MEASUREMENT OF RAPIDLY VARYING SURFACE TENSION

THE determination of surface tension has acquired great importance in biological work and references to suitable methods have appeared on several occasions in SCIENCE. For the measurement of quickly changing surface tension, in addition to the ring method so ably championed by Dr. du Noüy, I have found very useful a simple form of the "pressure in bubble" method.[1] The "pressure in bubbles" method enables one to take readings within one fifth of a second or less after the formation of the surface and is of value especially when one deals with liquids giving elastic films, when the ring method can not be used.

VICTOR COFMAN
E. I. DU PONT DE NEMOURS & CO.,
WILMINGTON, DELAWARE

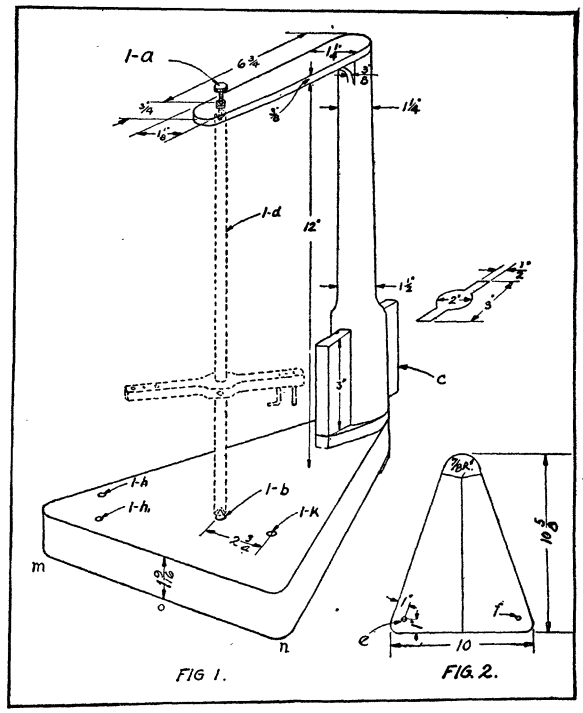
SCIENTIFIC APPARATUS AND LABORATORY METHODS

A WEIGHT-DRIVEN KYMOGRAPH

WHEN such phenomena as the speed of a nerve impulse or reaction time are to be recorded, a very fast kymograph drum is an absolute necessity. A weight-driven machine seems to serve the purpose more satisfactorily than one propelled by a spring.

Most instructors, who have tried to explain to the student in the laboratory of experimental physiology how to arrange the writing-points of the signal-magnet and of the muscle-lever in the same vertical line, open the switch, pluck the tuning fork and spin the drum a single revolution only, have been struck by the look of dismay upon the student's face. Such procedure requires good technic and plenty of patience. When the situation is complicated by a limited amount of time and a meager knowledge of technic, it is obvious that either simpler methods must be developed or these experiments must be omitted. Due to the great values being placed upon reaction times, it becomes advisable to devise simpler methods.

Therefore a stand was constructed for supporting the drum and the necessary devices for starting and stopping the drum, as well as a mechanism for producing break shocks. The stand consists of a triangular base of cast iron (Fig. 1), supported by three legs, as shown in Fig. 2. From one corner of the base arises a vertical pillar near whose point of origin is a slot to allow the placing of a pulley, such as a sash-pulley, over which the cord of the propelling weight passes. A horizontal limb arising from the vertical pillar is fitted with a 10/24 knurled head screw, 1-a, provided with a check nut. The end of this screw is sharply pointed to fit into the cupped end of the drum spindle, 1-d. This spindle is one-half inch in diameter to fit a Harvard drum, has cups at both ends and is of the proper length, about eleven and three quarter inches, to rest upon a steel point, 1-b, fitted into the base and to engage the screw, 1-a. Of course the base must be level and the spindle exactly in the vertical position.



When in use the stand is so placed that the vertical pillar rises almost directly from the edge of the table and allows the weight to fall therefrom. Near the margin of the right side of the base, as viewed by the operator, are drilled two holes, 1-h and 1-h_1, in which are placed three-eighth inch round iron rods six inches long for supporting the starting and stopping device. The latter is shown in Fig. 3 and consists of a bar of the dimensions shown in the figure, to the mesal surface of which is soldered a spring "latch" b, of the shape figured and made from number 26 piano-wire. Piano-wire is quite difficult to handle unless one end is firmly held in a vise. In construction the bar is first laid out and drilled, after which it is used as a guide for drilling the holes, 1-h and 1-h_1, in the base of the stand.

A vertical brass rod, Fig. 4-d, projecting downward from the brass bar attached to the lower end of the drum, engages the U-shaped bend in the "latch" and serves as a means of holding the drum at rest and checking it at the proper time when in motion. This brass bar, whose dimensions are shown in Fig. 4, is

[1] *Chemical Reviews*, Vol. 4, p. 31.