ENGINEERING INVENTIONS.

A combined feed pump and condensing apparatus for engines has been patented by Mr. John Houpt, of Springtown, Penn. This invention relates to features of two former patents issued to the same patentee, and the combined apparatus covers a primary condenser, by which the exhaust steam is cooled to a temperature a little below that of boiling water, under a partial vacuum, a secondary condenser, operating to produce a good vacuum in front of the piston, and to keep a higher temperature in the cylinder than in ordinary condensing engines.

MECHANICAL INVENTIONS.

A slide rest, for use on turning lathes, to guide the tool in forming the work, has been patented by Mr. Jacob Fitz, of Hanover, Pa. The invention consists in a sliding block and a guiding form interposed between the usual longitudinally sliding carriage and the tool rest carried thereby.

An automatic felt guide for paper machines has been patented by Mr. Benjamin A. Schubiger, of Montoursville, Pa. The guide roll and cone guides are mounted on a supporting bar with a center pivot, and there are carrying rolls on the opposite ends of the bar for supporting the ends, so that the felts may be automatically corrected when tending to run sidewise or out of line, from the tension of the web varying by the stretching of some parts more than others.

MISCELLANEOUS INVENTIONS.

A flower pot has been patented by Mr. Daniel O. Martin, of Marshall, Ill. It is so constructed that a quantity of water will be retained in the lower part of the pot and at the same time air will have access to and can circulate around the roots of the plant, thereby promoting rapid growth.

A wire crimper has been patented by Mr. Matthew M. Jones, of Kokomo, Ind. A box with its front end closed and perforated for the free passage of wire has a transverse bar in combination with a hinged or pivoted lever handle, combined with other devices, for crimping wire in constructing picket and other fences.

Improved barbed metallic fencing forms the subject of a patent issued to Mr. Albert Potts, of Philadelphia, Pa. The metallic fencing strip, notched upon its edges, is combined with pointed wire staples, the staples being fixed in place in the notches by twisting their pointed ends together so barbs are formed upon the strips.

A sample trunk or case has been patented by Mr. Henry W. Mattoni, of New York city. It is made with stop springs interposed between the ends and sides and the ends and sides of its trays, so the latter will be kept in place and protected against sudden jars, arched metal springs and re-enforcing rubber springs being used.

A pump has been patented by Mr. Orlin W. Hammond, of Belmont, N. Y. It is an improved lift and force pump for adaptation to small bored wells, and has an air chamber attachment to the rod for working the piston, the rod being hollow and forming the water conductor for the delivery of the water from the pump.

A coal dumper has been patented by Mr. Thomas Wallwork, of Litchfield, Ill. The invention consists in the combination, with a frame, of a box hinged therein at one end, the frame being provided at one end with gates hinged to the top and bottom, the gates so connected that they open and close together automatically.

A caster wheel and die for making it have been patented by Mr. Walter S. Ravenscroft, of Parkersburg, W. Va. The caster wheel is made of woody fiber or wood or paper pulp, and has its central portion additionally compressed, for which purpose the dies have plungers operated by eccentrics, so rotated as to give any desired pressure.

A washer for vehicle wheels has been patented by Mr. Bartholomew Masterson, of Milford, Mass. The washer is jointed or hinged, so it can be secured on a spoke very easily and rapidly, without the felly being removed, it being passed around the spoke above the shoulder, where it will prevent any longitudinal movement of the spoke.

A door check has been patented by Mr. Frank M. Sears, of East Saginaw, Mich. Combined with a stud projecting from the door is a block with a transverse and a vertical aperture, a pin or bolt being held in the latter, and resting on a spring adjustable by a screw, making a convenient device for holding a door open, and preventing it from being opened too far.

An improved sleeve for coats and other like garments has been patented by Mr. Charles F. Butterworth, of Troy, N. Y. The object is to make an elastic, warm fit about the wrist, for which purpose is provided a hollow annular fur band, and a spring within it, and a securing strip, with one edge secured to the wristlet and its other edge interposed between the turned in portion of the sleeve and its lining.

A ball trap, for throwing targets, has been patented by Mr. Charles F. Stock, of Peoria, Ill. This invention relates to certain improvements formerly patented by the same inventor, and covers an improved clamp for holding the target, while a rear weight with a lip or projection is substituted for the rear extension of the arm and stud for suddenly stopping the swing of the arm.

A baling press has been patented by Mr. Andrew Johnson, of Greensborough, Ala. It has slotted ends, with ratchet bars at the sides of the slots, and fulcrum bars suspended near the ends, the press box being provided with a follower strengthened by a truss, and carrying spring-held catch bars to engage with the ratchet bars, with other details of special device, to facilitate the baling of cotton, hay, etc.

An improved sewing machine has been patented by Mr. George A. Annett, of Sutherlands Corners, Ontario, Canada. The invention relates especially to the needle and take-up mechanism, which is so combined as to accomplish by one movement the work of two essential parts, and they are so arranged that the thread will be slackened as the eye of the needle enters the goods, whether they be thick or thin.

A folding box has been patented by Mr. Henry Krog, Sr., of Washington, Mo. In combination with the bottom section and cover are removable sides and ends, a chain, screw bolt, and nut for pressing the bottom and cover against the bottom and top, edges of the sides and ends, and a fastening device in the end pieces of the bottom section, for holding the lower end of the chain.

A traveling brick machine has been patented by Mr. Henry Stelzmann, of Leech Lake, Minn. A locomotive machine is contrived to feed the clay from a tank it carries into a device for working preparatory to pressing, when it is passed through a press, and delivered in properly formed brick upon the surface of the drying yard, all by the automatic action of the machinery geared with the propelling engine, the only hand labor being that of substituting full for empty clay tanks.

Business and Personal.

The Charge for Insertion 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.

NEW BOOKS AND PUBLICATIONS.

THROUGH SPAIN ON DONKEY BACK. Drawings by W. Parker Bodfish. Boston: D. Lothrop & Co., Publishers. Quarto, unique binding, $1.50.

This is an entirely unique volume. Its illustrations are novel and numerous, and its letter press remarkably sprightly. To see any country "on donkey back" is to meet with surprising adventures, and see much more than the ordinary traveler sees. It introduces us to the homes of the people. It takes us into out-of-the way places and among out-of-the-way people. We learn their ways and amusements, their weakness and strength; we meet noblemen and peasants, priests and beggars, soldiers and citizens, women and children, people of fashion and husbandmen, dancers and singers, watersellers and herdsmen, shoemakers and fruiterers.

BERLY'S UNIVERSAL ELECTRICAL DIRECTORY. A reference book for industries connected with Electricity and Magnetism. Wm. Dawson & Sons, London: Cumming & Brinkerhoff, New York.

This book is a comprehensive directory for the use of all engaged, experimentally or practically, in any of the numerous applications of electricity to the arts and sciences. With much valuable information as to the present state of our knowledge in this department, it gives classified lists of manufacturers and dealers in articles required for every use to which electricity has thus far been put, in America, in Great Britain, and on the Continent of Europe. The mere enumeration of the articles now called for in this line would make an extended catalogue. The kinds of wire alone afford an immense variety of brass, copper, iron, galvanized iron, German silver, phosphor-bronze, steel, insulated in various ways, or with different coverings; then there are all kinds of telegraph and telephone materials, electric light and dynamo machine appliances, chemicals for use in batteries, etc., and this book gives the buyer the means of reaching first hands through all this field. It also gives the officers and 1,111 members of the London Society of Telegraph Engineers and Electricians, with statistics about the telegraph, telephone, cable, and electric light companies of the world.

FOUNDATIONS AND FOUNDATION WALLS By George T. Powell. William T. Comstock, New York. Price $2.00.

This is a revised and enlarged edition of a book which has already met with a large degree of public approval. It treats particularly of pile driving, building stones, and bricks, as well as of mortars, limes, cements, and concretes, gives tables of weight of materials, and practical explanations of the various methods of building foundation walls for all kinds of buildings.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

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

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

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

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

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at the office. Price 10 cents each.

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

(1) M. D. D. asks: Is there any difference in the manufacturing of silver steel and ordinary cast steel? Are circular and cross cut saws made of silver steel better than those made of the ordinary cast steel? A. Alloys of steel with less than one five-hundredth of silver have been made in England for fine cutting instruments, but not known to have come into trade use. Cutlery has been imported from England, and probably made here, under the name of silver steel. The silver part had more relation to the high luster of its finish than to its composition. There are quite a number of grades of cast steel suitable for the various kinds of tool making. Saws are not made of the highest grade, as they require to be tough and elastic.

(2) W. M. asks: Can the bone of an ox be softened to such a degree by boiling with steam of high pressure that it may be crumbled by the thumb and finger like a boiled mealy potato? If so, please state how great the pressure must be, what the temperature must be, and how long must it be used. Please inform me of the best cement for cementing a patch on a rubber boot? A. By using superheated steam at a temperature at which the bones will not become charred or burnt, you can accomplish your purpose. See article on page 71 of SCIENTIFIC AMERICAN for Feb. 2, 1884, on "Two New Processes for Making Artificial Ivory." For cement see rubber cements, on p. 2510 of SCIENTIFIC AMERICAN SUPPLEMENT, No 158.

(3) J. S. writes: An expert in this city claims that a copper ball perfectly air tight, used as a float in hot water, will in time fill with water and sink, and still be air tight or not leak. Some of us can't see it; won't you give us light? A. Floats that are called air tight are not always tight, especially if there is any pressure upon them. Thus floats have been used in steam boilers, and are now occasionally used in France for low water detecters. They are not reliable. They may be absolutely tight when first put in, but do not stay so. The hot water and steam has a disintegrating effect upon the joints, and the pressure in time fills the float with water. If there is no pressure, as in a hot water tank, the heat of the water expands the air upon the inside of the float, producing pressure, which will let out the air through a leak that does not otherwise show. When the water is cold, there is a corresponding pressure inward which carries in a little water. Repetition of this process soon fills the ball.

(4) C. L. B. writes: 1. I wish a power for a small mill, and I would ask if it is advisable to run it by sand power? A. We do not think that sand storage power is as yet practicable. 2. Which is the best—the vertical or horizontal flouring mills? A. The horizontal mills are considered best. 3. Which is the best—an upper or under running stone (I mean portable mills)? A. The under running stone is considered the best. 4. Should cogged gearing be greased or run dry, such as a thrashing machine horse power? A. All quick running gearing runs better and lasts longer if greased.

(5) D. R. W. & Co. write: Can you furnish us with information for building oven for japauning iron castings? If there is any work in print treating on the subject, please let us know, and we will send price. A. We know of no practical work devoted to the subject of japanning. For japanning you will require from 240° to 260° temperature. The ovens are usually made of brick for safety, and heated by an iron flue or stove pipe passing around the room, the fire being upon the outside. Some place a heater (such as is used for dwellings or stores) in a chamber below the drying room, arranged to let the hot air pass up into the drying room. There should be no communication between the hot air chamber and the open fire that could possibly admit the vapor of the varnish to the fire. Steam is also used in coils of iron pipe laid around the room. It needs a pressure of from 60 to 80 pounds in the coils to make a useful temperature.

(6) L. F. writes: I have been trying to make butter color, according to the receipts you give in SUPPLEMENT, No. 316. After carefully following your direction I have been able to impart but a slight tinge to the olive oil I have been using. Can you suggest any improvement in the process, and thus help me out? A. We are unable to assist you in your difficulty. Both the annatto and turmeric are substances capable of imparting their color to oils and butter, when treated in the manner as described, and we fail to comprehend why they do not act in your hands. Perhaps, by using a larger quantity, the desired result will be accomplished, or it may be that the heat is not continued for a sufficient length of time.

(7) H. G. K. writes: I have bought two lenses, with which I wish to make a telescope. They are a double convex lens for object glass, about one and three-eighths inch diameter with focus of about 72 inches, and a plano concave lens for an eye piece about five-eighths inch diameter and 1·1 inch focus. 1. How far should I arrange the lenses from each other? A. Place the concave lens the distance of its own focus *within* the focal point of the convex or object lens. 2. What will be the magnifying power? A. The power will be the focal length of the object lens in inches divided by the focal length of the eye lens in inches, or 65 times. 3. Does not the concave eye piece make the object smaller, and as I have a double convex eye piece yet of about one inch focus, would it not be better to use that? A. You can use the double convex eye piece by placing it its own focal length beyond the focal point of the object glass. 4. What would be the magnifying power then? A. Power as above, or 72 times. 5. When it is said that a telescope magnifies 100 times, does it mean that it makes the object ten times higher and ten times wider? A. The magnifying power means diameters, or 100 times wider and 100 times higher.

(8) C. S. H. writes: 1. We have a phrenological bust that has become much soiled from dust, etc.; the faculties are all labeled. How can I cleanse it? A. Of stearine and Venetian soap, each two parts; pearlash, one part; the stearine and soap cut small and mixed with 30 parts of solution of caustic potash, boiled for half an hour, stirring continually. Add the pearlash dissolved in a little rain water and boil a few minutes; stir until cold and mix with more lye until it is quite liquid; keep well covered up. Remove all dust and stains from the plaster, and apply the wash as long as it is absorbed. 2. Some old putty has discolored my new nickel plated irons. How can I remove the color? A. Polish the nickel with a little rouge; first however apply alcohol or ether to remove the oil contained in the putty stain. 3. Can cider be kept in glass cans or jars, if put in when cider is new, and kept well sealed? A. If hermetically sealed, cider will keep. The addition of pepper seed and other spices is sometimes desirable.

(9) A. L. writes: Can you tell me where I can find directions for making plaster casts, say of a head, arm, or foot, from the living subject? The trouble is with the moulds. A. We donot know of any work treating of plaster casts. It is not difficult. Use boiled linseed oil to keep the work from sticking together. So divide the subject that each section will draw off when set. This is the principal feature of the art. Ordinary putty, made soft by the addition of a little linseed oil and working, answers for a bed or stop when a half mould is to be started. For instance, a hand may be laid flat upon the soft putty and partially embedded, so as to be even with the parting lines; then raise a thin wall of the putty or a piece of tin around the hand to keep the plaster from spreading, then pour the freshly mixed plaster upon the hand. The plaster should be just thin enough to pour easily; a few trials will enable you to make the best mixture. In a few minutes it will set, when the hand can be lifted from the putty and the mould taken from the hand, trimmed and gauged or doweled by making a few countersunk holes on the flat part outside of the band for steadying the opposite mould; then oil well the mould and the hand and lay the hand in the mould, upside down from its original position; put the piece of tin or a wall of putty around as before, and pour in the plaster; allow to set, then part the mould and let it dry. Then oil the inside, thoroughly put together, and tie with a string; it is then ready for the final cast, which we think will be clear to you. To cast a face or head is much more difficult. The hair requires to be laid smooth with a mixture of lard and tallow, so as not to stick to the plaster, a tube for the nostrils to facilitate breathing. A front face can sometimes be taken in a single cast. It will be safer to become familiar with other parts of the body, as the hands, feet, etc., before attempting a face. When you are ready to try a face, commence by sections, as a quarter side, chin, and mouth, and in this way learn to combine the parts.

(10) P. J. N. writes: I have a very old superior violin. In having it somewhat repaired, the ignorant repairer also, thinking, I suppose, to add to its appearance, gave it a coat of bright red dye, and then of varnish, not thereby injuring the tone, but completely spoiling its looks. I have removed the varnish and dye from it, and wish to recolor and varnish it again. Will you please inform me what dye I shall use (some dye commonly used for such purposes)? Also what varnish? A. We would recommend you, if the instrument is a valuable one, by all means to put it at once in the hands of some competent violin repairer. An excellent brown can be prepared by putting 2 ounces dragon's blood, bruised, into a quart of oil of turpentine; let the bottle stand in a warm place, and when dissolved steep the work in the mixture. If this be too dark colored, it can be diluted by using a larger amount of the oil of turpentine. The formula for a suitable varnish is given in answer to query 3, in our issue of March 8, 1884.

(11) A. McK. asks (1) how to lay thin veneers on lumber one-eighth inch thick. A. A good manner of laying veneers on thin work is by clamping with screw clamps or weights between two planks dressed flat, with paper each side of the veneered parts to prevent sticking. 2. A receipt for making a good liquid glue. A. Liquid glue—4 ounces hard glue, 16 ounces acetic acid; dissolve by soaking and heating. Spaulding's glue is supposed to be ordinary glue dissolved in good, strong vinegar. Another way is to add a little pyroligneous acid to a thick solution of glue and water.

(12) S. B. G. complains that ever since enlarging his well the water has tasted bad during the hot months, although previous to the change the water was pure all the year round. A. You have not given us the essential facts in regard to your well. You say that before you enlarged it the water was good during the hot months. Did you put a wooden curb in? If so, was it oak or pine? Does it taste of rotten wood, or of decayed animal matter, or fishy from minute insects or animalcules living in the water? Possibly the well is so large that there is both vegetable and animal growth in the water. Small animals sometimes are drowned in wells without being noticed, having lodged in the stone work. Frogs are known to taint wells where the upper part is loose. A trout in a well will often keep it clear of small water insects and larvæ.

(13) W. C. S. asks: 1. What metal or alloy must I use to secure the greatest and most rapid expansion and contraction when exposed to the flame of an alcohol lamp or gas jet, and afterward allowed to cool off? A. Zinc expands most, but does not return to its original dimensions. Brass is probably the best metal for your purpose. 2. The length of the piece to be used being about one inch, of what shape and thickness should it be to reach the desired end? It must be capable of standing the heat of the flame for a considerable length of time. It must not melt. A. A cylindrical tube would probably be best. 3. Where can I find the best information concerning the expansion and contraction of metals? A. Consult any work on physics.

(14) F. W. W. writes: 1. A common hard coal base burner in sitting room of dwelling house here, on being touched by the finger of a certain person, gives a spark one-eighth to one-quarter inch long. No unusual conditions surround either stove or person, but stove will not give spark to any other person, and person cannot get spark from any other stove or object, and only from this one when temperature is 20° or more below zero. A. This phenomenon is common in houses warmed by furnaces, and in other dry houses. The friction of the feet upon the carpet is sufficient to generate enough electricity to yield a spark which will light gas and give a perceptible shock. The persons who could not produce the spark had something about the clothing or person which dissipated electricity as fast as generated. 2. A freight engine, Denver & Rio Grande road: In cab an iron brace passes within a quarter of an inch of a screw head in wood of cab; brace touches boiler; screw touches nothing but wood. Passenger engine on same road: Brass message hook screwed in wood of cab, entirely insulated from any metal; hook has spring guard over it to keep messages on it; point of hook and guard a quarter of an inch apart; both touch no other metal. Now, in both engines a spark can be seen between brace and screw head and between hook point and guard, when steam is escaping rapidly from the popper or safety valve in dome, and at no other time. Temperature has no effect in this case. A. A form of electric generator has been devised which operates by a jet of steam. The locomotive in these cases was an electric generator of this class.

(15) F. E. C. asks: 1. Is one 1½ quart gravity battery sufficient to make a dining room bell ring? A. Yes, provided the bell is adapted to the current. 2. Is not a bisulphate of mercury battery, the negative substance being a carbon cell, one of the strongest one fluid batteries? A. Yes. 3. Could a small boat (say two feet long) be run by about three bisulphate of mercury batteries, which are about two inches in diameter and the same in depth? A. Not very successfully. Better use a bichromate battery. 4. Could I make a small dynamo (for giving shocks) cheap, and about how much wire would it take for coils? A. A small dynamo is not well suited to your purpose. Better make a magneto. There is no way of making a good machine cheaply. Wind enough No. 36 wire on your armature to give it a resistance of at least 200 ohms. 5. In making a gravity battery, which is the best—to have the zinc or copper plate the largest, or to have them the same. A. The copper plate should be fully as large as the zinc. 6. I have a number of carbons such as are burned in the arc lights; would they be any better (after the copper is filed off) for the negative plate than copper in any of the sulphate of copper batteries? A. No.

(16) E. E. R. writes: The following questions have been discussed here by several mechanics; no two agree; please give formulas. There are a number of us take your paper from our book store. 1. If you have an engine of 60 horse power with a cage speed of 600 feet per minute, what load will it lift from the bottom of a shaft, and what will it haul up an inclined plane with a gradient of 1 in 3? A. The weight lifted, 3,300 pounds, and on the incline 9,900 pounds, less friction of plane, but this assuming that the power is 60 horse power net; that is, delivered at the rope. This weight includes weight of rope and cage and appurtenances. There should be some deduction for friction of rope and cage. 2. If you have an engine 12x24 on first motion, with a drum of 10 feet diameter, 40 revolutions per minute, 70 pounds steam pressure, how much will it lift from the bottom of a shaft 250 feet deep? A. Assuming 55 pounds average net pressure on pistons=30 horse power net with conditions same as above, 792 pounds weight. 3. If you have an engine 12x24 second motion, geared with a 12 inch pinion to a 5 foot drum, how much will it lift from the bottom of a shaft 220 feet deep? Of course you can assume speed and steam. A. Assuming pressure on pistons and speed of engine same as No. 2, power=30 horse power with conditions same as No. 1, 7,717 pounds; but from this must be deducted the allowance for friction of 2 inch motion shaft and gearing.

(17) J. N. W. asks for a receipt for making "off color" diamonds appear perfectly colorless. There is a receipt. I think it is a mixture of Prussian blue and alcohol, but I do not know what quantity to use; can you tell me? A. Diamonds having a yellow hue are said to be rendered colorless by being dipped into a solution of the aniline violet well known as mauve, violet de Paris, methyl violet, etc. A thin coat remains on the stone, and as violet is the complementary color of yellow, the diamond appears perfectly white or slightly bluish, which renders it still more valuable.

(18) H. C.—The pump will work with hot slops if the packing and valves are *not* leather. If they are leather, make them of rubber or metal. If the pump makes an 18 inch stroke, and 10 strokes per minute, it will discharge 1,000 gallons per hour and will take a horse or mule power to work the pump.

(19) E. B. H. asks how to do japanning on malleable iron. A. Paint the work with the japan varnish and place in an oven heated to 250°. The oven must have *no* direct communication with the open fire, as the evaporation of the volatile spirit of the varnish mixed with the air makes an explosive compound. Use a furnace outside of the oven, with the pipe passing around the oven. Make the oven of brick or iron. If you have steam at 60 pounds pressure, you can make a steam coil on the bottom of the oven answer your purpose, which is far safer than a stove.

(20) S. O. H. asks: 1. Will a boiler 9 feet 6 inches long, 48 inches diameter, with 120 2-inch tubes, and with a good draught, furnish steam for a 17 horse power engine? A. Yes. 2. We now run a boiler 19 feet long, 48 inches diameter, two flues 16 inches diameter—which of the two boilers consumes the most fuel? A. We think the tubular boiler would prove most economical, provided you have good water. 3. We have a steam pump with steam cylinder 13x14 inches, water cylinder 8 inches, suction 5 inches, and it draws water 25 feet. discharge pipe 4 inches, with lift 170 feet high, 50 strokes per minute, 40 pounds steam pressure of piston. What horse power, does the pump exert? A. About 7⅛ horse power, depending somewhat on arrangement of pipes and the friction.

(21) M. R. S. asks: Can you explain to your readers the operation of the storm glass? The larger tube appears to be nearly filled with alcohol and camphor, leaving a small air space. The instrument certainly indicates, to some extent, approaching changes of weather. But how can it do this, when it is hermetically sealed? It is affected, somewhat, by heat and cold. A. No satisfactory explanation of this phenomena has ever been given, so far as we know. It has been suggested by certain English authorities that electricity was the means of effecting the changes in the solution.

(22) L. McN. asks for a receipt for making an infusible cement that will stand a great heat without crumbling or falling off, as I want to line a hot blast gas furnace with it. Also a receipt for making crucibles that will stand the intense heat of the hot blast gas furnace. I would like the cement to be non-conducting. A. A good fireproof cement is given in answer to query 58, on page 28 of the SCIENTIFIC AMERICAN of January 13, 1883. The black lead or graphite crucibles will be found most suitable for your wants. The composition of these is 52·6 per cent of carbon, 45·4 of earthy matter, and 2·08 of water. The earthy matter used is fire clay.

(23) F. A. L. asks for a receipt for a good, lasting, cheap perfume. I have tried several cologne receipts, and find all too expensive. The following is quite cheap, and will, we think, meet with your approbation: Mix 1½ fluid ounces oil of lavender, ½ fluid ounce oil of rosemary, 1 fluid ounce oil of lemon, and 20 drops oil of cinnamon with 1 gallon alcohol.

(24) J. M. R.—The following are both French polishes: 1. Shellac, 3 pounds; wood naphtha, 3 pints; dissolve. 2. Shellac, 2 pounds; powdered mastic and sandarac, of each 1 ounce. Copal varnish, ½ pint; spirits of wine, 1 gallon; digest in the cold till dissolved.

(25) J. D. asks how to make a good chocolate brown on sumac leather. A. Try the following: Boil equal parts of pine and alder barks in six times their bulk of water until all the coloring matter is extracted, and when cold add a small quantity of alcohol. Saffron boiled for 12 to 15 hours makes a good brown stain, to which alcohol must be added to make it set.

(26) W. H. C. asks (1) how to obtain a bright, glossy polish on a black walnut counter. A. A good black walnut polish is prepared by taking pulverized asphaltum, and put it in a jar or bottle, pour over it about twice its bulk of turpentine or benzol, put in a warm place, and shake occasionally; when dissolved, strain and apply it to the wood with a cloth or stiff brush; should it prove too dark, dilute with turpentine or benzol. If desired to bring out the grain more, apply a mixture of boiled oil and turpentine. When the oil is dry, polish the wood with a mixture of 2 parts shellac varnish, boiled oil 1 part; shake well before using. Apply with a cloth, and rub briskly. 2. Also a bright, glossy polish for a Georgia pine floor. A. For the pine, use white bleached shellac, 3 ounces; white gum benzoin, 1 ounce; gum sandarac, ½ ounce; spirits of wine or naphtha, 1 pint; dissolve. 3. Also a cheap amber color paint to paint the ceiling, which will readily wash off. A. For amber color paint: Mix French yellow in boiled oil, adding sufficient red lead or litharge to produce the desired shade.

(27) H. D. H. writes: We desire to know how to make "liquid gold" for use in china decorating. A. Powdered gold, which is prepared by grinding gold leaf with white honey on a porphyry slab until reduced to the finest possible state of division; this is mixed with thick gum arabic and powdered borax. With this mixture the design is traced on china, etc., and baked in a hot oven. The gum is then burnt and the borax vitrified, and at the same time the gold is fixed on the china.

(28) J. W. L. asks what material white clay pipes are made of. A. The clay pipes are mostly imported, and are largely made in England. It is probable that suitable clay for this purpose is found among the clay beds of New Jersey, but this is used chiefly in the potteries. Pipe clay is of about the same quality as that used for the manufacture of pottery. To burn white, the clay should be free from iron.

(29) G. H. L. asks for a receipt for dyeing the lining of carriages, etc., without removing it from the carriage. Something that could be applied with a brush or sponge. A. Apply an aqueous alkaline solution of aniline blue while hot, with a brush, and then go over the work, using another brush, with dilute oxalic acid.

(30) W. McK.—The width of the English Channel between Calais and Dover is 21 miles.

(31) S. B. H. asks for a receipt for making precipitated chalk, also for stove polish? A. Take 6 parts calcium chloride, 13 parts sodium carbonate, with a sufficient quantity of distilled water. Dissolve the calcium chloride and the sodium carbonate each in 2 pints (Imperial measure) of the water. Mix the two solutions, and allow the precipitate to subside. Collect this in a calico filter, wash it with boiling water until the washing ceases to give a precipitate with silver nitrate, and then dry the product at a temperature of 212°. We give a formula for a paste stove polish as answer to query 7 in the SCIENTIFIC AMERICAN for June 9, 1883.

(32) M. W. F.—The ball is moving at its greatest velocity at the moment of leaving the gun, and its power of penetration is greatest at that point. The friction of the air gradually retards its motion during its flight. No projectile moves in a straight line, but curves toward the earth.

(33) T. S. V.—A receipt for making an oil paste shoe blacking is as follows: Ivory black in impalpable powder, 1 ounce; molasses, ⅛ ounce; sperm oil, ⅛ ounce; sulphuric acid, ¼ ounce; hydrochloric acid, ⅛ ounce; mix the first three ingredients, then add the acid with enough water to reduce to proper consistence. Triturate together until a perfectly homogeneous paste is obtained.

(34) A. J. L. writes: Suppose a two inch (diameter) pulley on shaft is driven six hundred turns per minute by a one and a half inch belt, moderately tight, and the shaft is doing as much work as it can without slipping the belt. How much power is consumed in driving the belt, that is, about how much power is the machine using from a line shaft or other appliance for driving it? A. Nearly one horse power, estimating the lap upon the pulley at 0·4.

(35) O. V. D. writes: I have had a great deal of trouble in hardening small steel pinions, etc.; would be obliged for your advice. How can I harden small articles of polished steel without discoloring or scaling them? A. You do not tell us what your troubles are. To keep the pinions bright, cover them with a little hard soap. Heat in an alcohol flame to a full red, and harden in water or oil. If the alcohol lamp does not heat to the proper degree use a blowpipe, open flame. Some prefer to lay the pinion upon a piece of charcoal in a little groove to keep it from rolling; heat with the blow pipe with alcohol flame, and quickly throw into water. If the pinion is long and slender, it may be liable to spring by throwing into the water. A piece of slender binding wire attached will enable you to plunge it endwise. Experts can do this by making the groove near the end of a piece of charcoal, and tipping the charcoal so as to let the pinion slide into the water endwise.

(36) G. T. E. asks: How can I make brass castings smooth, and without blow holes, and what kind of material should I use to make my mould? A. To make brass castings smooth, mould in very fine sand that has a little clay in it, such as the fine loam or yellow top soil from the prairies. Or better, obtain some fine moulding sand from a foundry, where they have experience in selecting the right kind. Face the mould by dusting finely pulverized charcoal or flour upon the face of the work. Use the sand as dry as will mould without breaking up. If too wet, it will blow the castings.

(37) C. C. M. Works ask: Where is the most successful steam heating company in the United States? A. The New York Steam Heating Company is supposed to be the most successful, as they have supplied steam very steadily over a large district for about three years. There is one in St. Paul, Minn., that claims to have been successful, but we have not heard from them during the past year. There is also one at Belleville, Ill. The Troy, N. Y., Co., have failed, as also the American Co. of New York.

(38) A. S. G. asks in what respect the tremendous wheel illustrated in No. 10 of SCIENTIFIC AMERICAN, used by the Calumet and Hecla Mining Company is superior to an elevator such as is used in a flour mill? A. The elevator bucket system as used in mills, when enlarged to the capacity of the great wheel of the Calumet and Hecla Mining Company, would weigh, with its elevated frame work and guides, more than the great wheel, and would have a great number of loose or working joints carrying successively great strains, which would cause rapid wear and breakage. The friction of this class of machinery is much more than the simple bearings of a single wheel.

(39) J. W. H. Jr., asks the horse power of the following two engines, each having 60 pounds steam pressure: No. 1. 2½x4 inch cylinder, ports ¼x1, exhaust ½x1, ½ inch steam pipe, 300 revolutions per minute, well built, horizontal, and all works easily, rock shaft for steam chest valve. No. 2. Same style as No. 1, but 3x5 cylinder, ¾ inch ports, ¾ exhaust, 60 pounds pressure, 250 revolutions per minute, ¾ supply pipe. You will tell me where I can find rules for calculating the power of engines, the above data being known. A. No. 1. 1¾ horsepower. No. 2. 2⅝ horse power. For rules for finding horse power of engine, see SUPPLEMENT, No. 253.

(40) W. L. S. asks: 1. Where can I get a copy of the U. S. statutes in regard to the inspection of river steamers, licensing of masters and engineers for the same, etc.? A. Apply to the Steamboat Inspectors, or write to the Treasury Department, Washington. 2. Is it good practice to use a spring, such as a pair of spring scales, on the lever of a safety valve? A. No; not except specially fitted for the work.

(41) R. O. F. writes: We have a question in dispute. We lately read an article about a rat that had got into the machinery which generates the electric light for a large Chicago firm, and by placing his forefeet on one of the dynamos and his hind feet on the other caused the current to pass through his body, killing him instantly and at same time forming a short circuit which immediately extinguished the lights; it also stated that they could get no light until the rat was removed. Now, we desire to know if this is a fact? A. We doubt some parts of the rat story. The current might kill a rat, and the rat might possibly form a connection between two wires sufficient to start an arc and thus stop the lights on the circuit, but the rat would be rapidly cremated.

(42) O. W. asks the receipt for making cement pavement. A. Cement pavements may be made with Portland cement, broken stone, and sand. If for foot walks, 3 inches in depth of small broken stone may be rammed evenly upon the earth bottom. Mix Portland cement and water to the consistence of cream and pour over the surface, spreading with a stiff broom. When hard, spread with fine gravel mixed with cement and water 1½ to 2 inches deep. Then a coat 1 inch deep of sharp clean sand (such as is used for making mortar), mixed with equal parts of Portland cement, with enough water to make the mass like mortar. Lay evenly and smooth. This will set strong enough to walk upon in from 1 to 2 days. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 33.

(43) G. H. W. asks: 1. Will the dynamo machine described in SUPPLEMENT No. 161, run one of Edison's incandescent lamps (8 candle power)? A. No. It will run three 3 candle lamps, however. 2. If it will not, is the machine powerful enough to store, during the day and night, sufficient electricity to maintain three or four of the above lamps during the evening? A. It is rather small for the purpose, but it might do it. 3. Should the armature of the dynamo machine be wound with coarser or finer wire than No. 18, to give the best results with the storage battery? A. Coarser. Try 16.

(44) W. F. S. asks for the composition of the wax used for engraving relief line maps. Or refer me to a work on wax engraving. As I understand it, the wax is spread on copper plates. The engraving is made, the wax and the electrotypes made direct; but I do not know the kind of wax used. A. Paraffine is used. If required of dark color, melt and thoroughly mix a little fine lamp black, or, what is better, the bone black from the artist furnishing stores. Some use asphalt and beeswax. Asphalt will also mix with the paraffine and make a very tough wax.

(45) P. H. W. asks: Suppose a rifle ball be shot directly downward to a target 50 feet below, leaving the muzzle at a velocity of 1,200 feet per second, and another ball sent vertically upward (starting with the same velocity). Will the force of gravity cause the first to reach its target in any less time than the other, the distance being the same? If so, why do we give to the gun sight less elevation when shooting at an angle downward than when shooting at an elevated target? No practical sportsman, standing on the bank of a river 30 feet high, would elevate his sight to shoot at game on the water at one hundred yards distance. A. The ascending bullet would be retarded by gravitation, while the descending one would be accelerated by gravity, and would reach its target first. Be-

cause, when firing downward the bullet is accelerated by gravity, and the trajectory will be a smaller curve than in horizontal firing, requiring the breech sight to be low. When firing upward, the bullet is retarded by gravity, making the trajectory a greater curve than in horizontal firing, requiring the breech sight to be high. In shooting at game on the water, however, it is necessary to aim under the bird, as there is an optical illusion.

(46) W. A. G. asks: Are there any coal gas machines that are small enough for one or two families, and what price? We have here good coal for $1.75 per ton. A. We have not heard of any coal gas works or machines for a few lights. Naphtha and oil gas machines are made of suitable sizes for factories and hotels. Air gas machines, made by vaporizing gasoline and mixing the vapor with air, are numerous in this market, and of suitable size for small establishments.

(47) C. C. H.—For a durable drive way, a bed of asphalt and coarse sand two or three inches thick, laid upon a well rammed bed of broken stone three or four inches thick, is the best. A concrete bed of Portland cement and gravel laid upon broken stone is also good. The tar from a gas house, mixed with sand and laid upon broken stone well rammed and covered with a thin coat of loose sand and rolled, and given a few days to dry and harden, makes a very cheap drive way.

(48) C. E. De P. asks: 1. Where can I obtain the monoxide of copper, or how can I prepare it? I tried to do it by precipitating a solution of sulphate of copper with a solution of potash, but the precipitate instead of being black powder is a green insoluble substance. What is the trouble? What is the cheapest way to get it? A. Copper monoxide is prepared by calcining metallic copper at a red heat with full exposure to air, or, more conveniently, by heating the nitrate to redness, which then suffers complete decomposition. 2. What is the process of coloring kid gloves? What is the coloring material that is used? A. The gloves are generally stuffed with cotton, and the coloring matter applied by means of a sponge or cloth. 3. How can the gloss be best removed from photographs before coloring? A. To accomplish this, rub the picture with a little finely pulverized pumice stone, applying it by means of a buff badger.

(49) B. W. asks: Will a 4 inch pipe draw any more water out of a reservoir running down a hill 400 feet, than it will running down 33⅓ feet, each having same head over mouth of pipe? A. We understand you to mean the head above the point of delivery; if this is correct, your 400 feet of pipe would deliver slightly less than pipe 33⅓ feet.

(50) S. P. B. writes: In No. 6, SCIENTIFIC AMERICAN, vol. xxxii., of 1877, your paper gives a notice of the building at that time of a "two foot cheap railway," between Billerica and Bedford, N. H. Did this road prove a success? What is its capacity in freight? A. This road, proving unsuccessful, was abandoned.

(51) C. B. U. asks: 1. Can the string of a piano be made to vibrate hard enough to endanger its strength by *continually* striking its key note on some other instrument near by. Again, can a bridge (suspension) be made to vibrate by striking its key note on a musical instrument near it, so as to endanger its strength? A. The induced vibration of the string of the piano would, we presume, in time be sufficient to endanger its strength, although it will be less in volume than that from the strings of the initial instrument. Theoretically, yes.

(52) A. D. H. asks how to remove pimples from the face. A. The removal of pimples depends largely upon a correct diagnosis of their condition and a knowledge of their cause. Therefore, we would recommend consultation with a competent physician in regard to your difficulty. A receipt for the removal of comedones is given on page 52 of the SCIENTIFIC AMERICAN, for January 28, 1882.

(53) R. B. asks: 1. If the pressure per square inch of a boiler is 90 pounds, will the pressure in the water glass be 90 pounds per square inch also? A. The water gauge glass should and does have the same pressure as the boiler per square inch. If not, something is wrong. 2. Does an engine of 10 horse power with 9 in. stroke take more steam than a 10 horse power engine with 12 in. stroke? A. A 10 horse engine should take the same quantity of steam at 9 in. or 12 in. stroke. The diameter of the cylinder should vary inversely as the stroke for the same power. 3. Will a box of an engine that knocks because it is too loose become heated? A. A knocking box will be more liable to heat than a properly fitted box, the knocking having a tendency to throw out the oil and make the box dry. 4. Will a large shaft heat quicker than a small one, running at the same speed? A. If you take simply the weight of the two shafts into consideration, the large shaft will heat more quickly than the small shaft at same speed, because it has a greater weight, and contact surface rubs at greater speed. If, however, the shafts sustain considerable weight, so that the difference in the weight of shafts themselves becomes an unimportant factor in the problem, then the conditions are changed, and the smaller shaft will heat more rapidly than the larger, owing to the greater weight per square inch of bearing surface upon the former.

(54) A. W. asks if a Plante storage battery consisting of 40 pounds of sheet lead, having 7,000 square inches of surface, is capable of running one incandescent lamp for one hour? A. The battery referred to would run a small electric lamp for an hour. It would not, however, run one of the ordinary high resistance lamps.

(55) R. M. asks: 1. Whether "rotten wood ashes, principally from beach and sycamore," are valuable as fertilizer on red clay land, in which there is a mixture of gravel? A. Wood ashes are always valuable as fertilizers. 2. Would the refuse of a lime kiln having been exposed to the weather for a long time have value as a fertilizer? A. The lime kiln refuse is good in itself, and better mixed with muck. 3. My wife fails of success in using the bread recipe of "S. H.," in the SCIENTIFIC AMERICAN of Feb. 2, 1884. Is anything left out in the published recipe? A. The recipe of S. H. is the old-fashioned "salt rising," where yeast is not at hand. It is the production of yeast and bread sponge at the same time. If the conditions are observed and the flour is good, there need be no failure.

(56) S. R. writes: 1. What is meant by the pitch of a toothed wheel? A. The pitch line of a wheel is the circle upon which the pitch is measured. The pitch is the distance between the centers of the teeth upon the pitch line. 2. And the simplest way to take the pitch of any wheel? A. In properly constructed teeth the pitch line should be seven-tenths of the distance from the bottom to the top of the teeth. Thus, seven-tenths of the depth of one tooth multiplied by two, plus the diameter of the wheel at the bottom of the teeth, is the pitch diameter. This sum multiplied by 3·1416 gives the pitch circumference. This sum divided by the number of teeth gives the pitch. 3. Is it practical to line a horizontal engine without taking the piston out of the cylinder; if so, the best way to do it? A. It is practical to line a horizontal engine without taking out the piston, but it requires a practiced eye to work with outside lines. Lay a line over the center of the piston by plumbing down to center of head and rod; another line at the side of the piston on a level with the centers of head and rod. Measure your centers from each line, and set shaft and crank pin—the engine bed being first made level both ways, and the shaft bearing centers also made level with your center alignment.

(57) G. H. E. asks: Why are not dry gas meters used in place of wet ones? A. The dry meter is now the standard meter used by the great gas companies. The wet meter requires much care, and is liable to freeze in cold weather.

(58) E. Le D. asks how to clean nickel plated goods, so as to keep them bright? I have an Albo carbon cluster light (gas) in nickel, and I suppose the heat keeps it dull. A. Too much polishing with powder will soon destroy the nickel plating. Wipe thoroughly with a cloth moistened with kerosene oil as often as necessary. Occasionally add a little whiting or chalk to the cloths. If any parts are not burnished that require to be cleaned, a small brush with chalk and soap water will make the work quite clean.

(59) W. A. M. asks: 1. If an engine with an oscillating cylinder 1½ in. bore and 3¾ in. stroke would drive a boat 12 ft. long by 2 ft. 9 in. beam? A. Probably about 5 miles per hour, if the boat is of good model. 2. What size boiler would suit the above engine? A. Boiler should have about 43 sq. ft. fire surface.

(60) J. F. H. asks: Which of the two exhausts do you consider the best—a single or double nozzle—for a locomotive, or in fact for any kind of double engine? If you have preference for either, will you please state why? A. If strong draught is required a single nozzle is best, as it can be central to the chimney, but it must be borne in mind that with one nozzle, for exhausting from two engines, whatever be the back pressure produced, it affects *both* engines more than a double or twin nozzle.

(61) F. W. C. asks: Will a 3 in. pipe 50 rods long supply sufficient water for 2 rams, one using a 1 in. feed pipe, one a 2 in. feed pipe? A. What head is there on the 3 in. pipe, or how high is the reservoir which receives the water from brook above that which supplies the ram? If this is 8 ft. or more, 3 in. pipe is sufficient.

(62) W. S. M. asks for a receipt for sticking brass ornaments on to vegetable ivory? A. The following cement, which is recommended as satisfactory in attaching any metallic substance to glass or porcelain, will undoubtedly be satisfactory to you: Mix 2 oz. of a thick solution of glue with 1 oz. linseed oil varnish or ¾ oz. Venice turpentine; boil them together, stirring them until they mix as thoroughly as possible. The pieces cemented should be tied together for 2 or 3 days. See also receipts given on page 131, SCIENTIFIC AMERICAN for March 1, 1884.

(63) J. B. McC. asks if there is a composition that, put on rusty shafting, when taken off will take the rust off with it? A. Dip or treat the shafting with a solution of one part of sulphuric acid in ten parts of water. On withdrawing the articles from the acid solution, they should be dipped in a bath of hot lime water and held there until they become so heated that they will dry immediately when taken out. Then if they are rubbed with dry bran or sawdust, there will be an almost chemically clean surface left, to which zinc will adhere readily.

(64) W. H. H. asks: Can you state the name of the vessel which first crossed the Atlantic between England and America by steam? A. The American steamer Savannah went from Savannah, Ga., to Liverpool in 1819. This was the first steam propelled vessel to cross the Atlantic.

(65) S. E. asks: What is the drawing and lifting power of the strongest magnet? A. You do not say whether you mean permanent or electro magnet. There is scarcely any limit to the size an electro magnet can be made. Without knowing something of what you require we cannot help you.

(66) B. asks: What is the greatest speed ever attained by an ice boat, and if it attains a greater speed than the rate at which the wind blows at the time it is propelled? What explanation can be given for the fact that boat goes faster than the wind? A. With a twenty mile per hour breeze ice boats have run, on fine ice, at the rate of 70 miles an hour. If you squeeze a suitable wedge between thumb and finger, you will find the wedge to move further and faster during the squeeze than the fingers that impart the movement. On the same principle the ice boat, which is the wedge, may be driven three times or more faster than the propelling wind, when the latter acts against the inclined side or sail of the boat. If the wind were directly abaft, the boat would not go quite so fast as the wind.

(67) J. E. E. writes: 1. I have made one of the dynamo electric machines as described in the SUPPLEMENT, and I am satisfied it will work well if I can get the commutator in the right position. I cannot understand how or when it should change. A. The change should take place when the poles of the armature begin to recede from the poles of the field magnet. 2. How large a machine will I require to produce a light equal to two 4 ft. gas burners? A. A machine three or four times the size of the one referred to should afford as much light as two 4 ft. gas burners.

(68) A. McD. G. writes: I have a Daniell's battery of 4 cells, with which I am trying to do some electrotyping. Construction of the battery is correct, connections all right, and a good current is produced. But instead of a plate of copper, that metal is deposited on the mould in *powder*, which crumbles on being touched. Please tell me what is the matter? A. Try connecting your battery for a quantity current.

(69) H. G. E. asks: 1. What weight per square foot would solid ice 2 feet in thickness sustain, the ice resting upon the water surface? Could a train of cars cross in safety? A. Ice 8 inches thick will bear a weight upon sledges of 1,000 pounds per square foot (Haswell). We have no doubt that ice 2 feet thick will bear a railroad train if the rails are properly laid on the ice. 2. What ratio will correctly give the horse power of a body of water of different heads? A. To compute the power of a fall of water, multiply the volume of the flowing water in cubic feet per minute by 625 (the weight of a cubic foot of water), and this product by the vertical height of the fall in feet. Divide this sum by 33,000 for the horse power.

(70) A. N. J. asks: What form of a solid stands the greatest twisting strain—cylindrical, prismoidal, or other form? A. The cylindrical.

(71) J. M. G. asks: 1. What is a Bunsen gas burner, and how is it constructed? A. A Bunsen gas burner is one that burns with a non-luminous flame. It is often made by slipping a tube 3 or 4 inches long over an ordinary gas burner, and drilling air holes in the tube opposite the top of the gas burner. 2. What kind of a thermometer is used for high temperatures, such as melted cast iron, lead, or tin; and what is it made of? A. Pyrometers are used for high temperatures. See our advertising columns for these instruments.

(72) F. J. H. asks: 1. What the meaning of terms, mounted in tension and arranged for quantity? A. A battery is said to be connected for tension when the positive pole of one cell is connected with the negative pole of the adjacent cell, and so on. A battery is connected for quantity when all the positive poles communicate with one conductor, and all of the negative poles communicate with another conductor. 2. How shall I arrange a bichromate of potash battery for incandescent electric lighting? A. Connect it for tension. 3. What shall I coat an oak box with to protect it from the acid of a bichromate of potash battery? A. You might soak the wood in paraffine. Better use glass jars.

(73) O. A. B. asks: What size and quantity of magnet wire should be wound on a round iron core ¼ in. by 10 in., to make the strongest magnet, for a short time, with a single Leclanche cell, prism form, telephone size? Wind the opposite ends for 2½ in. with No. 24 silk covered copper wire. Let the depth of the winding be about ¼ in. or ⅜ in.

(74) E. A. G. asks: 1. What is the value or strength of exhaust steam as compared with live steam? A. Exhaust steam to have any value as a motive power must escape from the cylinder under pressure, and will detract so much from the efficiency of the engine; but in compound engines, where the exhaust of the high pressure cylinder operates the piston of the low pressure cylinder, a great gain in economy is claimed. 2. If exhaust steam is worked three times in an engine, what is the comparative strength of the steam in the workings? A. It depends altogether upon the manner in which it is worked. We doubt the utility of the third cylinder. 3. From whom could one get a disinterested, yet practical and scientific, opinion of the merits of a newly patented steam engine as compared with other engines? A. In any of our engineering schools you will find persons who would make the required tests.

(75) W. F. L. asks: How the carbon buttons in Blake transmitters are polished? A. You can readily polish the carbon button of a Blake transmitter by using the finer grades of French emery paper. Place the emery paper face upward on a level surface and rub the button on it.

(76) C. W. C. asks: What size pipes should be used to bring 15,000 gallons of water every 24 hours 4 miles under 150 feet head? Want the smallest that would do the work. A. This depends much upon bends in the pipe and smoothness of the bore. We would not recommend pipe less than 1¾ inch diameter.

(77) C. A. W. asks: Can you inform me how the papier mache fruit, etc., as used on the stage is made? Papier mache leaves, fruit, etc., are made by pressing the moistened paper, thick or thin according to the kind of work, in moulds, and then drying in the mould. Moulds should be slightly oiled with linseed oil boiled. Fruit is pressed in halves, and glued together. There is something in SCIENTIFIC AMERICAN or SUPPLEMENT about papier mache.

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

C. P. C.—The specimen sent has no economic value as far as we know, except to dealers in minerals. Their valuation of it, however, would be very low.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

April 1, 1884,

AND EACH BEARING THAT DATE.

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

Air and dust separator, J. P. Anderson 295,969
Animal trap, H. B. Swartz 296,085
Bag holder, P. Cole 296,135
Ball trap, C. F. Stock 296,247
Baling press, A. Johnson 296,014
Barrel lifter and carrier, W. H. Ibelle 296,010
Barrels, casks, etc., head for, P. Moran 296,088
Barrels, manufacture of, C. B. Washburn 296,091
Battery. See Secondary battery.
Bed, folding, A. F. Gue 296,162
Bed, spring bottom camp, W. G. Holden 296,007
Beer chip, B. Ricel 295,944
Bell ringer, steam, A. Cooke 296,139
Belt guide, Moore & Ball 295,932
Bench. See Wash bench.
Billiard cue tip, Thomas & Core 296,087
Billiard cushion, M. Delaney 295,910
Bit. See Extension bit.
Blacking case, G. T. Martin 296,198
Blast furnace, H. Schulze-Berge 296,225
Blind, house, H. S. Davis 296,144
Block. See Paving block.
Blotter, A. N. Sill 299,235
Bolt heading machine, C. S. Seaton 296,073
Book cover, E. S. Getchell 295,996
Books, receipt, check, draft, and similar, W. M. Brinkerhoff 296,122
Boot, rubber, A. O. Bourn 296,119
Boot, rubber, I. F. Williams 296,264
Boots or shoes, last or holder for lasting, J. W. D. Fifield 296,154
Boring machine, Z. C. Phillips 296,053
Box. See Cuff box. Folding box. Safe deposit box.
Box trimming machine, packing, F. Myers 295,933
Brace. See Machine brace.
Bracelet, H. A. Church 299,133
Brake. See Wagon brake.
Brick machine, F. A. Comstock 296,276
Brick machine, traveling, H. Stelzmann 296,082
Buckle, Keys & Lockwood 296,182
Buggy top, J. C. Oliver 296,045
Burner. See Vapor burner.
Butter pail, J. Meserole 296,034
Button, I. G. Platt 296,216
Button attaching implement, J. F. Thayer 295,954
Button fastener, F. A. Smith, Jr 295,951
Button fastening, G. W. Fish 296,155
Cable way gripping device, R. K. Evans 295,915
Calendar and paper weight, combined, L. Keller 296,179
Calipers, W. A. White 296,259
Camp chair and cot, W. H. Bakewell 295,971
Can. See Fruit can.
Cans clean while being filled, device for keeping fish, meat, fruit, and other preserving, T. Levi 296,023
Car brake, J. P. Centner 296,274
Car brake, electro magnetic, H. S. Park 296,211, 296,212
Car coupling, J. H. Beidler 296,114
Car coupling, S. & S. Crocker 295,985
Car coupling, F. J. Hetzner 296,005
Car coupling, C. E. Mark 296,026
Car coupling, Mignault & Dion 296,205
Car coupling, N. B. Sheldon 296,238
Car coupling, I. H. Trabue 295,956
Car, dumping, M. Van Wormer 296,088
Car, stock, L. R. Stiles 296,245
Car wheel and axle, M. Jordan 296,017
Car wheel and axle, S. J. Stevenson 296,244
Car wheel hub, J. V. Hawkey 296,004
Cars, machine for driving endless ropes for the propulsion of street, G. Poole 296,057
Carriage, child's, B. V. B. Dixon 296,149
Carriage top prop block, J. Stanley 296,240
Cartridge loading machine, F. L. Chamberlin 295,980
Case. See Blacking case.
Caster or other article of table service, table, Hull & Yale 296,287
Caster wheel and die for making the same, W. F. Ravenscroft 295,942
Casting mould, electrotype and stereotype, C. B. Cottrell 296,278
Casting pan, electrotype and stereotype, C. B. Cottrell 296,277
Catamenial sack, N. Amia 296,104
Cell cases, manufacture of, Jaeger & Faber du Faur 296,288
Chain and hook, guard, E. Langerfeld 296,022
Chair. See Camp chair.
Cheese curd, device for testing, E. V. Lapham 296,189
Cheese press or mould, L. A. Rites 296,064
China and glassware, apparatus for decorating, H. Schulze-Berge 296,223
China and glassware, applying fusible metallic colors to, H. Schulze-Berge 296,226
Churn, M. McKinney 296,202
Churn, S. C. Pyle 296,296
Clamp. See Drum and cymbal clamp.
Cloak, J. Landesmann 296,021
Clock pendulum regulator, S. M. Terry 296,249
Clock synchronizing apparatus, G. G. Wagner 296,256
Coal dumper, T. Wallwork 296,089
Coat sleeve, C. F. Butterworth 296,130
Cock box for water or gas pipes, stop, A. R. Ketcham 296,181
Coffee substitute and preparing the same, C. Alvord 295,968
Cold drawing rods, etc., machine for, C. C. Billings 295,898
Collar, horse, Tesch & Frank 296,250
Compressible gauge, C. A. Leib 295,927
Cooler. See Water cooler.
Copybook, copy case, and removable copy plate, D. A. Radley 295,941
Corkscrew, A. J. Walter 295,962
Corn cutting machine, green, G. W. Roberts 296,066
Cornet, C. G. Conn 295,981
Corset stay, H. Reily 296,068
Coupling. See Car coupling. Hose coupling. Thill coupling.
Coupling, C. E. Mark 296,027
Crank, J. H. Burks 296,272
Crusher. See Ore crusher.
Cuff box, I. P. Turner 295,958
Cultivator, D. W. Branch 296,121
Cultivator, A. J. Marberry 296,025
Cultivator, W. S. Pates 296,937
Curtain fixture, T. J. Parkinson 296,048
Curtain fixture, G. E. Swan 296,299
Curtain loop, B. F. Burnett 296,127
Curtain pin, J. Day (r) 10,464
Curtain pole ring, J. Berbecker 295,972
Curtain roller fixture, J. Harris 296,003
Cut-off nozzle, C. T. Holloway 296,172
Cutter. See Paper cutter. Sole edge cutter. Straw cutter. Vegetable cutter. Washer cutter.
Dental drill hand piece, J. H. Siddall 296,078
Dipper, G. T. Peters 296,051
Dish, butter, J. D. Lucas 296,293
Ditching machine, tile drain, W. P. B. Decker 295,909
Door and panel work, W. N. Miller 296,035
Door check, F. M. Sears 296,229
Door, ventilating, H. W. Eastman 295,989
Drill. See Rock drill.
Drills, manufacture of, C. Van Haagen 296,254
Drum and cymbal clamp, P. W. Fair 296,152
Educational appliance, A. H. Kennedy 296,018
Electric conductors, binding post for, A. G. Goodbody 296,160
Electric switch board, T. N. Vail 296,253