phide exerts some reducing action on the pyrophosphate, causing a volatilization of some of the constituents of the latter compound, another experiment was tried with a mixture containing a slightly higher per cent. of phosphide, to see whether there would be a correspondingly greater loss in the pyrophosphate.

0.0561 gram of the pyrophosphate, and 0.0472 gram of the phosphide, treated with chlorine, gave a residue weighing 0.0193 gram, a result which seems to sustain the above supposition.

CORNELL UNIVERSITY,
May, 1894.

NOTES ON ALUMINUM.[1]

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 six per cent. of gold is as white as pure aluminum but much more brittle. The alloy with ten 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 fifteen per cent. of gold is a very soft fine-grained metal. It has a slight violet tint, although nearly white. The alloy with fifty per cent. of gold has a beautiful violet color. It is very soft and spongy. The alloy with seventy-eight per cent. of gold is very brittle. The color is peculiar; it is between pink and violet. The alloy with ninety per cent. of gold has a pale violet color, while the alloy with ninety-four 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 fifty per cent. of gold, forty-five per cent. of copper, and five per cent. of aluminum takes the color and polish of fourteen 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 four to eight

[1] Abstract from a paper read before the Rhode Island Section, February 15, 1894.

per cent. of silver, and from ninety-six to ninety-two 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 fifty per cent. of nickel and fifty 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 sixty-six per cent. of copper, twenty-four per cent. of nickel and ten per cent. of aluminum takes a fine polish and has the color of ten carat gold. The alloy containing fifty-five per cent. of copper, thirty-three per cent. of nickel and twelve 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 is in every way satisfactory. It requires no "soldering fluid" and no soldering iron.

Melting of Aluminum.—In melting aluminum the temperature should be kept even and not much above the melting point of the metal. The metal should be fed into the crucible in small pieces and pushed down as fast as it becomes soft. The most serviceable flux is a little tallow, although it is not necessary to use any. A sand crucible must not be used as the aluminum readily attacks the silicon.

In alloying, the aluminum should be put into the crucible after the other metal or metals have become liquid.

Restoration of the Mat.—Aluminum can be cleaned, and its peculiar mat restored by dipping for a minute and a quarter, in a solution of three ounces of caustic potash in a quart of water, then washing thoroughly and dipping in a mixture of three parts nitric, and two parts sulphuric acid, by volume.

Caustic soda can be used with nearly as good results. The main advantage in the substitution is the lower price of caustic soda.

LABORATORY OF CORNELL AND ANDREWS.

PYROXYLIN, ITS MANUFACTURE AND APPLICATIONS.

BY WALTER D. FIELD.

(*Continued from Vol. 15, p. 140.*)

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PART II.

NITRATION OF THE FIBER.

MIXED cotton and flax fiber in the form of paper, from two to three one-thousandths of an inch thick and cut into one inch squares, is nitrated by the Celluloid Manufacturing Company, and the same paper, left in long strips, one inch wide, is used for nitration by the Zylonite Manufacturing Company, of North Adams, Mass. The Celluloid Manufacturing Company introduce the cut paper into the mixed acid by means of the arrangement shown in Fig. 1, H, which is a rapidly revolving,

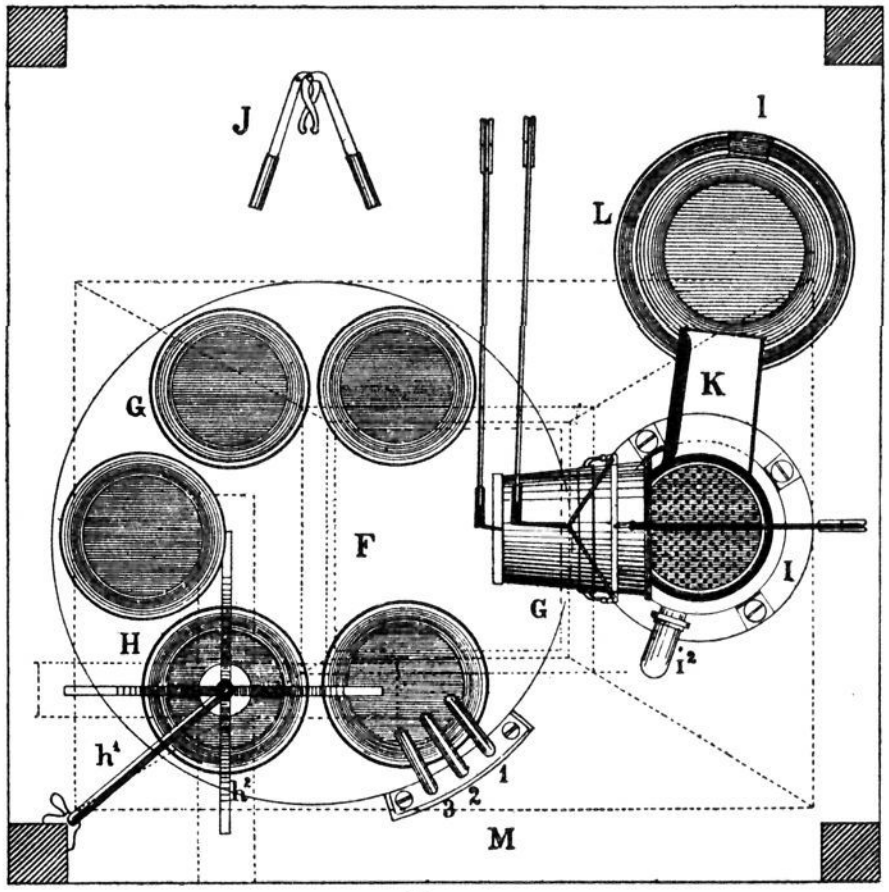

FIG. 1.