

A METHOD OF RECORDING THE BALLISTOCARDIOGRAM OF ACCELERATION

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Direct ballistocardiography is nowadays widely used in the practice of hospitals and research institutes. The majority of electromagnetic recorders used for this purpose enable the ballistocardiogram of velocity to be traced. Recorders for tracing the ballistocardiogram of acceleration ("the one which most accurately reflects the propulsive function of the heart" - Dock) are complicated and so are less widely used in practice.

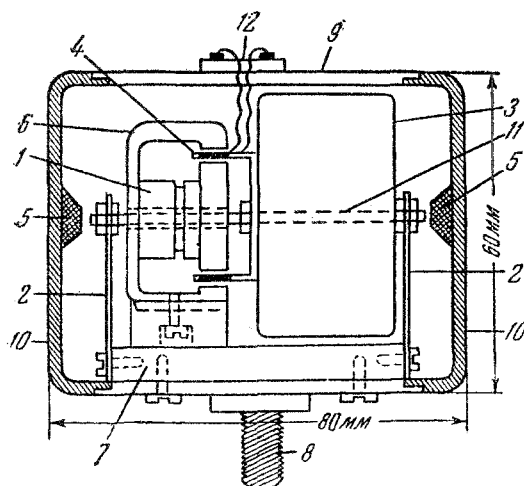


Fig. 1. General features of the recorder.

1) Magnetic ring; 2) flat steel springs; 3) seismic mass (brass); 4) coil; 5) limiting stops (rubber); 6) magnetic conductor (iron); 7) base (iron); 8) fixing bolt of the recorder (iron); 9-10) body and top of the recorder (iron); 11) bolt for the moving part (brass); 12) coil leads.

In the Sverdlovsk Research Institute of Spa Treatment and Physiotherapy an electrodynamic recorder has been constructed which enables the ballistocardiogram of acceleration to be recorded by a direct method.

In its construction the recorder (Fig. 1) consists of an electrodynamic system of a permanent ring magnet 1, taken from a type 0.5 GD dynamic loudspeaker, in the gap of which a coil 4 with a weight 3, acting as a seismic mass, are suspended on flat steel springs.

The coil has a large number of turns of PÉL 0.05 mm wire with a resistance of the order of 1 kohm. The coil leads are connected in parallel with a condenser with a capacity of 2 and 20 μf , which creates a constant period of 180-200 millise.

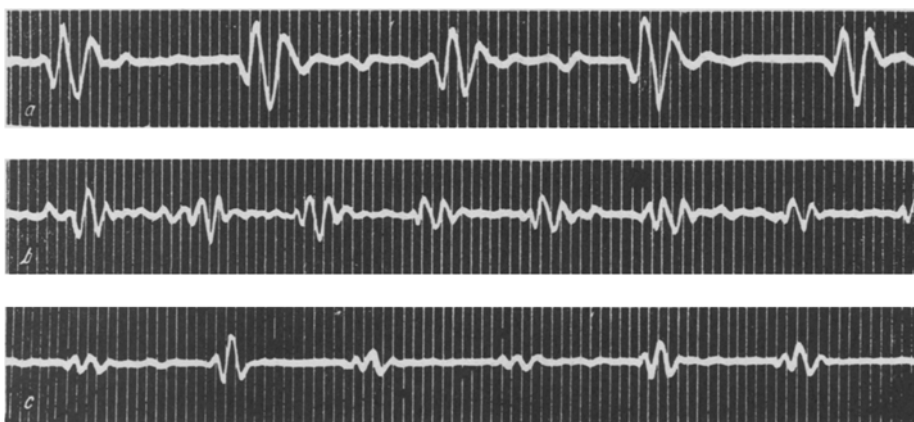


Fig. 2. Ballistocardiograms. a) Of a healthy person; zero degree of abnormality; b) patient N-va, aged 30 years; diagnosis hypertension, angina pectoris, first degree of abnormality; high L waves; c) patient U-v, aged 29 years; diagnosis hypertension, atherosclerosis second degree of abnormality.

The body 9 of the recorder is fixed to a strip with the screw 8 and placed on the subject's knees. In response to movement of the person's body, the body of the recorder together with the magnet move synchronously, but the coil, by virtue of the inertia of its mass, remains relatively at rest. In consequence of the displacement of the magnet in relation to the coil, an electrodynamic current is induced in the latter, the average value of which reaches 1-1.5 mv.

The tracing is made on an EKP 4 electrocardiograph with a rate of film movement of 4 cm/sec.

By means of this recorder ballistocardiograms were registered in persons of different ages and sex, both healthy and suffering from hypertension, atheromatous cardiosclerosis, angina pectoris, and organic heart disease.

The ballistocardiograms were interpreted by the method suggested by Brown, and in addition the curves were analyzed quantitatively (Dock, A. L. Myasnikov, V. V. Parin).

The results obtained agree completely with the clinical picture of the disease and the reports in the literature on this subject.

The recorder is portable and convenient to use.

By way of illustration we show curves traced by means of our recorder (Fig. 2).

SUMMARY

The authors describe a new apparatus for recording the ballistocardiogram of acceleration which has been designed at the Sverdlovsk Scientific Research Institute of Spa Treatment and Physiotherapy.

The new design of electrodynamic recorder permits registration of ballistocardiogram of acceleration by direct method.

In comparison with the known models the new apparatus is portable and convenient. The results of investigation obtained with its aid completely correspond to the clinical picture of the disease.