study, I procured potassium cyanite to remove the same. But the solution being too strong, it left two large erasions, where the greenishness of the cloth is entirely taken away, or in some places but slightly. What should I use to restore the cloth to its former color? A. By the use of the cyanide you have entirely removed the color, and therefore it cannot be restored. A little coloring matter with some alcohol varnish might produce a new coating.

(5) L. P. S. asks how the cold rolled shafting is made. A. By pickling the round iron in an acid bath to free it from scale, and rolling between hard, polished, grooved rollers.

(6) S. A. H. asks how to clean a rubber watch chain that has become brown by or faded by the sun; it was originally black. A. Dip thechainin carbon disulphide. This chemical, however, must be very cautiously used, as it an exceedingly dangerous substance to handle by one not an expert.

(7) J. S. S. asks a rule for finding boiler capacity necessary for heating building where pipe and heaters are in place and radiating surface known? A. One square foot of effectual heating surface in boiler to eight square feet of radiating surface in cold or exposed buildings. One to nine and one to ten, where conditions are less active.

(8) E. E. D. asks when the Greek language ceased to be a living language. A. The so-called ancient forms never died out, but are nearly all found, even in the more cultivated modern Greek of the middle ages. Greek is now, says Geldart, "as really alive as it was in the days of Homer. Modern Greek resembles the ancient language fully as much as current English does the English of Chaucer."

(9) Hatmaker writes: We use a varnish to cover pin holes in cotton cloth and silk which leaves too great a gloss in contrast to the material (black); can you give us a recipe that would answer the purpose better? We use alcohol varnish only, and want a dead color? A. Try the following: Well wash 1 lb. of parchment shavings or cuttings in two or more lots of cold water; then put them into a saucepan or other vessel with 4 quarts of cold water, and let them simmer gently until the quantity is reduced to 2 quarts. Strain through a fine sieve, and one teacupful mixed with 1 quart of water are the proportions used in finishing silks.

(10) S. & F. ask how rubber bands are made. A. Rubber bands are made by cutting rubber tubing into suitable sizes. The process of making the tubing is given in SCIENTIFIC AMERICAN SUPPLEMENT, No. 251, under title of "The India Rubber and Gutta Percha Industries," a series of valuable papers appearing in SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 249, 251, 252.

(11) C. S. asks: 1. In what proportion to take dextrine in place of gumarabic to have the same consistence and the same gloss, etc., as with the latter, for inks, varnishes, etc.? A. The gum is added for the purpose of holding the gallo-tannate precipitate in suspension, and also in order to give the ink a body or gloss on drying, therefore the amount is easily determined by adding the gum until the precipitate ceases to fall. The difference between the amount of dextrine to be used and the gum arabic will be very slight. 2. Receipts for burnishing ink for heel and sole edge polishing? A.

a. Extract of logwood.....1 to 2 ounces.
Tincture of iron.....1 to 2 "
Sweet oil.....1 to 2 drachms.
Diluted alcohol.....1 pint.

b. Extract of logwood.....4 ounces.
Bichromate of potassium.....12 grains.
Ferrocyanide of potassium.....12 "
Rainwater.....1 gallon.

The ink in either case is applied with a brush and immediately burnished with a hot iron. 3. Some authorities on inks? SCIENTIFIC AMERICAN SUPPLEMENT, No. 157, treats the subject of inks quite fully. Spons' Workshop Receipts ($2) contain numerous recipes for the substances mentioned by you.

(12) H. C. asks: 1. What plating battery is the cheapest for gold plating jewelry? A. Better use a Smee battery. 2. Also, how to remove printer's ink from some valuable engravings, without injuring them? A. It cannot be done except in places where a sharp eraser can be used.

(13) R. asks: Why does lightning so seldom strike trains and rails? Railroad men claim that the oiling and greasing of the iron is the cause. Mechanics claim it is the immense quantity of iron, that spreads and weakens the electricity. A. It is probably due to the diffusive effect of the metal of the track.

(14) C. T. writes: I have been building a battery of the cells and covered copper wire belonging to a telephone; the name on the cells is "Leclanche battery;" the wire is the wire which I found running in the walls of a building, and I also got an electric bell. I wound about 300 or 400 yards of the wire on a reel about 6 in. long; the reel is tin for the core and wood at the ends. I connected the wires from the reel to the electric bell, and connected the wires from the bell machine to the cells, two of them, then I connected two wires with handles to the electric bell machine. It will work all right, only when it has been working about ten minutes it gets weaker and again I have got the fine iron wires in the core, but it does not seem to regulate the current. Could you kindly help me out of my trouble, or tell me where the fault is? Is it with the wire all being of one size, or is it with the tin being in for the core? Can you tell me of any back number of the SCIENTIFIC AMERICAN SUPPLEMENT with the full description of building a battery, so I can get one? A. The trouble with your battery is that you keep it on a closed circuit too long. It is probably partially exhausted, and therefore polarizes or "runs down" quickly. The Leclanche battery is not adapted to continuous use, but is very efficient for intermittent use. The coil you have made, if we understand you, is only a primary or magnetic coil formed of office wire. You should have used magnet wire, and to secure the results you seek, you should apply a secondary wire. See article on induction coil in SUPPLEMENT, 160. For information on batteries consult SUPPLEMENT, Nos. 157, 158, and 159.

(15) J. L. B. asks whether a vessel with a centerboard can carry more sail without upsetting than one without, provided there is no weight to the centerboard? A. The tendency of a boat to capsize is increased by the centerboard (if light), by preventing the leeway of the boat on a side squall.

(16) J. B. H.—You could compress about 2,000 cubic feet of air into a steel cylinder 1 foot in diameter and 10 feet long. It would have a pressure of nearly 2,000 pounds to the square inch. A human being requires about 15 cubic feet of air per hour, so this would last three men 40 hours. It would run a 1 horse power engine about 1¼ hours, if the change of temperature caused by the use of the air were otherwise provided for.

(17) C. C. P. asks: When can a person be called a musician? Has a person got to know how to read music at sight before they can be called a musician, or is there such a thing as a natural musician? I had an argument with a lady here, and she claims that you cannot call a person a musician unless they can read music at sight, no matter how good they can play on different instruments. I claim if they are good players on different instruments, they are musicians. Which is right? A. A musician, according to Webster, is "one that sings or performs on instruments of music according to the rules of the art." One may be a good musician without being a *scientific* musician, and we would call anyone who could produce good music a musician.

(18) C. R. C. writes: I intend to build a small steam engine, cylinder 2¼ x 1¼ in. About how many pounds power will it have? How large a boiler would it require, boiler made of ⅛ in. iron? How many pounds working pressure would it stand? How large a fly wheel would engine require? A. It would depend on the construction of the engine, the speed at which it is driven, and the steam pressure. Probably one-third horse power would be a fair estimate, the engine making 300 revolutions under 60 lb. average piston pressure. The boiler should have 4 to 5 square feet of heating surface. If you make the diameter of the boiler small, it will easily stand 75 lb. pressure per sq. in. Your fly wheel should be 10 in. in diameter, and should weigh about 20 lb.

(19) J. E. M. asks how much oxygen gas water will hold in solution, and the best simple means of generating it for office use? A. The coefficient of solubility of oxygen in water at 59° F. is 0·02989, *i. e.*, water will absorb 0·02989 of its volume of oxygen. This is a very small percentage. It may be greatly increased by lowering the temperature. For 32° F. the coefficient is 0·04114. Oxygenated water or peroxide of hydrogen, H_2O_2 is prepared by heating some baryta (BaO) in a current of oxygen, converting it into peroxide of barium (BaO_2). This is powdered, suspended in water, and acted upon by a stream of carbonic acid gas. The water is thus charged with peroxide of hydrogen: $BaO_2 + H_2O + CO_2 = BaO.CO_2 + H_2O_2$. The carbonate of baryta is allowed to subside, and the clear solution of peroxide of hydrogen is poured off. Oxygen is readily prepared by mixing with chlorate of potash one-fifth of its weight of powdered black oxide of manganese, and heating it in an iron or glass retort. The oxygen is conveyed from the retort to the wash bottle by means of a rubber tube. If pure oxygen is required it should be passed through tubes containing potash, to remove any carbonic acid and chlorine which it might contain. Two precautions are necessary in making oxygen; one is to test a small portion of the mixture of manganese and chlorate of potash in an open spoon or ladle over a flame, to see that it contains nothing which would render it explosive; the other is to remove the rubber tube from the retort when the bubbles of oxygen cease to rise in the wash bottle, to prevent the drawing of the water back into the retort.

(20) W. B. asks a good welding compound for cast steel. A. Borax 91 parts, sal ammoniac 9 parts. Pulverize together and melt in an iron pot until frothing ceases, pour out and cool. Then grind in a mortar to a powder for use.

(21) S. E. K. F.—Saw teeth should always be set so as to allow a clearance to the saw. It makes the saw run easier, and prevents heating by the friction. For circular and mill saws there are swedges made that set up the edge of the tooth to give clearance to the blade. The whole tooth does not need to be set out or swedged, only the point.

(22) Subscriber wishes a formula for making red, blue, and purple ink, used for rubber stamps. Also how to make a good hektograph. A. Red.—Dissolve ¼ ounce of carmine in 2 ounces of strong water of ammonia, and add 1 drachm of glycerine and ¾ ounce of dextrine. Blue.—Rub 1 ounce of Prussian blue with enough water to make a perfectly smooth paste; then add 1 ounce of dextrine, incorporate it well, and finally add sufficient water to bring it to the proper consistence. Violet.—Mix and dissolve 2 to 4 drachms aniline violet, 15 ounces alcohol, and 15 ounces glycerine. The solution is poured on the cushion and rubbed in with a brush. For hektograph, see SCIENTIFIC AMERICAN SUPPLEMENT, No. 438, under title of "How to Make and How to Use the Copying Pad."

(23) J. M. B. writes: We have made some "farm bells" out of cast iron, and they don't ring satisfactorily. What is the trouble? What composition should go in with the cast iron to make a good-sounding farm bell? A. Use hard iron, No. 4 or 5. Make the model from a good-sounding bell. The form has great influence on the tone.

(24) C. N. asks, in order to settle a dispute, the course a rifle ball takes after leaving the gun. A. The course of a rifle ball is very nearly a parabola, the curve or trajectory being the result of three forces—the impulse of the gun, the resistance of the atmosphere, and gravitation. You will find a very interesting and mathematical discussion of the whole subject of projectiles, illustrated with geometrical diagrams, in Chambers' "Treatise on Practical Mathematics," pages 348 to 353, which we can mail you for $1.50.

(25) E. W. asks: 1. How can cast iron plates one inch to one and one-half inches thick, eight inches wide, and five feet long, be chilled without springing the chills? The trouble we have met with is that the chill, which we make about four inches thick, expands on the top surface through contact with the hot iron, and throws the ends down, forming an arc of a circle, thus cutting the middle of the castings almost in two. We have also tried to chill these castings for about two feet in the center, and have failed on account of the chill warping and leaving an uneven surface at ends of chill. A. Either make your chill hollow and flow water through it, or make it sectional. 2. Also what is the best work you can name on electricity and electrical engineering? I want to make it a study; understand the elementary principles already. A. Dredge's Electric Illumination, Thompson's Dynamo Electric Machinery, Gordon's Electricity and Magnetism, Maxwell's Electricity and Magnetism. You should also study Faraday's Researches.

(26) G. K., Jr.—Paint sticks to tin that has been exposed to the weather for a short time better than to fresh, bright tin. There is a slight film of oxide formed by the exposure, which prevents the paint from chipping off.

(27) J. F. S. asks the best receipt for solution for the preservation of fruits in a fresh state for exhibition purposes. A. Glycerine has been recommended for the preservation of fruits, previous to eating which, the glycerine should be removed by immersing the fruit in water. Dipping the fruit in paraffine is an excellent means of preserving it. Collodion will probably be found most satisfactory for exhibition purposes. A thin coating of this varnish will entirely prevent the access of air to the fruit.

(28) C. M. asks the best way to mix plumbago and mineral oil, in order that the former may not precipitate, but remain suspended in the oil. A. The only way is to make the mixture so thick and pasty with plumbago that mechanical settlement is practically excluded.

(29) J. G. L. asks how to make a cheap orange stain for birch wood. A. Yellow or orange stains generally result from the use of nitric acid or turmeric. Thus 2·1 ounces finely powdered turmeric are digested for several days in 17·5 ounces 80 per cent alcohol, and then strained through a cloth. This solution is applied to the articles to be stained. Nitric acid diluted with 3 parts of water is likewise used. A hot concentrated solution of picric acid can likewise be used.

(30) G. A. F. asks what to apply to gilt gas fixtures to remove dirt, fly specks, etc. A. Very few chandeliers are gilt; they are burnished and lacquered with yellow lacquer. Take the chandeliers to pieces, and boil in strong soda ley for a few minutes, brush over with a soft brush, pass it through a strong solution of potassium cyanide (a deadly poison), wash through a tubful of boiling water, dry in clean saw dust, wipe up bright with a wash leather, and relacquer. A pale gold lacquer consists of 1 gallon of methylic alcohol, 10 ounces of seed lac bruised, and ½ an ounce of red sanders, dissolved and strained.

(31) C. R. S. asks how extract of malt is made, also quantity that would be a dose. A. Extract of malt is made from the infusion extracted with water at a temperature ranging between 160° and 170° Fah., drained off without pressure, and evaporated to the consistence of honey. It is nutritious and laxative. The dose is a tablespoonful or more, *ad libitum*.

(32) A. J. V. desires a recipe for mahogany stain. A. In order to produce a dark mahogany stain: Boil ½ pound of madder and 2 ounces of logwood in 1 gallon of water, and brush well over the wood while hot; when dry, go over the whole with pearl ash solution, 2 drachms to the quart. For a lighter stain: Put 2 ounces of dragon's blood, well bruised, into 1 quart of oil of turpentine; let the bottle stand in a warm place, shake frequently, and, when dissolved, steep the wood in the mixture.

(33) A. R. R.—For a silvering solution, add 15 drachms crystallized nitrate of silver to 250 drachms water, to which add 30 drachms cyanide of potassium: when dissolved, add 750 drachms of water in which 15 drachms of common salt has been dissolved. Clean the metal thoroughly and dip in a weak bath of nitric acid and water, rinse in clear water, and dip in the silver bath. The silvered wood mouldings are silver gilt, or silver bronzed in the same manner as painters gild and bronze signs and ornamental work.

(34) W. J. L. desires (1) a remedy for removing rough skin from the face, that has been pitted by small pox. A. Use simple oil, pomade, or ointment medicated with croton oil, and of a strength just sufficient to raise a very slight pustular eruption, is probably the safest and most effective and convenient of all the preparations that are employed for the purpose of removing pock marks. 2. One for removing blackheads that appear on the face. A. Cover the parts affected with a pomade consisting of kaolin 4 parts, glycerine 3 parts, acetic acid 2 parts, with the addition of a small quantity of some ethereal oil.

(35) G. S. F. asks: Can a generator be made that will generate gas from 74° gasolene sufficient to supply 12 gas burners? If so, how can it be made and what size will it be, and what is the best kind of material to use to make same, and what shape would it be? A. It requires a great deal of experience to produce a generator for gasolene gas. Almost any device by which air is brought into contact with gasolene, or fibrous material saturated with gasolene, will produce gasolene gas, but the important points are to produce gas of uniform quality and to produce it safely. Our advice would be to purchase a machine from a reputable maker.

(36) P. H. B. asks: Is not a dose of aqua ammonia (diluted so much as not to be impossible to swallow, injurious to the taker, in some way, even while effecting some cure? If so, in what way? Are eruptions on the face and general loss of energy among the hurtful effects? A. Ammonia is simply a stimulant, and entirely transient in its action. It has no cumulative effect. Aqua ammonia is used chiefly as an external application; very seldom internally. If diluted with water to such a degree that it could be swallowed without difficulty, its effect would be slight, and there would be no reason to apprehend danger. Facial eruptions and loss of vital force and energy certainly are not to be charged to it; they are doubtless due to some other cause.

(37) R. M. G. writes: Will you kindly inform me how I can use the dynamo described in your paper as a motor and how many cells of battery I require to run it, and about what fraction of a horse power it will be? A. The dynamo will operate as a motor without any alteration, provided it is properly adjusted as a dynamo. Possibly you may be obliged to shift the commutator a little one way or the other. It will require from 8 to 10 cells of Bunsen or Grove battery to run it. It will not be as economical as if constructed for a motor. More wire on the armature and less on the field magnet would improve it for a motor. The amount of power realized from it depends upon so many circumstances as to make it difficult to say. Probably one-fifteenth horse power.

(38) J. W. C. asks: 1. Where can I get a two cell Leclanche battery? A. From any dealer in electrical supplies. Consult our advertising columns. 2. Can you give me any information in regard to making or wrapping an electro-magnet, and what size wire should I use on it? 2. For description of various forms of electro-magnets consult SUPPLEMENT, No. 182. The size of wire used will depend on the purpose for which you intend the magnet. 3. Where can I purchase electrical supplies? A. See our advertising columns. 4. Where can I get a book on electricity? A. See our book catalogue, which we send you. 5. Are there any directions in any back numbers of the SUPPLEMENT to make a battery and magnets? If so, what number? A. See SUPPLEMENT, Nos. 157, 158, and 159, for articles on batteries, and SUPPLEMENT, No. 182, for magnets.

COMMUNICATIONS RECEIVED.

"Why," by C. S.
"On the New Star in Andromeda," by E. J. P.
"Gulf Stream," by J. C. G.

INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

September 22, 1885,

AND EACH BEARING THAT DATE.

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

Accordion, mechanical, C. Oettel..... 326,773
Adding machine, J. L. McCaleb..... 326,767
Adding machine, R. F. Wilcox..... 326,824
Air brake, W. W. Hanscom..... 326,846
Alarm lock, G. Bredee..... 326,840
Alcohol and hydrocarbons and rectifying and aging liquors, manufacturing and distilling, D. D. Cattanach..... 326,715
Alcohol, hydrocarbons, and acetic acid, and for aging and refining liquors, apparatus for the manufacture and distillation of, D. D. Cattanach..... 326,716
Ash leach, J. H. Moran..... 326,581
Automatic guard or track clearer, H. M. Taaffe..... 326,668
Axes, forming the edges of, H. Hammond..... 326,645
Bag, J. Maddock..... 326,665
Bait, artificial, F. C. P. Robinson..... 326,886
Bale and package tie, I. N. Hopkins..... 326,563
Baling press, J. B. Miller..... 326,579
Ball. See Rubber ball.
Barrel, metallic, J. D. Moran..... 326,669
Bed bottom, spring, J. M. M. Gernerd..... 326,555
Bed, extension, H. B. Pritchard..... 326,918
Bed rail brace, J. Adams..... 326,618
Belt shifter, automatic, F. L. Dow..... 326,633
Belt tightening device, C. S. Wardwell..... 326,695
Bird cage, G. Bredee..... 326,841
Bit. See Bridle bit.
Blast furnace, V. O. Strobel..... 326,804
Bluing, compound for laundry, P. Spence..... 326,601
Board. See Wash board.
Boiler. See Steam boiler.
Boiler furnace, J. Collis..... 326,547
Boiler furnace, steam, M. Coryell..... 326,631
Boiler furnace, steam, F. Leadbeater..... 326,877
Boiler indicator and alarm, J. M. Williams..... 326,699
Book cover or protector, C. Boyce..... 326,838
Boot or shoe nail, F. F. Raymond, 2d..... 326,782
Boot or shoe tip and stud, G. Chambers..... 326,844
Bottle stopper and fastener, C. J. Jordan..... 326,656
Bottles containing aerated liquids and fitted with internal stoppers, apparatus for opening, H. Codd..... 326,630
Bottling machine screen attachment, F. Seely..... 326,679
Box. See Fare box. Folding box.
Box opener, E. Kricker..... 326,909
Brace. See Bed rail brace.
Bracelet, F. F. Tingley..... 326,686
Brake. See Air brake. Car brake. Wagon and carriage brake.
Breast pad, C. L. Morehouse..... 326,915
Brick hack, portable, Walker & Miner..... 326,812
Bridle bit, A. P. Baldwin..... 326,703
Bridle bit, C. E. Heinze..... 326,648
Bull lead, J. C. Covert..... 326,899
Burner. See Gas and vapor burner.
Button and pin, combined, E. M. Chapman..... 326,717
Button locating machine, T. E. Keavy..... 326,567
Button setting machine, F. H. Richards..... 326,786
Buttons, attaching, J. Mathison..... 326,765
Cabinets, etc., self-opening lid for, P. Vandernoth..... 326,810
Canopy, W. M. A. Cole..... 326,849
Capsule joining machine, T. C. Merz..... 326,578
Car brake, W. Bandel..... 326,883
Car brake, H. M. Taaffe..... 326,666
Car brake, automatic, H. M. Taaffe..... 326,667
Car coupling, S. U. Branstetter..... 326,622
Car coupling, E. Howe..... 326,741
Car coupling, O. J. Michaels..... 326,882
Car coupling, A. S. Reeves..... 326,590
Car coupling, J. Skinner..... 326,795
Car, dumping, Talley & Barnes..... 326,807
Car, freight, A. Wolcott..... 326,701
Car starter, C. Dickenson..... 326,855
Car starter, F. Rousseau..... 326,790
Car, stock, Lines & Long..... 326,755
Cars, system for heating freight, A. B. Vandemark..... 326,809
Card, playing, E. Seedhouse..... 326,678
Carriage, S. M. Chester..... 326,846
Carrier. See Trace carrier.