

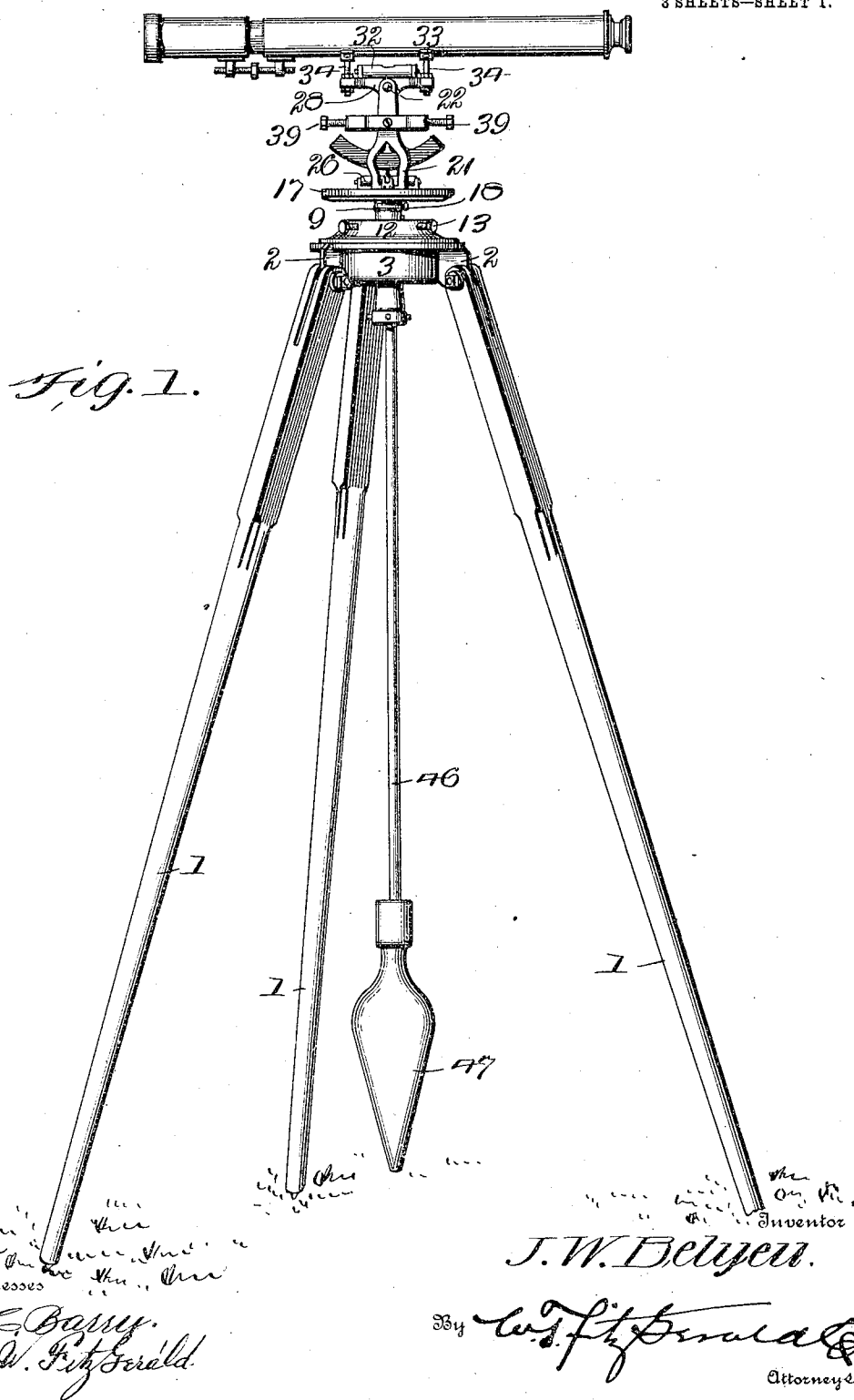
No. 784,511.

PATENTED MAR. 7, 1905.

J. W. BELYEU.
AUTOMATIC LEVELING INSTRUMENT.

APPLICATION FILED SEPT. 26, 1904.

3 SHEETS—SHEET 1.



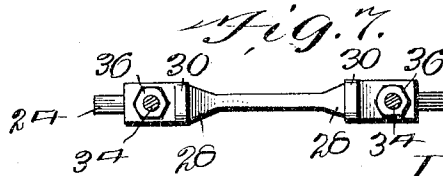
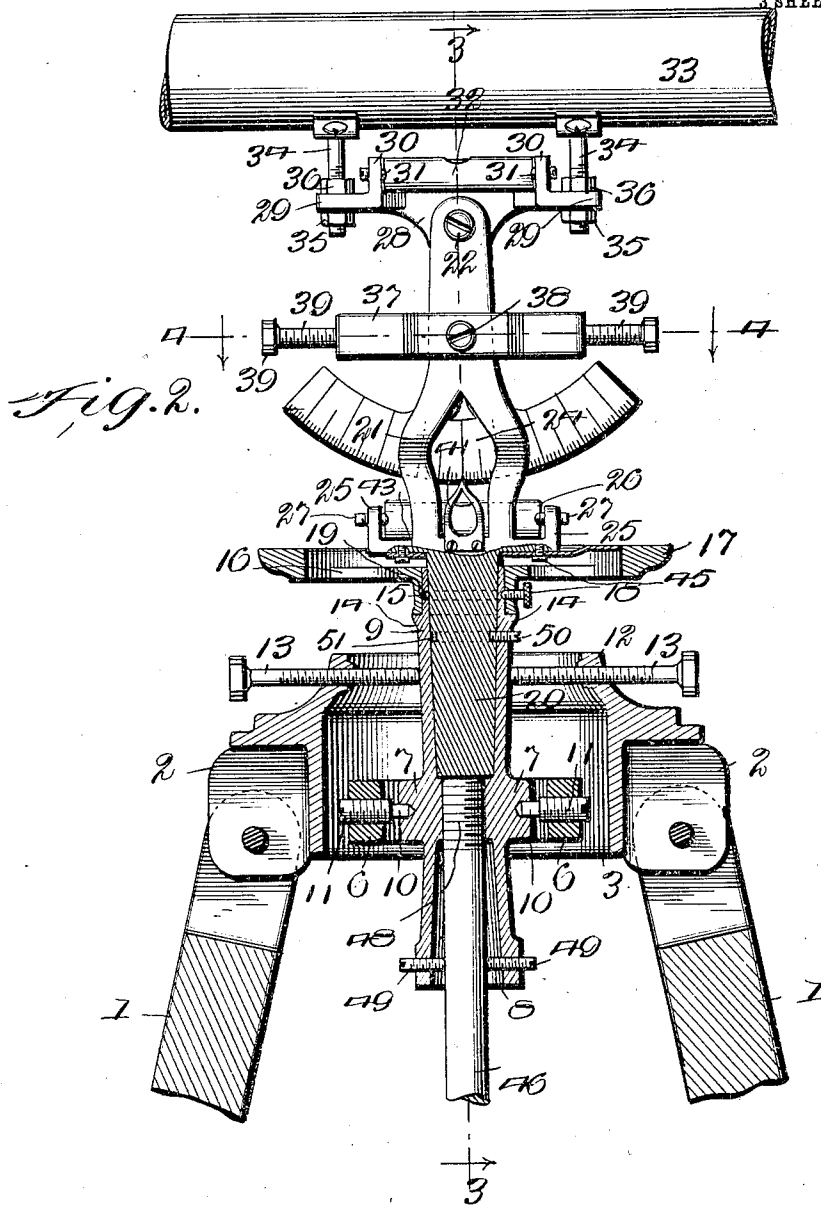
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Witnesses

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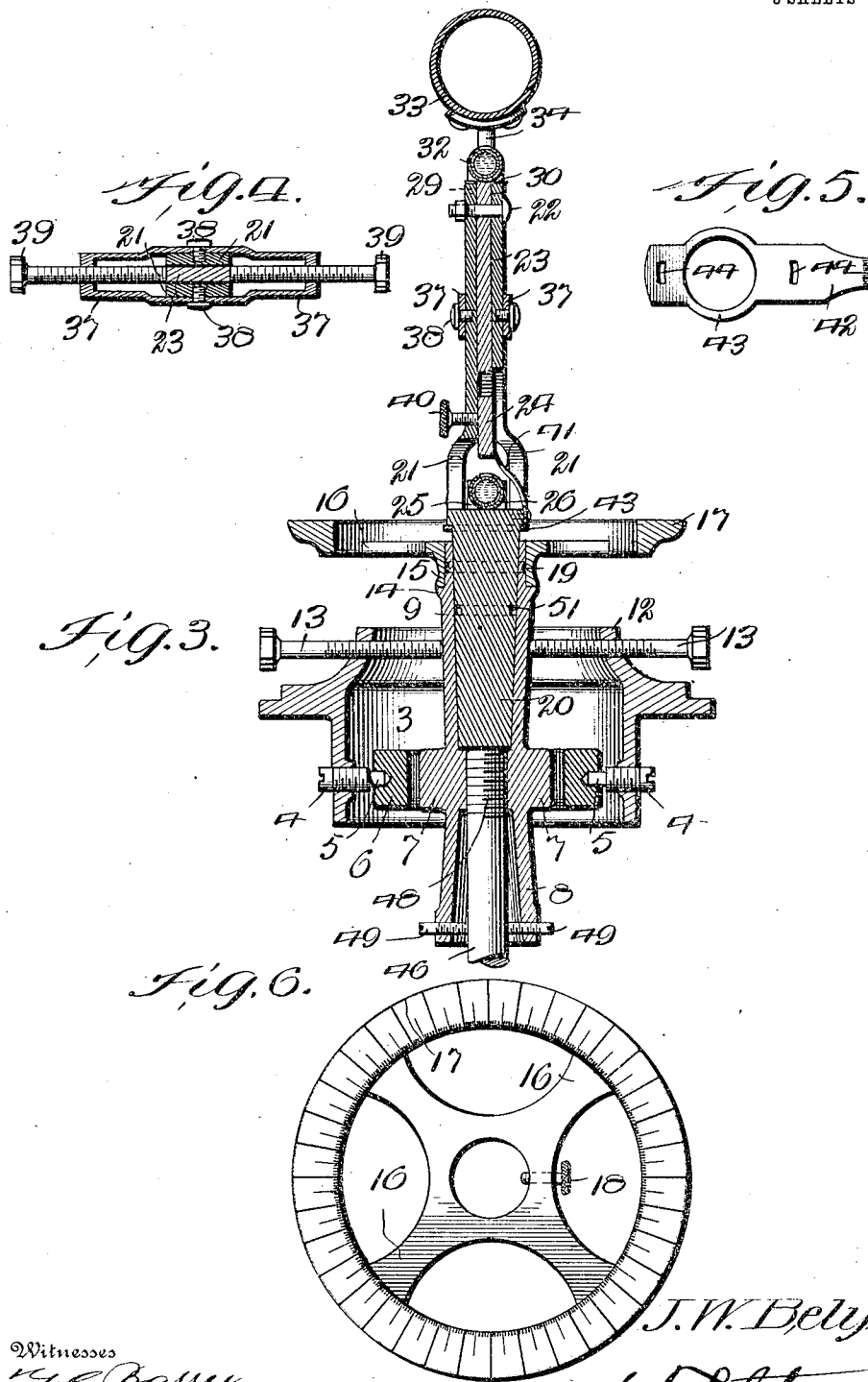
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UNITED STATES PATENT OFFICE.

JOHN W. BELYEU, OF ALEXANDER CITY, ALABAMA.

AUTOMATIC LEVELING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No 784,511, dated March 7, 1905.

Application filed September 26, 1904. Serial No. 225,980.

To all whom it may concern:

Be it known that I, JOHN W. BELYEU, a citizen of the United States, residing at Alexander City, in the county of Tallapoosa and State of Alabama, have invented certain new and useful Improvements in Automatic Leveling 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 relates to an automatic leveling instrument for the use of surveyors and others; and it consists of certain novel elements of combination and construction of parts, all of which will be fully set forth in the following specification and pointed out in the claims hereunto appended.

The main object of my invention, among others, is to provide an instrument which may be very accurately and promptly adjusted and which will thereafter be automatic in its action in restoring the sighting instrument to a true or level position.

Other objects and advantages will be hereinafter made clearly apparent, reference being had to the accompanying drawings, which are made a part of this application, and in which—

Figure 1 shows a side elevation of my invention complete ready for use. Fig. 2 is a similar view showing certain parts in section. Fig. 3 is a vertical sectional view taken on line 3 3 of Fig. 2. Fig. 4 is a sectional view taken on line 4 4 of Fig. 2. Fig. 5 is a detail showing one of the indices or fingers, while Fig. 6 shows a plan view of the graduated circle-plate employed to cooperate with the finger illustrated in Fig. 5.

Referring to the numerals on the drawings which are employed to designate the various details and cooperating elements of my invention, 1 indicates the supporting-legs, there being three of these legs, as is common with tripods of various kinds. Each of the legs is pivotally connected to a suitable extension or bracket 2, formed integral upon the outer side of the collar or body portion 3, said body portion having at two diametrically opposite points the adjustable fin-

gers 4, each finger having a conical terminal 5, designed to take into a suitable seat formed in the member 6. Within the collar 6 is mounted the member 7, provided upon its lower side with a tubular extension 8, slightly flared in character, and also a conical outwardly-flared tubular extension 9. It is therefore obvious that the member 6 is so mounted upon the pivot-points 5 that it will be truly balanced, and I suspend within the collar or member 6 upon the conical extension 10 of the adjustable fingers 11, disposed diametrically opposite each other and in a plane at right angles to the plane occupied by the fingers 4, and it therefore follows that the said member 7 has a universal movement and will automatically adjust itself to a horizontal position and incidentally carry the extensions 8 and 9 so that they will occupy a substantially vertical plane.

The upper portion of the body section or member 3 is fashioned into a slightly-constricted mouth or flange 12, and disposed in threaded seats provided in said constricted mouth or flange are the clamping-screws 13, there being four of said screws arranged in pairs, two of them occupying planes at right angles to the plane occupied by the other two, the object of said screws being to bear against the extension 9 and lock the same in an adjusted position.

The upper end of the tubular extension 9 is provided with a shoulder or offset 14, and fitting the reduced end of the extension is the collar 15, which has a plurality of spoke-like members or arms 16 connecting said collar with the circular plate 17, the upper surface of which is provided with a plurality of graduations, as will be clearly observed in Fig. 6, a set-screw 18 being seated in a threaded aperture in the collar 15 and adapted to take into a groove 19 in the tubular extension 9, as shown in Figs. 2 and 3.

The outwardly-flared tubular extension 9 forms a conical seat to receive the conical stem 20, the upper end of which is fashioned into a pair of parallel standards 21, and between said standards I pivotally mount upon the bolt or rivet 22 the stem 23. The lower end of the stem 23 is connected to or inte-

grally formed with the graduated segmental plate 24. The standards 21 also have the brackets or ears 25 at their lower ends, and between said ears or brackets I secure a level
 5 26, held in position by the locking-screws 27, as clearly shown. The upper end of the stem 23 is provided with a cross-head 28, having the branches 29 and the upwardly-
 10 the latter I secure by means of the set-screws 31 the leveling-tube 32.

The sighting instrument will be designated for convenience by the numeral 33 and is mounted upon the extensions 29 by means
 15 of the standards 34, each of the standards being securely connected to the sighting instrument at their upper ends, while the lower ends of the standards are threaded to be engaged by the locking-nuts 35 and 36 after the
 20 threaded stem has been passed through an aperture in the extensions 29.

I secure to the members 21, near the middle portion, the bracket 37, held in place by the set-screws 38, or the equivalent thereof,
 25 each end of the bracket having a set-screw 39, the inner end of which is designed to bear against the edge of the member 23, whereby the latter may be locked in an adjusted position.

Near the lower end of one of the standards 21 I dispose in a threaded seat the set-screw 40, the inner end of which is designed to bear against a contiguous part of the segmental graduated plate 24, whereby it will be held in
 30 an adjusted position.

Designed to cooperate with the graduated segmental plate 24 is the pointer or index-finger 41, attached to a convenient point upon the lower end of the standards or members
 40 21 or upon the upper end of the conical stem 20, as more clearly shown in Fig. 3. In like manner I provide an index-finger or pointer 42, having a circular opening 43 at one end to fit around the upper end of the stem 20,
 45 suitable slots or openings 44 being provided to receive the adjusting or securing screws 45 whereby the pointer or finger 42 may be reliably locked in an adjusted position.

It will thus be seen that I have provided
 50 a reliably-efficient form of automatically-adjustable leveling instrument for carrying an instrument of precision commonly used by surveyors and others, insuring that said instrument of precision may be accurately
 55 mounted in its operative position without regard to the character of the surface of the ground over which the surveyor may be required to pass.

My improved automatically-adjustable leveling instrument will be found useful for a great variety of purposes, and it is obvious that the various parts thereof may be cheaply and readily manufactured and each assembled in its operative place by any one of ordinary skill, thus making it possible to manu-

facture my invention at a comparatively small cost.

It is thought that the construction and manner of using my invention have thus been made clearly apparent, though it may
 70 be stated that in a preliminary use or adjustment of the instrument the locking-screws 13 are withdrawn, so as to give proper play to the universal joint after the tripod or legs have been disposed in the position which it is
 75 desired the instrument shall occupy. After the tubular extensions 8 and 9 have thus assumed a vertical position the same are locked by turing home the locking-screws 13, it being understood that a counterbalancing-rod
 80 46 and the weighted terminal 47 are placed in coöperation with the member 7, as by the threaded terminal 48 of said rod being entered in a threaded seat provided for its reception. To insure a greater accuracy of the
 85 adjustment of the rod 46, the locking-screws 49 are located in the lower end of the tubular extension 8, and thus disposed so that the inner ends thereof will bear against said rod and lock the same securely in place. After the
 90 preliminary adjustment just described has been effected, the same being readily determined by means of the level 36, a ready and accurate adjustment of the stem 23 may be attained by loosening the set-screws 39 and
 95 40, and after the level 32 has been disposed in a true horizontal position the set-screws 39 are turned home against the edges of the stem 23, while the set-screw 40 is caused to bear tightly against a contiguous part of the
 100 segmental graduated plate 24. By means of the index-fingers 41 and 42 any other adjustment according to the desired graduation may be easily effected.

By reference to Fig. 2 it will be observed
 105 that the threaded stem 20 is held rotatably mounted in its seat by means of the locking-screw 50, the end of which enters an annular groove 51, formed in a contiguous part of the
 110 tem, thereby preventing the stem from casually slipping out of place, but permitting it to have free rotary movement therein.

It is obvious that various modifications and changes may be made in the construction of parts entering into my invention, and I
 115 therefore desire to comprehend all substantial equivalents and substitutes which may be regarded as falling within the scope of my invention, and believing that the advantages and manner of using my invention and the
 120 construction thereof have been made clearly apparent further description is deemed unnecessary.

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

The herein-described automatic leveling instrument comprising the body portion or collar-like member 3 having suitable supporting-legs; an auxiliary collar member 6 pivot-
 130

ally mounted within the member 3 and a member 7 having extensions or sockets upon its upper and lower sides also pivotally mounted in said collar member whereby a
5 universal joint is formed for said extensions or sockets; a tubular member 9, a conical stem fitting in said tubular member; a leveling instrument 26 carried by the upper end of said
10 stem; a graduated plate mounted on said tubular extension; standards carried by said stem; a member 23 pivotally mounted between said standards and having at its lower
15 end a segmental graduated plate 24 and at its upper end a cross-head 28; a pair of brackets upon said cross-head; a suitable leveling in-

strument carried by said bracket and a sighting instrument and means to connect the same to said cross-head; whereby the sighting instrument may be moved in any direction and readily disposed in a true horizontal
20 plane and means to lock said parts in an adjusted position, all combined substantially as specified and for the purpose set forth.

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

JOHN W. BELYEU.

Witnesses:

JOHN T. ALLCOCK,
A. P. FEQUAY.