

## EQUIPMENT

Thermal ControlBridges, C. B. Incubators and thermal control.

For incubators and cold-rooms of room size the least expensive and best

engineered installation I have seen is that built at Stanford University, Palo Alto, under designs of Prof. Douglas Whittaker in cooperation with the Frigidaire Company. This controls against both rise and fall of temperature and its range of settings is from slightly above freezing to above 40° C.

Detailed descriptions of incubators and thermal controls used at the Pasadena laboratory and also at several other laboratories in the U.S.A. are given in: "Apparatus and methods for Drosophila culture". Am. Nat. 66: 250-273, 1932.

For trouble-proof inexpensive relay that described by Kocpf and Mezen in Science 83: 109-110 would seem to be the best available.

Crew, F.A.E. Constant temperature room.

The room measures 15' x 14' 9" x 8' 8" high.

Three of the walls are

inside ones and the outside one is to the South and has a thickness of 2'. The north wall is of 10" thickness having a corridor on the other side. The remaining walls are of 6" thickness. The rooms on either side and also the corridor have an average temperature of 14° C. The floor and ceiling are of acro-concrete construction, and although the actual thickness was not ascertained for the purpose of arriving at probable heat losses, a value of 12" was taken. The window in the room is in the south wall and has a glass area of approximately 16 square feet.

It was estimated that 82 feet of 2" diameter tubular heaters loaded at 60 watts per foot run would be sufficient to maintain the temperature of the room at any predetermined value up to 28° C. with the outside temperature at 5° C.

The heaters are mounted horizontally in pairs on each of the walls at a height of 15" from floor level. At time of erection provision was made for adding an extra tube to each or any pair should it be desired to run at higher temperatures. As the supply available was 230 volts, 50 cycles single phase alternating current, it was possible to adopt a thermionic relay switch for the automatic temperature control of the room. The relay switch comprises a thermionic valve supplied by a small transformer with filament anode and grid potentials operating the triple pole main contactor switch by means of the anode current. The thermostat is connected in the grid circuit and effects control by the application or non-application of a suitable potential to the grid. The thermostat is similar in construction to a glass mercury thermometer but in addition contains two contacts one of which is in permanent contact with the column of mercury. The other is connected to a small spiral of platinum wire. A small glass capsule containing a short piece

of iron is located at the top of the thermostat tube to which is attached a length of platinum wire passing through and making contact with the platinum spiral already mentioned. The capsule can be moved up and down in the tube by means of a permanent magnet applied externally and hence the thermostat can be arranged to make contact and "open" the main contactor switch at any desired temperature. With this type of thermostat it is possible to obtain temperature regulation within extremely fine limits.

On test it was found that in the event of the filament of the thermionic valve failing the main contactor switch would remain "on" and the room temperature rise to excessively high level. A small relay was therefore included in the filament circuit and so long as current is flowing in the filament the armature of the relay is held away from a pair of contacts, which when bridged by the falling armature completes a battery circuit to an alarm bell fixed in the corridor. In the event of an interruption of the supply, this relay also operates the alarm bell. (Messrs. Round & Robertson, Edinburgh). See sketch

