United States Patent

Haun

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[45] **Aug. 22, 1972**

[54] **SURVEYOR SIGHT**

[72] Inventor: **Horace H. Haun,** 9240 Burke St., Pico Rivera, Calif. 90660

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[52] **U.S. Cl.**.....**33/295,** 40/125 H, 248/170, 248/188.4

[51] **Int. Cl.** **G01c 15/06**

[58] **Field of Search**.....40/40, 39, 125 H; 248/46, 48, 248/170, 188.4, 188.7; 33/74 R, 74 B, 74 C, 74 D

[56] **References Cited**

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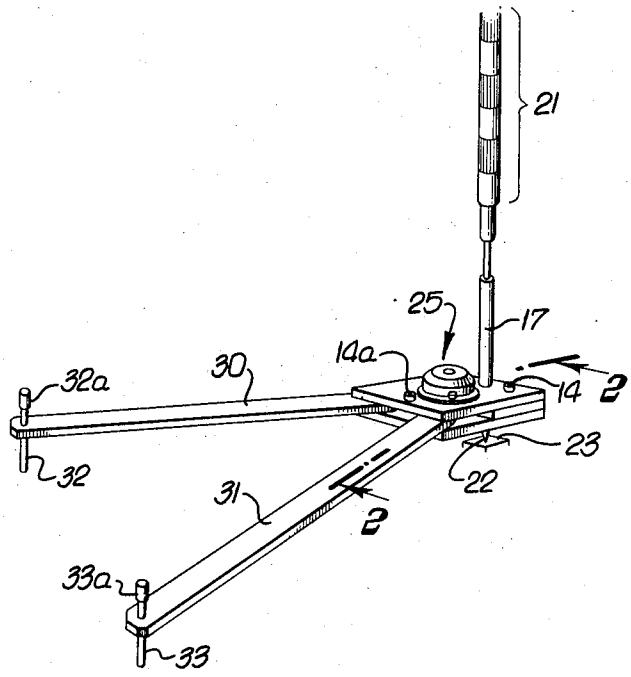
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[57] **ABSTRACT**

Sighting apparatus, usable in surveying, comprises a base and a first support therefor; a standard to support a rod or target and mounted on the base to extend upright directly above the first support; second and third supports including a pair of elongated legs having adjustable pivotal attachment to the base accommodating relative swinging of the legs through wide, generally horizontally extending arcs; and, level indicator means on the base to indicate when the standard extends vertically.

7 Claims, 5 Drawing Figures



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FIG. 1.

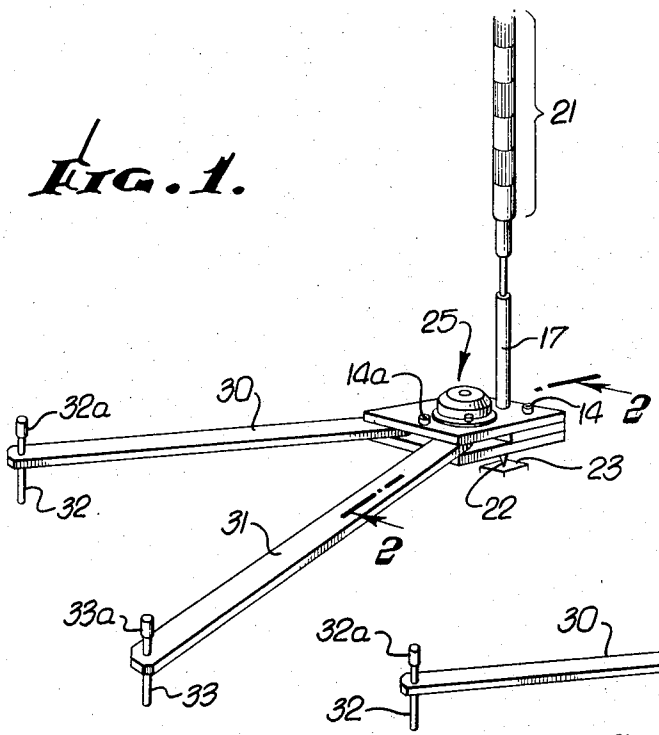


FIG. 5.

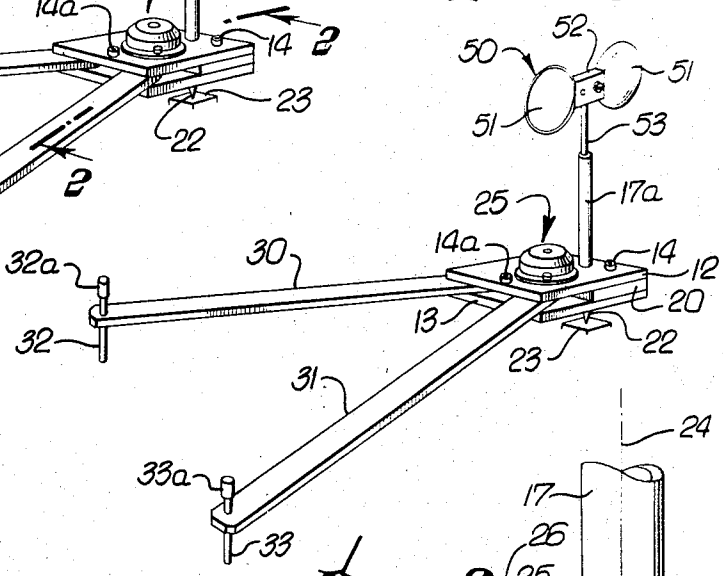


FIG. 3.

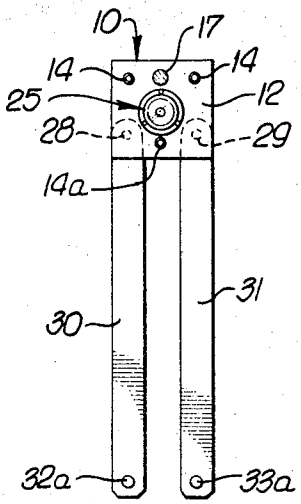


FIG. 2.

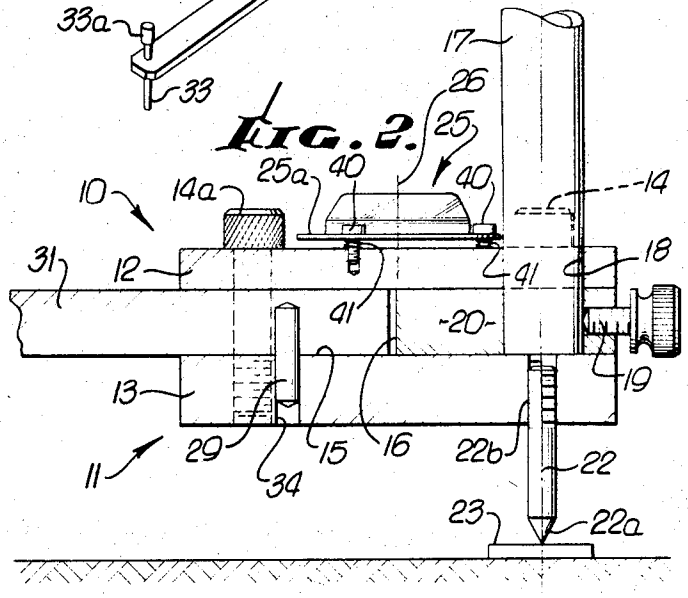
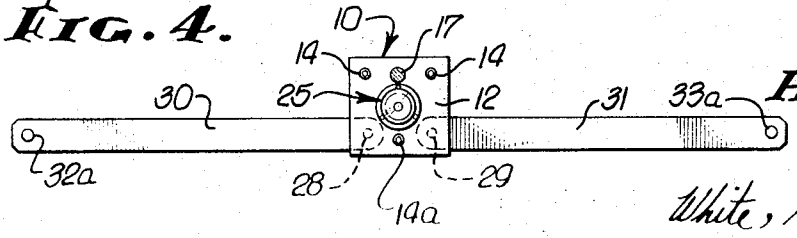


FIG. 4.



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SURVEYOR SIGHT

BACKGROUND OF THE INVENTION

This invention relates generally to surveying apparatus, and more particularly concerns improvements in surveyor's sighting equipment.

In establishing grades and angles the surveyor commonly uses sighting equipment such as a transit at one location and a sighting rod at a distant location. For high accuracy, the rod must be held or mounted so as to extend precisely vertically, which presents a problem where the terrain is uneven and the rod must be maintained vertically over a considerably length of time. While attempts have been made in the past to solve this problem, no one to my knowledge has provided a sight having the unusually advantageous, simple and effective structure, function and results characterized by the present invention.

SUMMARY OF THE INVENTION

Basically, the invention is embodied in sighting apparatus that comprises a base and a first support therefor; a standard mounted on the base to extend upright directly above the first support; second and third supports including a pair of elongated legs having adjustable pivotal attachment to the base accommodating relative swinging of the legs through wide generally horizontally extending arcs; and, level indicator means on the base to indicate when the standard extends vertically. As will be seen such elongated legs may be swung to a large number of positions and relative to one another and to the first support, to accommodate precise and rapid adjustment of the standard to vertical position even though the terrain is quite rough. In this regard, the second and third supports may include upright elements having vertically adjustable attachment to the legs to project therebelow for ground engagement.

Other objects and advantages include the provision of a level indicator in the form of a bubble chamber on the base mounting the standard; the provision of a first support and standard in the form of a shaft having vertically adjustable attachment to the base and projecting therefrom; the provision of sighting structure on the standard, as for example a rotary light reflector; and the mounting of the legs to the base to have a range of alternate positions within a swing-arc of at least about 75°, as will appear.

These and other objects and advantages of the invention, as well as the details of an illustrative embodiment, will be more fully understood from the following specification and drawings, in which:

DRAWING DESCRIPTION

FIG. 1 is a perspective showing of a surveyor's sight incorporating the invention;

FIG. 2 is an enlarged vertical section taken on line 2—2 of FIG. 1;

FIG. 3 is a plan view of the FIG. 1 sight with legs collapsed;

FIG. 4 is a view similar to FIG. 3, showing the sight with legs fully extended; and

FIG. 5 is a view like FIG. 1 showing a modified sight.

DETAILED DESCRIPTION

In the drawing, the base **10** of the overall apparatus **11** may advantageously include upper and lower metal plates **12** and **13** attached to an intermediate block **20**, as by means of fasteners **14**. A space **15** is left between the plates and beyond the edge **16** of the block, for purposes as will appear. Another fastener **14*a*** extends between the cantilevered extents of the plates **12** and **13**, for adjustment purposes as will also appear.

A standard is mounted on the base to extend upright, the illustrated standard **17** being in the form of a shaft received downwardly in a bore **18** in the base to be adjustably clamped by the set screw **19** threaded into block **20**. The upper extent of the standard may be striped at **21**, for sighting purposes.

A first support for the base may take the form of a stub shaft **22** having a tapered lower terminal **22*a*** to be placed directly onto the center point on the top of a monument **23** or other object, the axis **24** of the standard **17** then passing through that center point. Shaft **22** has vertically adjustable attachment to the base at **22*b***. Also located on the base is what may be referred to as level indicator means, as for example a bubble chamber **25**. The center **26** of the latter is nearly equidistant from the axis **24** and vertical axes of pivot pins **28** and **29** to be described. The chamber base **25*a*** is attached to the plate **12** by three adjustable screws **40**, and urged upwardly by springs **41**. Thus, the bubble in the chamber may be precisely centered when a plumb bob is used to orient the standard **17** vertically.

Also provided are second and third supports including a pair of elongated legs, such as at **30** and **31**, having adjustable pivotal attachment, as via pins **28** and **29**, to the base **10** accommodating relative swinging of the legs through wide generally horizontally extending arcs. Thus, for example, each leg has a range of alternate positions within a swing-arc of at least about 75°, and preferably up to 90° as is clear from a comparison of FIGS. **3** and **4**. Therefore, the support leg adjustment enables use of the device under rough and sloping terrain conditions, to provide precise vertical orientation of the standard.

The second and third supports may also advantageously include upright elements, such as screws **32** and **33**, having vertically adjustable attachment to the outer portions of the legs **30** and **31**. The screws project below the legs for ground engagement, contributing further to accommodation of the device to use on rough or sloping terrain. Screw terminals **32*a*** and **33*a*** are manually adjustable.

Once the legs have been horizontally adjusted and the screws vertically adjusted to achieve a vertical orientation of the standard, the fastener **14*a*** may be tightened to cause the cantilevered portions of the plates **12** and **13** to clamp opposite sides of the legs rigidly to the base, as may be desired by the user. Note that the legs pivot on pins **28** and **29** received in vertical bores **34** in plate **13**. Also, friction between the legs **30** and **31** and plates **12** and **13** may be varied by means of adjustment of fastener **14*a***

FIG. **5** illustrates a modified apparatus wherein the sighting structure includes a vertical standard **17*a*** on which a rotary light reflector is mounted. The reflector **50** may include a pair of oppositely facing parabolic reflectors **51** carried at **52** on a vertical pivot pin **53**

freely rotatable on the standard in response to wind induced rotation of the reflector. A beam of light directed at the reflector will then be reflected in pulses as the reflectors rotate. Otherwise, the FIG. 5 apparatus is the same in FIGS. 1–4.

I CLAIM:

1. Surveyor's sighting apparatus, comprising

a. a base and a first support therefor,

b. a standard mounted on the base to extend upright, said support defined by a shaft projecting below the base directly beneath the standard and having vertically adjustable attachment to the base,

c. second and third supports including a pair of elongated legs having adjustable pivotal attachment to the base accommodating relative swinging of the legs through wide generally horizontally extending arcs, and

d. level indicator means on the base to indicate when the standard extends vertically.

2. The combination of claim 1 wherein said second and third supports include upright elements having vertically adjustable attachment to the legs to project therebelow for ground engagement.

3. The combination of claim 1 wherein said level indicator means comprises a bubble chamber.

4. The combination of claim 1 including sighting structure on the standard.

5. The combination of claim 4 wherein said sighting structure includes a rotary light reflector.

6. The combination of claim 1 wherein each of the legs has a range of alternate positions within a swing-arc of at least about 75°.

7. The combination of claim 1 wherein the base comprises upper and lower plates between which the inner ends of the legs extend, and means to adjustably clamp the plates to said inner ends, the upper plate having a vertical bore in which the lower end of the standard projects, and means to releasably clamp the lower end of the standard projecting downwardly relative to the upper plate.

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