

No. 704,219.

Patented July 8, 1902.

G. SEYFFARTH.
GRAVITY LEVEL.

(Application filed Jan. 25, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

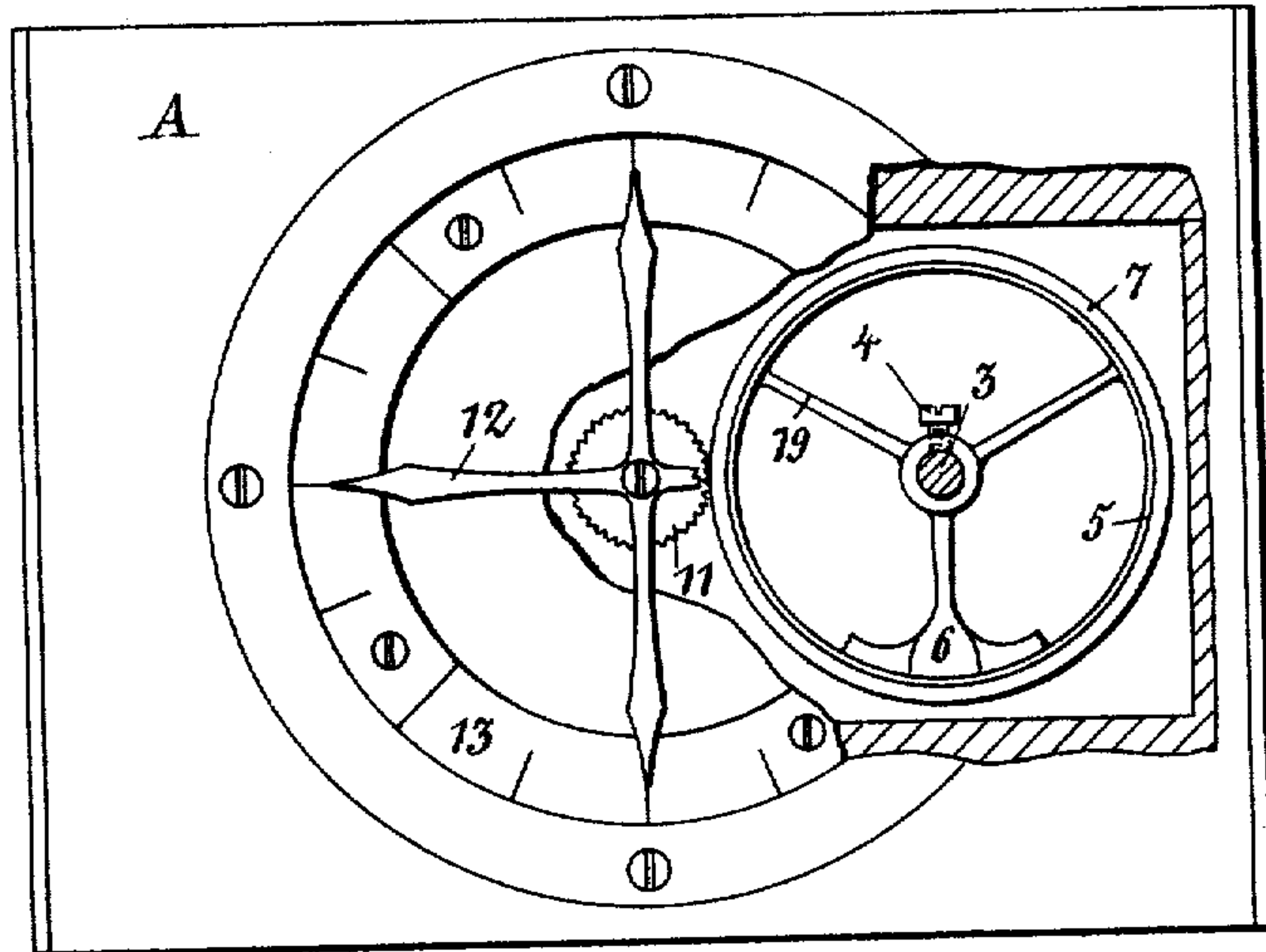


Fig. 2.

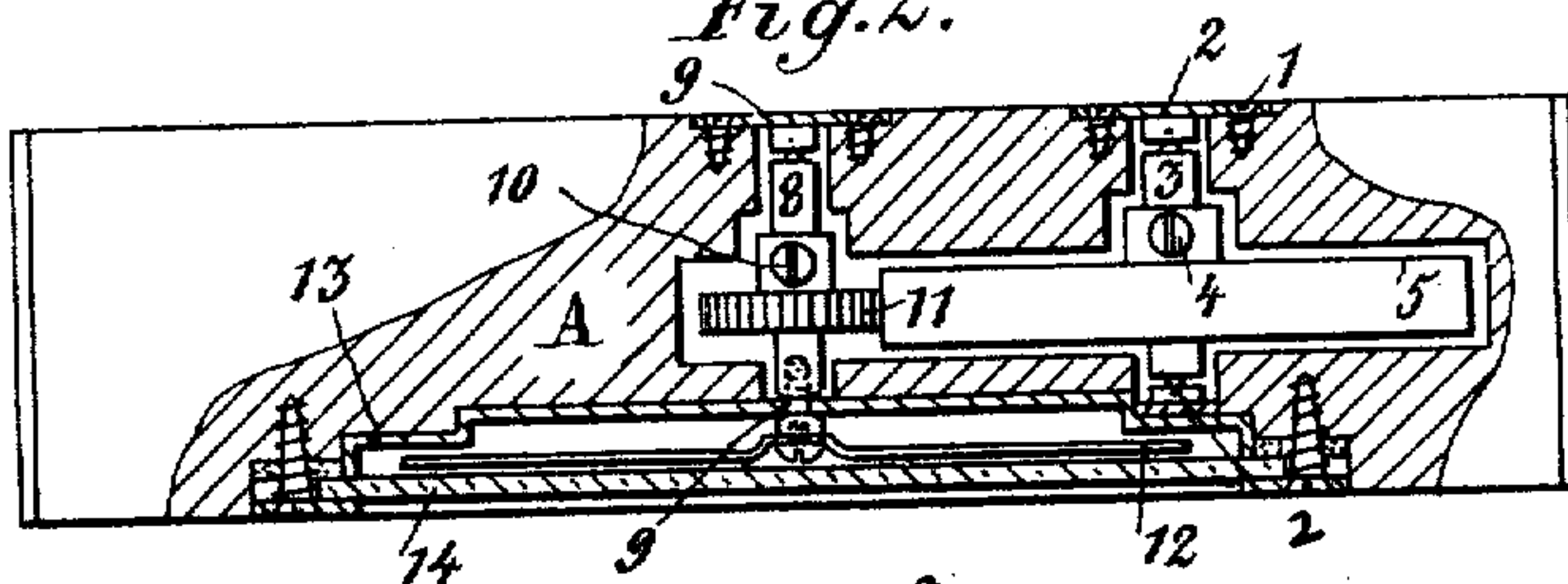
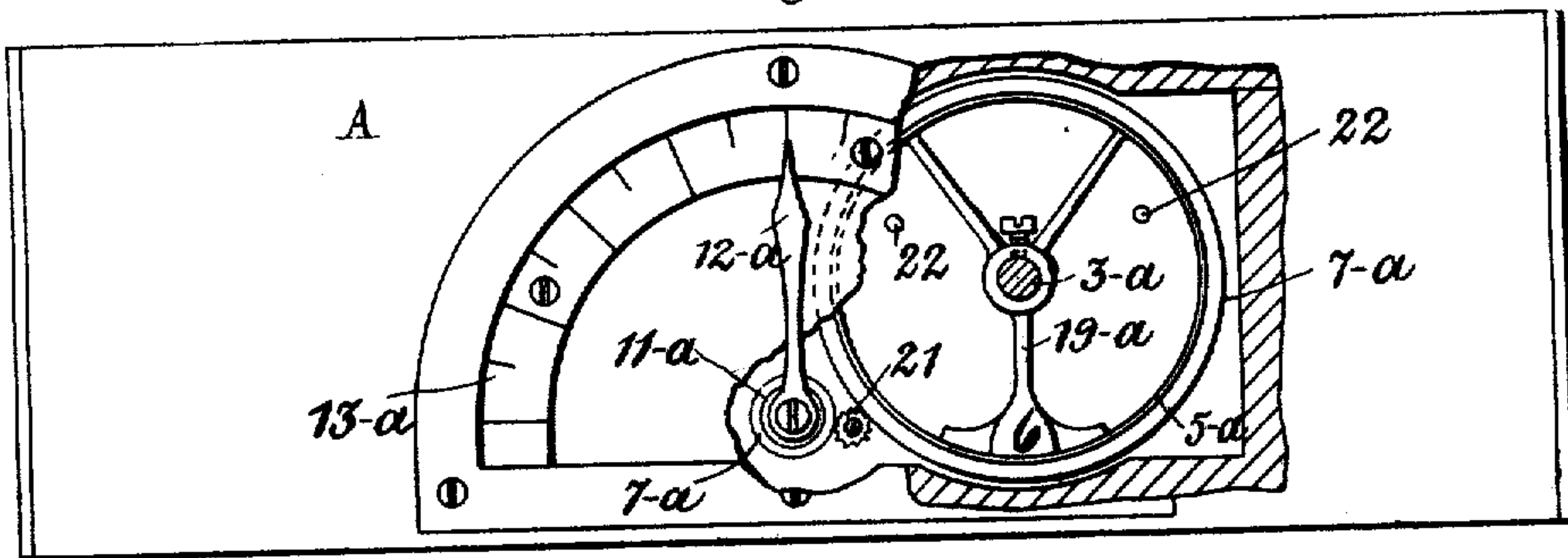


Fig. 3.



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2 Sheets—Sheet 2.

Fig. 4.

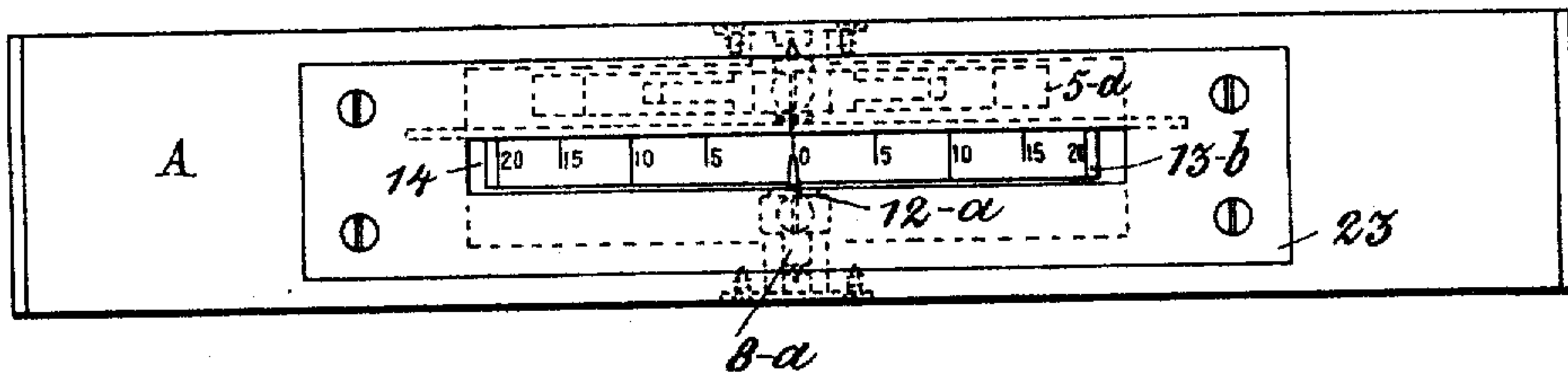


Fig. 5.

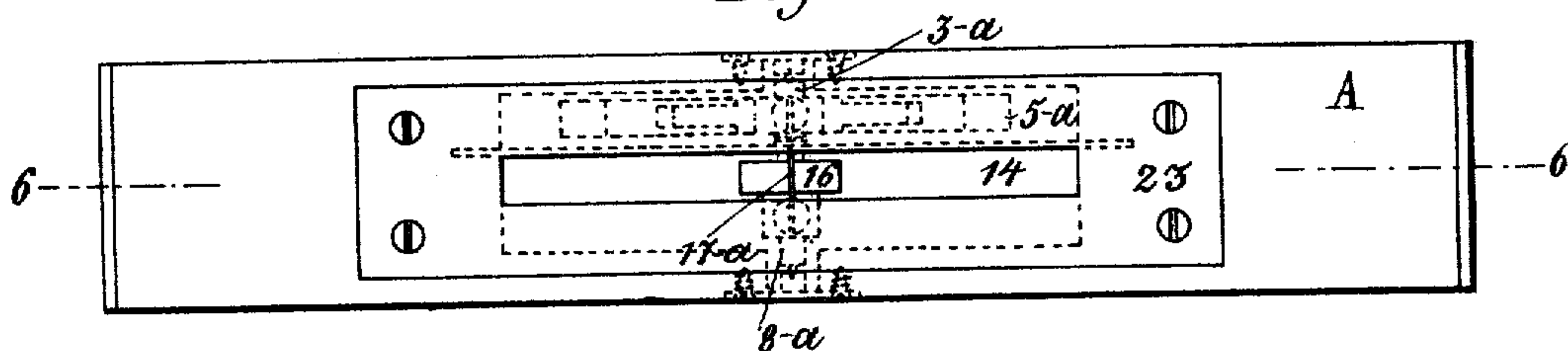
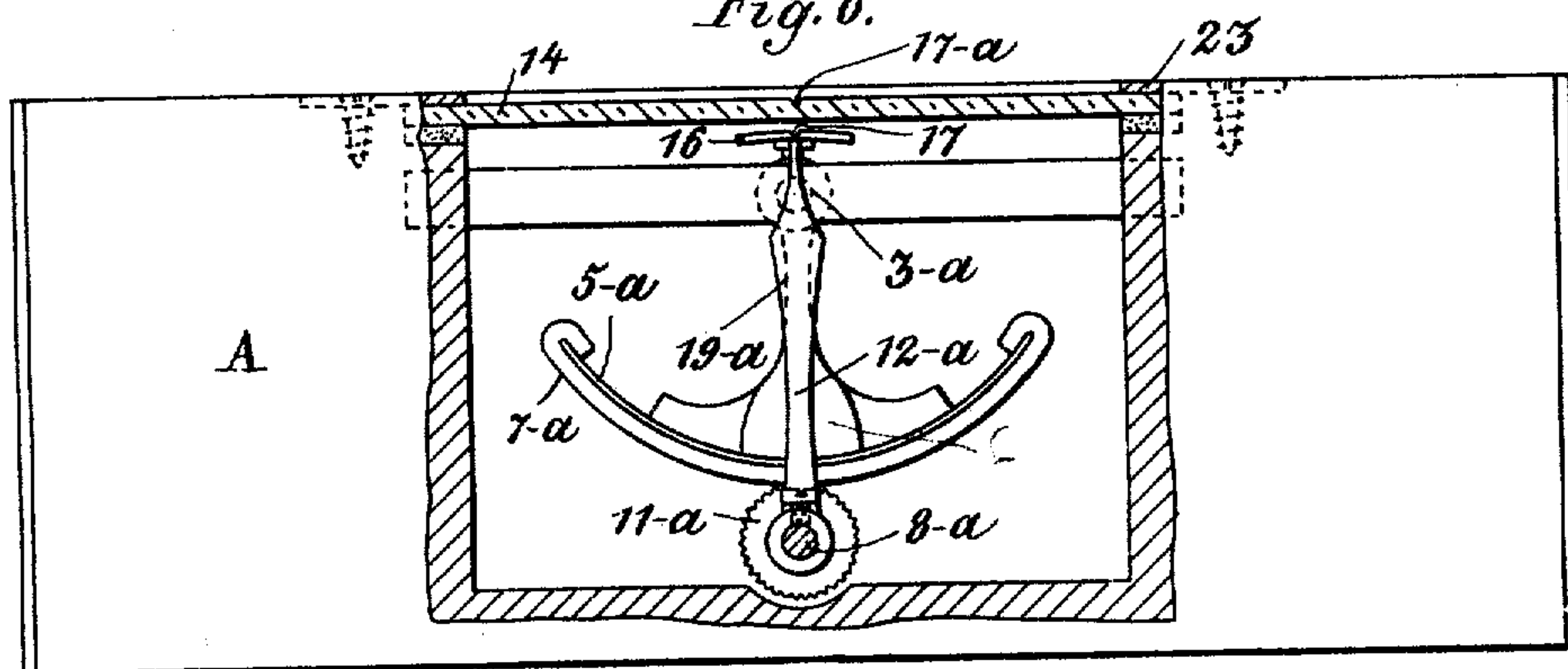


Fig. 6.



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UNITED STATES PATENT OFFICE.

GUSTAV SEYFFARTH, OF BROOKLYN, NEW YORK.

GRAVITY-LEVEL.

SPECIFICATION forming part of Letters Patent No. 704,219, dated July 8, 1902.

Application filed January 25, 1901. Serial No. 44,761. (No model.)

To all whom it may concern:

Be it known that I, GUSTAV SEYFFARTH, of New York city, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Gravity-Levels, of which the following is a full, clear, and exact specification, reference being had to the accompanying drawings, wherein—

10 Figure 1 is a front elevation of my improved gravity-level, part of the casing being removed to disclose the operating mechanism. Fig. 2 is a plan view of the level shown in Fig. 1 in front elevation, part of the casing being removed to disclose the operating mechanism. Fig. 3 is a similar view of a modified construction thereof. Fig. 4 is a plan view of another modified construction of my gravity-level, and Fig. 5 is a plan view of another modified construction; and Fig. 6 a sectional view thereof on line 6 6, indicated in Fig. 5.

Similar characters of reference indicate corresponding parts in all figures of the drawings.

My invention relates to levels; and it consists of the hereinafter-described tool provided with mechanism whereby the position of the object is determined and indicated by an oscillating weight actuating an indicating device.

30 The object of my invention is to produce a tool at low cost and adapted to stand such rough use and wear as such tool is exposed to in many trades and which tool at the same time is exact and always readily adjustable.

35 The so-called "spirit-levels" are more sensitive than such gravity-levels as heretofore used or known. They, however, are much more expensive and cannot stand such wear and usage as such leveling-tools are necessarily subjected to in many trades. Moreover, owing to the more delicate construction thereof, they are more easily knocked out of plumb than gravity-levels, and thereby rendered almost useless, because they cannot be readily readjusted. Such spirit-levels as are provided with readjusting mechanisms are seldom used in ordinary trade. They are either too expensive or too uncertain and always too delicate to be used for all kinds of work.

50 The defects of gravity-levels as heretofore known are mainly the lack of sensitiveness and

exactness in operation. This precluded the levels from being used in any work requiring very accurate adjustments or setting of parts, 55 and the object of my invention is also to obviate these defects.

As shown in the drawings, the several parts composing my improved gravity-level are set in a block or casing A, which is rectangular 60 in shape and having the central space free. Wood or metal can be used with equal advantage in constructing the block or frame. In this block A are secured by wood-screws 1 or by other suitable means bearings 2, exactly in line with each other, and in those bearings shaft 3, running transversely through the block, is mounted. I have shown this shaft provided with conical points of hardened steel entering corresponding depressions in the bearing-blocks. This construction I consider best suitable for the purposes for the same reasons as such constructions are employed in scales and other similar instruments; but it is not essential that the shaft be thus mounted. On this shaft 3 is set and rigidly secured thereto by set-screw 4 a wheel 5, having on one point of its periphery a weight 6, affixed thereto. Preferably this weight 6 is cast integral with one of the arms 19 of the wheel. When in place of wheel 5 only a segment is used—as, for instance, in the construction shown in Fig. 6—only one of these arms 19^a may be used for connecting the rim to the shaft, the weight 85 being located at the junction of this arm and the rim. The rim of the wheel is flat and covered with a strip of yielding material 7. This strip is preferably a layer of soft rubber approximately three thirty-seconds to one-eighth of an inch thick. 90

At a suitable distance from shaft 3 shaft 8 is mounted in bearings 9, and on this shaft and in position corresponding to the position of the wheel 5 on shaft 3 wheel 11 is set and secured thereto by set-screw 10. Wheel 11 is of considerably smaller diameter than wheel 5 and its rim finely serrated. Shafts 3 and 8 must be set parallel to each other and at such a distance from each other that the teeth of wheel 11 are pressed into the strip 7 of yielding material covering the rim of wheel 5, but not more than necessary to cause the wheel 11 and the shaft 8 to which it is affixed to re- 100

involve in its bearings when the wheel 5, which I call the "balancing-wheel," turns, because otherwise the pressure of the wheel 11 might overcome the action of the weight 6, actuating the wheel 5. On the same shaft 8, which I designate as the "pointer-shaft," is set a pointer 12. This pointer may be set on the end of the shaft, as shown in Figs. 1 and 3 of the drawings, or in another place, as, for instance, shown in Fig. 5. When set on the end of the shaft, a suitable dial 13 is affixed on the outer face of casing A, preferably in a recess, so the dial and pointer may be covered and protected by glass plate 14. The pointer may be in the shape of a single needle or in the shape of a cross, as may better serve the purposes for which such level is intended.

When assembling the parts and before securing the wheel 11 in its position on the shaft 8, the casing A is placed upon an exactly even and horizontal surface and wheel 5 allowed to assume its normal position—namely, a position as shown in Fig. 1—wherein it is brought by the weight 6, following the natural law of gravity. Thereupon shaft 8 is turned in the wheel 11 so that the pointer 12 is brought to indicate the zero-mark on the dial, and while the pointer is held in this position the wheel 11 is affixed to shaft 8 by set-screw 10. When thus adjusted, the wheels 5 and 11 are in such relation to each other that whenever the equilibrium of the wheel 5 is disturbed—as, for instance, by raising one end of the level—the motion is transmitted to the pointer-shaft 8 and the deviation from the horizontal position indicated by the pointer 12 upon the dial. As stated before, wheel 11 is of much smaller diameter than the wheel 5, and consequently the deviation of the wheel 5 from its normal position is correspondingly multiplied when transmitted to the pointer-shaft, and inasmuch as the pointer represents a radius or diameter considerably larger than that of the wheel 11 the swing of the pointer will be correspondingly larger than the extent of the motion of the balancing-wheel. By these means my improved gravity-level is rendered more sensitive than the best spirit-level heretofore known. Moreover, this level possesses also the advantage that the deviation from the horizontal position of the thing tested or measured may be accurately determined. For this purpose a graduated scale, as shown in Fig. 1, may be provided and the dimensions of wheels 5 and 11 and of the pointer 12 correspondingly arranged with reference to the graduations of the scale, so the extent of the deviation may be read off on the dial. If in consequence of long or rough use, shock, or the like the operating parts of my improved gravity-level should be brought out of alinement, they can be readily readjusted by setting the instrument on an even exactly horizontal plane, unscrewing set-screw 10, securing wheel 11 to the pointer-shaft 8, then setting pointer 12 on the zero-point of the

scale, and finally securing again the wheel 11 to shaft 8 in that position by screwing set-screw 10 tight again. The level when readjusted will be as safe and reliable as a new one. The yielding covering of the face of the wheel 5 can also be readily replaced.

The modified construction shown in Fig. 3 differs from the one shown in Figs. 1 and 2 in the arrangement of balancing-wheel 5^a and the pointer-wheel 11^a, the serrated pinion 21 being set between them and the pointer-wheel 11^a being also provided with a yielding covering 7^a upon its face, and in that the swing of pointer 12^a is limited to an oscillating motion along the scale 13^a. The motion of balancing-wheel 5^a is limited by pins 22, set between arms 19^a thereof. This arrangement is more suitable for levels of the usual long and narrow shape. Such pinion 21 and pointer-wheel 11^a may be used in any of the other constructions shown in the drawings. Its purpose is to change the direction of the motion of the pointer, but is not a necessary part of my invention.

The modified construction of the levels shown in Figs. 4, 5, and 6 is based on the same principle as those described above; but the parts are somewhat differently arranged. In place of balancing-wheel 5 an oscillating segment 5^a is used, connected to shaft 3^a by weighted arm 19^a, as shown in the drawings, pointer-shaft 8^a is mounted underneath shaft 3^a, and pointer 12^a is set on it adjoining wheel 11 instead of on its outwardly-projecting end. In the arrangement shown in Fig. 4 the tip of pointer 12^a is bent over at right angle and traverses segmental scale 13^b, whereon degrees of deviation are marked. In the arrangement shown in Figs. 5 and 6 a plate 16 is affixed to the tip of the pointer 12^a. The plate is provided with notch 17, indicating the zero-point, and, if desired, may also be provided with other marks, indicating degrees of deviation with reference to mark 17^a, provided on glass plate 14, covering the slot on the upper face of the instrument. Plate 23, screwed upon the top face of the instrument, limits the swing of segment 5^a, the ends of the segment abutting against it.

I claim as my invention and desire to secure by Letters Patent—

1. A gravity-level comprising a casing, a scale on the casing, a shaft mounted in the casing, an indicating device and a serrated wheel secured to the shaft; a second shaft mounted in the casing, and a rim conforming to a circle of a diameter equal to the distance from the center of the second shaft to the circumference of the serrated wheel, and having a yielding covering on its face, secured to the shaft, and a weight secured to the rim.

2. A gravity-level comprising a case, two shafts mounted in bearings set in the case, a circular rim secured to one shaft, a weight and a yielding covering affixed to the rim; a wheel, serrated on its circumference and en-

gaging with the rim, set on the other shaft; a pointer also secured to the other shaft and a scale set on the case in the path of the pointer.

3. The combination of a casing provided
5 with a scale, a shaft revolubly mounted therein, a pointer and a serrated wheel set on the shaft, and of a weighted balancing-wheel revolubly mounted in the casing in position to

engage with the serrated wheel and having a yielding covering applied on its face engaging with the serrated wheel.

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