May 26, 1936. C. A. STOCKHOLM 2,042,365

LEVEL AND INCLINOMETER

Filed June 22, 1935

Fig. 1.

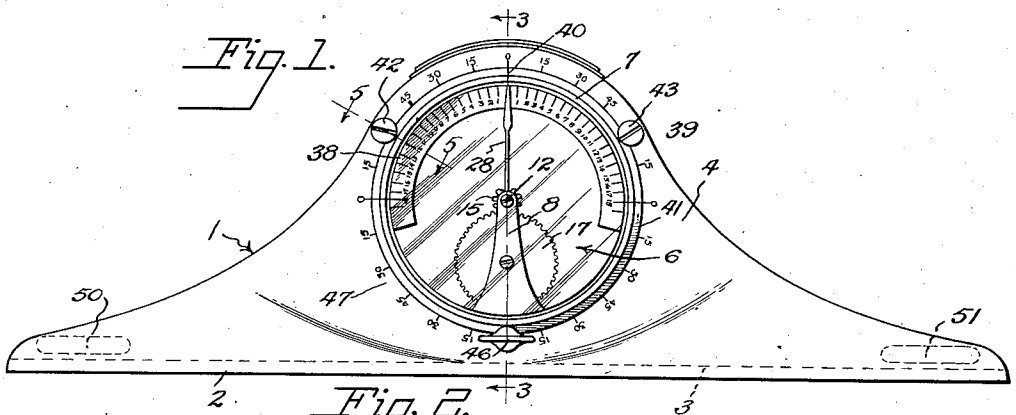


Fig. 2.

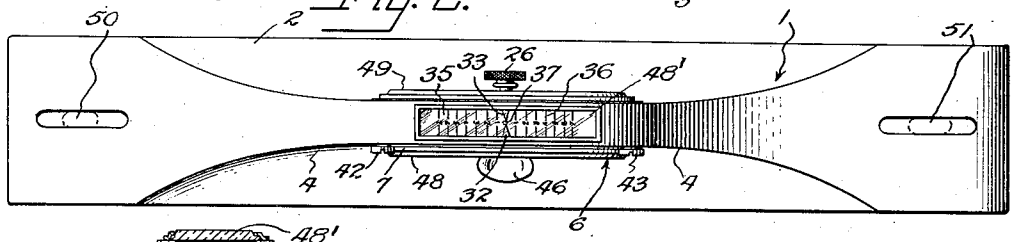


Fig. 3.

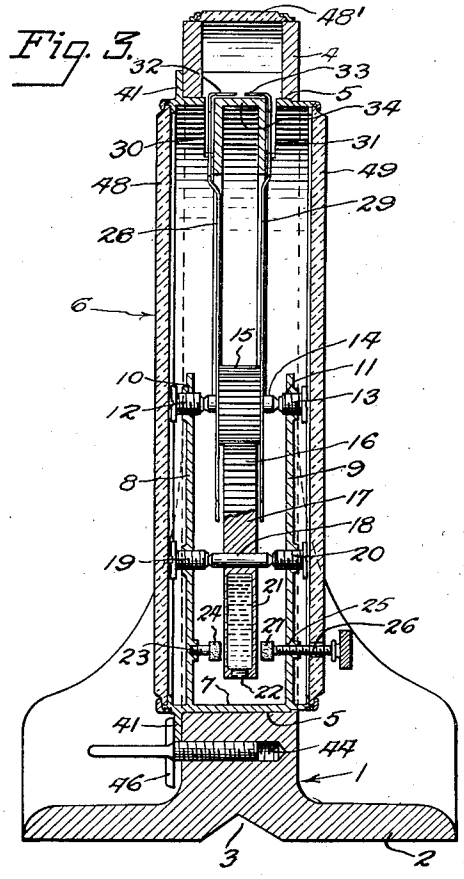


Fig. 4.

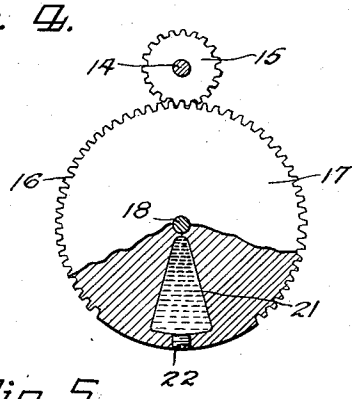
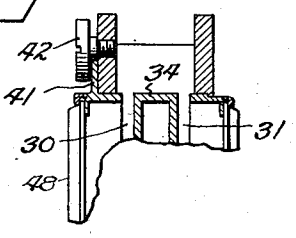


Fig. 5.



Inventor

C. A. Stockholm

By Mason Fenwick & Lawrence

Attorneys

Patented May 26, 1936 2,042,365

UNITED STATES PATENT OFFICE

2,042,365

LEVEL AND INCLINOMETER

Charles A. Stockholm, Beaumont, Tex.

Application June 22, 1935, Serial No. 28,003

3 Claims. (Cl. 33—215)

This invention relates generally to inclinometers, and more particularly to pendulous devices of this character which are provided with various scales to indicate level degrees of inclination.

The main object of the invention is to provide a device of the character referred to, which can be manufactured cheaply and sold at low cost; and which will have all the characteristics of expensive instruments of precision for effecting the same purpose.

Another object of the invention is to provide a device of this character with means for clamping the moving elements in any desired position of angular adjustment.

Other objects of the invention will become apparent as the detailed description thereof proceeds.

In the drawing:

Figure 1 is a side elevation of a preferred form of the present invention;

Figure 2 is a top plan view of the device shown in Figure 1;

Figure 3 is a vertical transverse section to an enlarged scale, taken on the line 3—3 of Figure 1;

Figure 4 is a side elevation of a pendulum, geared with a pinion for operating an indicator forming part of the present invention, part of the pendulum being broken away to show details of construction; and

Figure 5 is a fragmentary transverse section taken on the line 5—5 of Figure 1.

In the drawing, the invention is shown as comprising a casting 1 provided with a base 2, machined to form a plane surface adapted to be positioned upon any object, the inclination of which is to be determined. The base 2 is also provided with a recess 3, triangular in cross-section, adapting the device for use on shafts and other objects which are cylindrical or similarly curved in transverse section.

The casting 1 comprises also a central body 4 extending up from the base 2 centrally over the recess 3 and perpendicular to the plane face of the said base 2. The body 4 is provided with a large cylindrical aperture 5 adapted to receive, adjustably and detachably, the inclinometer mechanism, which is designated as a whole by the reference numeral 6. The inclinometer 6 comprises a cylindrical casing 7 which fits snugly but slidably within the aperture 5.

Standards 8 and 9 project upwardly from the lower part of casing 7; and the upper ends of these standards are provided with coaxial screw-threaded apertures 10 and 11 adapted to receive the pivot screws 12 and 13, respectively. A shaft 14 having conical opposite ends, is supported for rotation about a normally horizontal axis by the pivot screws 12 and 13; and a pinion 15 is secured to the shaft 14 to mesh with gear teeth 16 formed on the upper part of the periphery of the cylindrical pendulum 17.

The pendulum 17 is secured at its center to a shaft 18, having its conical opposite ends rotatably received in the pivot screws 19 and 20, which are threaded into corresponding apertures formed in the standards 8 and 9, at such distance from the axis of the screws 12 and 13 as to hold the gear teeth of the pinion 15 and pendulum 17 properly meshed throughout all movements of the pendulum 17. The lower part of the pendulum 17 is provided with a chamber 21 adapted to be closed at its lower end by a screwthreaded plug 22, and to be filled with mercury, or other heavy material, to impart the characteristics of a pendulum to the cylindrical member 17.

To prevent undesirable oscillations of the pendulum 17 during transportation of the instrument, or to clamp it in any position of adjustment, the standard 8 has secured thereto and near the lower end thereof, a stud 23 provided at its outer end with the tip 24 of rubber or other resilient material. The standard 9 is provided with a screw-threaded aperture 25 directly opposite to the stud 23; and this aperture 25 carries an adjustable screw 26, provided at its inner ends with a tip 27 of rubber or other resilient material adapted to contact with the adjacent face of the pendulum 17 to clamp the pendulum securely against the resilient member 24.

A pair of indicators 28 and 29 are secured to the shaft 14 on opposite plane faces of the pinion 15 and extend radially therefrom. The upper ends of the indicators 28 and 29 extend through slots 30 and 31 formed in the upper part of the casing 7; and are provided at their outer ends with indicating tips 32 and 33 bent over a central segmental part 34 of the casing 7, which is provided, as shown in Figure 2 of the drawing, with scales 35 and 36 reading in opposite directions from a central fiducial mark 37. The slots 30 and 31 extend throughout a semi-circle around the upper part of the casing to permit angular movements of the indicators 28 and 29 through an angle of 90° in either direction. The upper part of the casing adjacent the slots 30 and 31 is also provided with scales 38 and 39 extending in opposite directions from a fiducial mark 40. Obviously, the indications of the instrument may be read

on the scales **35** and **36** at the top of the instrument or on the scales **38** and **39** formed on either face of the scale supports.

To mount the inclinometer mechanism on the body **4**, the casing **7** has formed thereon an annular flange **41** adapted to seat against a face of the body **4**. Stud screws **42** and **43** are screw-threaded into the body **4** and are angularly spaced apart to hold the flange **41** snugly against the face of said body, while at the same time permitting angular adjustment of the inclinometer mechanism in the body of the instrument. The lower part of the body is provided with an internally screwthreaded bore **44** adapted to receive a screw **45** having a butterfly clamping head **46** adapted to engage the flange **41** to clamp the inclinometer mechanism, in any position of angular adjustment in the cllindrical aperture **5**. The extent of angular adjustment may be determined by the degree scales **47**, which are formed on the face of the body **4** concentrically around the edge of the aperture **5**.

To protect the mechanism, the casing of the inclinometer includes glass closure plates or windows **48** and **49** suitably and detachably secured in position by means of screw bezels or other means commonly used for this purpose. In order to provide access to the upper end of the scale **36**, the upper part of the body **1** is provided with a window **48'** through which the scales **36** and the indicator ends **32** and **33** may be viewed. Spirit levels **50** and **51** may be mounted in the base of the instrument to supplant the inclinometer mechanism.

Since devices of this character must be used frequently in locations where light is either poor or difficult to produce, it is intended that the various scales and indicators shall be made self-luminous, as by coating the indicators and scale markings with some kind of phosphorescent or radio-active material.

Having thus described my invention, what I claim is:

1. An inclinometer comprising a base member having a plane face provided with a recess, a body extending perpendicularly to said base, and having a cylindrical opening therethrough, a cylindrical casing slidably and rotatably mounted in said opening, means for clamping said casing in any position of angular adjustment in said opening, a pair of standards extending radially inward from the cylindrical wall of said casing, a pinion journaled in said standards, a cylindrical pendulum journaled in said standards to rotate about an axis parallel to the axis of said pinion, and having gear teeth meshing with the teeth of said pinion, the walls of said casing opposite the standards being slotted and having a scale formed on the periphery between said slots, semi-circular scales fixed to said casing at the inner walls of said slots, and indicators extending radially from said pinion to read on all of said scales.

2. An inclinometer comprising a base member having a plane face provided with a recess, a body extending perpendicularly to said base, and having a cylindrical opening therethrough, a cylindrical casing slidably and rotatably mounted in said opening, means for clamping said casing in any position of angular adjustment in said opening, a pair of standards extending radially inward from the cylindrical wall of said casing, a pinion journaled in said standards, a cylindrical pendulum journaled in said standards to rotate about an axis parallel to the axis of said pinion and having gear teeth meshing with the teeth of said pinion, the walls of said casing opposite the standards being slotted and having a scale formed on the periphery between said slots, semi-circular scales fixed to said casing at the inner walls of said slots, indicators extending radially from said pinion to read on all of said scales, and means adjustable on said standards to clamp the pendulum in any desired position of angular adjustment.

3. An inclinometer comprising a base member having a plane face provided with a recess, a body extending perpendicularly to said base, and having a cylindrical opening therethrough, a cylindrical casing slidably and rotatably mounted in said opening, means for clamping said casing in any position of angular adjustment in said opening, a pair of standards extending radially inward from the cylindrical wall of said casing, a shaft journaled in said standards, to rotate about the axis of said casing, a pendulum journaled in said standards to rotate about an axis parallel to the axis of said shaft, means for transmitting the rotation of said pendulum to said shaft, the walls of said casing opposite the standards being slotted and having a scale formed on the periphery between said slots, semi-circular scales fixed to said casing at the inner walls of said slots, and indicators extending radially from said shaft to read on all of said scales.

CHARLES A. STOCKHOLM.