

About 1 3/4 inch. 4. I have some tintype plate. Will this do for the diaphragms? A. Yes.

(35) D. A. R. asks if the Manetto or the Thompson battery, or any other modification of the same, can be used on open circuit. If not, will you please inform me of any form that may be so used, dispensing with the liquid? My object is to attain some form of battery that may be carried about, and at the same time work on open circuit. A. A Lelanché battery would probably suit your purpose. You might use a moist pile, consisting of a number of disks of copper and zinc separated by disks of pasteboard and arranged thus: copper, zinc, pasteboard; copper, zinc, pasteboard, etc. The pile should begin with one metal and end with the other. Saturate the pasteboard with brine.

(36) W. L. J. asks: Is there any method of hardening lead after moulding? A. As we understand you, no.

1. Can additional light from the same jet be given by using a conical reflector? A. No; but all of the light may be thrown in one direction. 2. What amount of heat will the common reflectors now in use stand without being destroyed or unfit for use? A. A metallic reflector will stand all that is required. 3. Of what materials are these reflectors constructed? A. Of silver plated metal or silvered glass.

(37) E. A. K.—The amount of water in fine wheat flour is usually about 10 per cent. Potato flour usually contains from 8 to 12 per cent, and somewhat whiter.

(38) W. & D. ask: 1. Will you please inform us of the fastest speed ever attained by a locomotive and a train, either on this continent or on the other? A. This is a disputed point, which we think has never been satisfactorily settled. 2. Will you also tell us where we can find a description of the largest locomotive in the world? A. See SCIENTIFIC AMERICAN, August 15, 1874, p. 100.

(39) W. E. B. asks (1) for information about galvanizing gray iron. A. See p. 139 (12), current volume, SCIENTIFIC AMERICAN. 2. Also give a recipe for tinning iron, etc. A. The articles must first be thoroughly annealed while excluded from the air, and when cold submitted to a hot dilute pickle of sulphuric acid. After the oxide is removed they should be cleaned in water. Whendry, plunge them in a bath of hot palm oil, and when heated to the temperature of the oil (about 200° Fah.) immerse quickly in a bath of melted tin covered with the oil. Remove and drain. To obtain a thicker coat of tin submerge again in the tin bath, heated but little above the melting point. Small articles of brass or copper are tinned by boiling with a strong aqueous solution of potassic stannate, or with tin filings and solution of cream of tartar or caustic soda.

(40) D. C. asks: Can water be congealed or hardened so as to be unaffected by a moderate heat? I have seen, in caves in Bermuda and elsewhere, a stony substance formed by dripping water. Is this formed by the gases of which the water is composed, undergoing a chemical process caused by the nature of the materials forming the surroundings of the cave, or is it simply an accumulation of particles of matter which the water gathers in its course? A. No. Water containing lime carbonate in solution deposits a portion of it on free exposure to air. The stalactites and stalagmites seen in caves consist of lime carbonate deposited in this way from water trickling through the roof of the cave.

(41) F. D. T. asks for a recipe for making artificial whisky without alcohol. A. Whisky cannot be made without alcohol.

(42) M. M. asks how to clean or bleach ivory that has become stained or yellow from exposure or handling. A. Ivory is whitened or bleached by rubbing it with finely powdered pumicestone and water, and exposing it to the sun while still moist, under a glass shade to prevent desiccation and the occurrence of cracks. Repeat the process until the proper effect is produced. Ivory may also be bleached by immersion for a short time in water holding a little sulphurous acid, chloride of lime, or chlorine in solution; or by exposing to the fumes of burning sulphur, largely diluted with air. Where the ivory keys cannot be removed the polishing process may be the best.

(43) C. H. F. writes: If a man should leave Chicago, Ill., at 12 o'clock Monday noon, and travel west around the earth at the same rate of speed as the earth revolves on its axis, he arriving in Chicago at 12 o'clock Tuesday noon, where would he first have passed people to whom it had been Tuesday noon? A. We believe that sailors make the change near the coast of Asia.

(44) S. G. writes: I have a high pressure engine, 12 inches bore, 20 inches stroke, running 90 revolutions per minute. The pulley on the main shaft driving the governor is 9 inches in diameter. The pulley on the governor is 10 inches in diameter. I wish to speed this engine to run 120 revolutions per minute. What size pulley will I need to put on the governor? The governor is Judson's patent. A. About 13 1/2 inches diameter if the governor is running at the right speed with the present arrangement. You will find the proper speed stamped on the governor, and should proportion the pulleys so as to give this speed when the engine is running 120.

(45) C. H. H. asks how he can make a good dressing and polish for leather. A. See pp. 60 (10), 220 (43), 300 (45), vol. 38, and 91 (21), current volume, SCIENTIFIC AMERICAN. How is liquid glue made? A. Dissolve fine glue in a small quantity of strong acetic acid. 1. How can I make a good writing ink? A. See pp. 76 (15), vol. 38, and 76 (54), 123 (15), 327, 299 (18), 300 (61), and 124 (49), vol. 37, SCIENTIFIC AMERICAN. 2. Is there anything that can be added to make it a copying ink? A. A little sugar.

(46) J. F. asks: How is celluloid made? A. Celluloid is a kind of solidified collodion. It is composed of some fibrous material, such as cotton, which is dipped in sulphuric and nitric acids. The cot-

ton then possesses the quality of solubility and sudden explosion, and is termed gun cotton or pyroxylin. When this is dissolved in ether and alcohol it is called collodion, and is used in photography. Celluloid is made by using camphor in place of alcohol and ether, in connection with pyroxylin. The pyroxylin is ground to a pulp with water. It is then strained to expel the water, and pressed into a mass. Gum camphor is ground with water and thoroughly incorporated with the pulp, one part, by weight, of camphor being used to two parts of the pulp. The mass is then put in a mould and subjected to powerful pressure, and heated while under this pressure from 150° to 300° Fah.

(47) A. B. H. asks (1) for the best kind of oil to use to keep a gun from rusting. A. Clean the barrel occasionally and cover the exposed portions of the metal with a film of linseed oil. 2. What is best for lubricating the lock, etc.? A. Purified olive or sperm oil.

(48) W. H. P. asks how to etch on steel. A. The clean plate must be covered with an even film of wax, either applied while the heat is uniformly heated, or dissolved in alcohol and flowed on the warm plate. The etching fluid may be made as follows: Pyroligneous acid 4 ozs., alcohol 1 oz., nitric acid 1 oz., by measure. Or use iodine 1 oz., iron filings 1/2 drachm, water 4 ozs. The lines are cut through the wax with a fine steel point, so as to leave the metal surface bare under the lines. The etching fluid is then poured on, and removed as soon as the metal is sufficiently etched.

(49) C. W. W. asks what to use to make muslin and paper for small balloons fireproof or airtight. A. The fabric may be rendered unflammable by soaking it in a strong aqueous solution of commercial sodium tungstate and drying. For airtight varnishes, see, p. 268, vol. 36, SCIENTIFIC AMERICAN.

(50) C. F. H. asks: What is the substance mostly used for coloring butter, and also state the simplest test for its detection? A. Annatto is very often employed; when pure it is not detrimental to health; but it is often adulterated with red lead and ochre. Examine several portions of the sample under a good microscope, using a 1/4 or 1/8 inch objective. In pure butter nothing is seen except the characteristic fatty globules and granular masses of curd and the cubical crystals of salt. If the butter has been artificially colored, the coloring matters as well as farinaceous and other common adulterants may be distinguished as distinct from the butter.

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

J. P. and W. J. P.—An impure micaceous and silicious clay (aluminum silicate) of little value.—T. M.—It is a rich ore of iron containing zinc blende. A quantitative analysis would be necessary to determine its precise value.

COMMUNICATIONS RECEIVED.

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

- Meteoritic Phenomena. By D. E. W.
The Crank Motion. By E. H.
Celestial Machine. By G. V.
An Astronomical Law. By H. L.
The Sensitive Flame as a Microphone. By W. L. S.
The Electrical Indicator for showing the Rotation of the Earth and the Micro-Telephone. By A. E. D.
The Micro-Telephone. By T. J. F.
The Metamorphosis of the Barnacle. By G. K.
Hack Horses and Chemistry. By W. P. W. D.
Spider and Potato-bug. By R. B. F.
Flow of Water through Pipes. By R. G.
Fuel Saving. By R. G.

HINTS TO CORRESPONDENTS.

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.

Many of our correspondents make inquiries which cannot properly be answered in these columns. Such inquiries, if signed by initials only, are liable to be cast into the waste basket.

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.

[OFFICIAL.]

INDEX OF INVENTIONS FOR WHICH

Letters Patent of the United States were Granted in the Week Ending July 30, 1878, AND EACH BEARING THAT DATE. [Those marked (r) are reissued patents.]

A complete copy of any patent in the annexed list, including both the specifications and drawings, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired, and remit to Munn & Co., 37 Park Row, New York city.

Advertising apparatus, N. T. Scott (r) 8,355
Alloys, copper and manganese, P. M. Parsons 206,604
Areas, vaults, etc., lighting, etc., T. Hyatt 206,571
Axle box, car, C. B. Harris 206,564
Axle box, car, A. Onslow 206,608
Axle, car, W. H. Murphy 206,599
Bag holder, E. Cartier 206,637
Ball and ear, W. M. Dallman 206,543
Ball joint, W. Ellinger 206,393
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Button and stud, J. A. Rupert 206,487
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Car starter, Lynn & Snyder 206,530
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TRADE MARKS.

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Soap, Lautz & Brothers & Co 6,425
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