No. 702,354. Patented June 10, 1902.

J. BEAL.

SURVEYING INSTRUMENT.

(Application filed Feb. 8, 1902.)

(No Model.) 2 Sheets—Sheet 1.

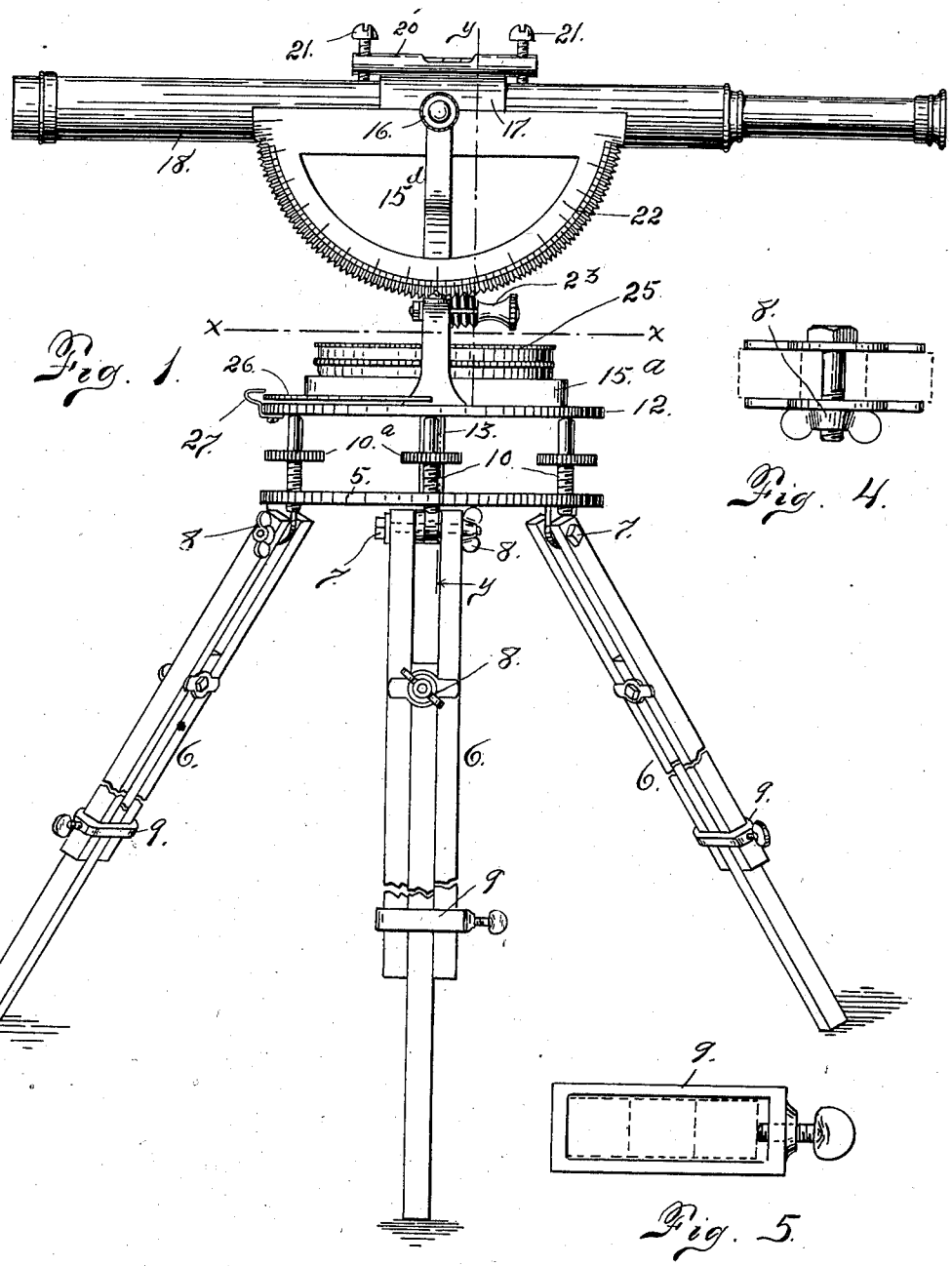


Fig. 1.

Fig. 4.

Fig. 5.

WITNESSES:

Otto E. Haddick.

Dena Nelson.

INVENTOR.

John Beal.

BY

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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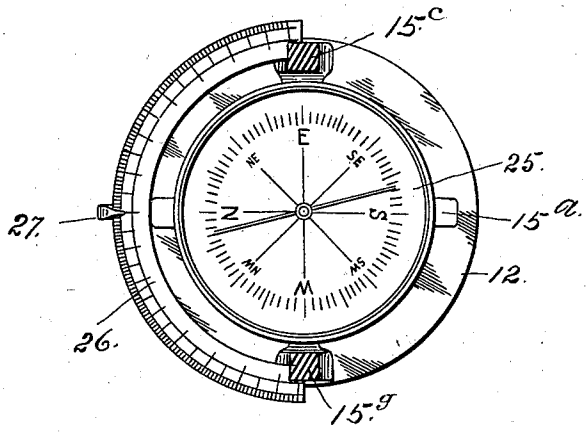


Fig. 2.

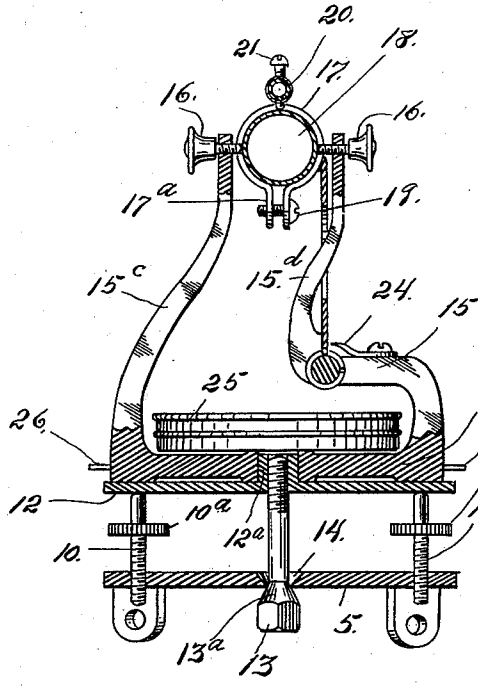


Fig. 3.

WITNESSES:

Otto E. Haddick.

Dena Nelson.

INVENTOR.

John Beal.

BY

ATTORNEY.

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOHN BEAL, OF DENVER, COLORADO.

SURVEYING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 702,354, dated June 10, 1902.

Application filed February 8, 1902. Serial No. 93,265. (No model.)

To all whom it may concern:

Be it known that I, JOHN BEAL, a citizen of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Surveying Instruments; and I do 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, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to improvements in surveying instruments, my object being to provide a device of this class which shall be simple in construction, economical in cost, reliable, durable, and efficient in use; and to these ends the invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a side elevation of my improved instrument. Fig. 2 is a horizontal section taken on the line $x\,x$, Fig. 1, looking downwardly. Fig. 3 is a section taken on the line $y\ y$, Fig. 1, looking toward the left. Figs. 4 and 5 are detail views of the clamps for holding the legs of the tripod in any desired position of adjustment.

The same reference characters indicate the same parts in all the views.

Let the numeral 5 designate a base-plate provided with depending apertured ears, with which are connected the legs 6 of the tripod by means of bolts 7, to which are attached thumb-screws 8. The tripod-legs are composed of three parts, the central part being adjustable to regulate the length of the legs, whose parts are retained in any desired position of adjustment by means of clamping devices 9.

Threaded in the base 5 are a number of thumb-screws 10, having milled heads 10^a and studs projecting above the heads to engagement with a platform 12, whose central part is provided with a hollow upwardly-projecting part 12^a, interiorly threaded, and into which is screwed the upper extremity of a bolt 13, whose lower portion passes through an opening 14, having conical or outwardly-flared walls. The portion of the screw engaging this opening is beveled or cone-shaped, as shown at 13^a. This construction permits the leveling of the platform 12 by the adjustment of the screws 10.

Revolubly mounted on the platform 12 is a frame having a circular base 15^a, whose central portion is provided with an opening or socket, into which is fitted the projection 12^a of the platform, which projection holds the frame in place and allows it freedom of rotation.

Projecting upwardly from the base of the frame and preferably formed integral therewith are two arms 15^c and 15^d, whose upper extremities are provided with threaded openings, into which are inserted thumb-screws 16, whose inner extremities enter recesses in the opposite sides of a clamping-sleeve 17, embracing the telescope 18, which is trunnioned on the screws. The lower part of the sleeve 17 is open and provided with depending flanges 17^a, apertured to receive a clamping-screw 19, whereby the telescope may be firmly held in place. By loosening this screw the telescope may be removed and replaced at pleasure. Attached to the top of the telescope by means of screws 21 is the usual spirit-level 20.

Mounted on the telescope and extending downwardly on one side thereof is a semicircular graduated plate 22, whose periphery is toothed to engage a micrometer-screw 23, journaled in the arm 15^d, which is provided with an offset 15^g, extending inwardly, and upon which is mounted an index or pointer 24, located adjacent the graduated outer portion of the plate 22. This offset in the arm 15^d permits the mounting of the plate 22 in such a manner that the portion adjacent the pointer is always outside of the arm 15^d, leaving the view unobstructed for observing the angle of declination of the telescope, this angle being controlled by the micrometer-screw and measured on the plate 22. From the inner extremity of the offset 15^g the arm 15^d projects outwardly and upwardly through the opening in the plate 22, whereby its upper extremity occupies the position outside of said plate.

To the base of the frame is attached a com-

pass 25. Attached to the base of the frame adjacent the platform is a horizontal semicircular graduated plate 26. Attached to the platform 12 and occupying a position adjacent this plate is a pointer 27.

In using the instrument the tripod-legs are extended and thrown outwardly to properly elevate the telescope and give the superstructure a stable support. The set-screws 10 are then adjusted to bring the platform 12 to the horizontal position. The telescope is then moved to occupy the desired inclination from the horizontal by the micrometer-screw 23, after which the trunnion-screws 16 are tightened. The frame supporting the telescope is also rotated on the platform 12 to cause the telescope to point in the proper direction as determined by the compass.

Having thus described my invention, what I claim is—

1. The combination of a frame revolubly mounted and provided with two upwardly-projecting arms, a telescope trunnioned on said arms, a graduated semicircular plate, attached to the telescope and occupying a plane perpendicular to the platform, one frame-arm having an offset and projecting upwardly therefrom and outwardly through an opening in the graduated plate, the arrangement being such that the plate is free to move with the telescope as the latter is turned on its trunnion, the graduated part of the plate adjacent the offset of the frame-arm, being outside of the latter, substantially as described.

2. The combination of a frame revolubly mounted and comprising a base and upwardly-projecting arms, a telescope trunnioned on said arms at their upper extremities, a semicircular graduated plate attached to the telescope and occupying a position perpendicular to the platform, one of the frame-arms having an offset, the said arm projecting upwardly and outwardly from said offset through an opening in the plate whose lower portion is outside of the frame, a micrometer-screw journaled on the offset part of the arm and engaging the edge of the plate which is toothed therefor, and an index or pointer mounted on the offset adjacent the graduated edge of the plate, substantially as described.

3. The combination of a frame revolubly mounted and comprising a base and upwardly-projecting arms, a graduated plate attached to the base of the frame parallel with the platform, a compass mounted on the base of the frame between the arms, a telescope trunnioned on the upper extremities of the arms, a graduated plate mounted to move with the telescope and occupying a position perpendicular to the platform of the instrument, one of the frame-arms having an offset projecting inwardly above the base of the frame, the said arm projecting outwardly through an opening in the last-named graduated plate, whereby the lower part of the latter is outside of the frame-arm, a micrometer-screw journaled in the offset of the frame-arm and engaging the edge of the perpendicular plate which is toothed for the purpose, and an index or pointer mounted on the offset adjacent the said plate, substantially as described.

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

JOHN BEAL.

Witnesses:
DENA NELSON,
A. J. O'BRIEN.