explosion to the gas in the generator proper, and the insertion of the wash bottle should never be omitted when the ignition tube is to be put to use. So long as it is kept hot we have never found the apparatus other than perfectly manageable, safe and automatic in action.

Inasmuch as a single gramme of potassium chlorate produces approximately a half liter of chlorine and a cubic centimeter more than a liter, it is obvious that a very compact generator may be capable of delivering a considerable supply of the gas, and we have found the diminutive apparatus shown in the accompanying figure an exceedingly convenient addition to

the furnishings of the laboratory table when chlorine is needed frequently and in small amounts. This little generator is easily made of a side-neck test tube, funnel tube, stopper, glass stopcock and flask. The upper chamber of the test tube, which is constricted near the middle, holds easily ten grammes of the fused chlorate, and when the outer flask is filled with hot water the automatic action is satisfactory for a considerable length of time. A little wash bottle containing a hot saturated solution of manganous chloride in strong hydrochloric acid is a desirable addition when a purer gas is needed than that delivered directly from the generator, and the attachment of the ignition tube makes it possible to secure the chlorine entirely free from chlorine oxide, though carrying, of course, some free oxygen.—*Amer. Jour. Science.*

APPARATUS FOR COLLECTING SAMPLES OF WATER SOME DISTANCE BENEATH THE SURFACE.

By WILLIAM T. BURGESS, F.I.C.

IN the present state of knowledge it is frequently necessary for chemists to supplement the chemical analysis of a water by a bacterioscopic examination, and for this purpose it is advisable to collect a small special sample with the greatest care.

I have occasion to collect a large number of samples for bacterioscopic examination under conditions where to obtain perfectly representative samples they must be taken several feet below the surface; for this purpose I have devised the little apparatus described below, and venture to think it an improvement on the arrangements illustrated in various works on bacteriology.

The sterile collecting tube, T, having a capacity of about 6 c. c., is drawn out at each end, the longer end being further drawn down at x to a very fine capillary, so that a slight blow near the end causes it to break off at that point. The tube is only partially exhausted, and this is conveniently effected by heating the body

of the tube and sealing up while still hot. (A stock of sterile tubes is stored in small cylindrical metal cases.) The tube is supported by two hard brass wire arms, A A, adjustable on a stout brass wire, B, which is bent twice at right angles. One end of this wire carries a weight, W, and the other a helical spring, S, made of piano wire. The normal position of the free end of this spring is shown at S', but before the tube is placed in position it is brought over to the other side and retained by a loose ring, R, attached to the wire, C, by which the apparatus is lowered. The spring is sufficiently strong to carry the apparatus without slipping out of the ring if it is lowered into the water carefully, but a slight jerk is sufficient to release it, when it flies round and breaks off the end of the exhausted tube at x. The tube fills in a few seconds, when it may be drawn

up, sealed, and stored with the usual precautions until the cultivations are started.

Several of these contrivances may be arranged on one wire, and thus a number of samples at definite depths may be collected simultaneously; and by constructing the apparatus of stouter materials it may be employed for taking larger samples.

Having experienced the convenience of this little device, which is manipulated by a single wire, I hope this description may be of use to other chemists.—*Chemical News.*

AN IMPROVED COMPOUND FOR USE IN THE MANUFACTURE OF MATCHES.

By H. PRIESTER, Lauenburg, Pomerania.

CLAIMS "the utilization of magnesium either alone or alloyed with other metals to form combustible compounds capable of being applied by dipping," matches coated in this way giving a colored light and scattering sparks when burning. It is stated that a much more brilliant result is obtained when the magnesium is alloyed with copper, cadmium or zinc, and then added to one of the known firing mixtures.

SOME LABORATORY APPARATUS.

By A. BIDET. *Comptes Rend.*

Siphon Level Regulation.—This is an S-shaped tube (Fig. 1) with a side tube S sealed on a little above the

FIG. 1.

FIG. 2.

lower bend. The long arm, O, is inserted in the apparatus in which the constant level of liquid is required, and the hole, O, is placed at the side of the tube to prevent air from the boiling water passing up into the siphon tube. Water flows continuously through A, and may then pass through either S or B, the tube BO forming a siphon which may act in either direction according as the level of the water in the apparatus to be supplied is above or below that for which the instrument is regulated. The hole, O, by free admission of air, serves to prevent the tube, S, from acting as the limb of a siphon.

Safety Tube Arranged to Prevent Splashing.—This apparatus (Fig. 2) serves for introducing liquids into a vessel and for leading off gases by the side tube. Regurgitation quietly transfers the liquid in the middle cylinder into the upper funnel through the recurved tube at O, whence it returns after the pressure has again become normal. The lower tube is adapted to a tubulure by a cork with one perforation.

Internally Cooled Condenser.—In this instrument (Fig. 3) the vapors entering by the upper tube are con-

FIG. 3.

densed in the annular space surrounding a water-cooled glass tube, sealed into an outer vessel at its lower end, and the condensed liquid passes away through T. An outside water jacket may be adapted to this, so that a double cooling surface is presented for condensation.

Commutating Arrangement for Condenser.—By connecting an inverted condenser with R (Fig. 4) and a downward condenser with D, and adjusting the inner circularly sliding tube, I, so that the hole, O, is opposite one or other of these tubes, this instrument allows

distillation or cohobation to be carried on at will, or to be effected alternately without delay. The tubes are joined by an India rubber ring. A cork in the in-

FIG. 4.

ner tube permits the passage of a separating funnel for the introduction of liquids into the distilling flask.

Superheater for Vapors.—The superheating is effected by passing the vapor through T (Fig. 5) to the copper spiral, which is inclosed in a brass jacket terminating above in an open cone. The spiral is lined with metallic gauze, and beneath it is placed a suitable burner. The superheated gases pass away over the bulb of a thermometer, t. With such an instrument

20 cm. high a temperature of 300° C. has been attained in the efflux. With a triple Bunsen burner a still higher temperature could be attained.

NOTES ON ALUMINUM.*

By GEORGE FREDERICK ANDREWS.

THE writer of this paper has made a large number of experiments with aluminum, particularly with reference to its use in jewelry, etc. The facts stated are the results of some of these experiments.

Alloys Containing Gold.—The alloys of gold and aluminum are interesting, though of little practical use except for decorative purposes. The alloy with 6 per cent. of gold is as white as pure aluminum, but much more brittle. The alloy with 10 per cent. of gold is harder than aluminum, but does not work well except at a high temperature. Its color is light violet brown. The alloy with 15 per cent. of gold is a very soft fine grained metal. It has a slight violet tint, although nearly white. The alloy with 50 per cent. of gold has a beautiful violet color. It is very soft and spongy. The alloy with 78 per cent. of gold is very brittle. The color is peculiar; it is between pink and violet. The alloy with 90 per cent. of gold has a pale violet color, while the alloy with 94 per cent. of gold has a color approaching pink again. Alloys containing small percentages of aluminum leave a bright violet color on the cupel, under the blowpipe.

An alloy containing 50 per cent. of gold, 45 per cent. of copper, and 5 per cent. of aluminum takes the color and polish of 14 carat gold, but easily tarnishes. This alloy has also been used in electroplating, but it is not entirely satisfactory for this purpose.

Alloys Containing Silver.—Alloys containing from 4 to 8 per cent. of silver and from 96 to 99 per cent. of aluminum are useful for many purposes. They are harder than aluminum but not brittle. They take a very fine polish, and hold it well. Their color is very near that of fine silver. These alloys are now used for the manufacture of charms, medals, metal trimmings and decorations of various kinds.

Alloys Containing Nickel.—The alloy containing 50 per cent. of nickel and 50 per cent. of aluminum has a dull gray color. It is very porous, and so brittle as to be useless.

The following alloys of copper, nickel, and aluminum are all very hard, fine grained, and show great strength. The alloy containing 66 per cent. of copper, 24 per cent. of nickel and 10 per cent. of aluminum takes a fine polish, and has the color of 10 carat gold. The alloy containing 55 per cent. of copper, 33 per cent. of nickel and 12 per cent. of aluminum has a beautiful golden brown color. The alloy containing 72½ per cent. of copper, 21¼ per cent. of nickel and 6¼ per cent. of aluminum closely resembles it, but the color of the latter is richer and deeper. These alloys may become very useful for decorative purposes.

Solder for Aluminum.—Notwithstanding the assertions which are still heard to the contrary, aluminum can be successfully soldered. The writer has used solder which makes a clean, perfectly firm joint, and

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