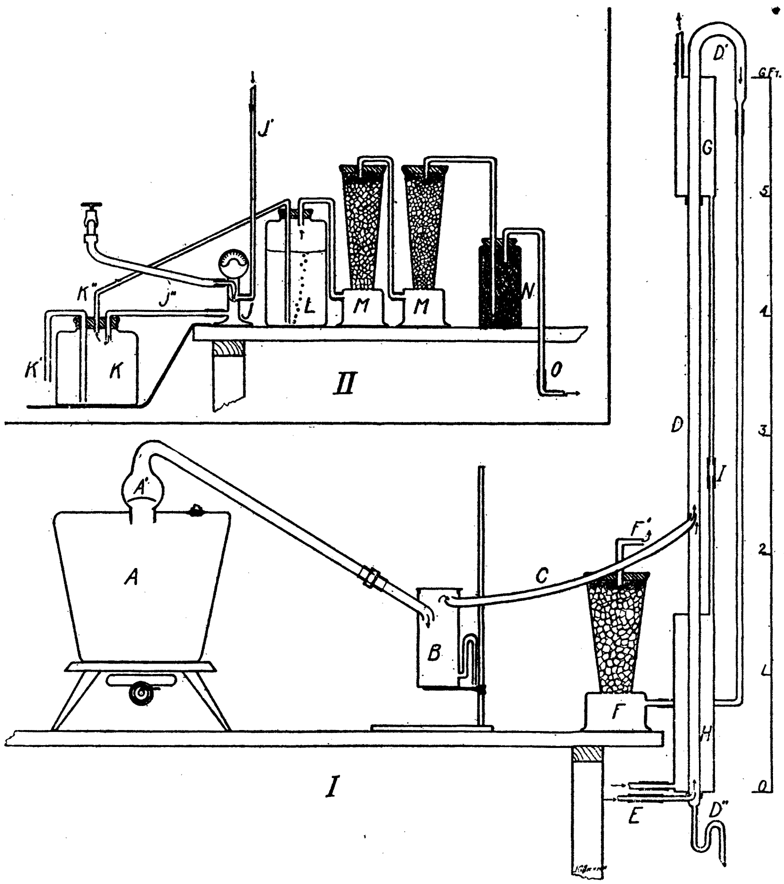
at the most vital procedure—viz., the allotment of grants—will sufficiently indicate. If some of the accessories have a different appearance, surely allowance may be made for the disturbance caused by the greatest war in history?—H. H. Turner, General Secretary of the British Association, in the London *Times*.

SPECIAL ARTICLES

THE BOURDILLON WATER STILL

Those who wish to obtain an abundant supply of "conductivity" water may be interested in a distilling apparatus which has been in use in this and other departments of the University of Wisconsin for the past few years. This still was originally described by



EXPLANATION OF FIGURES

Fig. 1. Steam Generator and Boiler. *A*, boiler, 15-liter capacity, copper; *A'*, dash plate; *B*, trap with removable lid, copper; *C*, lead to condenser, ½-inch diameter, block tin; *D*, condenser-tube, 6 feet long, 1 inch inside diameter, block tin; *D* , outlet for escaping gases, block tin; *D"*, outlet for condensed water, block tin; *E*, inlet for washed air, block tin; F, soda-lime tower and H_2SO_4 in pumice tower (the figure shows but one jar); *F'*, outlet to out-of-doors; *G*, upper condenser jacket, 12 inches long, 4 inches diameter, copper; *H*, lower condenser jacket, 18 inches long, 4 inches diameter, copper; *I*, rubber connection serving as expansion joint.

Fig. 2. Air Pump and Wash Train *J*, aspirator; *J'*, air inlet from out-of-doors; *J"*, water and air outlet of aspirator sealed into top of jar; *K*, pressure jar; *K'*, water outlet of pressure jar *K*; *K"*, air outlet of pressure jar *K*; *L*, wash jar containing commercial H_2SO_4; *M,M*, soda-lime towers; *N*, dust filter of cotton-wool; *O*, washed air outlet connecting with *E* of Fig. 1.

Bourdillon.[1] It was first used in this university by Mr. M. Meacham in 1914–15 in the laboratory of Dr. S. F. Acree. With this apparatus slightly modified from the original the writers have been able to secure a very good grade of water by a single distillation of laboratory tap water.

Referring to the accompanying illustration, Fig. 1 consists of a boiler and condenser and Fig. 2 of an air-washing apparatus. The essential feature of the operation of the still is the washing with a stream of purified air of steam and of hot condensed water while spread out over the large interior surface of the consenser-tube. During operation the steam passes from the boiler *A* (Fig. 1) through the trap *B* and upward through the condenser-tube *D*. At the upper end of *D* it is condensed and runs while still hot down the sides of *D* to the bottom where it is further cooled before being discharged into the receiving vessel. During the passage through D the steam and hot water are washed by a stream of purified air which is forced into *D* at the bottom and passes upward and out at the top carrying with it volatile impurities from the steam and hot water. The nonvolatile impurities are retained in the boiler.

It is usual to put about one gram of $KHSO_4$ or H_3PO_4 into the boiler for each two or three liters of water, although this may not be essential. In the construction of the condenser it is better to have the workman use muriatic acid rather than rosin as a flux for soldering, because the latter substance may be difficult to remove from the interior after completion. In the arrangement of the air-washing system it is essential to have the soda-lime towers between the acid jar and the condenser to prevent any volatile fumes from the acid passing into the condenser. It is better that air be forced rather than drawn through the apparatus, because this avoids the possibility of contaminating the air stream by leakage of laboratory gases inward. The air pressure obtained from the pump may be regulated by varying the height of the water outlet *K′* as well as by regulating the water supply to the aspirator. Contamination of the interior of the condenser tube *D* from the outside is prevented by inserting absorbing chambers *F* of soda-lime and H_2SO_4 in pumice between *D′* and the out-of-door outlet *F′*.

By using special care and after continued use for some time, water with a specific conductivity of 0.4×10^{-6} mhos has been obtained from tap water by a single distillation. With a fifteen-liter boiler on an ordinary gas-range burner, no difficulty has been encountered in securing eight to ten liters of water per day having a specific conductivity of from 1 to 2×10^{-6} mhos. After the apparatus has been started and regulated, it requires very little attention. The following data are offered as an example of what may ordinarily be expected of this still.

TABLE I

Specific Conductivity of Water Obtained from Tap Water by a Single Distillation with Potassium Acid Sulphate and Phosphoric Acid

$KHSO_4$ Added to Water in Boiler		H_3PO_4 Added to Water in Boiler	
Samp. No.	Conductivity $\times 10^{-6}$	Samp. No.	Conductivity $\times 10^{-6}$
1	1.05	7	1.15
2	1.01	8	0.97
3	1.30	9	1.01
4	0.68	10	0.89
5	0.94	11	1.91
6	0.89	12	0.89
Average	0.94	Average	1.14

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[1] *Trans. Chem. Soc.*, 103, 791, 1913.

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