

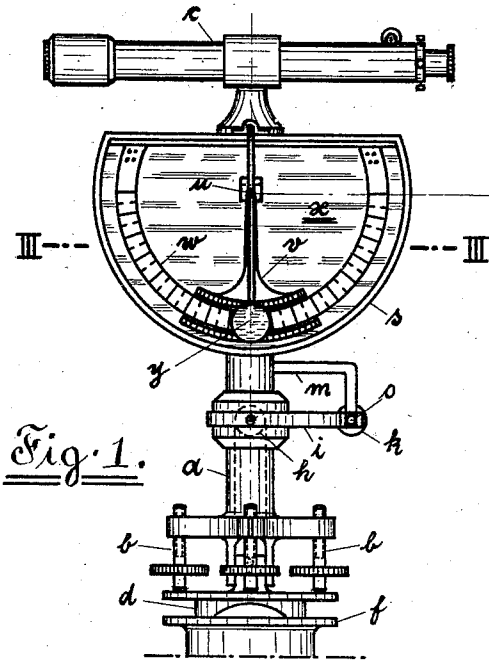
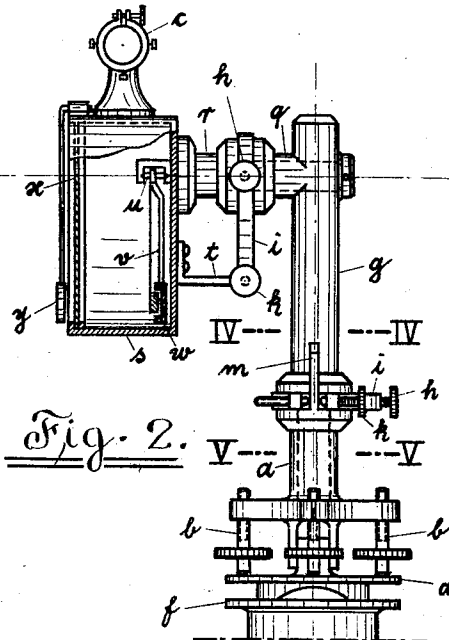
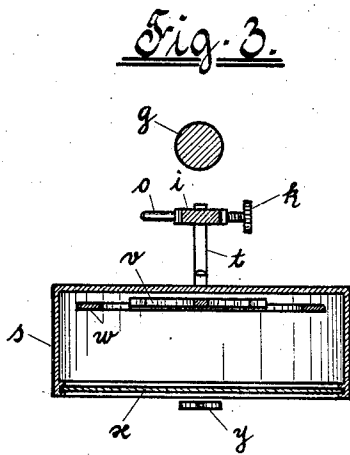
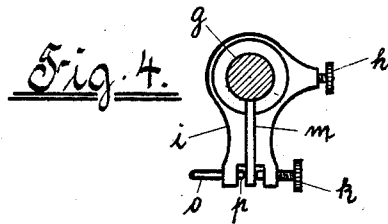
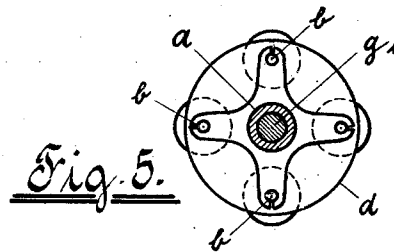
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H. THEIS

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GEODETIC INSTRUMENT WITH PENDULUM ARRANGEMENT

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UNITED STATES PATENT OFFICE

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GEODETIC INSTRUMENT WITH PENDULUM ARRANGEMENT

Application filed September 11, 1930, Serial No. 481,228, and in Germany March 7, 1929.

This invention relates to a geodetic instrument with pendulum arrangement, in which the telescope adapted to be moved horizontally and vertically, is turnable on an arm extending at right angles to the vertical axle. In comparison with geodetic instruments of known type the novelty according to the invention consists in that a known protecting casing for the pendulum is turnable together with the telescope fixed on the same and carries inside the graduated arc and the nonius constructed as pendulum and on the opposite wall a transparent disc, in front of which a reading lens known per se is suspended pendulum-like.

The sensitive measuring elements are therefore encased separately and notwithstanding easily readable by means of the lens. The elements required for adjusting are freely accessible, so that an accurate working is obtained notwithstanding the easy handling.

An embodiment of the invention is illustrated by way of example in the accompanying drawings in

Fig. 1 in front elevation.

Fig. 2 is a side elevation partly in section viewed from the right.

Fig. 3 is a section on line III—III of Fig. 1.

Fig. 4 is a section on line IV—IV of Fig. 2.

Fig. 5 is a section on line V—V of Fig. 2.

In a stand *a* adjusting screws *b* are screwed as usual, designed to adjust the position of a telescope *c*. The adjusting screws *b* rest upon a base plate, which is screwed removably on a head plate *f* of the stand. In the stand *a* the vertical axle *g* of the instrument fitted with a fine adjusting device is rotatably mounted.

The fine adjusting is effected in known manner by means of an oscillatable bow *i* (Fig. 4) rigidly connected with the stand *a* when the screw *h* has been tightened, and in the fork-opening of which bow an oscillatable arm *m* engages, which is fixed on the axle *g* and controlled by an adjusting screw *k*. Opposite the screw *k* a screw sleeve *o*

with bolt *p* controlled by a spring is arranged in the oscillatable bow *i*.

On the upper portion of the vertical axle *g* branches at right angles an arm *q* in which a shaft *r* of a segment shaped drum casing *s* carrying the telescope *c* is pivotally mounted. On the drum casing *s* an oscillatable arm *t* for the fine adjusting mechanism *h, i, k* (Fig. 2) of the shaft *r* is fixed. The axis of the telescope *c*, mounted on the flattened portion of the envelope of the drum casing *s*, is situated in the plane of oscillation of shaft *r* and is standing horizontal when the axle *g* is vertically adjusted.

In the extension of shaft *r* in the drum casing *s* a pivot axle *u* of a pendulum hand *v* is arranged. The pendulum hand *v* adjusts itself always perpendicularly even if the drum casing *s* carries out oscillating movements. The pendulum hand *v* has nonius divisions above and below a graduated arc *w* extending concentric to the pivot axle *u* and fixed on the rear wall of the drum casing *s*. The graduated arc *w* is subdivided into divisions on its upper and lower longitudinal edges at either side of the center (zero point) registering with the axis of the axle *g* and with the hand *v*. The divisions might be subdivided on the one longitudinal edge into minutes and these again at the other longitudinal edge into seconds, so that the angles of oscillation relative to the normal position of the drum casing can be read in degrees, minutes and seconds.

For accurate reading a freely oscillating pendulum lens *y* with magnifying glass is arranged on the front side of the drum casing *s* which casing is closed by a glass pane *z*.

If the foot of the telescope *c* is connected in known manner with a hand or oscillatable arm (alidade) which is adapted to be turned around the center of a graduated arc (limb) mounted on the drum casing, the angles situated between the several lines of sight can be read also in the horizontal plane.

The application is as follows:

After the instrument has been placed on the stand and fixed on the same, it is adjusted in known manner by turning of the adjusting screws *b* so that the zero point of the

hand *v* registers with the zero point of the graduated arc *w* in every turning position of the carrier or axle *g* of the telescope. In this position the telescope axis is horizontal for levelling purposes.

5 If a point situated higher or deeper in the vertical plane has to be intersected the drum casing *s* is tilted, so that the line of sight of the telescope *c* registers with this point. The
10 angle of inclination to the horizontal can then also be read at the same time as oscillation angle between the zero point of the drum casing *s* and the zero point of the hand *v*.

15 I claim:

A geodetic instrument with pendulum arrangement, comprising in combination a telescope adapted to be moved in horizontal and vertical directions, a vertical axle for said
20 telescope, an arm carrying said telescope and mounted on and at right angles to said vertical axle at the upper end thereof, a protecting casing rotatable together with said telescope, a graduated arc in said casing, a pendulum pivoted at the center of said arc and
25 having a vernier cooperating therewith, a transparent disc in the casing wall opposite said graduated arc and pendulum, and a magnifying reading lens oscillatably suspended in front of said transparent disc.

30 In testimony whereof I affix my signature.

HERMANN THEIS.

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