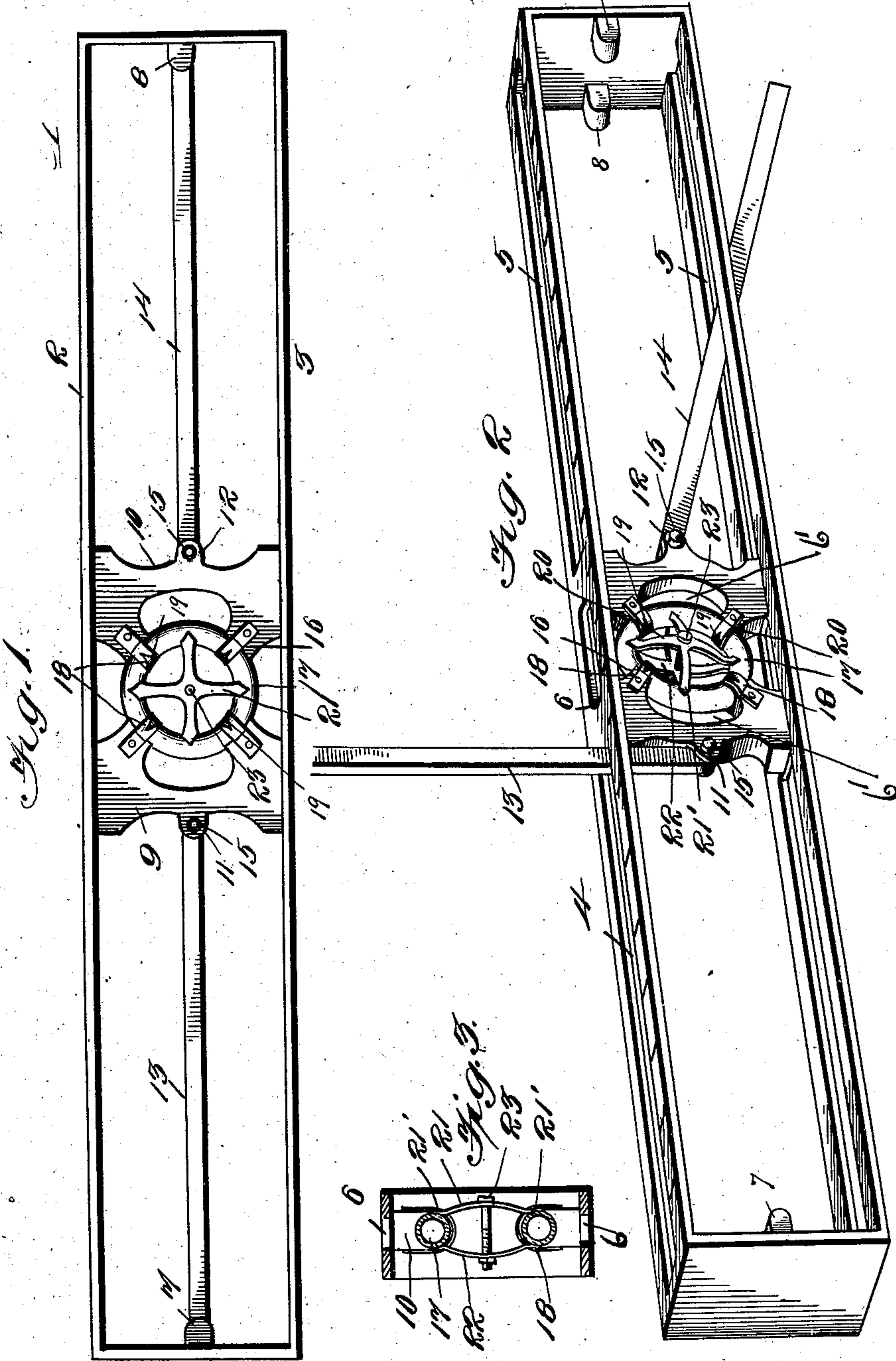


(No Model.)

J. HARTFORD.
SPIRIT LEVEL.

No. 604,985.

Patented May 31, 1898.



WITNESSES
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UNITED STATES PATENT OFFICE.

JOHN HARTFORD, OF SAN FRANCISCO, CALIFORNIA.

SPIRIT-LEVEL.

SPECIFICATION forming part of Letters Patent No. 604,985, dated May 31, 1898.

Application filed January 25, 1897. Serial No. 620,575. (No model.)

To all whom it may concern:

Be it known that I, JOHN HARTFORD, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Spirit-Levels; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to spirit-levels.

My object is to provide a level of simple construction which will be adapted for use on bevels or slopes and also as a try-square and one which can be used on both sides.

A further object is to provide a novel form of level having ruled sides and one which can be used at any degree of inclination, as found desirable.

Further objects will appear more fully hereinafter in the description of the invention, where the construction of the device will be clearly set up, and the novel features thereof pointed out in the appended claims.

In the accompanying drawings, Figure 1 is a side elevation of my complete level; Fig. 2, a perspective view showing the gage of the device in use and the try-square extended, and Fig. 3 a cross-section.

The body of the level is cast in a single piece 1, which is of rectangular shape and open inside, the same being provided with leveling-faces 2 and 3, ruled off, as shown, and provided with two elongated slots 4 and 5 and an intermediate slot 6, the slots of the two sides being located in alinement. Projecting from the inner faces of the end walls are sets of ears 7 and 8.

The numerals 9 and 10 designate cross-pieces which extend from side to side, being cast integral with the frame and located at opposite ends of the intermediate slots 6. These are provided with sets of ears 11 and 12.

The numerals 13 and 14 designate bars which are pivoted in between the sets of ears 11 and 12. The bars have their free ends adapted to be received between the sets of ears 7 and 8, so that they are retained within the frame. The bar 13 is adapted for extension transversely through the slots 4, and the bar 14 may be projected through the slots 5 and used as a bevel or slope gage. It will be

seen that when extended the bar 13 forms, together with one side of the frame, a try-square. The bars 13 and 14 are pivoted on clamping-screws 15, whereby said bars may be secured in extended position. The cross-pieces 9 and 10 are formed integral with curved clamp-sections 16.

The numeral 17 designates a circular glass tube which holds the mercury, alcohol, or other suitable fluid employed. This tube fits in between the cross-pieces 9 and 10 and against the clamp-sections 16. Additional detachable clamp-sections 18 are employed for securing the tube in position. Said clamp-sections are provided with grooves 19. I find it preferable to employ rubber or felt packing 20 around the glass tube where the clamp-sections encircle the same in order to protect the tube against being broken. There is a gage, and the same consists of two bowed-out braces 21 and 22 of similar construction, which have the pointed arms 21', extending diametrically at right angles to each other. The two members are secured together by a bolt 23. When these are not in use, they have their pointed ends received in the grooves of the clamp-sections, and thus serve as a guard for the tube. The gage thus provided can be turned around to any desired point and clamped by means of bolts, so that the uppermost arms 21' will indicate where the mercury or air bubble should be located in order to give the desired angle, and hence it will be seen that any desired angle may be obtained by using this gage.

The slots 6 6 are sight-slots to enable the user to see the tube, and the openings 6' made in the cross-pieces are for the purpose of seeing whether the object is plumb.

There are many slight changes which could be resorted to in carrying out the invention without detracting from any of the advantages thereof, and hence I consider myself entitled to make all such changes as properly come within the spirit of the invention.

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

1. In a spirit-level, the combination with an open body or frame, of gage-bars located within the frame and independently pivoted upon opposite sides of the central portion, and

clamping pivot-screws upon which said bars are mounted, whereby either bar may be held in any desired position, independently of the other, substantially as shown and described.

5 2. In a spirit-level, the combination with a body, of clamp-sections secured thereto for holding in place an annular spirit-tube, the ends of said clamp-sections being provided with grooves, and a gage having radially-extending, pointed arms to fit within said
10 grooves, as and for the purpose set forth.

3. In a spirit-level, the combination with a body, of an annular spirit-tube fitted in said body, clamp-sections for securing said tube
15 which have grooves, and a gage extending diametrically of the tube and pivoted centrally thereof, which also serves as a guard for the tube and has its ends adapted for reception in the grooves aforesaid when it is
20 not in use.

4. In a spirit-level, the combination with a body, of an annular spirit-tube connected

thereto and exposed on both sides, gages consisting of a plurality of arms extending diametrically of the tube and located on opposite sides thereof, and a bolt or pin passing through the center parts of said gages, the latter also serving as protectors for the tube. 25

5. In a spirit-level, the combination with a body, of an annular spirit-tube fitted therein and exposed at both sides, and gages located on opposite sides of the said tube and which consist of bowed-out braces having pointed ends bearing against the tube, and a bolt passing through the center parts of said gages and through the open space of the tube, said
30 gages serving as protectors for said tube. 35

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN HARTFORD.

Witnesses:

JUSTIN GATES,
W. L. COFFEY.