

(No Model.)

J. M. HAISE.

GRADE MEASURE.

No. 479,803.

Patented Aug. 2, 1892.

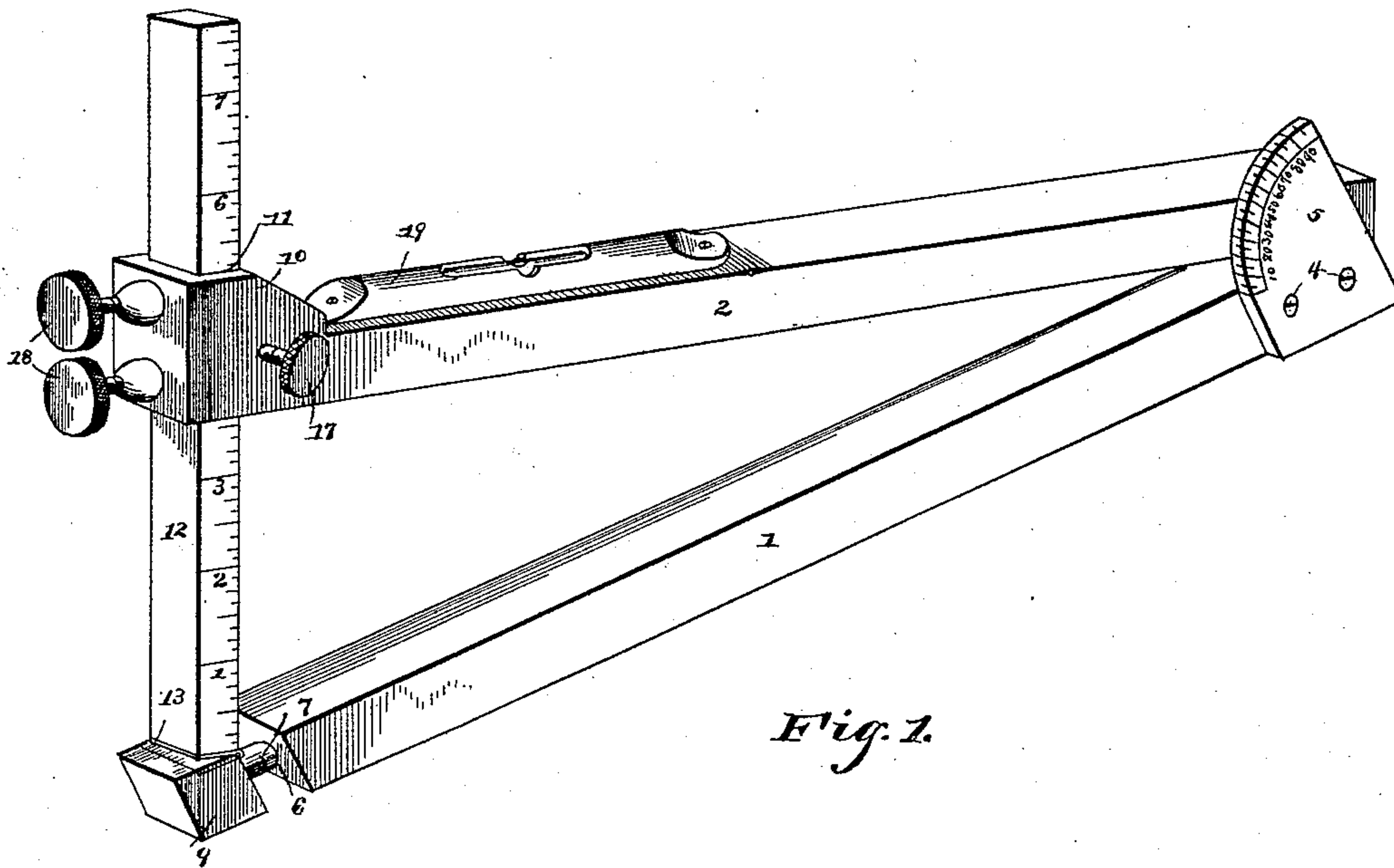


Fig. 1.

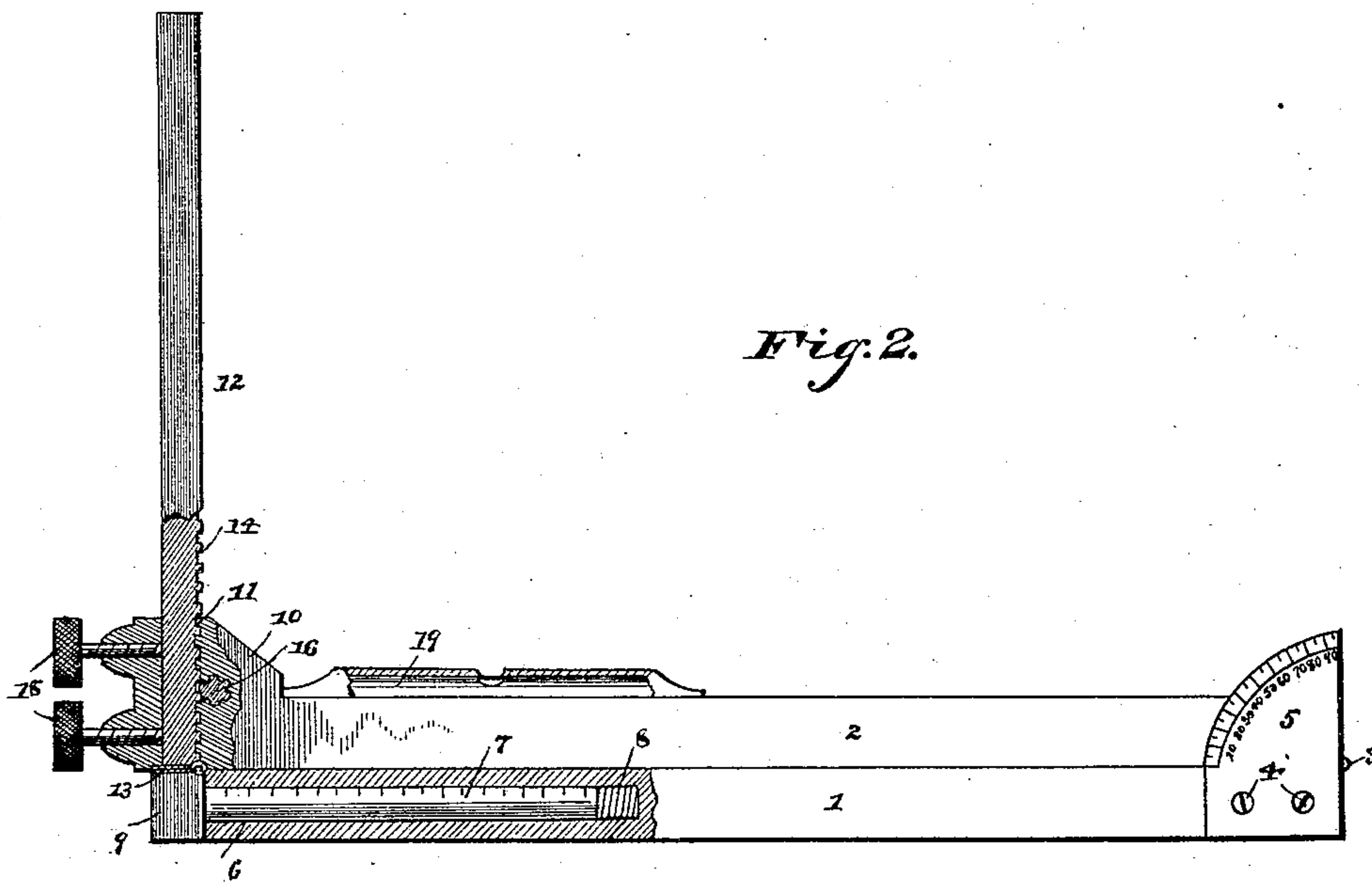


Fig. 2.

Witnesses:

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GRADE-MEASURE.

SPECIFICATION forming part of Letters Patent No. 479,803, dated August 2, 1892.

Application filed September 11, 1891. Serial No. 405,421. (No model.)

To all whom it may concern:

Be it known that I, JOHN M. HAISE, a citizen of the United States, residing at Florence, in the county of Erie and State of Ohio, have invented a new and useful Grade-Measure, of which the following is a specification.

My invention relates to a device for measuring grades of roadways, railroad-beds, ditches, &c., and determining accurately and without computation the number of inches or feet fall thereof.

The objects in view are to provide a cheap and simple device adapted for the above purpose that may be conveniently carried about and employed, is not sensitive or liable to get out of order, and capable of being adjusted at various angles and secured in any of its positions during an examination thereof after a measurement.

Other objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a perspective of a grade-measure constructed in accordance with my invention, the same being open as in operative position upon a grade. Fig. 2 is a side elevation and partial section of the instrument, the same being closed.

Like numerals of reference indicate like parts in both figures of the drawings.

In constructing my instrument I employ a lower bar or member 1 and an upper bar or member 2, the same being connected at their adjacent rear corners by a hinge 3, let into the inner faces of the members, whereby said members may be folded flatly upon each other or separated. Secured to one of the side faces of the lower member in a removable manner by means of a pair of screws 4 is a quadrant-shaped plate 5, the curved edge of which is divided off into degrees indicated thereon, so that the degree of inclination or angle of separation existing between the two members when swung upon their hinge is readily indicated and observable by reference to the scale upon the said quadrant. When the instrument is not in use, the quadrant is preferably removed to permit of close packing and preservation. The lower member 1 is longitudinally bored, as at 6, and seated in the bore is a cylindrical gage-bar 7, shorter than the bar,

and interposed between the rear end of said bar and the bottom of the bore is a light coiled spring 8. The bar 7 is divided into a scale of inches, as shown, and at its outer end has formed thereon a cubical head 9, the upper surface of which is flush with the upper surface of the member 1. A box 10 is secured to the free end of the upper member 2 and is provided with a transverse slot or opening 11, the rear wall of which is flush with the end of the member 1 when the two members are brought together.

12 designates a gage-bar, rectangular or square in cross-section and divided into feet and inches. The bar has its lower end loosely connected to the upper side of the head 9 of the gage-bar 7 by means of a hinge 13, the leaves of which are let into the lower end of the gage-bar 12 and the upper side of the head 9. The gage-bar fits loosely in the slot 11 of the box 10 and is provided upon its inner side or face with a finely-toothed surface 14. A shaft 15 passes transversely through the box 10 and at right angles to the slot 11 thereof and within the box is provided with a toothed wheel 16, engaging the teeth 14 of the gage-bar 12. The shaft 15 is revolved through the medium of a pair of milled thumb-nuts 17, located upon the ends of the shaft outside of the box 10, and by such revolution of the shaft and through the medium of the toothed wheel the gage-bar 12 may be moved within the box, and thus the members adjusted toward or away from each other, as will be obvious. The gage-bar 12 and the box may be locked together at any point by a pair of thumb-screws 18, passed through the front end of the box and bearing on the face of the gage-bar. The upper member 2 has mounted upon its upper face a spirit-level 19.

In operation in order to find or determine the inclination or rise of a given incline—as, for instance, a road-bed, roadway, or ditch—the instrument is placed upon the same, and after loosening the screws 18 the milled nuts 17 are slowly revolved until the spirit-level indicates that the upper member is exactly level. The screws 18 are now tightened, and by reference to the quadrant 5 the degree of inclination will be given, and by reference to the gage-bars the number of feet or inches existing between the free ends of the mem-

bers will be readily observable and will indicate the rise or fall commensurate to the length of the lower member 1, which member in length may be one or more feet. Therefore if the lower member is one foot in length and the aggregate of inches exposed upon the gage-bars 7 and 12 is six it will be obvious that the rise or fall of the incline is six inches to the foot, or, as expressed in degrees, the incline is at an angle of forty-five degrees. It will be seen that the member 2 and the gage-bar 12 constitute a right angle, while the member 1 constitutes the hypotenuse of a right-angled triangle, and that by adding the number of inches exposed upon the gage-bar 7 to the known length of the lower member 1 the full length of the hypotenuse is easily found; furthermore, that the perpendicular distance between the hypotenuse and free end of the upper member is shown in inches and fractions thereof by the scale on the perpendicular bar 12 and the upper arm gives the horizontal or level line of the angle.

When not in use, the instrument may be conveniently packed for transportation by removing the gage-bars, folding them together, folding the two members together, and removing the quadrant-shaped plate. The gage-bar 12 being at a right angle with the upper member, it will be seen that when the two members are spread the hypotenuse of the triangle is proportionately lengthened, and hence the necessity of providing the lower gage-bar and thus forming the lower member in an extensible manner.

Having described my invention, what I claim is—

1. In an instrument of the class described, the combination, with the two members or bars hinged together at their rear adjacent corners, the lower member being extensible, of a gage-plate of quadrant shape having degrees of a circle indicated thereon, a gage-bar connecting the outer ends of the two members, and means for locking the bar, substantially as specified.

2. In an instrument of the class described, the combination, with the opposite members, the upper one of which is provided with a slot or opening and the lower one with a longitudinal bore, and a hinge connecting the rear adjacent corners of said members, of a graduated gage-bar mounted in the bore of the lower member and a graduated bar mounted in the slot of the upper member and adjustable therein, the two bars having their meeting ends loosely connected, substantially as specified.

3. In an instrument of the class described, the combination, with the opposite members hinged together at their adjacent rear corners, the upper member having a slot and the lower member longitudinally bored, of gage-bars mounted in the slot and in the bore and hinged at their adjacent ends and a coiled spring interposed between the lower gage-bar and the end of the bore, substantially as specified.

4. In an instrument of the class described, the combination, with the opposite members hinged together at their adjacent corners, the lower member being bored and the upper member terminating in a slotted box, of a gage-bar mounted in the slot of the box, set-screws mounted in the box for binding upon the gage-bar, a shaft mounted transversely in the box, provided at its center with a toothed wheel for engaging teeth formed upon the gage-bar and at its ends terminating in milled nuts, a gage-bar mounted in the bore of the lower member and terminating at its outer end in a head flush with the outer surface of said lower member, and a hinge connecting the upper surface of the said head with the lower end of the gage-bar of the upper member, substantially as specified.

5. An instrument of the class described, the same consisting of two bars of the same length, hinged at their rear extremities, the upper bar being provided with a spirit-level, a loop or box at the free end of the upper member, a set-screw in said loop or box, and a rigid strip, bearing a scale of inches, flexibly connected at its lower end to the free end of the lower bar, passing through the loop or box, and impinged upon by the screw, substantially as specified.

6. An instrument of the class described, the same consisting of two bars of the same length, hinged at their rear extremities, the upper bar being provided with a spirit-level, a loop or box at the free end of the upper member, a set-screw in said loop or box, and a rigid strip, bearing a scale of inches, flexibly connected at its lower end to the free end of an extensible bar which has bearings in the lower bar, passing through the loop or box, and impinged upon by the screw, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

JOHN M. HAISE.

Witnesses:

T. C. CHAPMAN,
GEO. I. HAISE.