periment, and is entirely impracticable. 2. If a cannon e placed in an exact vertical position and a ball fired therefrom, would the bail fall back into the cannon's mouth, or where probably? A. The ball will fall ahead of the cannon in the direction of terrestrial motion, according to an answer recently given by Knowledge.

(8) J. A. L. asks: How many cells of Leclanche battery will be required to operate one 8 candle power incandescent lamp? Will an increased numof lamps require an increase in the number of cells? Will it require twice as many cells for a 16 can-dle power lamp as for an 8 candle power? A. It will take about 50 cells of the best Leclanche battery without porous cup. The more lamps the more cells will be needed. For a 16 candle lamp about double the number would answer. They would only light the lampfor a very short period before weakening and needing rest. The proper battery is a large bichromate battery.

(9) J. G. & Co. write: A party has had in use for some time a Ball electric light dynamo, 20 light machine, driven with two 31/2 inch belts from pulleys on each end of dynamo, 13 inches diameter. He is advised to abandon the use of one belt, on the ground that a single belt is ample and that dynamo will run better and not use any more power. He thinks such advice is more in the interests of the owner of the dynamo to secure a steady light regardless of power and life of machine, as it was constructed to be used with two belts, which view is correct? A. We think two helts preferable to one of the same width, as they can be rnn looser than a single belt of the same size. By the use of two belts the strain is divided between the two iournals. The difference between driving dynamos coupled and separated is little or nothing.

(10) W. S. B. asks for a soldering mixture which can be used to solder the terminals of the platinum wire in an incandescent electric light with the copper wires which connect with the dynamo, so that the heat from the platinum wire will not melt the solder. A. A galvanic soldering of copper would probably answer. If the copper wire is of sufficient size, we think ordinary silver solder with borax would do.

(11) J. S. asks how to make a good strong dry sand core for iron moulding, something that can easily be handled without breaking and will come out of the casting easy and without much trouble. A. Dry sand cores for iron castings are usually made with new sand with as little flour paste as will make the core hold together. The less paste, the easier the core is drawn out. Bake the core in an oven, dry enough to brown the surface, but not hot enough to weaken the

(12) T. S. M. asks: What proportion of the water from a spring would a common hydraulic ram raise to a height of fifteen feet, with a fall of three feet, and is it practicable to use a ram with only three feet of fall? Will water flow through a small pipe as fastin proportion to its size as through a large one. or in there not more friction in the small pipe? A. Your ram will atilize about one-fifth the water flowing through the supply pipe. Supply pipe should be from five to ten times the fall, in length, and of a size suitable for the size of the ram. A large pipe has less friction in proportion to its area than a small pipe.

(13) W. V. R. asks a short description of the motion of the sun spots across the surface of the sun, as seen from the earth. A. The sun's axis being inclined to the ecliptic, the sun spots at different times in the year move in a direct line, inclined upward or downward equal to the inclination of the solar axis; while at intermediate times they follow a curved line, downward when the north polar axis is toward us or upward when the south polar axis is toward us, as in the sketches herewith.



(14) C. F. H. asks how to make phosphorized oil. A. Phosphorus is soluble in any of the fixed oils. Dissolve it in the proportion of 24 grains to the ounce, say of cottonseed or olive oil.

(15) D. E. M. asks: Can I make a motor of the same style as dynamo "Siemens," described in SUPPLEMENT, No. 161, of sufficient strength to run a velocipede carrying two persons, and how many cells of the Grenet battery are needed ? A. The motor you refer to would not run such a velocipede. You would need about] 100 Grenet cells to give you one man power in the outer circuit.

(16) A. Y. C. asks: 1. Why cannot compressed air be used as a motor for light vehicles ? A. It is too bulky, and requires too heavy reservoirs to sustain the pressure. It also cools on expansion, there by involving a loss of power. 2. If it can, could no compression be effected by windmill power in portable boxes, to be placed in the vehicles? A. It could. 3. What would by the weight and dimensions of a box of best material to contain enough air, say of 20 atmo spheres, to propel a light carriage to contain two persons, making 6 miles an hour for 8 hours, over an average good road ? A. An average of one horse power for 8 hours could be maintained by a cylinder about 100 in. long and 30 in. diameter, filled with air compressed as you d scribe. The cylinder should be at the lowest estimate, if of steel, three-tenths inch thick. The power would continually run down, of course. 4. How is the "lethal chamber" constructed for the "painless re moval" of animals, as I have some dogs I wish to get rid of ? A. Put the dog in a tight box, with a saucer full of chloroform, or invert a tight box over him and filigit with coal gas. Have no lamp or fire near, for fear of a conflagration. See SUPPLEMENT 476.

been done is derived from somebody's unattested ex- and geological specimens. For ease of polishing, make the surfaces slightly curved. A piece of sole leather drawn and nailed to a board makes a good finisher. using pulverized pumice stone and water on the leather. A piece of felt or heavy woolen cloth, tacked on a board, also makes a good polisher. Use for polishing, oxide of tin, called putty powder by the marble workers. Apply it wet with water to the cloth, so as to saturate the cloth with the creamy mixture. With these crude appliances and plenty of muscle the amateur will develop the characteristics of ordinary specimens.

(18) J. P. S. asks how the preparation own as " beef, iron, and wine " is manufactured. A.

| Ammonio-citrate of iron | 256 g | rains | • |
|-----------------------------|-------|-------|-----|
| Spirit of orange (1-10) | 16 | fluid | oz. |
| Water | 11/5 | ** | ** |
| Sherry wine, enough to make | 16 | ** | ** |

Dissolve the extract of beef in the wine, add the spirit of orange, dissolve the ammonio-citrate of iron in the water, and mix the solutions.

(19) Acoustic.—There is but very little sound produced by the string alone in a violin, which yon can prove by holding a violin string in a vise and stretching it with the hand, drawing the bow. It is the vibrating sounding board that gives volume and tone.

(20) A. D., of East Orange, N. J., writes We have at this place a fire alarm, consisting of a 5% foot tire (steel) of a locomotive driving wheel. It is suspended in a tower and rung with a hammer operated from the ground. It does not sound as loud as is desired, and I would like to know whether the volume of sound can be increased by cutting a piece from the tire. A, The sound of the steel tire will have a much larger volume at a lower tone by cutting. It need be cut only once across, and slightly opened by springing. Find the best point for striking the tire by its tone at different points.

(21) J. C. R asks a good formula for a blue lacouer, such as is used on watch springs, etc. A. Watch springs are blued by heat. You may make a blue lacquer by coloring shellac varnish, made thin with 95 per cent alcohol, with indigo blue or smalt

(22) J. B. asks: 1. A recipe for polishing gun stocks, in which neither varnish nor shellac appears, as they are not allowed. A. Mix boiled linseed oil and turpentine, equal parts, for a polish. Rub the gun stock with a piece of paraffine or clear beeswax. Then rub the stock with a few drops of the polish on a woolen cloth to a smooth surface, and brighten with a dry cloth. 2. How can lead be silvered ? A. By electro-plating, making the anode about three times that required for German silver, and the battery power strong but not too intense. Let there be a good deal of free cyanide in solution.

(23) G. S. asks what is good to put in a tumbling barrel to polish brass and zinc, and how is oxidizing done on brass ? A. Sawdust and pulverized charian are used. Also leather skivings and charcoal. Oxidize brass by exposing for a few minutes to the fumes of sulphur in a close box.

(24) R. S. asks: Is water compressible? For a long time liquids were regarded as being incompressible, but since then researches have been made on this subject by several physicists, and their results have shown that liquids are really compressible. In Ganot's Physics, in the chapter on Hydrostatics will be found an interesting account of the method of determining the compressibility of a liquid by means of an apparatus called a piezometer. Water experiences a compression of 0.00005 part of its original volume. The compressibility of sea water is only about 0.000044; it is not materially denser, even at great depths; thus at the depth of a mile its density would only be about one one-hundred-and-thirtieth greater. For water and mercury it was also found that within certain limits the decrease of volume is proportional to the pressure.

(25) J. A. W. asks: I have an old relay; it is wound to 240 ohms resistance. Can the same (the coils) be used as a motor for small power, such as toys, etc.? (I should say it was wound with No. 34 wire.) If so, how many cells of (one gallon cells) improved automatic battery (bichromate of potash and sulphuric acid) would it require to run it? There is a white substance that creeps over top of my gravity battery jars. What is it, and what use can I put it to? What is the cheapest battery for running a small motor, say for sewing machine ? A. The resistance of the coils is very high for a motor ; in general terms, the more cells you use, the better. Small cells and numer ous are better for your case than a few large ones. The white substance is sulphate of zinc; it is useful as a disinfectant, but is highly poisonous. For a motor, a large bichromate battery is, all things considered, the

(26) F. W. K.-If the earth should cease revolving, it would slightly change its form, and become a perfect globe, when gravity on the surface at the equator would be somewhat greater than now. As it is, a given weight at the equator weighs more at the poles, as is shown by the increased beat of a pendulum of fixed length.

best.

(29) M. F. S. asks: What will make a urable gold wash for a watch? A. Any gold wash or plating powder is less durable than electro-gilding, and that wears only according to the thickness of the deposit. You might try the following : Wash thoroughly one-fourth ounce chloride of gold, then add it to a solution of two ounces cyanide of potassium in a pint of clean rain water; shake well, and let it stand until the chloride is dissolved. Add one pound prepared Spanish whiting, expose to the air till dry, and then ake into a paste. In applying, rub it on the surface of the article with a piece of chamois skin or cotton flannel. The surface of the article should be thoroughly cleansed before applying the plating powder.

(30) J. W. asks: 1. Will you give formula for waxing meerschaum pipes, and the process for boiling? A. The bowls of the pipes, when imported into Germany, are prepared for sale by soaking them first in tallow, then in wax, and finally by polish-ing them with share grass. The coloring process as conducted by dealers is secret. 2. How can the coloring for pipes be made to cover the entire pipe? A. This is performed by a secret process, probably using some solvent of nico ine. 3. Is there such a thing as burning meerschaum by smoking ? A. Yes.

(31) G. W. C. asks how to make stain for the soles of fine shoes after they have been buffed A. The most common method of making a red sole look somewhat like oak leather is to damp with a mixture of borax and oxalic acid, made in a rather strong solution, and when nearly dry apply white bottom balls or French chalk; a little chrome yellow is also some times used in addition to the above. Many manufacturers have special stains, intended to be more durable, and to counteract the effect of acids used in making some kinds of sole leather.

(32) E. H. R. asks the average percent of gain in compounding the engine, or what it would be iua $9 \times 12 \times 15$ at 100 pounds steam and 26 inches vacuum. cutting off 16 stroke. A. 15 to 50 per cent, according to perfection of appliance.

(33) J. O. S. asks: How can I polish or varnish piano legs that have become dingy? A. To do such work well is laborious. Clean and smooth the surface well with rotten stone on a wet woolen rag, and follow with vigorous work with a chamois skin. Then to 2 ounces of melted white or yellow wax, add 4 ounces turpentine, and give a good covering coat

(34) M. H. M., Kentucky, asks: What will take burnt grease off of a boiler? A. If the boiler is brass or copper, use oxalic acid.

(35) S. T. S., Newark, N. J., asks: 1. Why does metal, a needle for instance, broken off in iu the flesh, travel to different parts of the body? A. Its movement is due to muscular contraction, produced by various causes and influenced by local conditions. 2. Are the American people, as a rule, thinner than the English or German, and if so, how do you account for A. They are said to be so, and it is probably the reit? sult of the climate. Nervous people are apt to be thinner than others, and the typical American is thin. 3. Please state average weight of English, American, Scotch, German, and Irish people. A. There is no data obtainable to answer such a question,

(36) Miss M. M. G. asks how to make bretzels. A. Take of flour 1/2 pound, fresh butter 1/2 pound, sugar 1/4 pound, add one whole egg, one yelk of egg, some grated lemon peel, and a tablespoonful of eet cream. Mix thoroughly on a paste board, and mould this paste into bretzels or small wreaths, wash them over with the yelk of an egg, strew them with pounded sweet almonds, and bake to a nice yellow color on a baking plate larded with butter.

(37) J. B. J.-If you desire a darker hair dye than that for which we gave a receipt Decem ber 25, use an increased amount of silver nitrate and less of the copper. Experience shows that the dye given produces excellent results.

TO INVENTORS.

An experience of forty years, and the preparation of more than one hundred thousand applications for patents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our extensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broad way, New York.

INDEX OF INVENTIONS For which Letters Patent of the United States were Granted

| I | 71 |
|--|----------------------------|
| Bib, E. F. M. Spies Boller for heating water for bathing or other pur- | 338,967 |
| poses, E. Hosford | 856,271 858,351 |
| Boiler gauge and alarm, automatio, J. Nurn- berger. | 358,289 |
| Boot, India-Tubber, G. Watkinson | 358,016 |
| Boot or shoe heel, J. T. Gray Bottle, E. C. Willis | 358,3194 358,319 |
| Bottle, nursing, R. C. Baker Box. See Packing box. | 358,00 8 |
| Box strap, S. C. Cary Bracelet, I. W. Dillon | 358,255 858 399 |
| Braided trimming, Thompson & Gorton | 358,238 |
| D. R. & W. A. King | 358,358 |
| Bucket, oyster, T. Schmidt | 358.411 |
| Buggy, buckboard, Barager & Long | \$58,010 |
| Burg, C. G. Douge, Jr Burial case, R. W. Gtiffith | 358,347 |
| Burnal casket, S. E. Baker Burner. See Atmospheric burner. Gas burner. | 358,009 |
| Lamp burner. Bustle, E. A. Gilbert | 358,115 |
| Bustle, T. P. Taylor Butter, making, G. F. Williams | 358,130 958,097 |
| Button, changeable. S. E. Smith Button hook, T. B. Hodge | 358,000 358,118 |
| Button, lever, J. Costello Buttons, machine for attaching, A. M. English | 358,384 358,342 |
| Cable hanger, J. A. Barrett Cables, covering for traction, T. E. McCann | 358,140 |
| Car brakes, slack adjuster for, Corson & Crane Car counling J. M. & J. K. Atwood | 358, 337 856 139 |
| Car coupling, W. S. Doan. | 856,190 258,110 |
| Car coupling, O. P. Hix | 358,267 |
| Carcoupling, R. E. Woods | 355,382 |
| Car heating and cooling device, A. R. Chiseim | 858,383 |
| Car seat, G. Harvey | 858,852 |
| Cars, hie-guard for street, A. Rapp Cars, etc., operating bells and indicators in street, | 355,325 |
| Swin & Carr. Carpet fastener, M. B. McCastline | 358,129 358,049 |
| Carriage, W. H. Simmons Carriage curtain fastener, W. S. Dunn | 358,226 358,389 |
| Carriage seat, D. B. Murray Carriages, handle for children's, W. S. Grove | 358,057 358,392 |
| Carrier. See Straw carrier. Cart, dumping, T. J. Flanigan | 356, 192 |
| Cart, road, T. W. Mudgett Cartridge loading machine, H. T. Hazard | 358,404 358,085 |
| Case. See Burial case. Clock case. Map case. Show case. Watch case. | 2 |
| Caster, furniture, L. T. Lawton Casting, mould for, A. E. Outerbridge, Jr | 358,206 358,365 |
| Ceiling, sheet metal or paper, C. B. Niebaus Cement, E. Densmore | 358,406 366,338 |
| Chain wheel, J. M. Dodge | 855,258 |
| chair. Chairs, adjustable foot rest for, J. Hogan | 358,154 |
| Chest. See Flour and meal chest. Chill, J. R. Whitney | 358,094 |
| Churn, H. P. Markley | 358,878 |
| Cider and other expressed juices, clarifying, A. Algoever | 368,320 |
| Cleaner. See Grain cleaner. Clip. See Paper clip. | 5 - TC 7 |
| Clock case, F. E. Morgan. | 858,055 |
| Cloth gigging machine, J. Woelfel | 369,136 356 (MI |
| Coal and other fuel, compound for treating, W. | 358 201 |
| Coal or rock drill, J. Henwood. | 358,006 |
| Samelson | 358,300 1965-050 |
| Cooking vessels, cover for, A. C. Cary | 358,333 |
| Corset, C. A. Griswold | 358,349 |
| Corset and making the same, B. Baldwin | 308,249 358,273 |
| Counter, J. S. Dunlap | oog, U35 |
| Cultivator. See Wheel cultivator. | |
| Cultivator, E. S. & C. R. Brown | 358,013 358,287 |
| Cultivator, W. M. Roberts Cultivator, tongueless wheel, C. A. Brostrom, | 358,073 358,254 |
| Cultivator, tongueless wheel, E. P. Lynch Cultivator, wheel, A. Lindgren | 358,362 366,210 |
| Cultivators, automatic foot for tongueless, R. J. Shawhan | 358,414 |
| Curtain fixture, T. M. Brintnall Cut-off mechanism, automatic slide va ve. M. | 856 ,377 |
| Wilkes | 358,318 |
| Cutting and beveling flexible and elastic mate- rials, apparatus for. Parker & Gunning | 356.067 |
| Cutting double pile fabrics, machine for, J. A. Campbell | 368.614 |
| Dampeners for press copying books, labels, etc Construction of reservoir. L. B. Bertram | 358 327 |
| Damper for stovepipes, chimneys, etc., C. E. | _ |

(17) H. D. R. asks how to polish geologi cal specimens, such as coral, onyr, jasper, and other minerals. A. For amatenr work, an ordinary grindstone angwers the purpose of grinding a facet or surface for showing the texture or crystallization of minerals

(27) C. R. asks: 1. How can I make cotton cloth, such as American drill, calico, etc., Aerated waterproof without painting, or having to spread any-Alarm. thing on it that would damage its texture or softness? Anchor A. See the articles on this subject contained in SCIEN-Annunc TIFIC AMERICAN SUPPLEMENT, Nos. 58 and 317. 2. Annunc There is a freezing mixture composed of sal-ammonia, saltpeter, and common soda. Can you give me the formula? A. Take 8 parts of sulphate of soda, 5 parts Atmosp each of sal-ammonia and saltpeter. When about to use, add double the weight of all the ingredients in Barber's water. Basins,

(28) B. & G. ask : Is there any preparation which will prevent flies and other insects from lighting on and specking windows, etc.? A. Make a strong infusion by boiling smartweed for a few minutes in water. When cold apply it to the glass, and for twenty-four hours it is quite effectual in keeping away flies and insects.

| United States were Granted | Sohn |
|---|--|
| February 22, 1887, | Damper, stove, Blakesley & White \$58,330 |
| | Dental plugs, device for forming, J. E. Low 358,282 |
| | Desk, W. F. Spurgin 358,229 |
| AND EACH BEARING THAT DATE. | Digger. See Post hole digger. |
| | Dip pipe and sealing cup, anti-sealing, E. Linds. |
| [S note at end of list about copies of these patents.] | ley |
| •••••••••••••••••••••••••••••••••••••• | Distilling ammonia, apparatus for, Gruneberg & |
| Aerated water. apparatus for making, W. Raydt 353,165 | Blum 359,195 |
| Air brakes, automatic regulator for, C. A. Bass 358,142 | Ditching machine, T. Willsea 358,179 |
| Alarm. See Gas alarm. | Door and jamb, J. T. Fanning |
| Anchor, J. Tiebout 358,306 | Door opener, electrical, L. P. Summers \$69.417 |
| Annunciator, pneumatic, J. A. Maloney \$58,363 | Door securer, Kirchner & Washburn |
| Annunciator, telphone, J. A. Barrett | Doubling frames, etc., stop motion mechanism |
| Ant trap, W. R. McCallum 358,212 | for, Dixon & Gradwell 858,257 |
| Atmospheric burner, E. F. Gennert 358,345 | Dress supporting device, A. Benjamin 355 372 |
| Automatic washer, L. H. F. Peter 358,219 | Dressmaker's fitting chair, E. Guion |
| Bags, woven fabric for forming seamless, B. C. | Drill. See Coal or rock drill. |
| Hardenbrook 358,265 | Drill, fertilizer sower, and check row marker, F. |
| Barber's chair, E. Berninghaus 358,326 | C. Vibert 358,399 |
| Basins, waste pipe and valve for, J. Demarost 358,147 | Drilling machine, coal, S. Jones 358,212 |
| Basket, folding, J. J. Pes nger 358,295 | Drygoods displayer, R. W. Whitehurst |
| Batt ry. See Electric battery. Galvanic battery. | Dust deflector, E. Wilson |
| Voltaic battery: | Electric bathery, Crocker & Curtis |
| Bayonet, H. H. Conklin 358,105 | Electric battery, Wheeler & Curtis, |
| Bedstead, folding, H. L. Albee 358,161 | Electric battery jar. Curtis & Croeker |
| Bedateed, metal, W. H. Edsall 858,151 | Electric battery, second sry, J.T. Van Gestel 36,663 |
| Berth, swinging or self-leveling, A. P. Bickmore., 358,328. | Electric light systems, switch board for, G.E. |
| Bever, F. E. Witter | Warde |