

Apparatus for the Determination of Heat Resistance of Spores

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Apparatus for the rapid transfer of capillary tubes from a hot to a cold bath, by means of two pneumatic jacks, is described.

The heat resistance of bacterial spores at temperatures where this resistance is low can be determined by means of Stumbo's "Thermoresistometer" (2) or by submitting suspensions of spores in glass capillary tubes to heat. Such a method has been devised by Stern and Proctor (1), who designed an apparatus in which capillary tubes are rapidly transferred from a hot to a cold

other horizontal. The photograph presented here (Fig. 1) shows a box in which 24 holes are drilled, and in which the capillary tubes are easily held in position by a reinforced rubber sheet. This box is locked to the piston arm of the vertical jack. The drum of the vertical jack is in turn able to move horizontally at each stroke of the piston of the horizontal jack.

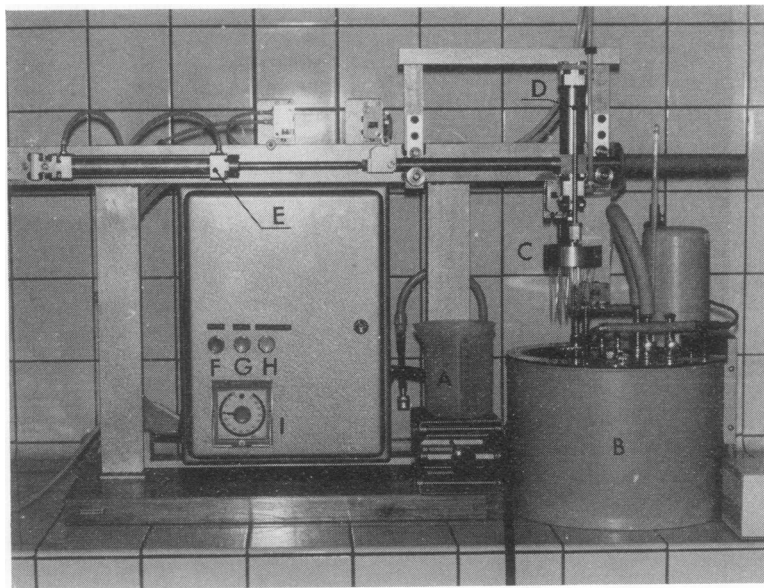


FIG. 1. Front view of the apparatus. (A) Cold bath; (B) hot bath; (C) box holding the capillary tubes; (D) vertical jack; (E) horizontal jack; (F) push button "up"; (G) push button "back"; (H) push button "in"; (I) timer.

oil bath. Another similar device was designed by J. M. Scharer (Ph.D. Thesis, Univ. of Pennsylvania, 1965).

In our laboratory, we have made an attempt to replace their counterweight mechanism with one having two pneumatic jacks, one vertical and the

All the connections in our apparatus are of the "fluidic" type (except for the timer switch) and work with compressed air (2 to 7 bars, 30 to 100 lb/in²). On the prototype, the timer is provisionally a Cycl-Flex Bliss Eagle Signal (HPS series). This prototype has been designed by Automation

Sogemo, Paris, France. Its overall dimensions are 30 by 70 by 120 cm (12 by 27.5 by 47.5 inches)

When an experiment is to be conducted, the horizontal piston is drawn in and the vertical is drawn out. The operator places the capillary tubes in position in the box and immerses them in a cold water bath (temperature of melting ice). In pushing the "up" button on the front panel, the box is raised by the vertical piston. Pushing the "back" button causes a horizontal motion by action of the corresponding jack, bringing the box to a position above the hot bath (here, an NBS Haake Ultra-thermostat is used). Finally, the "in" button initiates a downward movement and the capillary tubes are immersed in the hot bath. At the same time, the timer is started. When the time of exposure to heat has elapsed, the three actions outlined above take place automatically

but in reverse order. The time of transfer depends on the air pressure: a rise in pressure from 2 to 7 bars decreases the time of transference from 0.6 to 0.4 sec, comparable to that in the Stern and Proctor and in the Scharer apparatus.

Advantages of this apparatus, for which a French patent is pending, are: (i) the time of transfer, short and reproducible, and (ii) the wide versatility of use, water in the cold bath and oil in the hot bath being replaceable by any liquid, at will, for example, by acid for corrosion studies, etc.

LITERATURE CITED

1. Stern, J. A., and B. E. Proctor. 1954. A micro method and apparatus for the multiple determination of rates of destruction of bacteria and bacterial spores subjected to heat. *Food Technol.* 8:139-143.
2. Stumbo, C. R. 1948. A technique for studying resistance of bacterial spores to temperatures in the higher range. *Food Technol.* 2:228-240.