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3. Sets of isolines of vertical and horizontal pressures in the case of non-rigid structures are given in this paper. The different character of settlement of embankments on swampy land can be explained by the prevailing action either of vertical or horizontal pressure.

No. E-5                      STUDIES OF SOIL PRESSURES AND SOIL DEFORMATIONS BY MEANS OF A CENTRIFUGE  
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The study of soil problems by means of modeling with the aid of a centrifuge is used in various institutions of the USSR. (The laboratory for Soil Physics of the All-Union Foundation Research Institute, the laboratory for Physics of the Military-Engineering Academy, the laboratory for Soil Mechanics of the Research Institute for Water-Supply and Hydro-Geology, and the Research Laboratory of Moskva-Volgstroi).

The centrifuge gives the possibility to create a complete mechanical similarity and exactly reproduces the loadings called forth by the weight of the given system.

This principle has been put forward in the USSR by Professor N. N. Davidenkov and Professor G. J. Pokrovsky, independently of the American investigator, P. Bucky.

Centrifuges with effective radii from 0.8 to 1.5m have been made for experiments and the following problems have been studied by means of these centrifuges: (Fig. 1)

1. Stability of slopes in earth banks and cuts.
2. Distribution of pressure under foundations.

The results are shown in Fig. 2. The curve II is a theoretical one; the curve III shows the results of model experiments and the curve IV of field experiments.

The experiments have been carried out on sand. The pressures were measured by means of aerostatical dynamometers, which consist of a small vessel filled with coloured viscous liquid, and closed by a rubber membrane. The height to which the liquid rises at the end of the test in the capillary tube immersed in the liquid, indicates the pressure exerted on the apparatus during the test. (Fig. 3)

3. A similar apparatus has been used for determination of pressure on oulvert pipes buried in earth. By a special device not only the normal, but the tangential pressures as well could be measured. Fig. 4 shows the results. (The normal stresses are shown by the dotted line and the tangential stresses by the full line.)

4. Settlement of foundations. In Fig. 5 the results of model and field experiments are compared. The curve I shows the relation between time and settlement. The curve II-the relation between load and settlement.

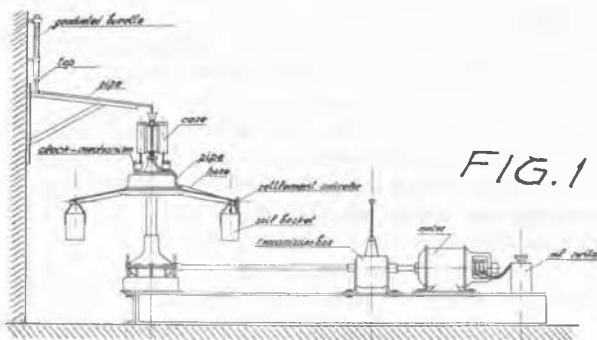


FIG. 1

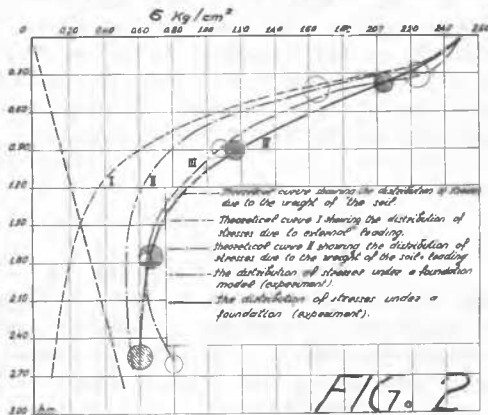


FIG. 2

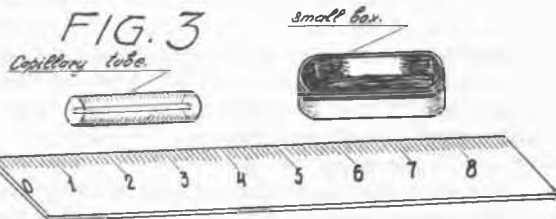


FIG. 3

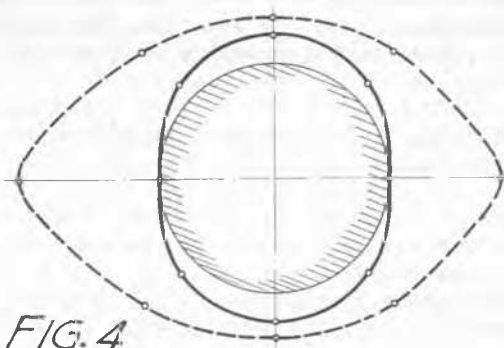


FIG. 4

Comparison of soil deformations through model and field experiments.

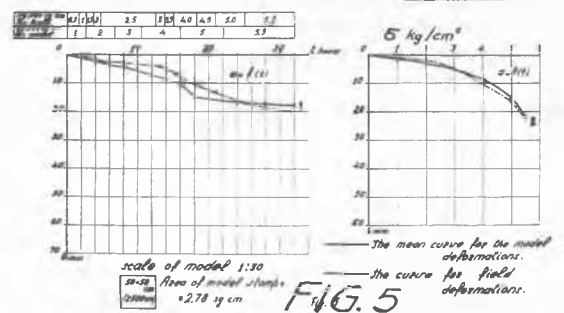


FIG. 5