33-251. XR 360,837 SR

(No Model.)

W. A. WRIGHT.

LEVELING INSTRUMENT.

No. 360,837. Patented Apr. 5, 1887.

Fig. 1.

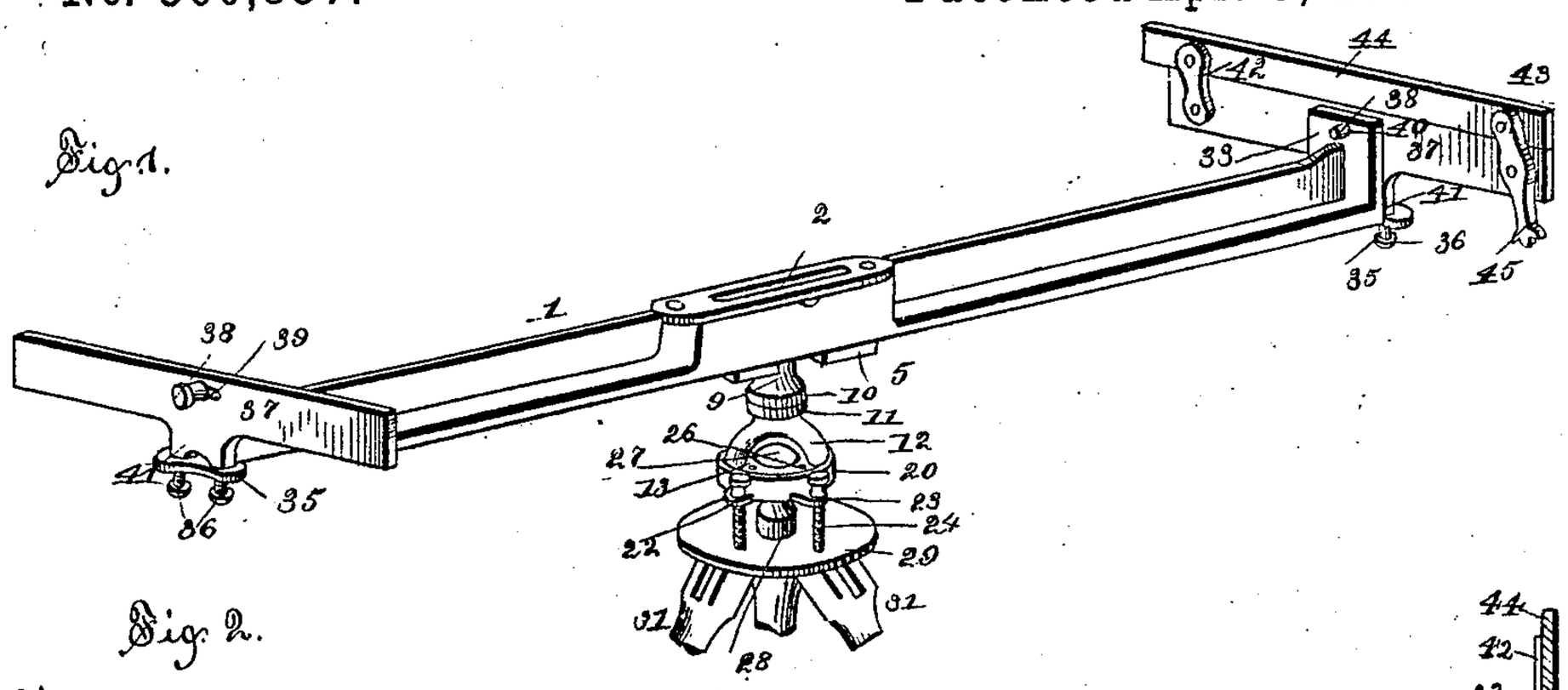


Fig. 2.

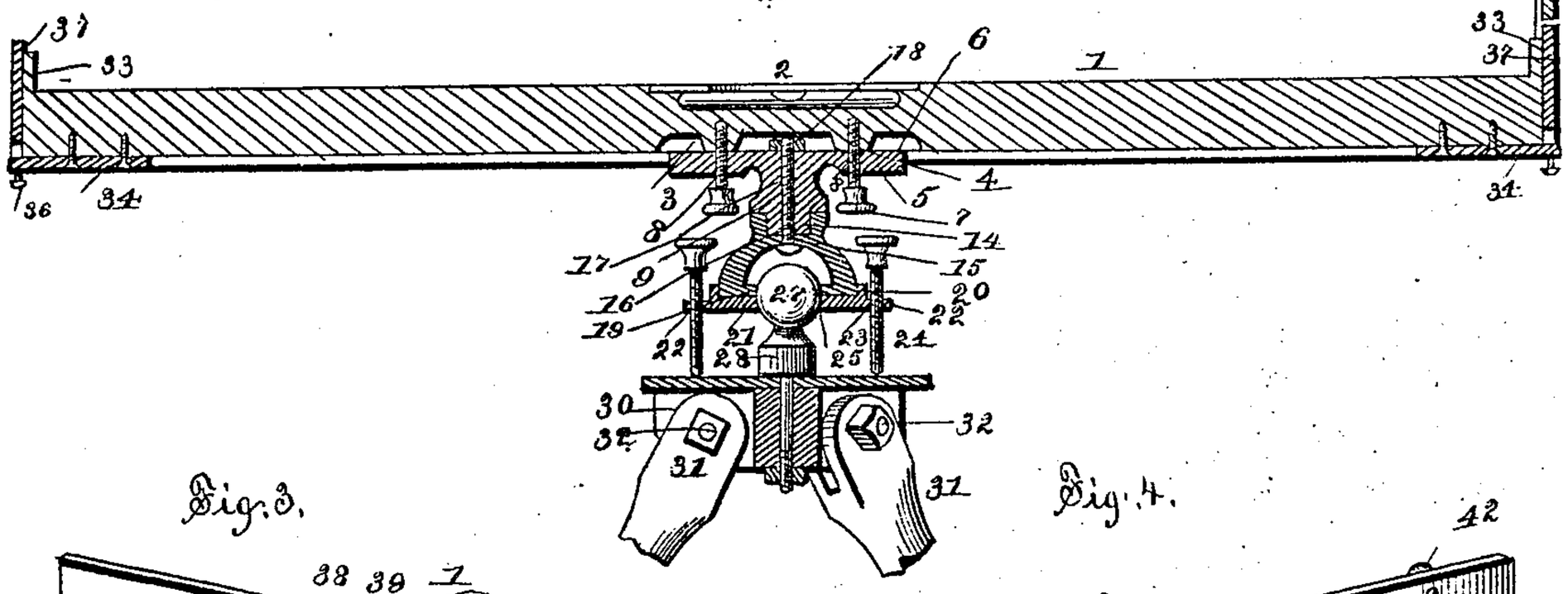


Fig. 3.

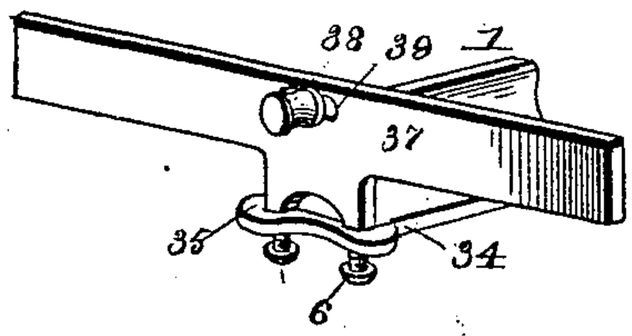


Fig. 4.

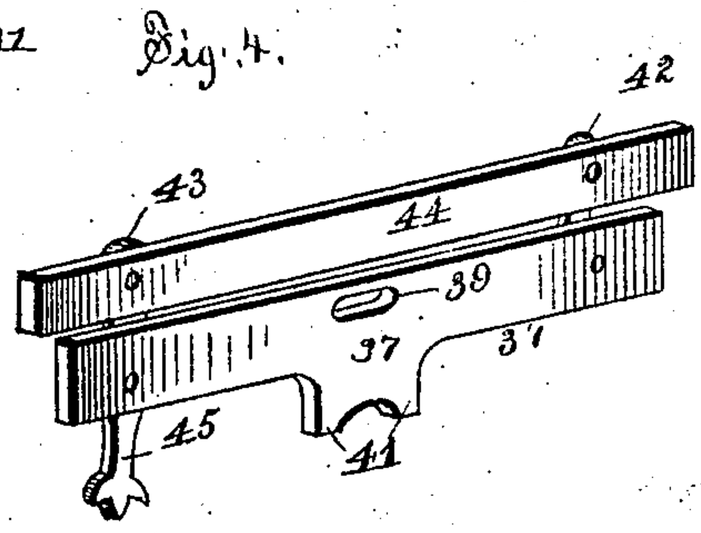
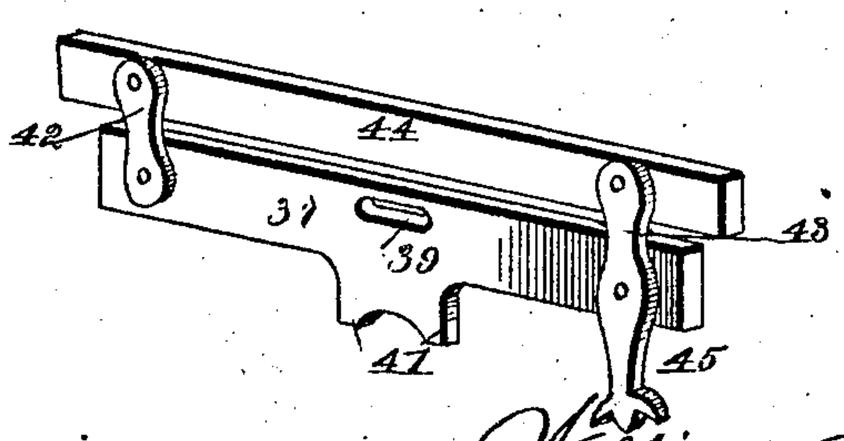


Fig. 5.



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x14

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UNITED STATES PATENT OFFICE.

WILLIAM ABRAM WRIGHT, OF CAVE SPRING, GEORGIA, ASSIGNOR OF ONE-HALF TO J. B. LAPSLEY, OF SAME PLACE, AND J. W. LAPSLEY, OF CALERA, ALABAMA.

LEVELING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 360,837, dated April 5, 1887.

Application filed October 6, 1886. Serial No. 215,477. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM ABRAM WRIGHT, a citizen of the United States, and a resident of Cave Spring, in the county of Floyd and State of Georgia, have invented certain new and useful Improvements in Surveyors' Levels; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 is a perspective view of the upper portion of my improved surveyor's level. Fig. 2 is a longitudinal vertical sectional view of the same. Figs. 3 and 4 are views of the cross-bars at the ends of the level-bar, and Fig. 5 is a view of the inner side of the sight-bar.

Similar numerals of reference indicate corresponding parts in all the figures.

My invention has relation to levels for surveying; and it consists in the improved construction and combination of parts of the same, as hereinafter more fully described and claimed.

In the accompanying drawings, the numeral 1 indicates the level-bar, which is provided with a spirit-level, 2, at its center and with a groove or recess, 3, at the middle of its under side, having two screw-threaded perforations, 4.

A cross-head, 5, is provided with a rib, 6, upon its upper side, which rib fits into the recess or groove, and screws 7 pass through perforations 8 in the ends of this cross-head into the threaded perforations in the recess of the bar, securing the cross-head to the under side of the bar. The cross-head has a central downwardly-projecting shank, 9, which is formed with an annular flange or rim, 10, facing downward and fitting against a similar rim, 11, supported from two curved converging arms, 12, projecting from a frame, 13, and the reduced portion 14 of the shank fits and turns in the central perforation of this rim, which perforation is formed with a portion, 15, of a smaller diameter at its lower end, a screw-bolt, 16, passing from below up through the smaller portion of the perforation and through an axial perforation, 17, in the shank, the bolt having a nut, 18, at its upper end.

The frame 13 is circular and formed with a central perforation, 19, beveled from the under side, and the frame fits within an upwardly-projecting circular flange, 20, upon the upper face of a frame, 21, having four lips, 22, at diametrically opposite portions of the frame at right angles to each other, the said lips having screw-threaded perforations 23, through which pass screws 24.

The lower frame is formed with a central aperture, 25, registering with the aperture in the circular frame, beveled from above, and screws 26 pass through the two frames from the under side, uniting the two frames.

A spherical knob, 27, is formed upon the upper end of a shank, 28, passing through a plate, 29, and this knob fits in the beveled apertures of the frames, the frames fitting upon the knob and rocking in all directions upon the same, the knob and the apertured plates forming a ball-and-socket joint. The lower ends of the screws passing through the perforated lips bear against the upper side of the plate, and the under side of this plate is provided with radiating ribs or wings 30, to which the upper slotted ends of the tripod-legs 31 are pivoted upon bolts 32, passing through the ends of the legs and through the ribs.

The ends of the level-bar are formed with flat faces 33, and plates 34 are secured in grooves in the under sides of the ends of the bar and have cross-heads 35 projecting beyond the ends of the bar, set-screws 36 passing up through the ends of the cross-heads.

Cross-bars 37 are secured to the flat faces at the ends of the bars by means of screws 38 passing through slots 39 in the cross-bars into perforations 40 in the flat faces, and the lower edges of these cross-bars are formed with pairs of downwardly-projecting lugs 41 at the centers, against which lugs the upper ends of the set-screws in the cross-heads may bear.

One of the cross-bars has two arms, 42 and 43, pivoted to it, and a parallel bar, 44, is pivoted with its rear or inner side to the upper

ends of these arms, swinging parallel to the upper edge of the cross-bar, and the arm 43 is provided with a downwardly-projecting handle, 45, by means of which the arm and consequently the parallel bar may be tilted.

When the level is to be used, the tripod is placed in position, whereupon the shank upon which the level turns is adjusted in a vertical position, the four screws in the frame rocking upon the spherical knob, enabling the frames to be adjusted in a horizontal plane, bringing the shank in a vertical line, the position being tested by turning the level-bar upon the pivotal shank, the level-bar being perfectly horizontal, when the bubble in the spirit-level will remain stationary at all positions of the level-bar. The level-bar may now be directed toward the extension-bar and its target, the cross-bar having the parallel bar being nearest the eye of the operator, which will sight between the edges of the bars. As these bars are of a greater or less thickness and have their adjacent edges or faces parallel with each other, a slit is thus formed between them, through which the light from the field passes to the observer; and as unobstructed rays of light can only pass in straight lines, the target must be placed in the plane of this slit or the rays of light reflected from it cannot pass through the slit, as they will be obstructed by the opposite edges of the bars. By means of the arms 42 and 43 this slit between the cross-bar and parallel bar above it can be increased from actual contact, when no light at all can pass between them to the full swing of the arms. In taking very accurate observations, and especially by persons not used to such work, it is necessary to make the slit between the bars as narrow as possible, so that the center line of the target must be placed in a very limited plane or it cannot be seen. If it is placed too high the light from it will be intercepted by the edges of these bars, and if it is placed too low the light will be intercepted by the cross-bar at the opposite end of the level, the top edge of which is placed in the center of the plane of the slit. If such accurate sight is not required, the parallel bar may be raised, which will increase the limits of the field in which the target can be seen, and if the target should be placed a trifle above the line of the ray of light which passes over the edge of the outer cross-bar it can still be seen, as the ray of light from it can pass between the bars, although it passes above the top of the cross-bar at the opposite end of the level; but if the target is placed too low it cannot be seen for the same reason as when a finer sight is being taken.

The cross-bars at the ends of the level-bar may be adjusted to have their upper edges perfectly level by means of the set-screws in the cross-heads, the said screws bearing against the lugs upon the lower edges of the cross-bars, and thus support the cross-bars, which may slide and rock upon the screws passing through their slots.

The shank of the cross-head supporting the level-bar, being provided with the annular rim and reduced portion revolving, respectively, upon the annular rim of the frame and in the aperture of the rim, and having the axial screw-bolt, will be pivoted perfectly true, so that after the frames have been adjusted perfectly horizontal the pivotal shank will be in a true vertical line, so that there will be no deviation when the level-bar is revolved in a horizontal plane.

The ball-and-socket joint and the four screws in the four portions of the frame enable the said frame to be adjusted in a perfect horizontal plane, motion in all directions being possible by this joint and by the screws, which may be screwed up and down at opposite sides, adjusting the frames in their desired position.

The upper frame, being secured within the flange of the lower frame, will be held perfectly true, so that the beveled apertures in the centers of the frames will be held registering perfectly true, preventing uneven wear and cutting of the spherical knob and consequent untrue adjustment of the instrument, and, if desired, the upper frame may be formed with a flange and have a portion of the lower frame fitting into it, the same results being attained.

Having thus described my invention, I claim and desire to secure by Letters Patent of the United States—

1. In a surveyor's level, the combination of a circular frame having a beveled central aperture and having the level-bar pivoted above it, a frame having a circular flange upon its upper face fitting around the edge of the upper frame and having a central aperture beveled from above and having the upper frame secured within the flange, and a spherical knob projecting from the tripod and fitting within the bearing formed by the beveled apertures of the frames, as and for the purpose shown and set forth.

2 In a surveyor's level, the combination of a frame supported upon a universal joint and having an upwardly-facing annular rim formed with a central perforation having a narrower portion at its lower end, a shank projecting downward from the middle of the level-bar and having an annular downwardly-facing rim fitting upon the other rim and having a reduced portion fitting in the perforation of the lower rim, and a screw passing through the narrow portion of the perforation in the lower rim and passing up through a central perforation in the shank having a nut at its upper end, as and for the purpose shown and set forth.

3. In a surveyor's level, the combination of the tripod having a circular plate at its upper end formed with a central upwardly-extending shank having a spherical knob at its upper end, a frame having lips projecting at right angles and formed with screw-threaded perforations and formed with a circular upwardly-projecting flange and with a central circular

aperture beveled from above and fitting around the spherical knob, a circular frame having a central aperture beveled from below and fitting over the knob and having screws securing it inside of the flange of the lower frame and having an upwardly-extending central portion formed with an upwardly-facing annular rim and with an axial perforation having a narrower lower portion, a shank projecting from the middle of the level-bar and formed with an annular rim fitting against the rim of the bearing and with a reduced portion fitting in the perforation of the bearing, and a screw-bolt passing upward from the narrow portion of the perforation through an axial perforation in the shank and having a nut at its upper end, as and for the purpose shown and set forth.

4. In a surveyor's level, the combination of the level-bar having flat faces at its ends and having grooves in the ends of its under side, cross-bars having slots at their middles for the passage of fastening-screws securing them to the faces and having each a pair of downwardly-projecting lugs at the middles of their lower edges, and flat bars secured in the grooves of the under side of the bar and projecting with cross-heads beyond the ends of the level-bar and provided with upwardly-extending set-screws in their ends bearing with the upper ends against the downwardly-projecting lugs of the flat bars, as and for the purpose shown and set forth.

5. In a surveyor's level, the combination of a level-bar, a cross-bar at each end, two arms secured to one of said cross-bars, and a parallel bar secured to the ends of said arms.

6. In a surveyor's level, the combination of a level-bar, a cross-bar at each end, two arms secured to one of said cross-bars, the end of one of which arms is formed into a downwardly-projecting handle, and a parallel bar secured to the opposite end of said arms.

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

WILLIAM ABRAM WRIGHT.

Witnesses:

FRED W. MAXWELL,

GEO. BARNETT.