(31) A. W. writes: I wish to become a locomotive engineer, but have had no experience in that direction. What will be the best course for me to pursue? A. If you are a good mechanic, try to obtain a position as fireman, and work your way up. If you have no shop experience it would be well to acquire some before going on the road.

(32) "Wisconsin" writes: 1. I have a stationary engine having an 8 x 20 cylinder that was bored out in good shape 4 years ago, and fitted, as I supposed, with two springs or rings in the piston follower. The engine became less powerful all at once, and on examining the piston I found it was solid, with a groove in the face, evidently intended for common packing. It did good service for one year. I now use hemp packing, and it lasts two or three days only. What should be done? A. From your account we think it would be well to refit the piston, and either put in new rings set by their own elasticity, or add springs to the present ones. 2. Where should a blower for producing an artificial draught be attached, in the smoke stack or under the grates? A. It usually does not make a great deal of difference.

(33) K. K. writes: The ceiling of our cellar is very low, being only about a foot above the top of the furnace, and the draught pipe is between the ceiling and the top of the furnace. The ceiling is lath and plaster. We are afraid that it will take fire some time when the furnace is hot. What remedy is advisable? A. It would be well to interpose a screen of some uninflammable material; but, if the other arrangements would permit, it would be safer to excavate a space in the floor of the cellar of dimensions sufficient to accommodate the heater, and increase the interval between its top and the ceiling by at least 2 feet.

(34) J. C. B. writes: 1. In a recipe for a process of preparing gelatin plates for making stearine relief pictures, I am told to "mix about 3 drops to the 100 cb. m." Is that correct? A. Read 100 cubic centimeters. 2. What is the length of time required for drying the plate before exposure? A. An hour to an hour and a half suffices; but it is better to let it stand a day or more if possible. 3. How should the plate be washed after exposure? A. Use hot water, changing it several times if necessary.

(35) In answer to J. G.: A well built cistern, properly faced with genuine Portland cement, will hold water tight for years. The walls should be laid in cement and, unless quite thick and in a firm clayey soil, faced on the outside as well as inside with the cement. For small rain water cisterns the brick work is occasionally laid in a mixture of equal parts of red and white lead tempered with oil; such require no cement facing, and are very strong. The materials must be dry. Water from such a reservoir must not be used for drinking purposes or in preparing food.

(36) J. S. A. asks how to stain wood in various colors. A. Brown: Concentrated solution of potassium permanganate in water. Red: Boil ¼ lb. of logwood and ½ oz. of soda in a pint of water; apply hot, and then go over the work with strong aqueous solution of alum. Rose: Potassium iodide in 12 parts of water for first bath; as second, mercuric chloride (corrosive sublimate) in 40 parts of water. Indigo solutions give blue washes. Wood dipped in concentrated hot solution of copper sulphate, and then in solution of washing soda, becomes light blue. Verdigris dissolved in 4 parts of vinegar imparts a good green color to dry wood. Turmeric dissolved in wood naphtha produces a yellow wash. Aqua regia (nitro-muriatic acid), when diluted with 3 parts of water, though somewhat destructive, is often used on light woods for a strong yellow.

(37) F. P. H. asks: 1. What battery do you consider best for small electrotypes and also for silver plating? A. Either Daniell's or the gravity battery. 2. Can I make a solution of German silver in the same way as plain silver? A. Treat the German silver as you would treat the metal nickel in making a bath for nickel plating. 3. I have a small Daniell's battery and also a decomposition cell; the battery is composed of a strip of copper, a porous cup and jar. I have been making small electrotypes of copper. I have lately found that the strip of copper has increased in weight, so that now it is about three times as heavy as when I first commenced to use it. What is the cause, and how can it be avoided? A. The formation of metallic copper on the positive pole is a natural result of the proper action of this form of battery. When the electric circuit is closed the sulphuric acid of the sulphate of copper solution, with which the battery is charged, unites with the zinc, for which it has a superior affinity, and thus induces galvanic action, by which the copper of the sulphate of copper solution is deposited on the copper plate or positive pole of the battery. With the arrangement described, we do not know of any positive remedy.

(38) F. M. S. writes: I am constructing an electric bell to be used in connection with a telephone over a wire line about 500 feet in length, over which line I have not been able to obtain any answer by the use of an electro-magnet wound with 50 feet insulated wire, using 1 cell of a gravity battery. Which shall I increase, the magnet or battery power, or both; and how much shall I increase them to obtain a good stroke upon the bell? A. Use four 1 gallon cells of gravity battery, with the magnet that you have.

(39) W. R. asks: What will remove ink from law binding, yellow leather or morocco? A. Filtered solution of calcium hypochlorite in acetic acid.

(40) E. W. asks: 1. How can small castings be nickel plated? A. See SCIENTIFIC AMERICAN, June 30, 1877, p. 408; and April 6, 1878, p. 209. 2. How can I bronze the castings in case I fail to nickel plate them satisfactorily? A. Varnish the castings with clear shellac varnish, and before the varnish dries dust the castings with copper bronze powder.

(41) R. B. R. asks: What is the simplest and least expensive mode of rendering shingled roofs fire or water proof, or both, without causing the water collected from such roof to be injurious or unfit for drinking? A. We are inclined to think that this problem has never been fully solved.

(42) J. L. writes: I have heard that it is beneficial to persons troubled with rheumatism to place glass tumblers under the bedposts of the beds they sleep in. The theory is that the glasses prevent the electricity from escaping. Has the plan any merit? A. It can hardly do any harm; but we are somewhat skeptical in regard to the benefit.

(43) W. M. M. asks how to render light rowboats waterproof along the joints. A. Fill the spaces with (pure) white lead and linseed oil, mixed to a thick consistency, and allow time to dry and harden thoroughly before using the boat. White lead already mixed can be purchased in small tins. If the seams are wide, calk with oakum, driving it in solidly.

(44) F. W. D. asks: How many leaves of gold (such as used by bookbinders) would make a block 1 inch high, if firmly compacted? A. About 160,000.

(45) C. M. B.—The recipe referred to is not satisfactory; lampblack alone is not a suitable basis for blacking, and a large quantity of glycerin is likewise objectionable. The following recipe will probably give better results: Boneblack (best dried from sugar house filters), 30 lbs.; sulphuric acid (commercial oil of vitriol), 2 quarts; strong malt vinegar, 2 quarts; mix and digest; then add with constant stirring coarse brown sugar, 11 lbs.; molasses (average New Orleans), 30 lbs.; sperm oil, 2 gallons. The ingredients must be well commingled by trituration, and allowed to act upon each other for several days before using. If too dry, a little water may be added.

(46) J. C. M. asks: 1. How is dextrin made? A. Commercial dextrin, or "British gum," is obtained by heating dry potato starch to a temperature of 750° Fah., in sheet iron trays or revolving iron or copper drums, similar to those used in coffee roasting, whereby it is transformed into semi-transparent, brownish lumps, which are converted into a pale yellow powder by grinding between millstones. It is completely soluble in cold water, from which it may be precipitated by addition of excess of strong alcohol. 2. Is potato starch the best substance from which to prepare it? A. Potato starch is generally used, but starch from other sources will answer. 3. What are the best tests to ascertain its purity? A. Agitate briskly a few grains of the dextrin in a test tube with fifty times its weight of pure cold water; then set it aside for 10 minutes. Pure dextrin dissolves completely in cold water to a clear solution. If not all dissolved pour off the solution, add a little water to the residue, heat to boiling, let cool, and add a few drops of iodine water; a blue color indicates starch.

(47) J. W. S. writes: 1. If I should construct a battery on the following principles, would it be a success? Take a one gallon glazed crock, put inside a zinc cylinder as high as the crock (cylinder open at one side); then use for porous cup a common unglazed plant jar, used for house plants; have inside the latter a strip of copper; then use around the zinc a solution of salt and water, and with the copper a solution of blue vitriol. A. Yes. 2. For strength of current how would it compare with a Grove's cell? A. It would have about one fifth of the power of the Grove's cell. 3. How many Grove's cells combined, ordinary size, will it require to operate successfully an electric lamp, or a light with carbon points, to be used for purposes of illustration in experiments in electricity? A. From 30 to 50 cells, according to their condition, will give a good light. 4. In diluting acids for battery purposes, how much water do you use? A. About twelve parts of water to one part of acid. 5. How long does a solution of acid last in the Grove battery without renewing? A. About 48 hours, if the zincs of the battery are thoroughly amalgamated with mercury. 6. Which would you advise one to use for experimental purposes, considering expense and usefulness, Grove's or a bichromate battery? A. Grove's would perhaps be the most suitable for your purpose.

Please give a recipe for mending broken glassware. A. Heat the glass and rub the surfaces that are to be united with shellac.

(48) J. W. S. writes: I am building a small steam yacht. It is to draw only about 1 foot of water. I propose using a propeller 1 foot in diameter and 16 inches pitch, but to obtain 6 miles per hour I shall have to run the screw at about 400 revolutions per minute. Will it give good results running so fast? If not, can I use a larger screw and not have it wholly submerged? I do not want it to project below the bottom of the boat on account of running in shallow water. Or, can I increase the pitch without increasing the diameter? A. There is no objection to running the propeller at that speed. You can increase the pitch to 20 inches if desired.

(49) E. H. R. writes: I have an interest book which says that the relative divisor of 12 per cent is 3,000; of 10, 3,600; of 9, 4,000, etc. What is a relative divisor, and how obtained? A. It is the divisor to be used in obtaining the interest for one day, or $\frac{1}{3\,6\,0}$ of a year. Thus at 12 per cent the interest for one day is $\frac{1}{3\,6\,0}$ of $\frac{12}{1\,0\,0} = \frac{1}{3\,0\,0\,0}$.

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

J. A. MCK.—It is asbestos (amianthus), used extensively for boiler felting, fire proof paints, etc. See address of dealers in our advertising columns.—H. L. C.—Minerals not received.—J. W. K.—Principally impure amorphous silica, probably from the decomposition of a soluble alkaline silicate—as water-glass. Not of considerable value unless occurring in large deposits.—L. N.—The syenite contains much iron sulphide—not otherwise metalliferous.—J. E. H.—It contains lime, magnesia, alumina, and potassa, combined with organic acids.—J. K. M.—No. 1 is smithsonite (calamine)—native zinc carbonate—of some value. No. 2 (small specimen) noble or precious serpentine. No. 3 is magnesite—magnesium carbonate.—M. F. C.—It is lenticular iron ore—a variety of hematite.—A. M. K.—It is kaolin, of good quality, and if properly freed from gritty matters by washing, would be of value.—H. P.—We cannot judge of the coating from the small sample sent. A number of such varnishes have been patented.—O. B.—Earthy limonite—a poor iron ore.—W. E. W.—It is sulphide of iron—marcasite.—T. O'N.—The sample was too small to admit of positive tests. The powder appears to consist principally of a lime salt, probably the sulphate (plaster of Paris), a salt of zinc, and the powder of a roct containing tannin.—W. E.—The igneous rock contains crystals of tourmaline and quartz, and a little chlorite.—A. R. Q.—The samples in the wooden box consist of a clay slate containing much iron sulphide, mica schist, and a ferruginous marl. They are not of value.—A. B. T.—The two light colored specimens are sandstone conglomerate containing mica schist and hornblende; the other is an argillaceous sandstone with seams of lime carbonate.

COMMUNICATIONS RECEIVED.

The Editor of the SCIENTIFIC AMERICAN acknowledges with much pleasure the receipt of original papers and contributions on the following subjects:

Cinders in the Eye. By W. S. N.
Locomotive Strokes. By J. A. H.
Aerial Navigation.
Liverpool Engineering Society. By W. B.
The Science of Life. By J. R. H.

LISTS AND SPECIFICATIONS OF PATENTS.

A circular issued from the Patent Office at Washington states that, the appropriation made by Congress for printing and binding having been exhausted, the publication of the *Official Gazette* (containing the lists of patents) has been suspended; and the printing of specifications has been stopped for the same reason, which will necessarily delay the regular issue of patents. We are therefore without our usual lists this week. It is believed that the suspension will only be temporary, as a deficiency bill is now pending before Congress. Whenever this appropriation shall become available, the work of printing and issuing the regular Patent Office documents will be resumed at once.

English Patents Issued to Americans.

March 26 to April 8, inclusive.

Aerial machine.—F. A. Lehmann *et al.*, Washington, D.C.
Baling hoops.—J. B. Gould, U. S. Consul at Birmingham, Eng.
Check valve trap.—G. Waring, Newport, R. I.
Gas lighter.—G. H. Kitchen *et al.*, Rye, N. Y.
Hot blast apparatus.—S. C. Salisbury, New York city.
Inhaling apparatus.—L. E. Felton *et al.*, Potsdam, N. Y.
Lamp.—R. S. Merrill, Boston, Mass.
Lawn mower.—W. J. Lloyd *et al.*, ——
Measure for liquids.—B. Fitts, Worcester, Mass.
Ordnance.—G. Paulding, Cold Spring, N. Y.
Railway truck.—E. R. Esmond, N. Y. city.
Reaper.—Wood Mowing and Reaping Mach. Co., Hoosick Falls, N. Y.
Refrigerator.—N. Wheeler, Bridgeport, Conn.
Regulating electric motors.—H. C. Spalding, Bloomfield, N. J.
Rollers for wringing machines.—G. P. Clark, Windsor Locks, Conn.
Spinning machinery.—J. W. Wattles, ——, Mass.
Steam, hydraulic, etc., press.—J. W. Hyatt, Newark, N.J.
Steam boiler.—B. T. Babbitt, N. Y. city.
Straw braid sewing machine.—M. P. Carpenter, New York city.
Tool sharpening machine.—A. K. Rider, Walden, N. Y.
Vapor burner.—F. A. Brown *et al.*, Newton, Mass.
Water meter.—C. C. Barton, Rochester, N. Y.
Waterproofing.—H. A. Clark, Boston, Mass.

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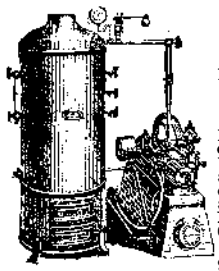

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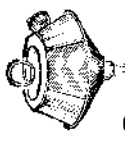

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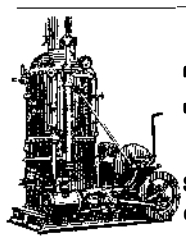

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