No. 798,931. PATENTED SEPT. 5, 1905.

G. F. STAAL & H. B. KAMSCHULTE.

DISTANCE MEASURING INSTRUMENT.

APPLICATION FILED AUG. 13, 1904.

Fig. 1.

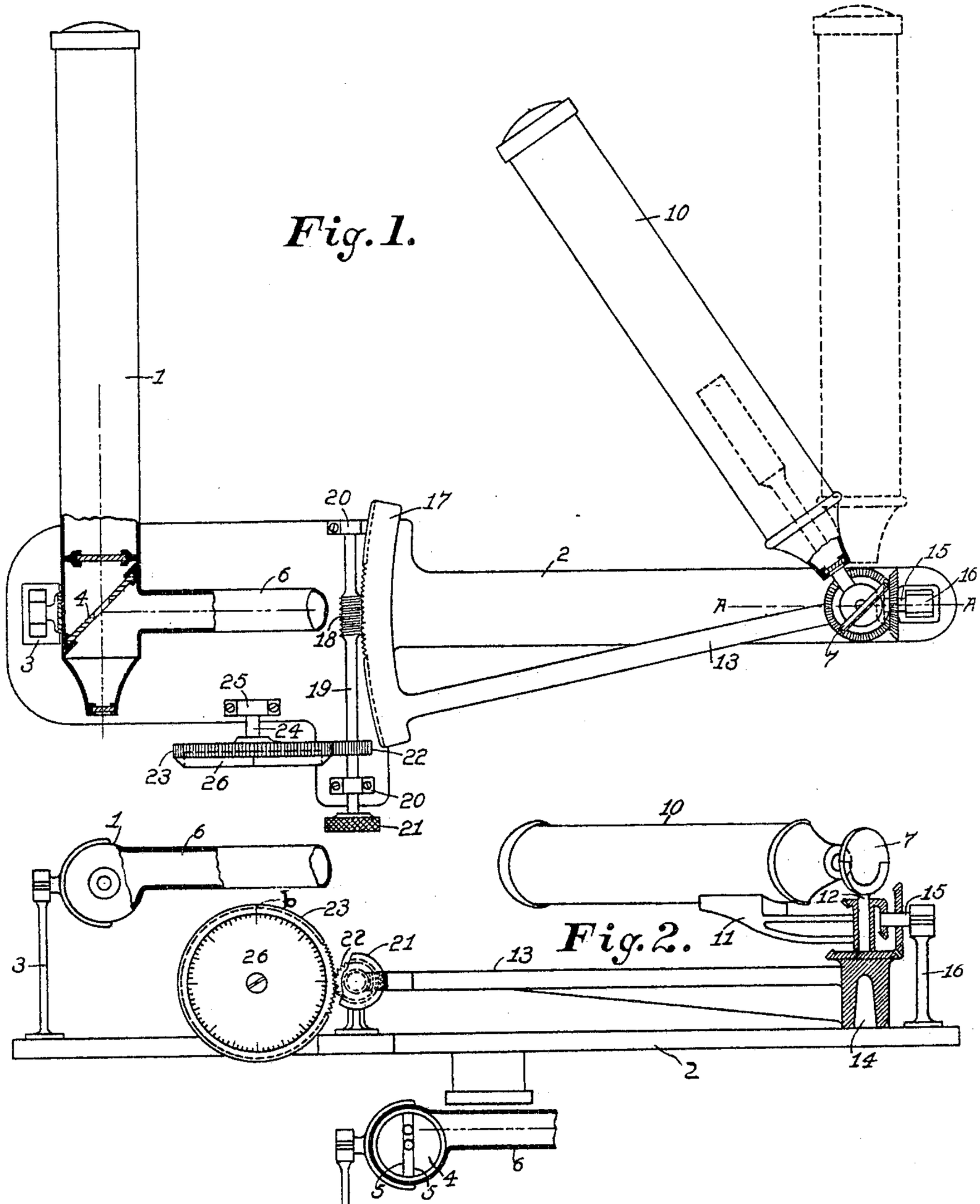

Fig. 2.

Fig. 3.

WITNESSES:

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DISTANCE-MEASURING INSTRUMENT.

No. 798,931. Specification of Letters Patent. Patented Sept. 5, 1905.

Application filed August 13, 1904. Serial No. 220,603.

To all whom it may concern:

Be it known that we, GEORGE F. STAAL and HARRY B. KAMSCHULTE, citizens of the United States, and residents of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented Improvements in Distance-Measuring Instruments, of which the following is a specification.

Our invention relates to distance-measuring instruments of the kind shown and described in Patent No. 760,545, issued May 24, 1904; and it consists in certain peculiarities of construction and combination of parts hereinafter particularly set forth with reference to the accompanying drawings and subsequently claimed, the object of said invention being to facilitate adjustment of movable parts of the instrument and to provide for easier determination of the distance of the object sighted from the point of observation.

Figure 1 of the drawings represents a partly-sectional plan view of our improved distance-measuring instrument, a tube constituting part of the same being partly broken away; Fig. 2, a front elevation of the instrument, partly in section on the plane indicated by line A A in Fig. 1, some of the aforesaid tube being partly broken away; and Fig. 3, a partly-sectional view of a fragment of said instrument.

Referring by numeral to the drawings, 1 indicates a primary sighting device in the form of a telescope secured to a standard 3 on the movable bed-plate or base 2 of the instrument at a permanent angle of ninety degrees thereto, and a reflector 4 is disposed in said sighting device at an angle of forty-five degrees to the line of sight, said reflector being shown provided with a central aperture between parallel vertical lines 5 5. The tube 6 of the instrument extends at a right angle to the aforesaid sighting device in connection therewith, open thereto in position to have its axis intersect the vertical axis of the reflector 4 slightly above the aperture in same, as shown in Fig. 3. In practice the other end of the tube terminates adjacent to the pivotally-adjustable reflector 7 of the instrument, this reflector being movable in time with a secondary pivotal sighting device 10, that is shown in the form of a telescope.

As thus far described the general construction and relative arrangement of parts in the instrument are the same as that shown and described in the patent aforesaid.

The supporting-bracket 11 of the sighting device 10 turns on a pivot-stem 12, projecting upward from the center of the hub end of an arm 13, and the reflector 7 is rigid with the stem back of said sighting device. The arm-hub has loose fit on a pivot-stud 14 of the base 2 in line with the aforesaid stem, and said hub is in miter-gear with a spindle 15, that has its bearing on a standard 16, fastened to the base 2. The spindle 15 is in like gear with the bracket 11, and the time of the gearing is such that the rotary speed of said bracket and sighting device therewith is twice as fast as the rotary speed of the reflector 7 and arm 13. The other end of the arm 13 is a toothed segment 17, in mesh with a worm 18 on an arbor 19, that has its bearings on standards 20, with which the base 2 is provided. A hand-wheel 21 or other suitable turning device is fast on the arbor 19 convenient to the observer sighting through the reflector 4, this being a feature of our improved instrument.

A spur-pinion 22 is shown fast on the arbor 19, in mesh with a spur-ring 23, that turns on an arbor 24, for which the base 2 is provided with a support 25, and the spur-ring encompasses a stationary circular scale-plate 26, made fast to the stationary arbor. A radial pointer-mark *b* on the spur-ring serves to indicate on the scale-plate the distance of an object from the point of observation, and while we have shown one form of scaling mechanism a movable part of which derives its motion from the arbor 19 when there is adjustment of the arm 13 said scaling mechanism may be varied in the matter of detail without departure from our invention.

When an object is sighted through the center of the reflector 4, the instrument as a whole is held in adjusted position and the reflector 7 of said instrument is independently adjusted with the arm 13 by manipulation of the arbor 19 until said reflector is caused to assume an angle that will project an image of the distant object on the stationary reflector 4. The object and image of same are now seen by the observer one above another, and if their vertical alinement is correct between the lines 5 5 on the reflector 4 said observer is assured of the correctness of his angles, the distance sought to be measured being then demon-

strated by the scaling mechanism. Coincident with the rotary adjustment of the arm 13 and the reflector 7, rigid therewith at the hub end of same, there is similar adjustment of the bracket 11 and telescope 10 therewith by means of the gearing above specified in connection with said arm, and it will be understood that all the adjustments of said instrument and its independently-adjustable elements are under the manual control of a single observer at the sighting-point, while at the same time a scaling mechanism that can be read by the naked eye is utilized to determine the distance of an object from a point of observation without computation.

Having now fully described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a distance-measuring instrument, a primary telescope containing a reflector having a permanent angle of forty-five degrees to the line of sight through said telescope, an arm having one end thereof on a pivot and provided at this end with an upwardly-projecting stem, another reflector in rigid connection with the stem, a bracket pivoted at one end on said stem, a secondary telescope mounted on the bracket forward of the stem-supported reflector, adjusting mechanism in connection with that end of said arm farthest from the pivot of same, and gearing by which motion is conveyed from the pivot end of the aforesaid arm to said bracket, the rotary speed of the bracket and secondary telescope therewith being twice as fast as that of said stem-supported reflector to which the reflector in the primary telescope is exposed.

2. In a distance-measuring instrument, a primary telescope containing a reflector having a permanent angle of forty-five degrees to the line of sight through said telescope, an arm having one end thereof on a pivot and provided at this end with an upwardly, projecting stem, another reflector in rigid connection with the stem, a bracket pivoted at one end on said stem, a secondary telescope mounted on the bracket forward of the stem-supported reflector, adjusting mechanism in connection with that end of said arm farthest from the pivot of same, distance-scaling mechanism in conjunction with the arm-adjusting mechanism, and gearing by which motion is conveyed from the pivot end of the aforesaid arm to said bracket, the rotary speed of the bracket and secondary telescope therewith being twice as fast as that of said stem-supported reflector to which the reflector in the primary telescope is exposed.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

G. F. STAAL.
H. B. KAMSCHULTE.

Witnesses:
FRANK J. MERZ,
MARGARET KAMSCHULTE.