METHODS

A DEVICE FOR RECORDING THE MOTOR ACTIVITY OF SMALL LABORATORY ANIMALS (CONTACT ACTOMETER)

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Actometers of various designs (keyboard, with a photocell, etc.) are used for a quantitative estimate of motor activity. Such devices are not manufactured industrially. This compelled us to develop an actometer having a simple design for measuring the motor activity of small laboratory animals.*

The proposed instrument is intended for a simultaneous study of the motor activity of a large group of animals. The operating principle of the actometer is that,as the animal moves in a room, an electrical circuit is closed and each closure is counted by means of an electromagnetic counter switched into the circuit. Small movements ("washing," shivering, etc.) are not recorded by the instrument.

The instrument consists of two parts, mechanical and electrical. Its mechanical part includes a chamber housing the animal (Fig. 1A). The base of the chamber is shown in Fig. 1B. To fabricate these chambers, we used commercially available cylindrical boxes (10-cm diameter and 8-cm high) equipped with a lid and made of synthetic opaque material. The lid of the box serves as the chamber floor (5) and the box, itself, has a hood (1) which covers the animal. The hood fits into a slot in the bottom. Holes are drilled into the hood for air. To the bottom of the chamber is attached a hexagonal aluminum disk 1-2 mm thick (6) which corresponds to the dimension of the bottom of the chamber. The sides of this disk, with the exception of the corners (10), are covered with a thin insulating material (11). The disk is attached to the bottom by means of a hollow wine-bottle stopper made of synthetic material (2). The thin portion of the stopper passes inside the chamber through a central hole in the hexagonal disk (6) and bottom of the chamber (5). This keeps the animal away from the central part of the bottom. In the lower end of the stopper is installed a central hemispherical electrode (4) projecting beyond the base plane of the chamber and connected with hexagonal disk (6) by means of tabs (3). This electrode can be moved freely in metal jack (9) which is also hemispherical and equipped with clamps for connecting the wires. In addition to the support point on the hemispherical electrode, the chamber also rests with one of its insulated sides (11) of the hexagonal disk (6) on the round metal disk lying below (7) which is insulated from the jack (9) and is also equipped with clamps for connecting the wires. Since electrode (4) projects beyond the base plane of the chamber, the chamber is always in a sloped position relative to the horizontal plane of round disk (7). When the experimental animal moves about inside the chamber, the chamber together with hexagonal disk (6) rocks along round disk (7) from one insulated side of the first disk to the other, and, in this case, the circuit is closed each time by uninsulated corners (10) of the hexagonal disk when they contract the round disk. All chambers are mounted on a single plastic panel; therefore,the dimensions of the instrument are comparatively small. The chambers can be freely removed from the panel if necessary.

The electrical circuit of the device (2) contains a 24-V direct-current source, electromagnetic counters, 2-way switches, and signal bulbs. The direct-current source is the lighting system, from which it passes through a transformer and rectifier. Impulse electromagnetic counters (for example, RS 0272005 TU) are switched into the circuit. When the animal moves in the chamber, closing of the electrical circuit is not only recorded by the electromagnetic counter, but also causes the corresponding signal bulb to light up, which makes it possible to visually check the

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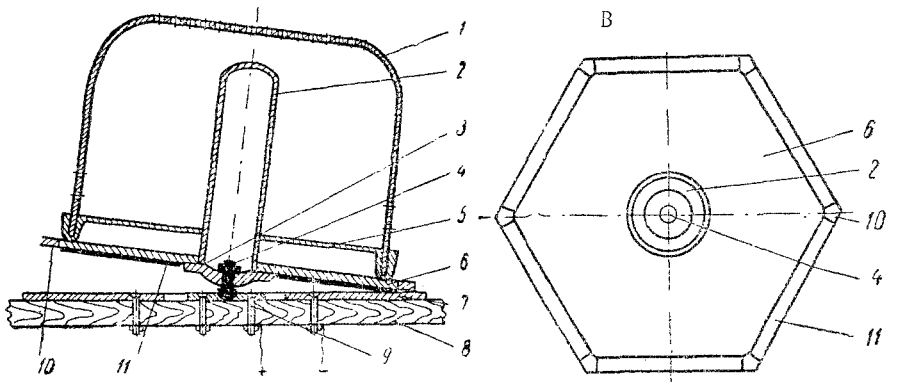

Fig. 1. Chamber of actometer in cross section (A) and its bottom view (B). Explanation in text.

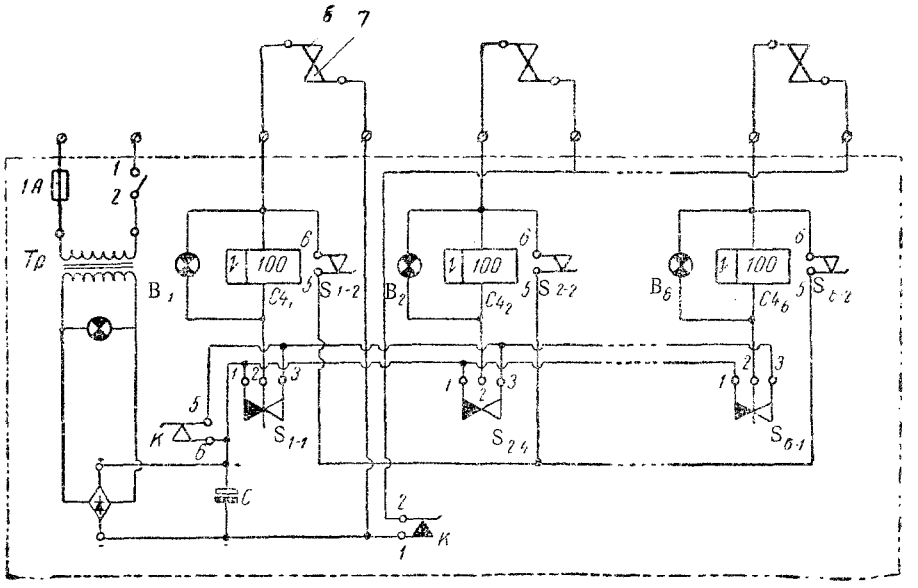

Fig. 2. Electrical circuit of contact actometer: Tp) transformer stepping down voltage from 220 to 24 V; C) condensor; S) 2-way switch; K) 2-way switch of control chamber; B) signal bulb; 6) contact surface of hexagonal disk; 7) contact surface of round disk.

operation of the instrument. The electromagnetic counters are mounted in the panel of the instrument. To check the accuracy of the counters during long experiments, the counter of any of the chambers can be connected in parallel to the counter of the control chamber by means of 2-way switches.

The fabrication of this device is comparatively simple, cheap, and can be made out of materials on hand. The results obtained on this actometer,when investigating substances whose effect on motor activity is known (phenamine, transamine, reserpine), coincide with the data reported in the literature.