

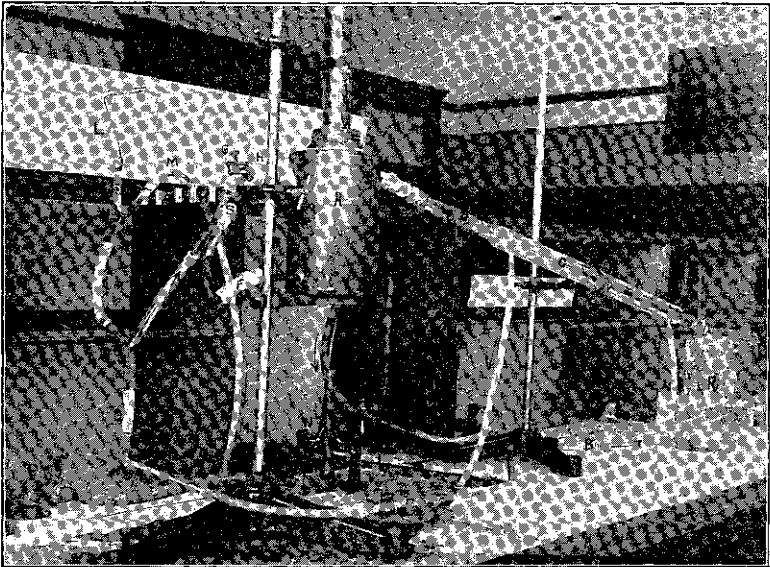
AN ATTACHMENT FOR AUTOMATIC DISTILLATION.

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Nearly every laboratory finds a number of uses for distilled water but it is not always possible for an expensive still to be installed. Teachers who have had the experience of allowing copper boilers to burn out or glass flasks to be broken by letting them boil dry in distilling small amounts of water will appreciate the convenience and economy of a simple automatic still.

The apparatus described is used as an attachment for "Apparatus A," a form of copper boiler very widely used in physics laboratories. The only other essential is some form of condenser.



Referring to the photograph, water enters from the hydrant and passes through the tube B in the direction indicated by the arrows. After flowing through the jacket of the Liebig condenser, it goes through tube D to the Y at E. Connection is made at this point to the boiler through the tubes H and K. The overflow passes out through M to the sink. L is open to the air. When the flow of water through the jacket of the condenser is properly adjusted, it will flow in a steady stream filling the tubes to the Y at U. From here the air entering from L causes it to flow in a series of bubbles forming an intermittent stream. The tube M at its highest point will need to be about

one inch above the level of the Y at S in order to counteract the pressure of the steam from H. In the photograph a stopcock is shown at G in order to leave only a small opening to H. Nearly sealing the tube will answer equally well. It must not be completely closed as this will stop the operation of the still. When steam has commenced to come from the boiler, slight adjustments of the height of M, or of the flame of the burner N, or of the flow of water will so regulate the amount of water in the Y at S as to keep it about half full of water.

Fluctuations will occur as the pressure of the gas or water changes, but the boiler cannot possibly go dry even if these changes are great if M is properly elevated above S. The whole operation of distillation is entirely automatic after the first adjustments are made and these are not at all difficult of accomplishment.

In addition to being automatic, a saving in gas is made by using the water from the jacket of the condenser to fill the boiler. It will be found desirable to cover the rubber connections with asbestos and a tin shield placed around the burner will keep in a considerable amount of heat. A yield of about a liter per hour should be secured from a burner turned at about half its maximum height.

While the attachments can be made up as illustrated, a simpler form could be made in two pieces by a glass blower which would be more convenient and work somewhat more satisfactorily.

MILL TAILINGS FOR ROAD METAL.

In Missouri a considerable amount of road material is obtained from the tailings of the concentrating mills at the zinc mines. This material, which is put on the market as "chats," consists of small angular fragments of chert and limestone. The zinc companies are very glad to get rid of this waste material, which is loaded on the cars by the railroads of the district at a cost of about 6 or 8 cents a ton. It makes more than ordinarily good roads and is widely distributed all through the Middle West. It sells in most places at prices ranging from 50 cents to \$1 a ton, but in the neighborhood of the mines it can be had for about 15 cents a ton. It is used for railroad ballast as well as road making. The annual output, according to the United States Geological Survey, amounts to about 1,300,000 tons.

In Tennessee and Alabama a quantity of chert is used for road metal, and in many States crushed slag from blast furnaces also furnishes a valuable road material. In Alabama, one of the large iron-producing States, over 2,000,000 short tons of furnace slag, the average value of which was about 25 cents a ton, was crushed and put on the roads last year. Crushed slag is also used as railroad ballast and for concrete and roofing material.