After a small hole had been made in the paraffin wall to allow air to escape from the artificial air sac, the egg was ready for manipulation of the membrane into position in contact with the coverslip by inflation of the natural air sac. Holding the egg tilted away from the opening in the paraffin wall, air pressure was applied by blowing gently through the rubber tube. The air pressure was carefully controlled by means of the screw clamp while the opening in the wall was sealed by the application of a pair of heated forceps to the glass immediately above it. The screw clamp was then closed tightly.

These membranes were found to remain in contact with the coverslip from two to seven days, or could be lowered and raised again at will. If desired, the glass tube can be removed from the egg and the opening in the wall of the natural air sac sealed with the vaseline and paraffin mixture. The apparatus is cheap, convenient and easily constructed.

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A TUBE FOR NITROGEN PURIFICATION

WE have found it necessary to devise a rugged, high capacity tube for the removal of traces of oxygen from nitrogen for our work in an oxygen-free atmosphere. Several designs of tubes have been described[1,2] that appear to have certain unique features. However, our apparatus is rugged, efficient, inexpensive and can be constructed in a very short time from materials available in most laboratories. These characteristics make it seem worthwhile to describe the apparatus briefly here.

The apparatus is described pictorially in Fig. 1.

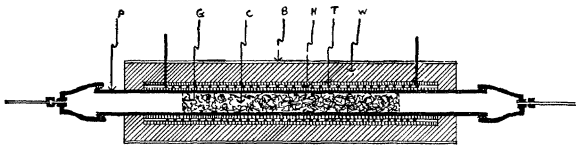

FIG. 1. P—iron pipe; G—copper gauze; C—copper turnings; B—asbestos paper; H—Nichrome wire (heater); T—asbestos tape; W—asbestos wool.

In brief, the apparatus is as follows: a 2 inch × 24 inch iron pipe is fitted with reducers to each end of which is attached a 1 foot length ⅜ inch copper tubing by means of sleeves and connectors. The copper tubing can be sealed easily to a glass line or rubber tubing by means of de Khotinsky cement or sealing wax. The tube is packed with fine, bright copper turnings to serve as the oxygen remover; the turnings are held in place with loose wads of copper screen. The outside of the iron pipe is wrapped with three layers of asbestos tape then wound with 40 feet of No. 18 Nichrome wire (0.4 ohm per foot) to serve as the heater coil. This is wrapped with two layers of asbestos tape, then with a 1½-inch layer of asbestos wool (commercial asbestos), held in place with two layers of asbestos paper and finally with several more layers of asbestos tape. The temperature may be regulated by means of an outside resistance. In fact it is highly desirable to calibrate the external resistance for several temperatures in the heater pipe.

The copper may be regenerated by slow, careful flushing with hydrogen.

A safety feature that is desirable in the use of any of these oxygen-removal tubes is a bottle of alkaline pyrogallic acid through which the purified gas may be passed after it leaves the heater tube; the pyrogallic acid will become discolored as it is exposed to and reacts with oxygen. This will serve both as an indicator of the efficiency of the tube as well as a safety trap to remove traces of oxygen should they not be removed in the hot tube. After the pyrogallic acid has become appreciably discolored it should then be replaced with a fresh solution and the copper must be regenerated. If the rate of flow of gas through the heated tube is very rapid it may be necessary to cool the gas before passing it through the pyrogallic acid solution. This is done easily by using a longer piece of copper tubing as an exit tube, coiling it several times and placing the coil under a stream of cold water.

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[1] E. C. Kendall, SCIENCE, 73: 394, 1931.
[2] Savage and Ordal, *ibid.*, 91: 222, 1940.

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