nitrogen. These solutions contain the following chemical compounds in volume-molecular proportions: mono-calcium phosphate, ammonium hydroxide, ammonium sulphate, potassium nitrate, magnesium sulphate and potassium sulphate. For 25 per cent. nitrate nitrogen, .0010, 0.0005, 0.00425, 0.0030, 0.0020 and 0.00575 respectively; for 50 per cent. nitrate nitrogen, 0.0010, 0.0005, 0.00275, 0.0060, 0.0020 and 0.00425 respectively; for 75 per cent. nitrate nitrogen, 0.0010, 0.0005, 0.00125, 0.0090, 0.0020 and 0.00275 respectively. The hydrogen ion concentration of these solutions can also be varied by varying the amounts of ammonium hydroxide and ammonium sulphate.

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A NEW TYPE OF RESPIRATION CHAMBER

IN connection with the cold storage investigations which have been carried on by the pomology section of Iowa State College considerable study has been devoted to the respiratory activity of fruit held under various conditions of maturity, humidity and temperature. In the past, the respiration chambers which were used consisted of desiccators, bell-jars, Bruehl receivers and galvanized iron containers. None of these was entirely satisfactory. A review of the literature on respiration also showed that respiration chambers used by other investigators were often a source of error due to lack of capacity or efficiency.

The respiration studies which were to be carried on during the apple storage season of 1928–1929 demanded the use of a glass chamber of large capacity. Glass was essential for observation of the progressive development of various storage troubles. Correspondence with a number of manufacturers brought forth the information that suitable chambers of about five-gallon capacity with necessary tubulatures, lid openings and ground glass seals could be made for about $100 a dozen provided a mold was constructed at an additional cost of $100 to $150. It can be readily seen that the above figures made the cost almost prohibitive for extensive work with a limited current expense budget.

Finally the writers discovered in a grocery store a wide-mouthed five-gallon pickle bottle which looked promising. Bottles of this type were finally purchased at a price of $2 each. The pickle bottle was transformed into an efficient respiration chamber by making certain alterations as shown in Fig. 1. A hole large enough to insert a No. 10 rubber stopper was cut through the lacquered metal lid. In order to prevent the sharp edges from cutting into the stopper a metal collar was soldered around the opening as

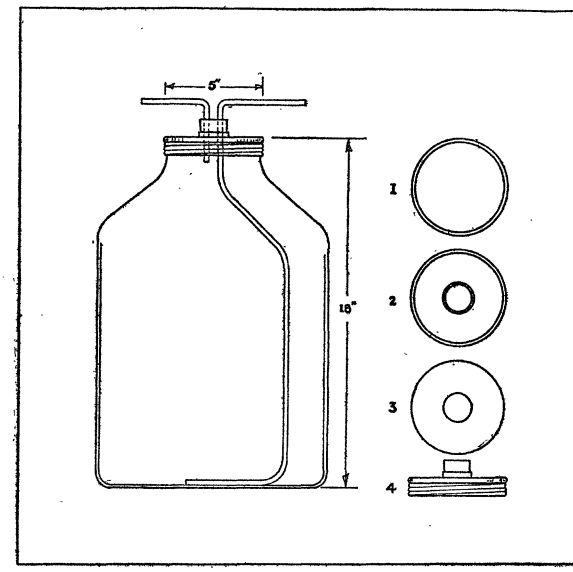

FIG. 1. Details of respiration chamber as developed from five-gallon pickle jar.

shown in No. 4, Fig. 1. The lid was made air-tight with a rubber gasket cut from 1/16-inch sheet rubber packing. This gasket was glued to the inner surface of the lid with tire patching cement. Then when a rubber stopper was inserted into the openings and the lid screwed down tightly repeated tests showed that the bottle was air-tight. As an extra precaution a heavy coating of vaseline was always applied to the edges of all openings when the bottles were in use. The suction connections were made from ¼-inch copper tubing and were installed as indicated in Fig. 1. The tube which took the carbon dioxide-laden air from the bottom of the chamber was bent to the shape of the side of the bottle in order to facilitate the insertion and placing of the material to be studied.

The most important feature of the pickle bottle was the five-inch mouth opening which permitted easy insertion of the hand and arm for the proper placing of the fruit or other materials. When used as a container for apples, the chamber held about seventy 2¾-inch to 3-inch specimens, or approximately 8,500 grams. In addition to the details shown in Fig. 1, the bottle was equipped with a heavy wire handle. From the standpoints of economy, efficiency and convenience, the respiration chamber gave satisfaction in every respect and was an improvement over the types of apparatus previously used in the work. At the present time several departments of the institution have adopted the pickle jar for use in various respiration experiments.

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