

No. 735,763.

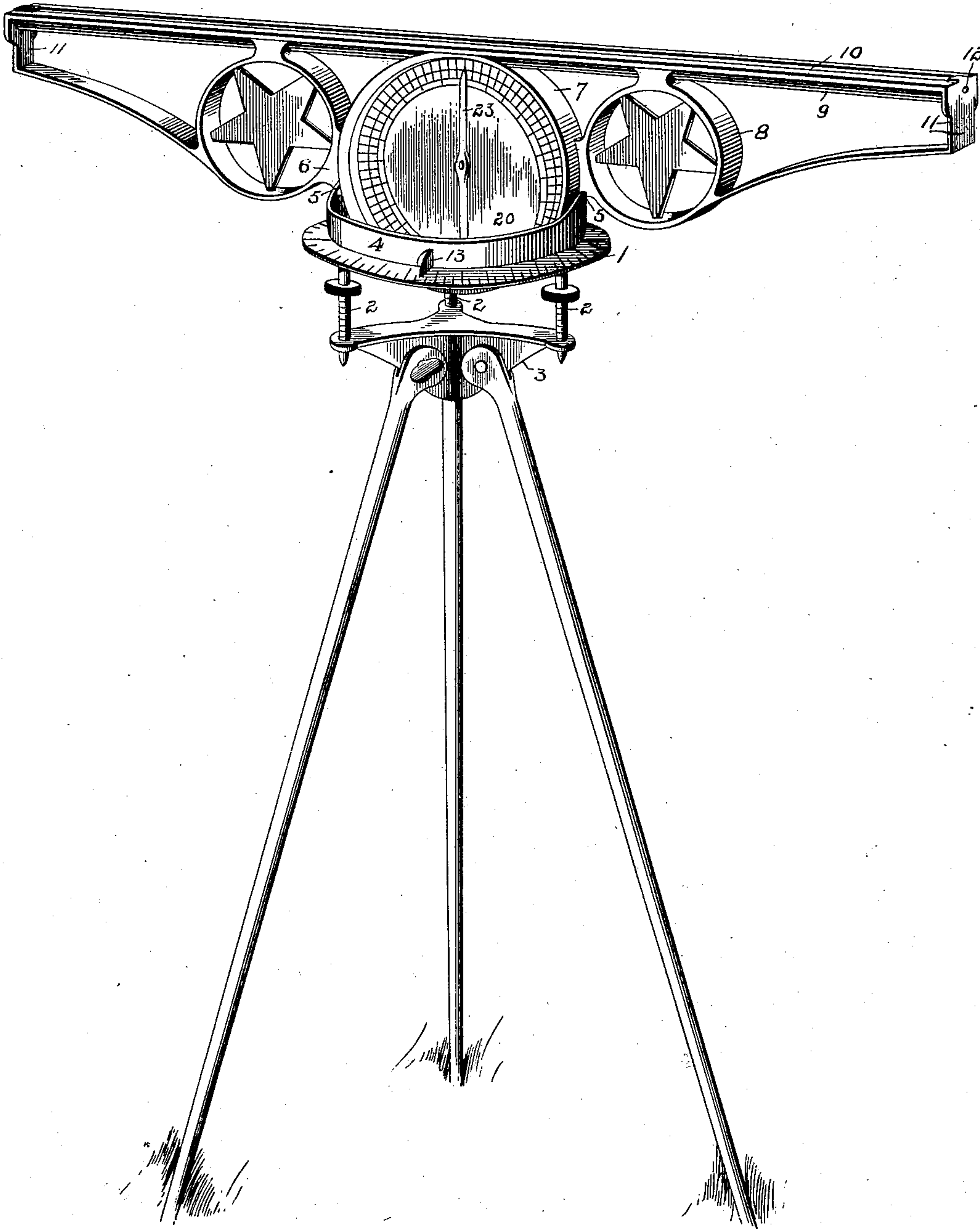
PATENTED AUG. 11, 1903.

J. HARMAN.
SURVEYING INSTRUMENT.
APPLICATION FILED NOV. 19, 1901.

NO MODEL.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

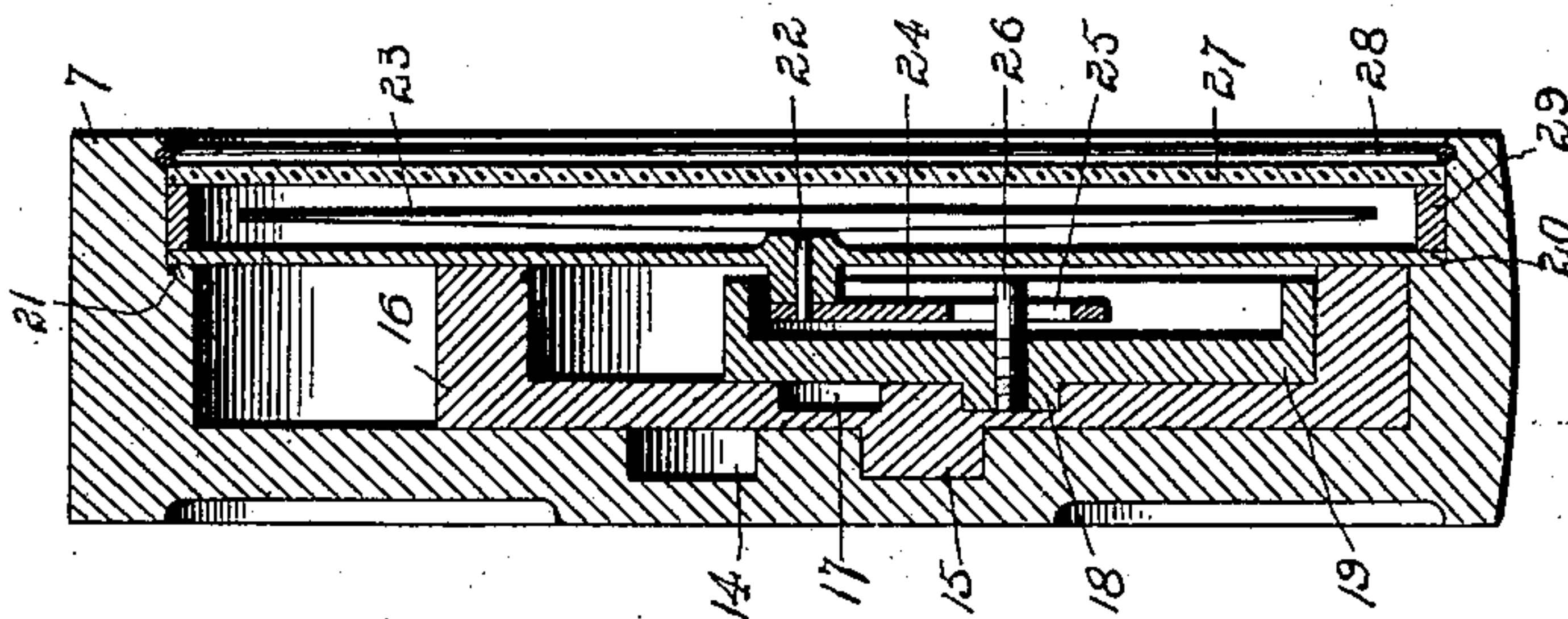
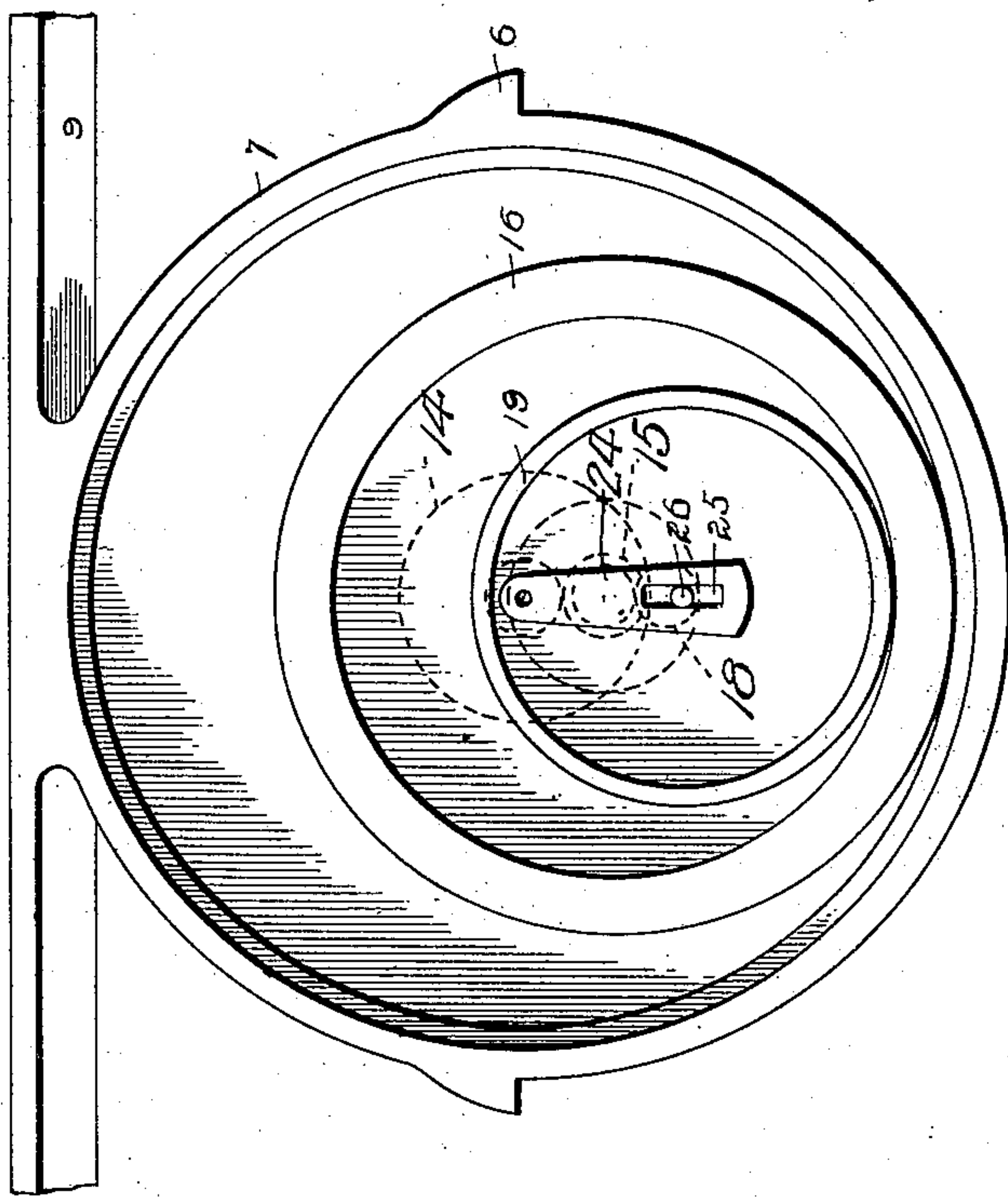


Fig. 2.



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UNITED STATES PATENT OFFICE.

JOSEPH HARMAN, OF BRAINERD, MINNESOTA, ASSIGNOR OF ONE-HALF TO
GEORGE W. HOLLAND, OF BRAINERD, MINNESOTA.

SURVEYING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 735,763, dated August 11, 1903.

Application filed November 19, 1901. Serial No. 82,819. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH HARMAN, a citizen of the United States, residing at Brainerd, in the county of Crow Wing and State of Minnesota, have invented certain new and useful Improvements in Surveying Instruments, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to new and useful improvements in surveying instruments, and more especially to a level for determining the position as to horizontality of an object or surface to which it is applied. Its primary object is to employ an indicating-needle which is unaffected by magnetism and which is controlled in its movement by a novel arrangement of weights.

A further object is to so arrange the operating-weights as to prevent all pressure or strain upon the pivot of the needle.

With these and other objects in view the invention consists in the novel construction and combination of parts hereinafter more fully described and claimed, and illustrated in the accompanying drawings, showing the preferred form of my invention, and in which—

Figure 1 is a perspective view of the device. Fig. 2 is a front elevation of the needle-operating mechanism with the needle and dial removed; and Fig. 3 is a central vertical section through said mechanism, showing the needle connected thereto.

Referring to the figures by numerals of reference, 1 is a circular graduated table adjustably secured by means of screws 2 to the web 3 of a tripod. Extending upward from the edge of a circular opening in the table 1 is a collar 4, having a pair of lugs 5 at opposite sides thereof which form notches therebetween. These notches are adapted to receive arms 6, extending from opposite sides of a circular casing 7, whereby said casing is supported in the circular opening in the table before referred to. A suitable ornamented bracket 8 extends from each arm 6, and these brackets, together with the casing 7, are secured to or formed with a sight 9, having a longitudinally-extending groove 10 in its upper surface. Each end of the groove 10 is closed by a plate 11, having an aperture there-

in in alinement with said groove, the aperture being shown at 12 in Fig. 1.

The collar 4 is revolvably secured in any suitable manner upon the table 1 and is provided with an indicating-finger 13, as shown.

The casing 7 is provided in the inner surface of the back thereof with a concentric groove 14, adapted to receive cylindrical lug 15, extending rearwardly from the center of a hollow roller 16, mounted upon the inner periphery of the casing. The inner surface of the back of roller 16 is also provided with a concentric groove 17, within which is fitted a cylindrical lug 18, extending from the center of a second hollow roller 19, which is mounted upon the inner periphery of the roller 16.

A suitable graduated dial 20 is secured within the casing 7 and abuts against an annular shoulder 21, formed within the casing. Revolvably mounted in the center of the dial is a pin 22, to the outer end of which is secured a needle 23, while its inner end is fastened to an arm 24, arranged within the roller 19. This arm is provided with a slot 25, adapted to receive a pin 26, extending from the center of roller 19.

A glass cover 27 is fitted within the casing 7 over the dial 20 and needle 23 and is secured in position in any suitable manner, as by means of a wire 28. A spacing-ring 29 is arranged between the dial and glass and serves to hold said glass removed from the needle 23.

In operation the level is adjusted by means of the screws 2 until the sight is brought into proper position. The rollers 16 and 19 promptly roll to the lowest point in the casing 7, and the pin 26 moves the arm 24 therewith, thereby causing the needle 23 to indicate the pitch of the level upon the dial 20.

By removing the casing from the collar 4 and inverting the same it can be used as an ordinary level, the sight 9 serving as the base.

It will be understood that the lugs 15 and 18 hold the rollers 16 and 19 always in contact with the casing 7 and roller 16, respectively. The parts will not, therefore, become displaced when the casing is suddenly inverted.

The device is extremely simple in construction, durable, and efficient. The rollers freely move in their positions, and as there is no

strain upon the pivot-pin 22 the needle 23 will promptly move to the proper position upon the dial.

In the foregoing description I have shown
5 the preferred form of my invention; but I do not limit myself thereto, as I am aware that modifications may be made therein, and I therefore reserve the right to make such changes as fairly fall within the scope of my
10 invention.

Having thus fully described my invention, what I therefore claim as new, and desire to secure by Letters Patent, is—

1. The combination with a sight; of a casing, a dial-face thereto, a needle pivoted in
15 said face, and nesting weights within the casing and one of which is adapted to travel upon the inner periphery of said casing, one of said weights being connected to and adapted to
20 operate the needle.

2. The combination with a sight; of a casing, a dial-face thereto, a needle pivoted to said face, nesting weights within the casing and one of which is adapted to travel along
25 the inner periphery of the casing, one of said weights being connected to and adapted to operate the needle, and means for preventing radial movement of the weights within the casing.

3. The combination with a sight; of a casing secured thereto, a dial-face to the casing, a needle pivoted to said face, a slotted arm to the needle, a series of nesting weights within the casing and one of them adapted to travel
35 upon the inner periphery of the casing, the inner one of the nesting weights being adapted to travel upon the inner periphery of a larger weight, and a pin to said inner weight adapted to engage the arm and operate the needle.

4. The combination with a sight; of a casing secured thereto, a dial-face to the casing, a needle pivoted to said face, a slotted arm to the needle, a series of nesting weights within

the casing and adapted to travel upon the inner periphery of the casing, the inner one of the nesting weights being adapted to travel
45 upon the inner periphery of a larger weight, a pin to said inner weight adapted to engage the arm and operate the needle, and means for preventing radial movement of the weights. 50

5. The combination with a sight; of a circular casing, a groove therein concentric with the edge of the casing, a revoluble weight mounted upon the inner periphery of the casing, a central lug upon the weight mounted
55 in said concentric groove in the casing, a second revoluble weight mounted upon the inner periphery of the first-mentioned weight, a central lug upon said weight mounted in a groove within, and concentric with the edge of, said
60 first-mentioned weight, a pin extending from said second weight, a dial to the casing, a needle pivoted in the dial, and an arm movable therewith and engaged by said pin.

6. The combination with a tripod having a
65 graduated table adjustably mounted thereon; of a revoluble collar upon the table, and a level loosely mounted on said collar, said level comprising a sight, a casing, a dial-face to the casing, a needle pivoted in said face, a
70 slotted arm to the needle, a series of nesting weights within the casing and adapted to travel upon the periphery of the casing, the inner one of the nesting weights being adapted to travel upon the inner periphery of a larger
75 weight, a pin to said inner weight adapted to engage the arm and operate the needle, and means for preventing radial movement of the weights.

In testimony whereof I affix my signature 80 in presence of two witnesses.

JOSEPH HARMAN.

Witnesses:

R. T. BROWN,
C. A. ALLBRIGHT.