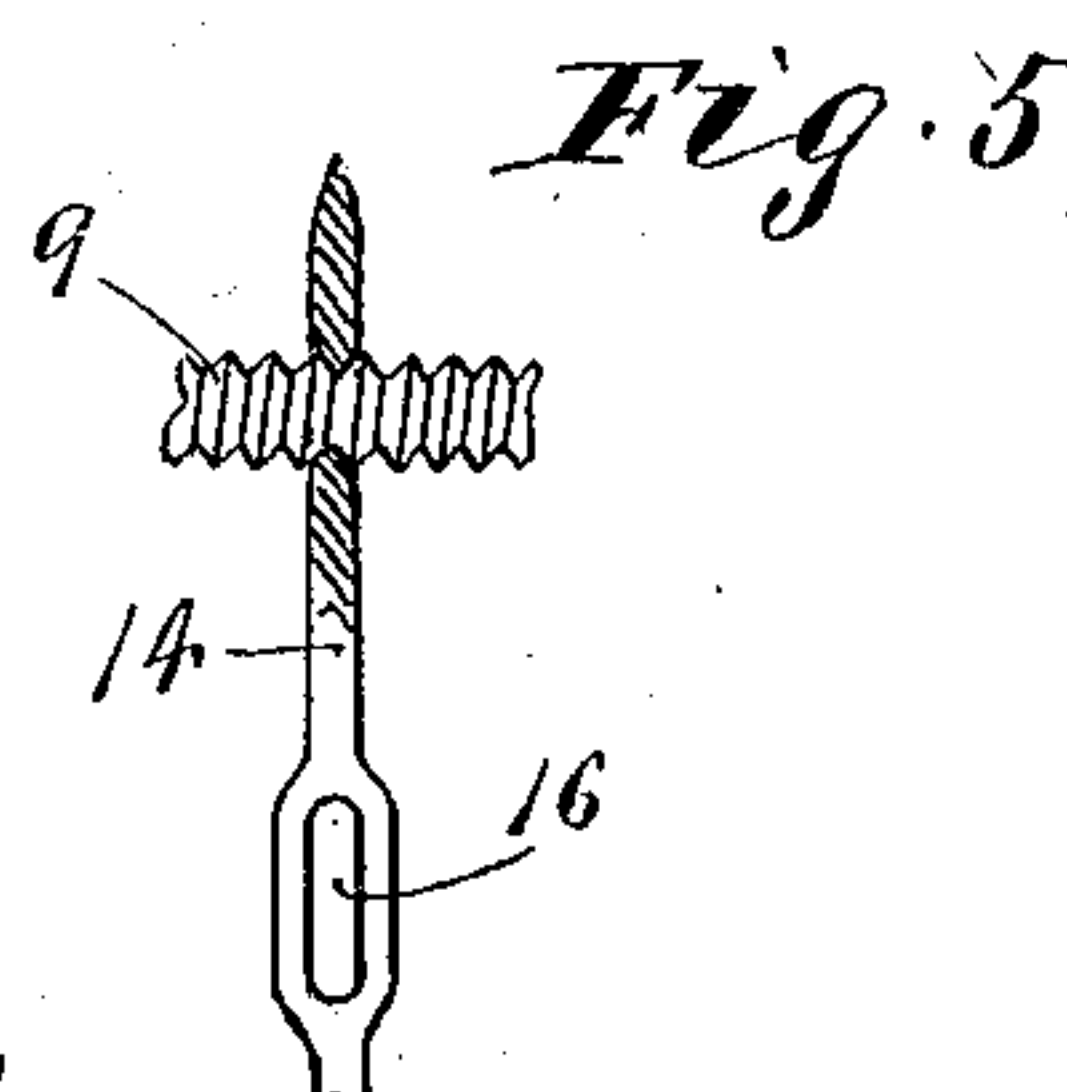
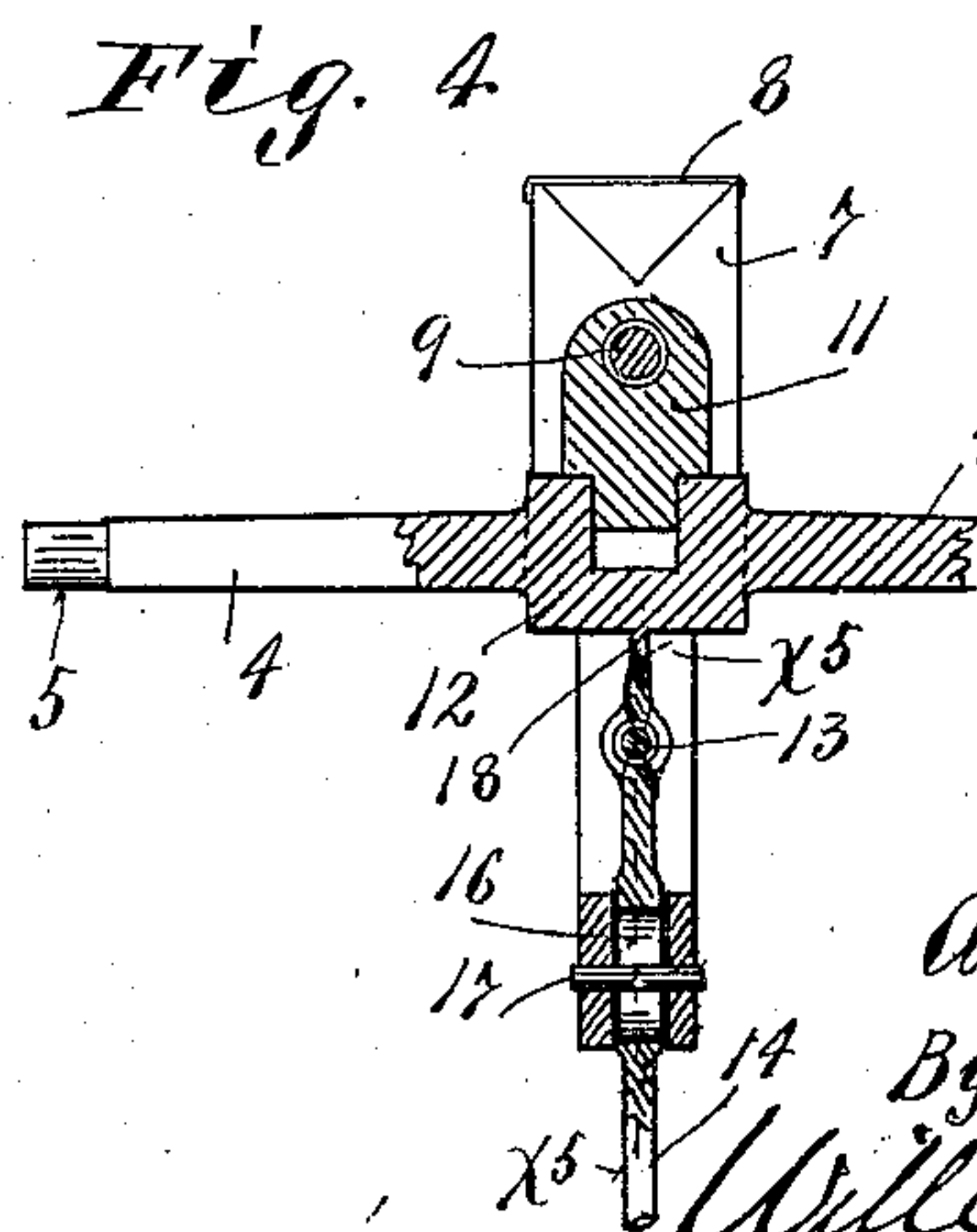
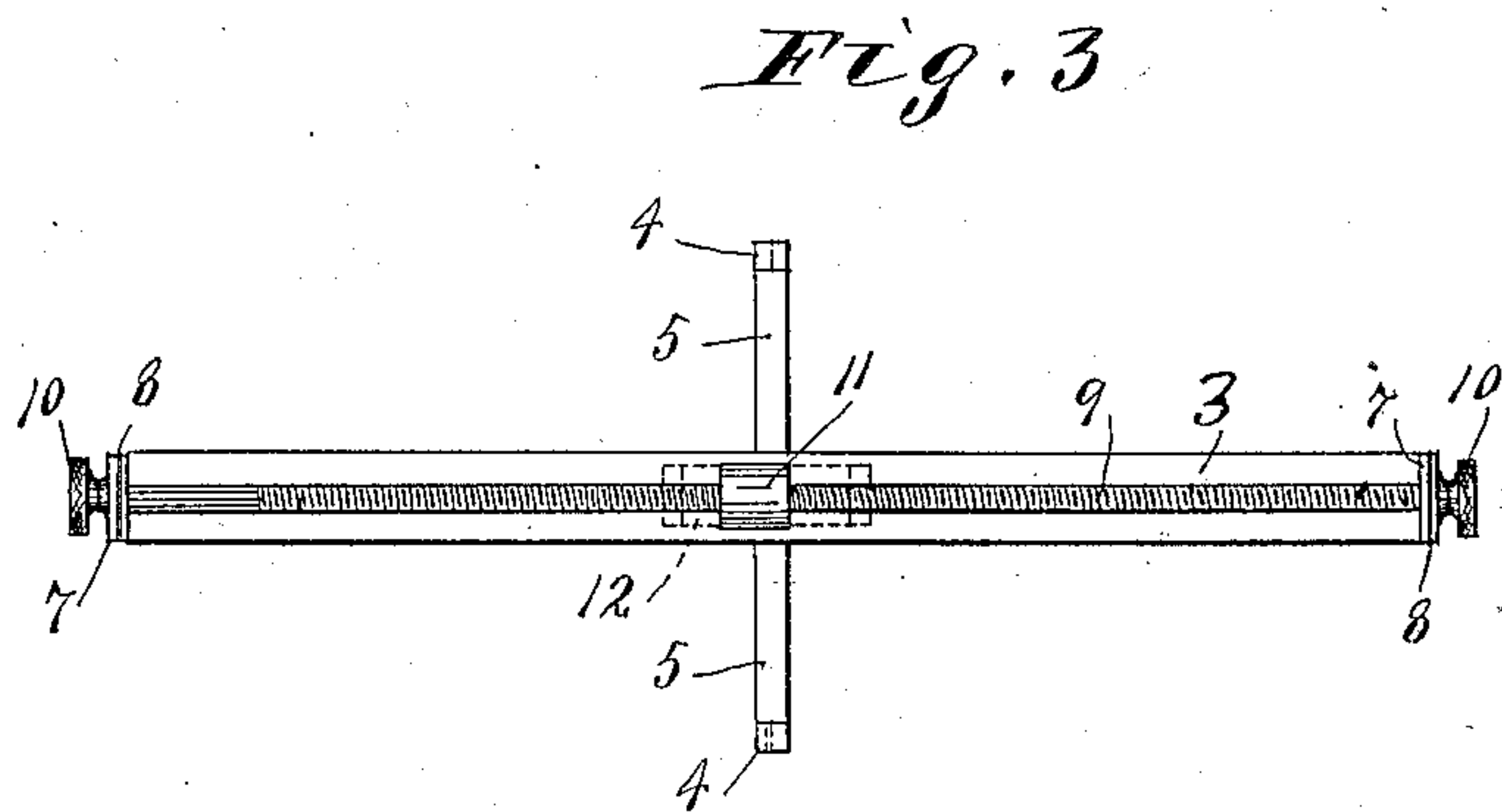
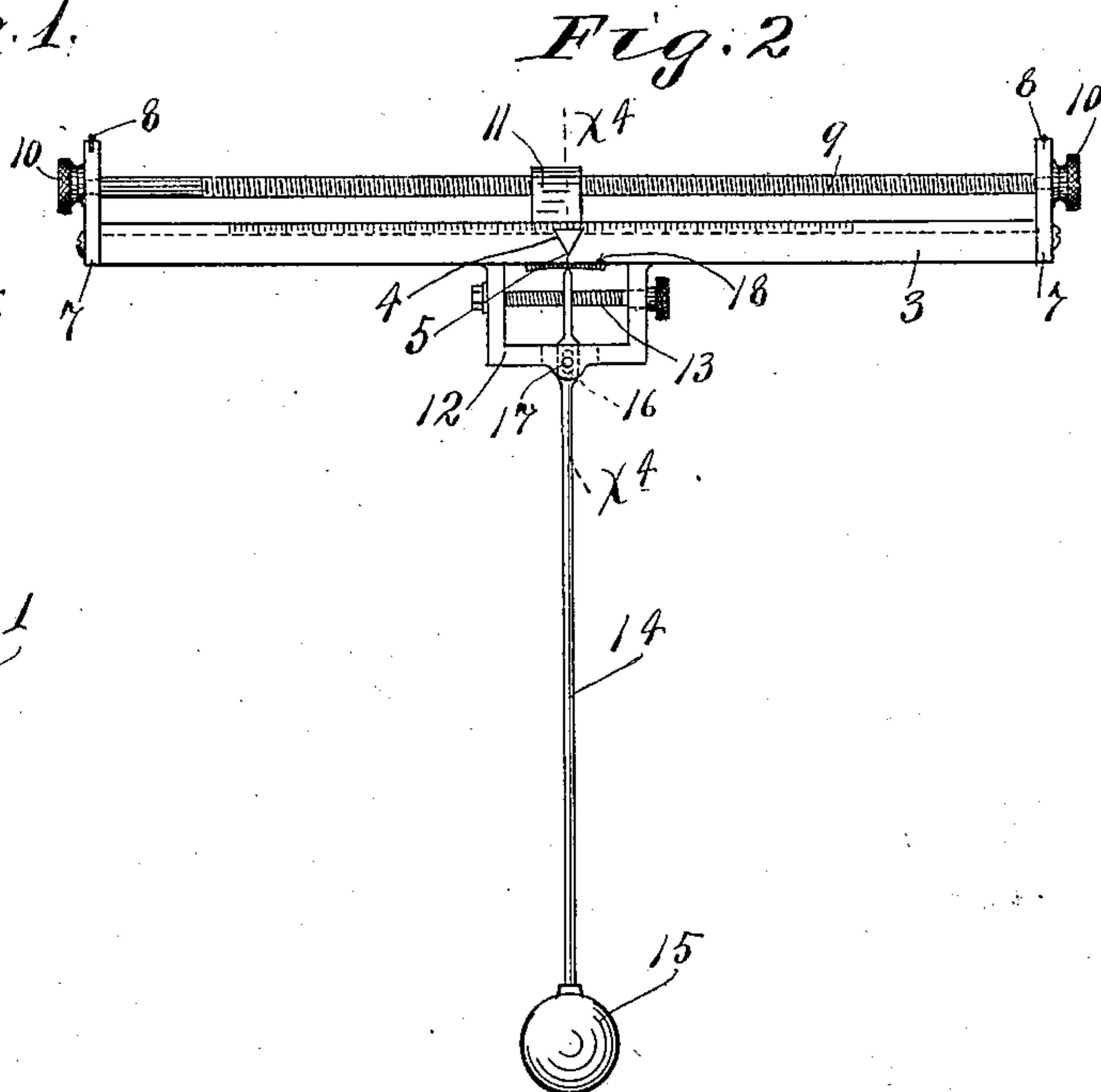
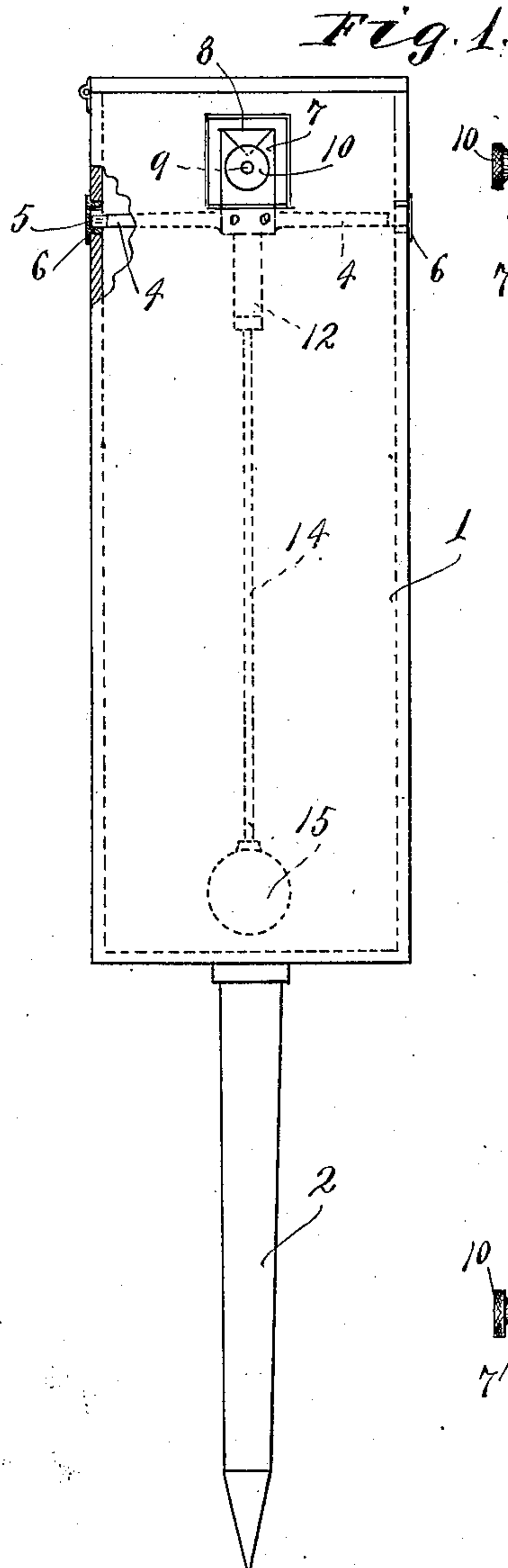


No. 889,196.

PATENTED JUNE 2, 1908.

A. A. BROTHEN.
SURVEYING INSTRUMENT.
APPLICATION FILED MAY 27, 1907.



Witnesses.
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UNITED STATES PATENT OFFICE.

ANDREW A. BROTHEN, OF MOUNTAIN HOME, IDAHO.

SURVEYING INSTRUMENT.

No. 889,196.

Specification of Letters Patent.

Patented June 2, 1908.

Application filed May 27, 1907. Serial No. 375,867.

To all whom it may concern:

Be it known that I, ANDREW A. BROTHEN, a citizen of the United States, residing at Mountain Home, in the county of Elmore and State of Idaho, have invented certain new and useful Improvements in Surveying Instruments; 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 has for its object to provide a simple, cheap and efficient surveying instrument, and to the above ends the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Referring to the drawings, Figure 1 is a view in front elevation, with some parts broken away, showing the improved surveying instrument. Fig. 2 is a side elevation showing the internal mechanism of the surveying instrument removed from the case. Fig. 3 is a plan view of the parts shown in Fig. 2. Fig. 4 is a vertical section taken on the line $x^4 x^4$ of Fig. 2; and Fig. 5 is a detail in section approximately on the line $x^5 x^5$ of Fig. 4.

Preferably, the movable parts of the instrument are located within a casing 1 that is rigidly secured to the upper end of a supporting post 2, the lower end of which post is shown as sharpened to adapt it to be readily forced into the ground to support the casing 1 in an upright position. Within the casing 1 is a so-called sighting bar 3, which at its intermediate portion is provided with laterally projecting fulcrum trunnions 4, the ends of which are formed angular at 5, and the lower edges of which are fulcrumed upon bearings 6 secured to the sides of the case 1. At its ends, the sighting bar 3 is provided with sight pieces 7 which are preferably formed with V-shaped notches in their upper edges and with horizontally extended sighting wires 8. A long adjusting screw 9 extends above and parallel with the sighting bar 3, and at its ends is swiveled in sight pieces 7 and it is provided with rigidly secured knurled heads 10, by means of which latter the said screw may be rotated by manipulation at either end.

Working with threaded engagement on the intermediate portion of the screw 9 is a coun-

ter-weighting block 11, the bottom of which, as shown, closely engages the upper edge of the sighting bar 3 to thereby hold said block against rotation while permitting the same to slide over the said sighting bar. Depending from the intermediate portion of the sighting bar 3, but rigidly secured thereto, is a yoke-like bearing bracket 12 in the vertical end portion of which is swiveled a small adjusting screw 13 that extends parallel to the main adjusting screw or screw rod 9.

The bracket 12 supports a pendulum 14, the lower end of which is provided with a head 15, and the upper end of which has a sharpened edge perforation that works much after the manner of a nut, upon the intermediate threaded portion of the adjusting screw 13. Just below the adjusting screw 13 the pendulum 14 is provided with a slot through which and the bifurcated bottom portion of the bracket 12 a pin 17 is passed, as best shown in Figs. 2 and 4. This slot and pin connection affords a pivot for the pendulum and permits slight endwise movement thereof, as is required when the said pendulum is adjusted by means of the screw 13. The sighting bar 3 is preferably provided with a graduated segment 18 that coöperates with the extreme upper end of the pendulum 14 to indicate in degrees the inclination of the sighting bar 3 with respect to a horizontal position, said horizontal position being assumed to be at 90 degrees with respect to the pendulum 14.

As is evident, the inclination that will be given to the sighting bar 3 may be varied by adjustments of the upper end of the pendulum under the action of the screw 13, and it is also evident that independently of this adjustment or in connection therewith, the inclination of the said sighting bar may be varied by adjustments of the counter-balancing block 11 more or less to one side or the other of the pivotal or fulcrum support of the said sighting bar. It is, therefore, evident that by the proper adjustments of either the pendulum or the counter-weighting block 11, or both thereof, the sighting bar may be set at the proper angle to give a rise or declining grade of any desired angle. The sighting should, of course, be taken across the two horizontally extended wires 8.

The instrument described is of very small cost and may be used by all persons, whether or not they are skilled in the art of surveying. It is especially adapted for use by persons

not skilled in the art of surveying and was particularly designed for use by farmers and others in the irrigated sections of the country. It will enable them in the first instance and
5 without experiment to accurately run their ditches and laterals so that they will carry water, and by its use the farmer or other person can also readily determine where his ground is improperly leveled and unfit for
10 irrigation, and this without waiting, as has been customary, for a year, more or less, in order to see where water will flow and where it will not flow. In this way, the farmer may be insured a good crop the first year on
15 much ground which would, under the old practice, not have been productive because not properly leveled for irrigation. The instrument will also save farmers and others surveyors' fees and, furthermore, will be at
20 hand when needed.

What I claim is:

1. In an instrument of the kind described, the combination with a suitable support, of a sighting bar intermediately pivoted to said
25 support and provided with a depending pendulum, sighting pieces secured to the opposite ends of said sighting bar, a screw rod rota-

tively mounted but held against endwise movement in said sighting pieces, and a counter-balancing weight having threaded engagement with said screw rod and movable longitudinally of said sighting bar, to vary the inclination thereof with respect to a horizontal, said weight being held against rotation by said sighting bar, substantially as described. 30 35

2. In an instrument of the kind described, the combination with a suitable support, of a sighting bar intermediately pivoted to said support, a depending bracket secured to the intermediate portion of said sighting bar, a
40 horizontal adjustable screw carried by said bracket, a weighted pendulum supported from and having screw-threaded engagement with said adjustable screw, and a slot and pin connection for connecting the weighted
45 pendulum to the bracket for pivotal and slight endwise movements, substantially as described.

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

ANDREW A. BROTHEN.

Witnesses:

O. E. CANNON,
J. H. WILLIS.