APPARATUS FOR DRYING FLASKS, ETC.[1]

By Charles Baskerville and Reston Stevenson.

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The frequent requirement in chemical work for dry flasks, bottles, test tubes, cylinders, beakers, etc., suggested the construction of a drying apparatus. Many forms of such an apparatus were devised, made, tried and found unsatisfactory. Then an electrical drier was constructed, about fifteen various forms were tried, and finally the form as presented in this paper was adopted as satisfactory. It is shown in Fig. 1.

The air enters the side tube *A* near the bottom, is heated by the red hot platinum wire *B* at the top of the apparatus, and the hot air which streams out dries the vessel which is placed over the top of the tube.

The air, before entrance, should be dried and cleaned by passing through sulphuric acid, calcium chloride, and cotton wool, so that the flask is dried more quickly and is cleaner than if ordinary air from the laboratory or from pipes were used. Compressed air is the convenient source of the air, but a foot-bellows is sufficient to operate the apparatus.

The heating is done by means of platinum wire *B*, wound around a porcelain tube *C*. If this platinum wire were the same gauge throughout its entire length, it would be dark at the bottom of the porcelain tube where the air first meets the platinum wire, dull red at the middle of the tube, white-hot at the top of the tube where the air which meets the platinum wire is already heated, and the length of wire which passes back through the center of the porcelain tube away from the air would fuse. This unequal heating, due to the different rates of radiation, can be avoided by constructing the heating wire by winding 10 inches of platinum wire of diameter 0.0115 inch around the lower part of the porcelain tube; 15 inches of diameter 0.013 inch around the middle and upper part of the tube; and 10 inches of diameter 0.14 inch around the top of the tube and back through the opening in the center of the tube. Also the windings are spaced unequally; the wires of diameter 0.0115 and 0.013 are wound closely at the lower part and farther apart at the upper part of the porcelain (see Figs. 1 and 2). In this way there are about 19 turns of diameter 0.0115 inch (see *D*), 25 turns of 0.013 (*E*), and 4 turns of 0.014 (*F*). By this arrangement, during use, the platinum

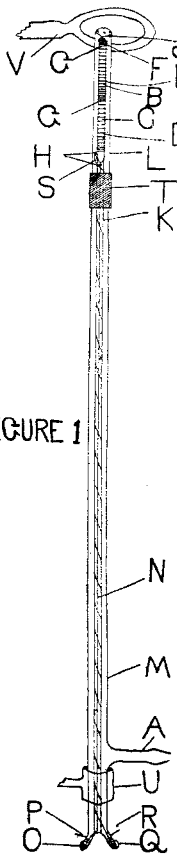


FIGURE 1

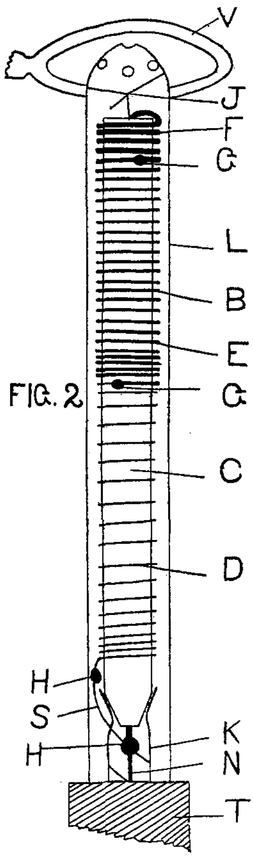
[1] Read before the New York Section, American Chemical Society, Dec. 17, 1909.

coil glows with nearly uniform brightness throughout its length, so that the maximum efficiency is obtained with minimum weight of wire and minimum length of porcelain tube.

The platinum wires are joined to each other autogenously (*G*,*G*) in the flame of the gas-oxygen blast lamp. The platinum wires are joined to the copper wires (*N*,*S*) autogenously in the flame of the air-gas blast lamp. These joints (*H*,*H*) are strong and neat.

The porcelain tube *C* is 2¾ inches long, of diameter 0.15 inch, and has an opening through its center of 0.035 inch diameter. Into the hole at the top enters a platinum wire, *J*, which has at its top 3 radiating platinum wires (the 4 wires are readily joined together at the same point in the flame of the gas-oxygen blast lamp). These wires reach out to the hard glass tube *L* and prevent the red hot platinum wires from touching and cracking the glass tube. The lower end of the porcelain tube is beveled and rests in the flared end of the soft glass tube *K*, which rests upon the bottom of the soft glass tube *M* and supports the porcelain tube.

FIG. 2.



Through the tube *K* goes the copper wire *N* of diameter 0.02 inch. This wire is sealed into the tube at *O* with blue enamel glass and presents a terminal at *P*. The external portion of the wire is wound around the tube several times in order to prevent breaking at *O*. The other copper wire, *S*, is wound around the glass tube *K*, whereby short-circuiting with wire *N* is prevented. The other terminal is at *R*. These copper wires do not get hot and do not appreciably oxidize.

The tip *L* is made of hard glass. It can be readily removed from the rest of the apparatus, disengaging it at the rubber tube *T*, so that broken tips can be replaced or other forms of tips can be substituted within a few seconds. The form of tip shown in Figs. 1 and 2 has six small holes at the top, which sprinkle the effluent air in every direction and is the best form for most uses, although various shapes can be made for special purposes.

Between the terminals *P* and *R* there is a resistance of about 5 ohms, and a current of about 6 amperes is requisite to heat the platinum wire to bright redness, so that the apparatus operates with a 30-volt current. In order to cut down a 110-volt current, about 50 cents worth of German silver wire, No. 22, will be sufficient. The entire length of the apparatus is about 30 inches. It is supported by a clamp, *U*, attached to an iron stand. Also attached to this stand is a ring, *V*, which supports the flask over the drier at an adjustible height.

The temperature of the current of air at a distance of an inch from the tip is about 100°.

In the operation of the dryer, the precautions must be taken that in starting, the current of air should be turned on before the current of electricity; and in stopping, the electricity should be turned off before the air.

The advantages of this form of drying apparatus are—

1. The heat is supplied just before the air enters the flask, so that there is no time given for the air to cool off before it reaches the moisture.

2. The air is both hot and dry, and is blown in all directions forcibly against the walls of the vessel which is to be dried, so that the operation is rapid. Furthermore, the temperature is not high enough to produce hysteresis of standard apparatus.

3. There is no necessity for the use of alcohol and ether, and the air which reaches the flask is free from dust, oil, etc., so that the flask is clean when it is dry.

This apparatus has been in practical use several months in the physical chemistry laboratories of the College of the City of New York, for drying bottles, flasks, test tubes, cylinders, beakers, etc., and has been found rapid, effective and convenient. This apparatus, apart from the external resistance, may be ordered from Eimer & Amend, at a cost of about $6.00.

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ANALYSIS OF SOME BOLIVIAN BRONZES.[1]

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Through the kindness of the authorities of the American Museum of Natural History, we were enabled to analyze portions of certain implements collected in the region around Lake Titicaca. It will be seen that these metals differ remarkably in composition, and indicate the possession of considerable metallurgical skill by the inhabitants of that region. The absence of the slightest traces of silver may be taken as a proof that the tin was derived from cassiterite, rather than native tin. The composition of Specimen IV suggests its preparation from domeykite, or some other copper arsenide, fairly free from sulphur. Owing to the small mass of samples, which were drilled or cut from the specimens, the density determinations, made with water in a pycnometer, are only approximate. In Specimen VI the porosity of the material undoubtedly occasioned a low result. Tin and copper were separated by potassium

[1] Paper read at the December meeting of the New York Section.