hydroxide and then ammonium sulphide. Allow to stand in a warm place until the precipitate has all settled, collect the precipitate on a small filter, ignite in a porcelain crucible, very cautiously at first, and finally with a blast-lamp. This gives ferric oxide and zinc oxide. Dissolve the ferric oxide and zinc oxide in hydrochloric acid, add water, heat, precipitate with ammonium hydroxide, collect ferric hydroxide, and calculate to metallic iron. Subtract ferric oxide from ferric oxide plus zinc oxide. This gives zinc oxide. Calculate to metallic zinc

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A NEW FORM OF CONDENSER FOR THE DISTILLATION OF LIQUIDS HAVING LOW BOILING-POINTS.

BY ERVIN E. EWELL.

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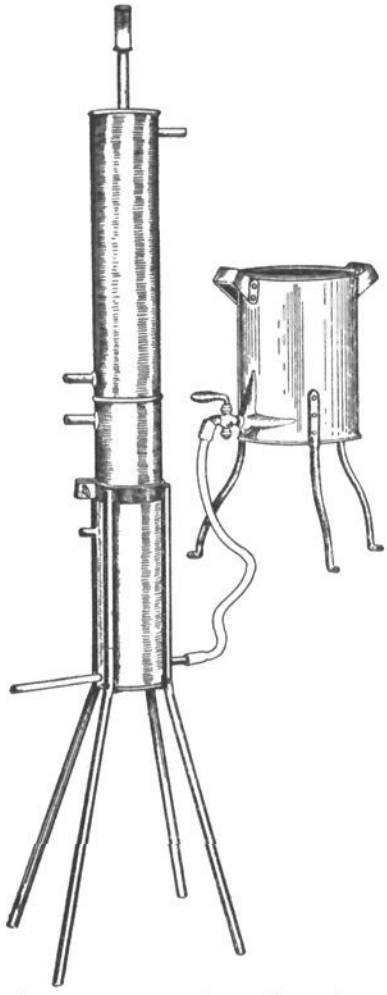
THE device to which I desire to call attention is one that will be of interest to all persons who find it necessary to distil large quantities of highly volatile liquids, during the warm months of the year. The apparatus is a comparatively simple one, consisting of a block-tin condensing worm surrounded by two copper jackets. Through the upper one of these, hydrant water is circulated for the preliminary cooling of the vapor; the lower one is filled with ice water for the complete condensation of the vapor and the thorough cooling of the distillate. In the apparatus that we have in use, this ice-water chamber is closed at the top and the ice water is prepared in a separate tank and allowed to flow into the jacket of the condenser at such a rate as the thermometer indicates to be necessary. Dr. Brown, formerly of this laboratory, has suggested that the ice-water chamber be made open and hopper-shaped at the top in order that the ice may be introduced directly into the cooling chamber. This method of construction would doubtless lessen the amount of ice as well as the attention necessary for the satisfactory working of the apparatus. When chloroform or other liquids of moderately high boiling-points are being distilled, and during cold weather, we use hydrant water in both chambers.

The accompanying illustration shows the general form of the apparatus and the device for supporting it. A condenser

of this construction has been in use in this laboratory for nearly a year with perfect satisfaction. It has twenty-four turns of three-eighths inch block-tin piping in each chamber; the turns of the worm being two and one-half inches in diameter from cen-



ter to center of the pipe, each chamber has two hundred and twenty square inches of cooling surface.

The vessel containing the liquid to be distilled is placed upon a plate containing a small quantity of mercury. If the vessel is a beaker or of some other open form, it is covered with a bell-jar, which is connected with the condenser by means of an opening at the top; if the liquid is contained in a flask, direct connection is made with the condenser. The plate containing the mercury is heated by steam. For this method of arranging distilling vessels, see page 103, of Bulletin No. 28, Division of Chemistry, U. S. Department of Agriculture.

WASHINGTON, D. C., March 15, 1897.