

special combinations known to themselves only. The chilling is done by casting the metal in contact with an iron mould.

(24) C. H. S. asks: What is "rectified" whisky? Wherein does it differ from "distilled" whisky? Which is the purer and more costly and which is the more wholesome? A. Rectified whisky is generally passed over animal charcoal, while distilled whisky does not pass through this process. It is simply distilled directly from the mash. The distilled whisky is apt to be the cheapest, and as regard wholesomeness it is entirely dependent upon the quality.

(25) A. J. B. writes: How can I melt rubber? A. Heat the rubber by steam or over a water bath till the rubber melts, and let it run into hot water, where it will collect at the bottom of the vessel, while the vapor will prevent it from burning.

(26) I. N. G. writes: I have a private telephone line half a mile in length, using three of Bell's hand telephones without microphone or battery. I notice that in time of lightning it passes in on the wire sufficient to ring the bells at each station. I supposed it was owing to the heavy magnets in the signal bells, and I arranged a simple "cut out," by which the bells and telephone might be disconnected entirely in a moment, and thought that would leave the wire free from any attraction for lightning, but when all instruments are off, the lightning during rain storms will snap and crack from the ends of the wire inside as though it was a telegraph line heavily charged. Why is this, and is there any special danger or way to avoid it? A. You should provide a lightning arrester of approved form for each end of your telephone line. The magnets have little or nothing to do with the effects you mention. It is advisable to keep away from the telephone during a near thunderstorm.

(27) F. M. S. asks: I have a graphoscope lens 7 inches diameter, 40 inches focus; what sized lens would I require for eyepiece to make an achromatic telescope, and what should be the length of tube? A. Supposing that your graphoscopic lens is a single crown of good quality and accurate finish, you will need a concave flint lens about 3 inches diameter and 30 inches focus, placed about 25 inches from the object glass; this distance must be ascertained by trial, as the effect of the flint lens depends upon its dispersive power. The focus should be at from 50 to 60 inches. For the eyepiece use the Huyghens form, field glass 3 inches focus, plano convex; eye lens, 1 inch focus, plano convex.

(28) O. C. L. asks (1) how I can cheaply prepare the porous cells used in batteries? A. No porous cell is of much account unless made of clay and properly baked. You can purchase porous cells for a small sum, and it will not pay to try to make them. 2. Which would give the best current for the electric light—a chromic acid battery of M. Truive's solution and same construction, or one using porous cells, same size carbons and a like solution in porous cells? A. The battery without the porous cells is preferable for this purpose. 3. Taking the better one of the above batteries, how many would it require for one and two lights respectively, carbons 9x6x1/4? Would the effect for lighting purposes be increased by dividing the same amount of material and making a greater number of cells? A. All this depends on the kind of light you propose to make. A small incandescent light can be run with 4 or 5 such cells.

(29) J. A. C. asks: What size of reservoir at an elevation of 75 feet will produce a 6 horse power at a distance of 600 feet for twenty-four hours, and what size pipe to convey the water? A. You would require a reservoir 85 feet square, 16 feet deep, capable of holding 2,250 cubic feet of water, which will furnish you with 6 horse power for twenty-four hours without addition. Your pipe 600 feet long will require to be 4 inches in diameter with 75 feet fall.

(30) A. M. I. asks: Can you give me instructions how to make the simplest galvanic battery adapted for medical use? A. See article on galvanic batteries, SCIENTIFIC AMERICAN SUPPLEMENT, Nos. 157, 158, and 159, for complete description of all sorts of batteries.

(31) E. M. B. asks what is the best non-conducting covering for steam pipes. A. The following table gives the results of a series of experiments by Mr. C. E. Emery, for the New York Steam Company:

Material.	Non-conductivity.
	Per cent.
Hair felt.....	100
Mineral wool No. 2.....	83.2
Mineral wool No. 2 and tar.....	71.5
Saw dust.....	68
Mineral wool No. 1.....	67.6
Charcoal.....	63.2
Pine wood, across grain.....	55.3
Loam.....	55
Gas works lime, slaked.....	48
Asbestos.....	36.3
Coal ashes.....	34.5
Fuel coke.....	27.7
Air space, 2 1/2" deep.....	13.6

(32) L. M. K. asks for a receipt for a cheap coating to put on cast iron that has to be submerged in water, that it may not rust or make the water taste. My pump is all cast iron, and if it is put in wells containing sulphur water it rusts very badly and spoils the water. A. There is probably nothing better than red oxide of iron or Prince's metallic paint and good boiled linseed oil, for iron work in water. Dry in an oven so as to make it hard, or a coat of good japan varnish stands well if baked hard. It is used on what is called enameled pipes for water. If the water has much sulphur, it will be difficult to thoroughly protect the iron.

(33) W. asks: Will you kindly inform me through your paper how I can clean the willow work on the baby carriages now so commonly used. After they have been used a short time they get sun burnt or soiled by the exposure to weather. A. If you are certain the soiling is not due to dirt from the atmosphere, etc., settling on the wood, then we recommend you to try some bleaching process. Either by using a chlorine bleach or burning sulphur in a closed chamber, or per-

haps by using hydrogen peroxide (SCIENTIFIC AMERICAN SUPPLEMENT No. 339). The size of the carriages is an objection, but we think that the only satisfactory process will be a bleaching one.

(34) E. T. S. writes: Please inform me through your paper where I can find a full description of the manufacture of turpentine and resin, from saw dust. A. The spirits of turpentine are made from the saw dust and refuse by a sweating process yielding 14 gallons of spirit, 3 to 4 gallons of resin and a quantity of tar per cord. The spirits obtained in this manner possess a different odor from those produced by distillation. The article on turpentine in Spence's Encyclopedia of the Industrial Arts, page 1686 et seq., will give some useful hints and descriptions of processes in use abroad.

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

C. P. C.—The samples sent are not at all characteristic and their identification is somewhat difficult. They appear to be as follows: No. 1 is a quartz mineral containing some flecks of black mica. No. 2 is a hornblende mineral with some pyroxene. No. 3. Hornblende with traces of pyrite. No. 4 is a silicious conglomerate. No. 5. Felspathic rock. No. 6 is a hornblende schist or slate. No. 7 is a mixture of different silicates, probably felspar and hornblende. No. 8 is a piece of hornblende rock.—J. S.—The sample is pyrite (iron sulphide), a mineral which usually carries gold, the amount of which can only be determined by a fire assay.—W. M.—This sample is a little below what is sold as second quality. Its value is dependent upon the supply. When the first quality is hard to procure, this variety will bring within 25 per cent. of the value of the better varieties. It sells at from 10 cents to \$3, according to the size of the sheets.—J. R. W.—The specimen is magnetite (iron oxide) and is a valuable ore of iron. The crystals resemble the ore which is mined at Port Henry, N. Y.—H. S.—No. 1 is a variety of hornblende called pearl stone. No. 2 is a silicious clay, a sort of conglomerate. It may carry metal, and therefore recommend you to have it assayed. No. 3. Yellow clay, too hard to grind cheap enough to compete with other varieties.—L. J.—The mineral is galena (lead sulphide). It may carry silver. This must be determined by assay.—W. C.—From a superficial examination of the sample, we are forced to conclude that it is inferior value.—F. C. Y.—The sample is a sulphide of iron, probably marcasite; it may carry gold. An assay would determine this.—J. D. M.—It is one of the uncrystallized varieties of quartz, probably jasper.—C. H. D.—The sample is pyrite (iron sulphide).

#### COMMUNICATIONS RECEIVED.

On Steam Boiler Furnaces. By J. M.  
On Microscopes. By S. R. G.

#### INDEX OF INVENTIONS

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