For greatest convenience the drawers in cabinets in which such trays are placed should have the inside dimensions of one of the larger members of the series, such as 22.6 by 32 inches. Or, one of the dimensions of the drawer can be taken as a base on which to determine the submultiple tray sizes. Fig. 1 shows a

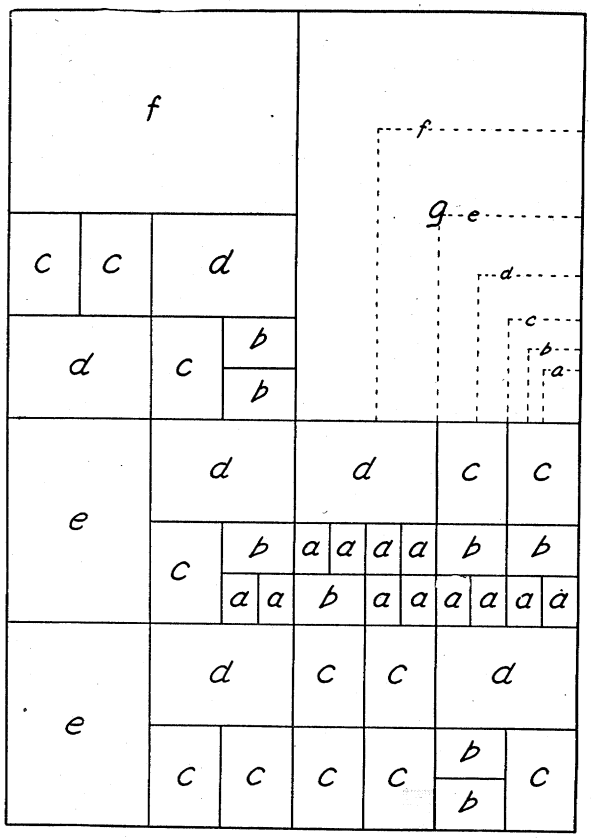

FIG. 1.

drawer of size *i* in which various sized trays of this series from *a* to *g* are fitted. Within the space *g*, the relative sizes of other trays are shown in dotted lines. No doubt such an arrangement or one in part comparable to it has been devised and used by some one long since, but since the basic scheme does not seem to have been generally in use, the foregoing presentation may be of value to others. The advantages of the plan are apparent; adaptations to special requirements are readily worked out.

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APPARATUS FOR STUDYING THE EFFECT OF INCREASED ATMOSPHERIC PRESSURE UPON THE DEVELOPING HEN EGG

A STUDY of the effects of unequal mechanical pressures upon developing amphibian eggs was among the earliest investigations of the experimental embryologists, but so far as I know no studies, other than those reported by the writer, have been made upon the effects of increased atmospheric pressure upon the avian egg. The apparatus described herein is the outgrowth of several years of experiment, the earliest reports of which were published in 1927.[1] Without describing all the failures and fruitless experiments I shall pass to the present apparatus, which serves its purpose reasonably well. Naturally if one should build a completely new apparatus it would be more compact and convenient than the one described here. The illustrations presented herewith were drawn to

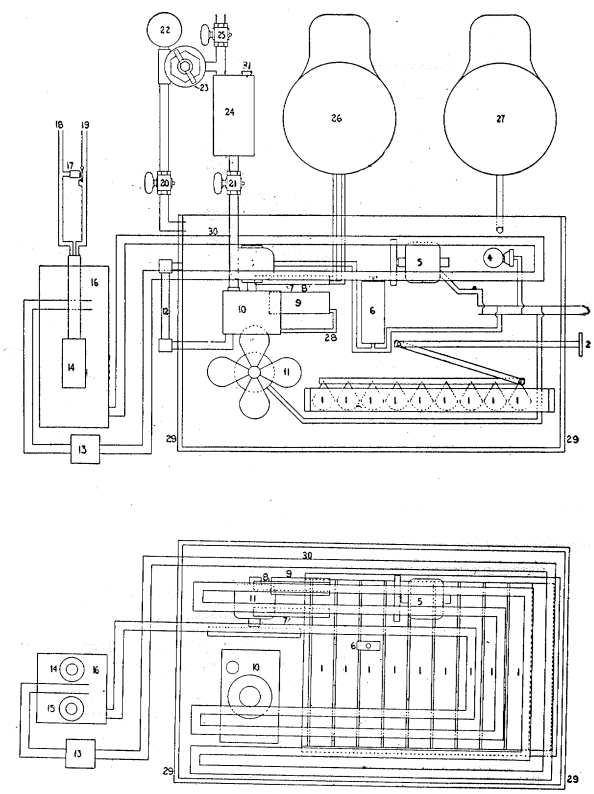

Fig. A. Schematic drawing of incubator with front wall removed. Fig. B. View from above with the lid removed. 1, Egg turner; 2, lever arm for egg turner; 3, electric circuit 110 v; 4, light (for illumination only); 5, fan to drive air over thermometer bulbs; 6, humidity control; 7, bulb of wet bulb thermometer; 8, bulb of dry bulb thermometer; 9, water reservoir for wet bulb thermometer; 10, reservoir of humidifier; 11, fan for circulation of air in incubator; 12, water gauge (outside of incubator); 13, water pump; 14, thermoregulator; 15, electric heater; 16, hot water supply tank; 17, mercury switch (6 volts through thermoregulator); 18, 6 volt line; 19, 110 a. c. to heating element; 20, air valve; 21, air valve; 22, air gauge; 23, pressure regulator; 24, water receptacle; 25, air valve; 26, dual recording thermometer; 27, recording air pressure gauge; 28, tube to supply water to thermometer reservoir from the humidity reservoir; 29, casing; 30, hot water coils; 31, port of entry for water.

[1] *Jour. Elisha Mitchell Sci. Soc.*, 42: 188.

scale and the various dimensions can, if desirable, be calculated on the basis of length (inside measurement 32 inches).

The casing (29), made of boiler plate riveted and welded together, was designed to resist 150 pounds of pressure per square inch. In the front wall (not shown) there is a hand hole of sufficient size to permit the placing of the eggs on the egg turners (1), and to make such adjustments of controls as may be necessary. The top is securely bolted on and is never removed except to repair the apparatus within. The entire tank is properly insulated with asbestos.

Compressed air up to 40 pounds of pressure is available from the building service lines, and higher pressure up to 80 pounds is available by a special compressor. There is a recording pressure gauge (27) attached directly to the tank.

The compressed air in use here has been dried, and of necessity a humidifier is used. This would probably be necessary in any set up—but if the air is not dried it will save considerable wear on the humidifier. A Bahnson cigar case humidifier (10), of the induction motor type with a control element of paper (6), is satisfactory for the purpose. Water is supplied to the humidifier and wet bulb thermometer through the receptacle (24). After properly setting valves 20, 21 and 25 the cap of the pipe 31 is removed and water is poured into the receptacle through 31. After replacement of the cap the valves are again opened, the water being forced into the humidifier tank. It may pass to the wet bulb reservoir through a tube (28). The level in the humidifier is indicated on the water gauge (12), which is outside the tank.

The relative humidity is determined by wet (7) and dry (8) bulb thermometers, corrections being made for the various pressures. An induction motor fan (5) drives air over the thermometer; while a second fan, (11) set at right angles to the first, aids in circulating the air in the chamber. If the air chamber were perfectly airtight the air would become too humid for satisfactory incubation, owing to the evaporation of water from the wet bulb, so provision must be made for slight leakage.

Contact points corrode quickly under pressure, so the temperature controls are placed on the outside of the incubator and in the supply tank (16) for the circulating of water which serves to furnish the heat for the incubator. For heating about 15 feet of one half inch brass pipe (30) are used, this being ample when the room temperature is maintained at from 60° to 70° F.

The water is circulated through the system by a motor-driven pump (13). The water is drawn from the bottom of the supply tank and returned to the top since less temperature variation occurs in the incubator under these conditions.

The eggs are placed on an egg turner (1), which is controlled by a bar (2) passing through the wall to the outside. The rack is sufficiently removed from the floor to permit free circulation of air under the eggs.

While this apparatus does not function as efficiently without pressure as do our commercial incubators, it does function sufficiently well to give at various pressures some very interesting results. These have been noted elsewhere,[2] but are summarized here as follows: Under pressure there is (1) marked acceleration of development in some embryos up to seven days of incubation, as indicated by weight; (2) a failure to develop normal extra-embryonic circulatory systems in the majority of embryos, which may account for the exceedingly high death rate about the eleventh day; (3) a hatching of a small percentage of the embryos; (4) no more abnormalities, except for the circulatory disturbance noted above, than occur under normal incubation conditions.

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MARIOTTE'S BOTTLE

IN SCIENCE for June 15, Mr. J. H. Wales describes a rather complicated apparatus for obtaining a constant flow of liquid from a source of decreasing head. A somewhat simpler device which will accomplish the same purpose is called "Mariotte's bottle" (Fig. 1).

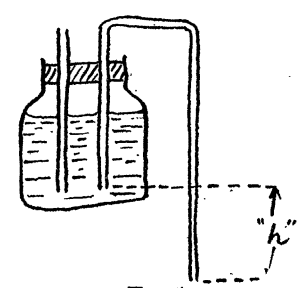

FIG. 1.

As the diagram shows, a stoppered reservoir is supplied with an air inlet and a siphon. When the siphon is working, the pressure at the bottom of the air inlet tube is obviously just atmospheric, for if it were greater air would not enter; it can not be less because it is in contact with the atmosphere. If the entrance to the siphon is at this same depth, then it will always be supplied with liquid at atmospheric pressure and will deliver a flow under the constant head "h," regardless of the changing depth within the reservoir.

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[2] Reported to the N. C. Acad. Science in 1933 and 1934.