maltose. Commercially it would be more profitable to make the glucose directly from the fresh root, in which case the considerable percentage of cane sugar contained by it would be saved, whereas if glucose is made from the starch the cane sugar is previously washed out. On account of the presence of the bark, however, the glucose made from the whole root is not so fine in quality as that made from the pure starch. Third, alcohol. The glucose on fermentation affords the usual quantity of alcohol. Fourth, cane sugar. A beautiful preparation of cane sugar was made from the water used in washing out the starch. The amount of cane sugar, however, is not large enough to warrant its extraction on a commercial scale from the waters used for washing. It is, however, present in sufficient quantity to indicate that in making glucose it is better to use the whole root as indicated above.

The general result of the analytical work is such as to establish the fact that the cassava is a plant of high economic value and worthy the attention of those interested in the carbohydrate products of the country.

[CONTRIBUTIONS FROM THE CHEMICAL LABORATORY OF THE U. S. DEPARTMENT OF AGRICULTURE; SENT BY H. W. WILEY.—NO. 3.]

AIR DRYING OVEN.

BY DR. G. L. SPENCER.[1]

Received May 3, 1893.

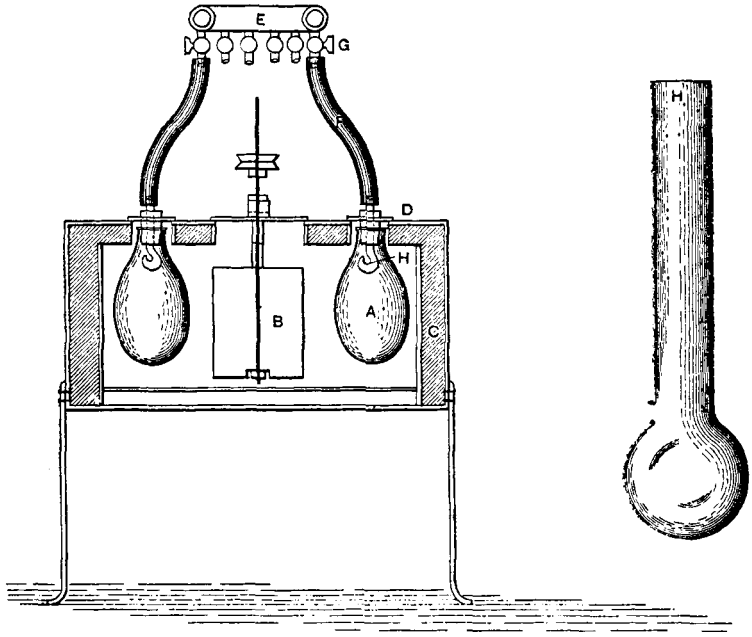
THIS oven is made of Russia iron, with double walls, and is cylindrical in shape. The walls are about one inch apart, and the space between them is filled with some non-conducting material; plaster of Paris is very convenient for this purpose. The bottom of the oven is also double, the outer bottom being made of Russia iron and the inner bottom—placed at a distance of one-half an inch from the outer one—is made of copper. The space between the two is filled with air. The object of having the inner bottom of copper is to allow a speedier and more even distribution of the heat, which is imparted from a lamp placed below the outer bottom. The top of the oven is also made double, with perforations sufficiently large to admit

[1] Presented to the Washington Chemical Society, April 13, 1893.

the drying flasks. The space between the tops is also filled with some non-conducting material like plaster of Paris.

After the flasks are placed in position the open space is closed by a cover, in the center of which is a hole through which the neck of the flask passes. The oven is heated with a cylindrical, flat, copper lamp, which is regulated by an ordinary mercury regulator. The air within the oven is kept in motion by a fan, B, driven very conveniently by a small toy engine connected with the exhaust or compressed air service.

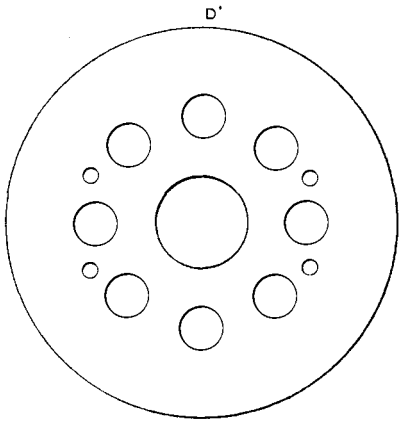
The drying flask, A, is made with a rounded bottom, and its



content ranges from 150 to 200 cc. It is closed with a rubber stopper carrying a water trap bulb, H H', arranged in such a way that the vapor of water which condenses within the exhaust tube, instead of falling back into the flask, remains trapped in the water bulb. All the flasks in the oven are connected by means of a common connection, E, with a vacuum pump capable of producing a vacuum of from twenty-six to twenty-seven

inches. The temperature at which the drying is to be made can be fixed at any desired point, from low temperatures up to as high as can be safely used without charring the material to be desiccated. For ordinary work the lamp is set for a temperature of 100°.

From six to eight of these drying flasks are connected *en batterie* with the pump. Each one can be connected or disconnected with the pump by its stop cock, G. If a current of hydrogen is to be introduced into the drying flask it is easily accomplished by passing a very small glass tube through the cork, joined to another tube by a rubber connection immediately below the cork. The inner tube should pass nearly to the bottom of the flask and be weighed with it. The hydrogen is sucked into the flask, passing through a wash bottle containing caustic soda and then sulphuric acid and over solid potash. The speed of the current, which need not be very great, is controlled by a stop or pinch cock. Any of the sample which may touch the inner tube during the intumescence caused by desiccation remains thereon and is weighed at the end with the tube which is detached and left in the drying bulb.



THE RIVER NILE.

By H. Droop Richmond, Late Second Chemist to the Egyptian Government.

Continued from p. 42.

In order to more readily compare the different analyses, I adopted a modification of Wigner's scale (*Analyst*, **IV.** c. f. Muter, *Analyst* **8,** 93). I do not agree with Wigner that a scale can be constructed for all waters, but I am of opinion that in a case like this, when a number of waters of the same origin have to be compared, that it is of use, though not of rigid exactitude. I