PHOTOTRANSMITTER FOR RECORDING OF PULSE

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Recording of pulse during human movements has in the past involved a great deal of difficulty. By means of a special piezoelectric transmitter fixed on the lobe of the ear we succeeded in recording the pulse during work on a veloergometer. However piezotransmitters are of little use for recording the pulse during muscular work since they react to the slightest vibration. That is why we used photoelectrical transmitters during muscular activity in order to record the pulse. The work of the phototransmitter in recording the pulse is based on the change in the photocurrent arising in accordance with the pulse fluctuations on filling of the blood vessels.

We constructed two phototransmitters to record the pulse: for the ear and the finger.

The phototransmitter, fixed on the helix or on the ear lobe (Fig. 1) consists of two small ebonite boxes: in one box are located two small electric bulbs (taken from a cystoscope) and in the other the plate of the photoelement. Both boxes are screwed on to a curved brass strip. Between the boxes a gap is formed the size of which is regulated by a small screw passed through the curved strip. By turning the screw the boxes draw together and thereby fix the transmitter to the upper part of the helix or to the ear lobe. The weight of the transmitter is 8-10 g. The electric bulbs are fed from an accumulator. The photocurrent arising in the transmitter is conducted to an intensifier at the exit of which is attached the electromagnetic ink pen of the recording apparatus.

The phototransmitter for the finger consists of 2 ebonite boxes and 2 brass plates connecting these boxes (Fig. 2). In one of the boxes 2 bulbs are located and in the other the plate of the photoelement. To the lateral surfaces of the box containing the bulbs are screwed 2 brass curved plates extending beyond the edge of the box. The box with the photoelement is supplied by two screws, the free ends of which pass straight through a hole in the brass plates. The screws are fixed with nuts.

As a result of such an arrangement one transmitter may be used for fingers of different diameters. In order to prevent extraneous light penetrating the phototransmitter the upper and lower surfaces of the boxes have a grooved aperture. The finger is inserted in the clearance between the apertures, the boxes are drawn near to the surface of the finger and after this the fixing nuts are tightened. The phototransmitter is slipped on to the terminal phalange of the finger.

By means of the phototransmitter for the ear we recorded the pulse during work on a veloergometer, walking, bending of knees, lifting and dropping of a load, etc. (Fig. 3). The phototransmitter may also be used to record the pulse during an operation and in various functional tests widely applied clinically.

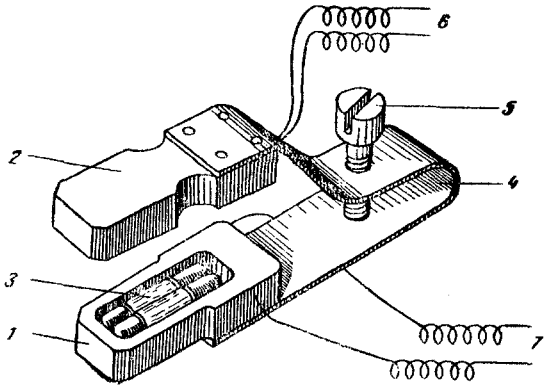

Fig. 1. Diagram of photoelectric transmitter for fixing on helix or ear lobe.
1) box with bulbs, 2) box with photoelement, 3) electrical bulbs, 4) connecting brass strip, 5) fixing screw, 6) intensifier, 7) accumulator.

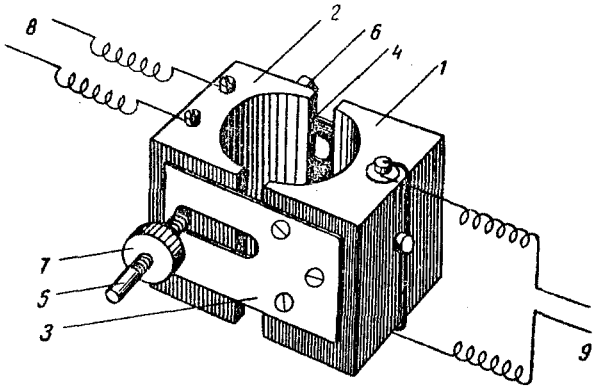

Fig. 2. Diagram of photoelectric transmitter for fixing on finger 1) box with bulbs, 2) box with photoelement, 3) 4) connecting plates, 5) 6) fixing screws, 7) fixing nut, 8) intensifier, 9) accumulator.

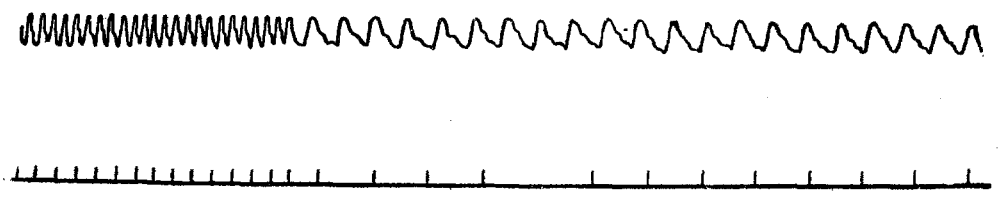

Fig. 3. Recording of the pulse with phototransmitter during work on veloergometer.