is said to have the longest bridge in the world, its length being 2,147 meters; but we should style the New York and Brooklyn bridge the largest bridge as it is the greatest and has the longest single span.—There were five crusades in which Jerusalem was the objective point, besides one by Saint Louis against Egypt in 1248.

(16) J. K. asks: 1. Is the pressure greater on a slide valve in the shape commonly adopted by engine builders than it would be on a straight or plain piece, same size each way as the valve where it rests on seat? A. Never greater than its area multiplied by the pressure, but less by the back pressure due to cutting off and the slight pressure from the exhaust. 2. Is there more piston pressure and area on a corrugated piston head than on a plain one? A. There is more surface, but not more pressure. 3. To keep melted cast iron hot in a ladle, we drop in a small chunk of lead, and apparently it boils. What is it that produces the effect? Does the lead burn? A. The lead caused boiling from the evaporation of a small portion of lead at high temperature of melted iron, or possibly the alloy suddenly formed with the iron liberated part of the carbon of the iron as a gas.

(17) P. B. A. says: I am about to make a sectional boiler of mercury flasks, as described in SUPPLEMENT No. 182. Will you give me a little further information on the subject. 1. Are all mercury flasks the same size (*i. e.*, about 4¼x12 inch), or are there larger sizes? A. All mercury flasks are about the same size. 2. Will a boiler made of 9 flasks below (for water) and 2 above (to hold steam and draw from) be large enough to supply my engine—3 inch bore, 4 inch stroke? Shall feed with "Korting" inspirator. Can I not feed as slowly as the water evaporates? These flasks are so very thick and small in proportion that, allowing for the inferiority of the iron (which is not charcoal hammered), they should stand a pressure of 300 pounds and not burst. I shall set the safety valve at 80 pounds, and run with between 60 and 80 pounds, which ought to be perfectly safe, if one flask does not rob another. In your issue of May 24, in answer to W. H. P., you condemn twin boilers with one common connection; so do I, but how else can I unite my flasks? The center one will of course get the most heat, being directly over center of fire; will it expel its water into the outside row of flasks? A. A boiler made of 9 mercury flasks will not be large enough for your 3x4 cylinder with any development of power. Feeding only as you make steam, or the jet system, has not been a success, although often tried. There is no trouble about the strength of a flask boiler. The trouble will be to control the generation of steam without a reservoir of water in the boiler. If you make all of the connections large, and carry the water as marked on your sketch, and keep an even fire, you will not have much difficulty in making all the steam the surface will be capable of, but the surface of the water being small makes it liable to foam up into the steam chamber.

(18) T. R. S. says: I am trying to make a little model cylinder 2 by 4 inches; how large a boiler would it take to drive it? What would you make the pattern out of? Do you think lead would do to make it? This will be the first time I have tried to make one, so please excuse me asking these simple questions. A. About 6 square feet of fire surface; make your pattern of pine.

(19) Who asks if there is anything that will act as an absorbent of nicotine? A. Anything in which nicotine is soluble will absorb it, such as water, alcohol, ether, and fat oils.

(20) C. D. P.—Your modes of propulsion are both inferior to simple oars, and will not give so good result for the power applied.

(21) F. V. R. asks: What is the explosive named panclastite made of? A. Carbon disulphide and hyponitric acid.

(22) A. H. L. says: I have been using purified animal charcoal, asbestos, and sand in a filter, and although these materials have all been purified (the sand and asbestos by heat), the water after a few days comes through sometimes with a putrid taste and odor and sometimes with a flavor of slate. The only other materials with which the water comes in contact are zinc, brass, glass, and tin. How can I purify the filtering media so as to avoid giving the water any taste at all? A. The essential function of most filters is to separate mechanical impurities; these readily contaminate the absorbents. They should therefore be frequently replaced, and probably therein lies your difficulty.

(23) R. R. McQ. asks: Have you any other method of preserving eggs than the Havana process that is reliable beyond a doubt? A. Several processes for the preservation of eggs are given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 317.

(24) P. O. W. asks: 1. What is used to cement the top part of lamps on to the glass? A. Use either plaster of Paris or else a mixture of one part caustic soda and three parts of colophony with five parts of water, and knead up the resin soap thus formed with half its weight of gypsum. 2. Can you tell me how to make an ink to trace on paper with, so that when it is placed face downward on cloth and a warm iron passed over it, it will leave the pattern on the cloth? A. Such inks consist of the ordinary solution of coloring matter mixed with sufficient resin to make it quite thick; after drying on the original, the cloth is placed over, and by heating the resin is dissolved and will impart its coloring matter to the cloth. White lead is used for producing a white color, Prussian blue or ultramarine for blue, and so on.

(25) H. D. V. V. desires to be informed how to test lard oil, so as to show whether it is pure or not. A. Chemical analysis is the only means of positively determining its purity. The following factors may serve to guide you in regard to its condition. Its gravity should be about 0·915, its flashing point about 525° Fah., and fire test about 600° Fah.

(26) A. M. T. asks the title and publisher of a good work on preserving and canning fish, vegetables, etc. A. There is no book published on this subject. Each packer has little secrets of his own, but the process is practically identical throughout, and has not changed since its inception. See Hints on Preserving and Canning, SCIENTIFIC AMERICAN SUPPLEMENT, No. 305.

(27) W. E. writes: The fumes or smell of sulphur coming from vineyards where flowers of sulphur have been used to prevent mildew on the grape so thoroughly pervades the atmosphere in that vicinity, especially after nightfall, as to be a source of much annoyance within doors in all cases where the vines so treated are located to the windward. It is desirable to avoid the very unpleasant odor if possible. The constant subjection to it for five or six months of the summer and fall season calls for a relief. Can you inform me of some means, whereby the odor can be neutralized on the inside of residences, so as to be less disagreeable? A There must be some mistake here, as no amount of sulphur scattered on vines or on the ground would produce any unpleasant odor. Even in greenhouses where the vines are washed with a solution of sulphur, and each vine coated with the mixture and thus blown about the house in dust, it is almost impossible to detect any smell of sulphur. If the sulphur is burned, then of course its odor would be very perceptible, but to deodorize the smoke or fumes would of course take the sulphurous acids all out of the vapors, and so entirely do away with any beneficial effects designed to destroy insect or fungus life. The burning of pastilles or some strong perfume might answer for closed rooms, but at best it could not entirely destroy the odor.

(28) J. A. D. asks: 1. Will concrete stand frost? Will it disintegrate by dampness or moisture? A. Concrete will stand frost if kept dry, but will disintegrate from the surface if frozen wet. It does not disintegrate by moisture alone. Much depends upon the quality of the cement used. The best Portland is very hard—strong—and resists disintegrating influences longest. 2. Can water be charged with carbonic acid gas? If so, with what per cent? A. Water absorbs its own bulk of carbonic acid gas at ordinary temperature and pressure. At high pressures it absorbs many times its bulk.

(29) C. C. writes: Would you not be kind enough to let me know, namely: 1. What coffee dust is used for? A. It is sold either as an inferior grade of coffee, or else mixed with chiccory and sold. It could be employed to manufacture the extract of coffee. 2. Who are the manufacturers of axle grease for machinery, made with blacklead, besides Dixon's? A. There are none.

(30) W. A. W. asks: How can I make rubber hold quicksilver and yet retain its pliancy? A. Good pure gum rubber, as sold by the manufacturers, if not overstretched will hold mercury and also retain its pliancy. 2. What expansion does a board undergo lengthwise? A. Substantially none.

(31) A. F. B. asks the shape and size of the flasks and clamps that rubber stamp makers use. A. Flasks like those used by brass foundry men, but made very small, will answer your purpose. You can vulcanize small jobs in a dentist's vulcanizer. 2. What pressure of steam would 320° on Hayes mercury bath thermometer indicate? A. 320° indicates 100 pounds pressure to the square inch.

(32) A. R. K. asks: Can a storage battery be made to light a four candle power incandescent lamp? A. Four cells of plunging bichromate battery will operate a four candle power incandescent lamp. If you require a constant battery, use four cells of Bunsen bichromate.

(33) W. F. S. asks: 1. Please inform me which are the best works for studying electrical engineering. I have a fair knowledge of the rudiments of the subject. A. Begin with Ganot's Physics; then study Gordon's Magnetism and Electricity; Dirge's Electric Illumination; Electricity, its sources and Applications, by John T. Sprague; Gordon on Electric Lighting; and procure a copy of Henry and Jamieson's Pocket-book of Electrical Rules and Tables. 2. Please say if electrical engineering offers better inducements as a profession than civil engineering? A. We should say neither better nor worse; all depends on industry and natural ability. 3. Also, do you think that wood engraving (as a trade) is less remunerative than heretofore? A. The pay of first class wood engravers is not less than it has been.

(34) J. S. P. asks if there is a simple work on electricity suitable for a boy 14 years old, who wishes to study it up during his holidays. A. Ganot's Physics and Electricity, its Sources and Applications, by John T. Sprague, will probably meet your want.

(35) F. B. D. says: I made a small induction coil, according to instructions given in SCIENTIFIC AMERICAN, about two years ago. It is very strong, and is satisfactory in every way as far as power goes, but the current is very uneven, and if you are holding the handles you will get severe shocks. I would like to know what is wrong? A. The difficulty with your induction coil is probably due to imperfection in the contact surfaces of your interrupter.

(36) J. F. D. asks: Why cannot an arc lamp be inclosed in a vacuum? And if it could, would there not be a great saving effected? A. It is not common to inclose an arc lamp in a vacuum; it might effect a saving, were it not for the wasting away of the electrodes and the difficulty of maintaining a vacuum.

(37) R. T. W. asks how to prepare tallow so as to use it as a lubricant. A. Tallow may be made soft with any oil, such as lard or kerosene. Kerosene and tallow make a very cheap lubricant.

(38) C. E. A. says: Our house was blown over the other day, and some claim that it was because a window was open on the side toward the wind. I think that it doesn't make much difference whether the window was open or not. How is it? A. The open window probably did have a slight effect.

(39) W. G. S. asks a recipe for a varnish, paint, or other coating that could be applied to iron scale beams, that are used in damp cellars in which large quantities of salt are used in curing hides. A. A coat of boiled linseed oil rubbed over the scales and allowed to dry is a good preservative. As the oil gets rubbed off by use of scales, rub the parts again with the oil upon a cloth. You cannot keep the scales bright and clean and prevent rust.

(40) C. P. F. asks: 1. If it will be wise to run his water pipe to a greater height than the roof, thereby securing water in case of fire on the roof. A. It would most certainly be wise to carry the water pipes above the roof. 2. How he can connect the pipe so as to insure an electrical contact between the joints? A. Screwing the pipes together strongly with plumbago and oil will give a sufficient metallic contact for all electrical purposes.

(41) C. O. N. asks the process by which buckram is made. Such as is used by carriage and sleigh manufacturers. A. Buckram is woven in a loom; it is linen, stiffened by glue starch. You may buy the coarse linen cloth, and stiffen it with glue size. It should be stretched when sized.

(42) J. M.—We fear that you will not be able to fill your barometer perfectly. It is quite a delicate operation. The tube should be inverted, the leather cushion taken off, and the cistern filled with mercury. The tube is then heated to near the boiling point of mercury to drive out the air, or a vacuum produced upon the cistern, which will draw the air out from the tube, which will then become perfectly filled with the mercury, when the leather can be put on and the barometer turned to its proper position. There are instrument makers in your city that can do this kind of work.—Your hoisting engine and boiler is about 10 horse power. Use 6 to 8 cubic feet of water, and from 40 to 60 pounds of coal, according to speed per hour.

(43) J. E. B.—You will find articles upon lens grinding in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 318, 139; on Achromatism, No. 409; on Eyepieces; No. 393; on Telescopes, No. 252 and No. 1. We think that you could not obtain any information in regard to telescope making from the American Academy of Science.

(44) A. O. L. asks: Is there an apparatus in use anywhere, by which oil is utilized for fuel under boilers? A. Yes. See SUPPLEMENT No. 63 for petroleum furnace for locomotive boiler.

(45) T. D. S. asks: Would it be advisable for me to put in asphalt for flooring, in a roller skating rink? Would there be friction enough to keep wheels from slipping? A. Asphalt and sand well rammed and smoothed makes a fair roller skate floor, but is liable to become soft enough to crease in hot weather. The sand is necessary to harden the asphalt, but it is also liable to cut the rollers away fast. There is nothing so good as hard pine with a little powdered resin rubbed over the surface.

(46) D. S. M. Co. desire us to inform them of a preparation that will remove stains from black walnut, the stains being those made by liquor, etc. A. We know of nothing better to recommend than alcobol; oxalic acid and water are sometimes used to remove stains from mahogany furniture.

(47) A. H. asks: Can you inform me how I can mix alcohol with common turpentine? I wish to make the varnish for musical instruments that you recommended in SCIENTIFIC AMERICAN, but find upon trial that turpentine and alcohol will not unite. A. By heating to a low temperature the solution will probably take place. The following may perhaps be more suited for your purpose. Rectified spirits of wine, half gallon; add six ounces gum sandarac, three ounces gum mastic, and half pint turpentine varnish; put the foregoing in a tin can by the stove, frequently shaking till well dissolved; strain, and keep for use. If it is too hard, it may be thinned by adding turpentine varnish.

(48) C. R. asks: Is there any use for worn out porcelain bricks? Can they be reworked? A. We know of no use to which the bricks can be applied to. They cannot be reworked.

(49) J. H. S. writes: I wish to make a small furnace for melting gold, using a blast of hydrogen gas. Can I make and store the gas, with safety, in an apparatus like that used by dentists for making laughing gas, that is to generate the gas in a glass jar and conduct it into a reservoir, made of an inverted zinc barrel within another larger barrel half filled with water? And is there any advantage or additional safety in purifying the gas through water, before storing it? A. For your purpose the employment of ordinary illuminating gas will give results equally as satisfactory as any use of hydrogen will. Your methods are perfectly feasible if you desire to follow them.

(50) J. F. B. asks: Will you please tell me the name of the article that is being used by the manufacturers of rubber goods in place of Indiarubber? A. We know of nothing that is used by manufacturers of rubber goods to substitute rubber. Chicle and also balata has been suggested for this purpose. They are gums or exudations from tropical trees, but we are not disposed to believe that they are in practical employment. Their use has simply been suggested on account of their properties identical and similar to the pure rubber. See articles on "The India Rubber and Gutta Percha Industries," SCIENTIFIC AMERICAN SUPPLEMENT, 249, 251, and 252.

(51) J. C. says: I want information how to construct an electric machine or galvanic battery to be mounted on a stand with handles, for persons to take hold, and a lever that will put on an increased force, with a dial attached which will show what each person can bear? A. The electric machine you refer to is simply a large induction coil provided with a movable core or a metal cover connected by a cord with the spindle of the index, which is supposed to indicate the strength of the current. When the core is pushed into the coil, it increases the strength of the secondary current, and permits the index to be moved by a spring which turns it in opposition to the cord. There is no real connection between the index and dial, and the coil. See SCIENTIFIC AMERICAN SUPPLEMENT 160.

(52) E. E. K. asks: 1. For a rule for finding the horse power of an engine when it is running? A. You can do this by means of a dynamometer and indicator; for full instructions consult works on this subject; also see SCIENTIFIC AMERICAN SUPPLEMENT. 2. Is there any use for old carbon points, such as used for electric lights? A. We think not. 3. How are lithographic pictures produced? A. Lithographic pictures are drawn upon a species of limestone, with lithographic crayons or pens. The stone carrying the drawing is wet, ink is then applied by means of a roller. The wet parts of the stone will repel the ink, while the ink attaches itself to the marks made by the lithographic crayon pen. A paper applied to the stone under pressure will receive an impression of the drawing made on the stone. 4. How large a boiler would it take to run an engine 1 x 2? A. About 8 inches in diameter and 18 inches high, with 20 ¾ inch flues. 5. Where could I get such such a one? What would it cost? A. Any coppersmith could make such a boiler. It would probably cost $15 to $20.

(53) J. S. C. asks: 1. What is the cause of the buzzing and snapping noises heard at times in the

telephone? A. The buzzing is due to earth currents if the line is isolated from other lines, but if it is in close proximity to telegraph, telephone, or electric light wires, the buzzing is due to induction. 2. Would the fact that branches of trees rest against the wires bave anything to do with it? A. If your line is charged by a battery, the grounding of the line against wet trees might create a buzzing. 3. What is the best book to give one a knowledge of the practical working of telephones, and what is its cost? A. Prescott's "Telephone, Electric Light, and other Novelties" and Du Moncel on the "Telephone" are probably the best works; they cost from $2.50 to $3 each.

(54) H. R.—Spelter in trade is zinc. The name has been used as a local term for a mixture of zinc and copper (granulated) used for brazing. Tubes are brazed by first turning and wiring the clean edges together. Then place pulverized borax and low melting brass granulated or in strips upon the inside, and turn the seam side down over a charcoal fire, commencing to melt at one end of the tube, and draw it slowly through the fire. Observe upon the inside of the tube the progress and condition of the brazing. The brazing material should always have more zinc in it than the tube that is to be brazed.

(55) J. J. H. asks: 1. How to keep windows from freezing? A. The most satisfactory method is by lowering the window from the top, thereby allowing ventilation and circulation of the air. The application of glycerine will prevent freezing. 2. A recipe for making cement for billiard cue tips. A. Try strong glue 50 parts, dissolved with a little turpentine in a sufficiency of water; to this mixture add a thick paste made with 100 parts of starch. It is applied cold. 3. And a cure for warts. A. A popular and useful remedy for warts consists of ivy leaves dried and ground to fine powder. The part having been moistened with strong vinegar, a pinch of the powder is sprinkled on it and then bound on with a strip of rag. A mixture of equal parts of savine and verdigris is also said to make an efficacious wart powder.

(56) J. E. R. desires a formula for silvering solution. A. Prepare a solution of 1 part potassium cyanide in 6 parts water; add it to a concentrated aqueous solution of nitrate of silver (free from acid), until the precipitate is redissolved. Mix this solution with fine chalk and apply after previous cleaning of the object.

(57) S. P. B. asks: 1. If the current in the field coils of a dynamo machine is an induced current? A. The current in the field magnet of a dynamo is either taken directly from the armature through the magnet coils, or the magnet is placed in a shunt circuit. 2. Are both field coils in the same circuit? A. Yes. 3. As the armature revolves, is there any reversal of the current? A. There are two classes of dynamo and magneto electric machines. One class delivers a direct current, the other alternating currents.

(58) H. H. E. asks: How the Edgerton system of making gas (as used in New Orleans) differs from the usual plan? A. The Edgerton system is the making of a permanent gas from crude petroleum by means of retorts. It is not new, except in some of the minor details, from other petroleum gas works.

(59) H. S. writes: I am experimenting with a new gas which I produce without fire. I employ copper vessels for the production of this gas. I have reason to think that a portion of the copper is taken up and becomes a part of the gas. If so, I wish to cleanse, or in other words, remove the copper from it. 1. Can you tell me how I can detect the presence of copper in the gas? A. The presence of copper may be detected by the green color with which the gas burns. By passing the gas through sulphureted hydrogen, a black precipitate will be obtained, or by running it through ammonia water a blue coloration will ensue, when copper is present. 2. And if present, how can I collect and remove it? I have thought that I could by pressure pass the gas through a chemical compound which has a strong affinity for copper, and so remove it. A. We should think that by passing the gas through sulphureted hydrogen and subsequent washing with water all copper would be removed.

(60) F. J. K. writes: You would oblige me by answering the following question, which is in dispute. Is the following size a 90 horse boiler or not: 70 tubes, 3 in.; 15½ ft. long, 60 in. diameter, with a water front supposed to be 2 horse, and a globe dome 24 x 24 of cast iron? There are many opinions on the capacity, and all agree except the maker of the boiler, who maintains 90; the others 63 to 65 at outside. Your opinion is very valuable to me in this. A. We calculate the horse power as follows: The area of one tube will be 1753·00, that is, 3·1416 × 3 = 9·4248; this multiplied by 12 gives us the 113·0976, which is the area of one foot. They are 15½ ft. in length, hence 113·0976 × 15½ = 1753·01, for 70 tubes = 122,710. This in sq. ft. is equivalent to 852·14. Hence for the tubes we have 852·14 sq. ft. The boiler shell is 5 ft. in diameter; 3·1416 × 5 = 15·7080 × 15½ = 243·25, divided by ½ = 121·63 ft., as the area of the shell. For the end we have as its diameter 5 ft. × 5 = 25 × 0·7854 (¼ of 3·1416) = 19·635 as the area of end ft. The sum of these is:

852·14
121·63
19·63
993·40

This divided by 12 or 14, according as you accept either number of square feet as being equivalent to the heating surface for each horse power, gives either 82·78 or 70·9 as the horse power of the boiler.

(61) W. H. W. says: I am greatly troubled with hornets, who have located in my top loft. They have built their nests in said loft, and multiplied frightfully this last season. Can you tell me the best and most effectual way of destroying these pests? They instantly charge any female who dares to enter said lofts. The intruders feel happy if they make good their retreat without being stung? A. There should be no trouble in getting rid of the hornets if attended to early in the season, when they commence to build their nests. Some pyrethrum powder and a good force pump (*e. g.*, Whitman's fountain pump), will do the work effectively. The powder to be stirred up in water (at the rate of ¼ pound to about 8 gallons of water), and the liquid to be sprayed on the nest. This should be done late in the evening or very early in the morning, when the hornets are all in the nest. Diluted kerosene emulsion may be substituted for the pyrethrum water. Later in the season, when the hornets are more numerous their destruction is of course more difficult.

(62) R. C.—The boiler you describe is in very common use and works well; large numbers have been used in steam launches and yachts, but for burning straw or wood as fuel it does not give sufficient furnace or firebox capacity, hence for this kind of fuel the locomotive boiler is better, as any desired capacity of furnace can be obtained. Either kind of boiler should have not less than 200 square feet heating surface, and if the return tubular is used 220 feet, would be better. We would not advise you to use a smaller cylinder than 8 inches diameter and 12 inches stroke. The engine will be more firm and steady if attached to the side of the boiler. There is no work published especially on portable engines, but Rigg on the Steam Engine (price about $15.00) will give you useful information. The automatic cut-off would not be worth while on such an engine. For an 8 inch cylinder by 12 inch stroke the steam ports should be 6 by ¾ inches, and exhaust ports 6 by 1½ inches.

(63) M. L. S. desires us to explain: 1. Upon what law of science, in Tufts' automatic fountains, a stream of water is made to rise from six to twelve inches above its own level? A. We believe the action of the automatic fountain is due to the elasticity of the air. The water flowing into the lower globe or reservoir expels the air, which is forced into the upper apartment; the air thus compressed acts upon the water and makes it jet out. By reference to any text book on physics, the full description will be found under the title of Hero's fountain. 2. Do you know of any reliable cure for catarrh? A. For the catarrh avoid the use of patent medicines, and consult a competent physician.

(64) J. W. H. asks a receipt for preparing water color white. A. It consists of zinc oxide mixed with water and a little glue or sizing of some sort. A beautiful and permanent white that can be used either in oil or water consists of powdered Roman alum 2 lb., honey 1 lb.; mix dry, powder, calcine in a shallow dish to whiteness, cool, wash, and dry. Then mix it with water and suitable sizing.

(65) S. T. H. asks the best method of dissolving odds and ends of sheet India rubber so as to utilize same. A. The best solvent for rubber is a mixture of methylated ether and petroleum spirit—the common benzolene used in sponge lamps. The general method, however, of using old India rubber is by heating it with steam, whereupon the sulphur discharges, the rubber melts, runs into hot water, and collects at the bottom of the pit, while the vapor prevents its burning.

(66) A. V. Co. ask: Can superheated steam be used in pipes or coils, to boil linseed oil in large iron kettles? What temperature can be secured by steam used in this way? Is any peculiar style of boiler required? A. Superheated steam can be used for boiling linseed oil, but is not considered economical, as the oil boils at 640°, which is a very high temperature for the economical use of steam. A kettle bricked up in a hot chamber, out of the direct contact with the fire, with a safety chimney, is much used.

(67) J. N. H.—1. Steam ports ⅞ x 7½ inches, exhaust 2 x 7½ inches. 2. Pipe not less than 2¾ inches diameter. 3. Your keys, if of ivory, should be bleached.

(68) W. H. P. says: I am tempering saws in lead, but find the cast iron kettle in which I hold it is so porous and burns away so quick that it makes it expensive. Can you tell me anything better than cast iron for that purpose? It would have to be large enough to hold about three tons of lead, which is brought to a bright red heat. A. If you have your lead pots cast *bottom down*, or in the same position that you use them, they will not be porous. Also make the bottom much thicker than the sides. Wrought iron is also used for lead pots. They are more expensive to make. Think that you will overcome much of your trouble by casting *right side up*.

(69) J. H. C. says: 1. I have two steel boilers 14 feet by 55 inches connected together on top of steam drums, with 4½ inch pipe; have the usual number of 3 inch flues. No connections at bottom; 4½ inch pipe to engine 30 feet off. Engine cylinder 16 x 42 inches, 50 revolutions per minute, eighty pounds steam. The water in the outside boiler continually ebbs up and down from 1 inch to 8 inches; what can be the cause, and what would remedy the trouble? A. The outside boiler evidently foams. It is doing more than its share of the work. There may be in the arrangement of the chimney connections a stronger draught upon the foaming boiler than upon the other one. The steam connections may also be unequal, or so as to favor the delivery of steam from the foaming boiler. Unequal firing will also produce the same effect. 2. How much water will flow through a pipe per minute, 1,400 feet long with a fall of 75 feet, first 100 feet of pipe 6 inches in diameter, next 400 feet 4 inches in diameter, the remainder 3 inches with ten elbows? A. You will obtain a flow of 18 to 20 cubic feet per minute. 3. How much pressure would be at lower end if shut up tight? A. A pressure due to its height, or 32½ lb. per square inch when closed. 4. Where can books and papers be had to gain a practical knowledge of the Brush and other electric lights? A. There are about 20 numbers of the SCIENTIFIC AMERICAN SUPPLEMENT that describe the various kinds of lights and systems. 5. Which is considered the best electric light now in the market for factories, mills, and cities? A. There are about as many different opinions as there are companies.

(70) W. B. W. writes: In a recent number of the SCIENTIFIC AMERICAN SUPPLEMENT (No. 160), directions were given for construc ing an induction coil which by using two pounds of No. 36 wire would give a half inch spark. Should like to know how much No. 31 silk covered wire I should have to use to obtain the same result? A. The coil described in the SUPPLEMENT yields a 1½ inch spark. The amount of fine wire given for the coil referred to is somewhat in excess of the requirements, and it is probable that if you use the same amount and make your bobbin somewhat longer (say 1¼) you will secure the same results. You do not state whether the size given is by American or English wire gange. This would make some difference, as the English wire of this number is about the same as No. 32 American.

(71) W. K. R. asks for a good receipt for making blacking with bone black as a basis?

| | 1 | 2 | 3 | 4 |
|---|---|---|---|---|
| A. Bone black | 47·00 | 49·74 | 42·40 | 36·00 |
| Molasses | 23·50 | 37·29 | 21·20 | 30 40 |
| Sulphuric acid | 7·55 | as $So_3$ | 10·64 | 1·53 |
| Vinegar | 7·00 | 9·32 | ... | ... |
| Hydrochloric acid | .... | .... | 5·32 | 2·00 |
| Gum arabic | 0·05 | 0·75 | .... | 1·00 |
| Olive oil | 5·00 | .... | .... | 5·00 |
| Sperm oil | .... | 0·55 | .... | .... |
| Whale oil | .... | .... | 3·00 | .... |
| Water | 8·50 | .... | 17·00 | 24·00 |
| Copperas | 0·70 | .... | ... | .... |

The first is the analysis of English, the second and third of American, and the fourth of French blacking.

(72) S. L. H. says: I am in quest of some substance that will remove clinkers from fire brick furnaces. Would not a furnace lined with soap stone be anti-clinker? A. Soap stone is the proper material for preventing clinker in furnaces. The mines are in New Hampshire.

(73) S. S. B.—The encyclopedia referred to does say that "Pitch of a roof is the ratio between the height and the space covered," and no more. Other authorities say it is the *ratio of the angle of the rafters*. This harmonizes for both double and single roofs.

(74) J. N. R. asks us a series of questions about the advisibility of adopting one or another system of water works for Lawrence, Kansas. We receive many such queries, which should properly be sent to an engineer, for they are of comparatively small public interest, almost always involve many questions not stated at the outset, and require an amount of personal attention and examination which we can hardly be asked to give gratuitously. To J. N. R. we would say that in order to decide what plan of water works are best suited for your city, we shall have to put ourselves in the place of a hydraulic engineer, and ask a great many questions, such as every particular in relation to the nature of the water in the Kansas River, and the eccentricities of the river. How much of the year it is clear? When not clear, is it loaded with sand or mud? In its muddy or high water stage is the water fit for household purposes? Is there any facility for low level reservoir of large capacity for supply during freshets? What is the average height of building—what, highest buildings? All of these points go to make up an opinion as to the best plan. The Holly system is the cheapest, but must have a supply uniform in quality which we fear in your case requires a settling reservoir. It will be unsafe to depend upon hydrants alone for fire purposes, 1,000 feet of hose is not admissible for fire purposes under this system. If with the combined system of Holly and high reservoir you are liable, without a low settling reservoir, to fill the whole system of pipe work with muddy water during flood season, this would have to be flushed out from the high reservoir to make the water fit for domestic use. Upon the whole, we think that the safest plan for a growing city as yours seems to be is to make plans in view of future wants, and start a plant for a uniform supply in quality of water from a low level reservoir large enough to supply clear water at all times, relying upon the Holly pressure system for all purposes, and in the near future build a storage reservoir that shall make a combined system perfect. You mention filtration. This is good to a limited extent, but has proved a failure for sudden demands. The system was built for the city of Newark, N. J. The supply being far short of the anticipation, the system was abandoned.

(75) W. L. S. asks: 1. How can I make a simple galvanometer? How can I find the focus of different forms of lenses? A. In SCIENTIFIC AMERICAN SUPPLEMENT No. 371 you will find a simple galvanometer described and illustrated. Find the focus of convex lenses by focalizing the image of the sun or any distant light upon a card or screen, and measure the distance from the lens to the image. For a concave lens make a circle of twice the diameter of the lens upon a card or screen, and project the image of the sun or a distant light upon the screen at a distance that the shadow of the edge of the lens will correspond with the circle; this distance will be its focal length. 2. How can I make a very black drawing ink, to use in the blue process of copying tracings? Have tried India ink rubbed in a solution of shellac and borax, but it is not satisfactory. A. We know of nothing blacker or better than India ink rubbed up with water only, as thick as it will flow.

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

S. S. Co.—The specimen is ferruginous clay or clay colored red by being mixed with iron oxide. Fine qualities of it are used for red pigments.

## INDEX OF INVENTIONS

**For which Letters Patent of the United States were Granted**

**July 15, 1884,**

**AND EACH BEARING THAT DATE.**

[See note at end of list about copies of these patents.]

Abrading points for dental and other uses, manufacture of, J. A. Swasey ..... 301,936
Aerated and mineral waters, apparatus for the manufacture of, J. S. Pearson ..... 301,919
Air and other gas, apparatus for cooling and impregnating, J. A. Saladin ..... 302,163
Air and water forcing and exhausting machine, A. D. Shelnutt ..... 302,167
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Axle box, J. Dakers ..... 301,867
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Bale tie, J. W. Griswold ..... 302,202
Bale tie, Lenox & Hentz ..... 302,009
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