

No. 833,880.

PATENTED OCT. 23, 1906.

W. L. E. KEUFFEL.
LEVELING ROD.

APPLICATION FILED JAN. 4, 1905.

3 SHEETS—SHEET 1.

Fig. 1.

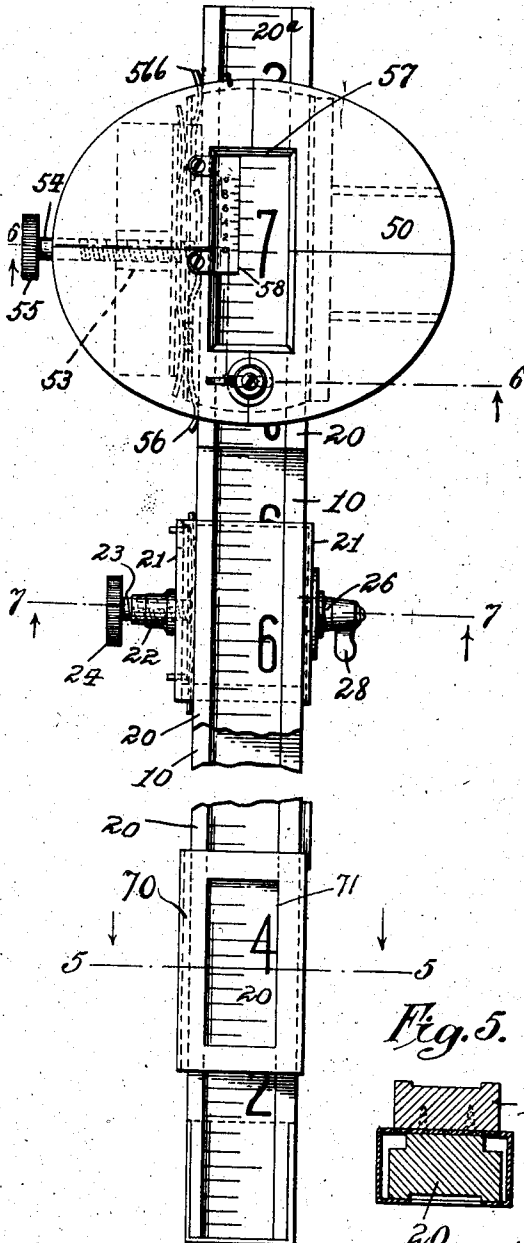


Fig. 2.

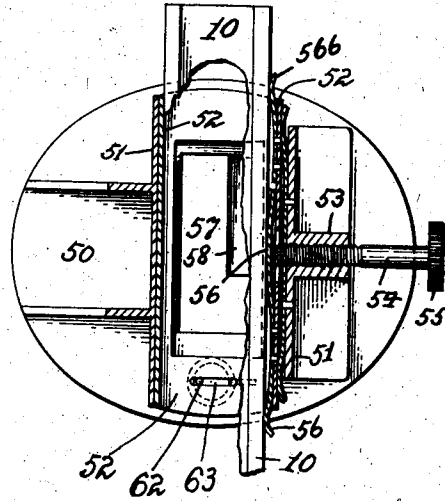


Fig. 3.

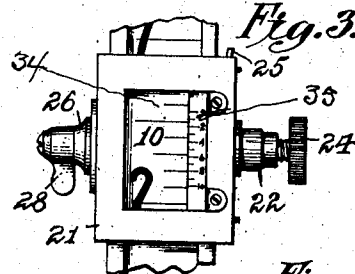


Fig. 4.

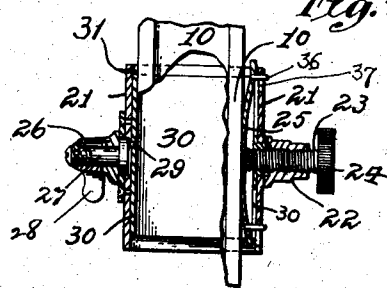
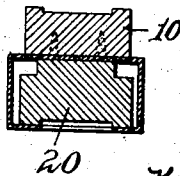


Fig. 5.



Witnesses
Alan Mc Donnell.
S. J. Coe

Willie L. E. Keuffel Inventor
By His Attorney William R. Baird

No. 833,880.

PATENTED OCT. 23, 1906.

W. L. E. KEUFFEL.
LEVELING ROD.

APPLICATION FILED JAN. 4, 1905.

3 SHEETS—SHEET 2.

Fig. 6.

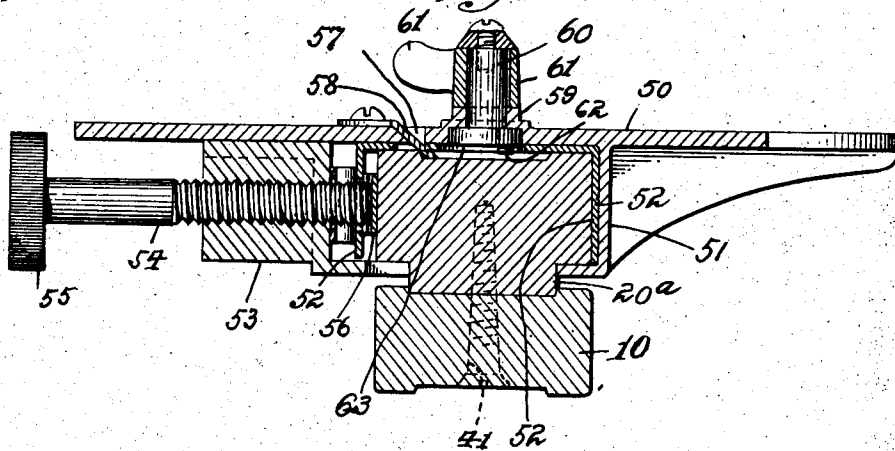
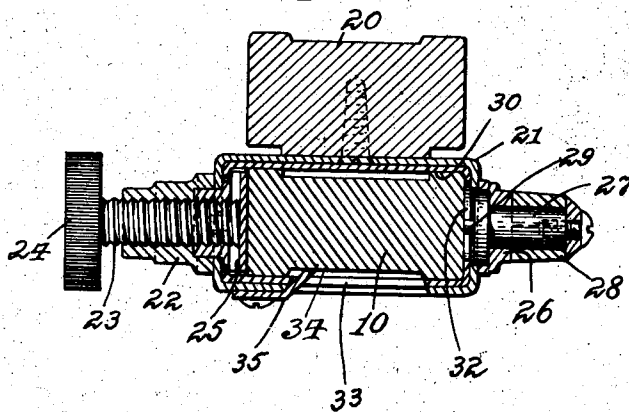


Fig. 7.



Witnesses
Alan Mc Donnell.
S. J. Co.

Willie L. E. Keuffel Inventor
By His Attorney William R. Baird

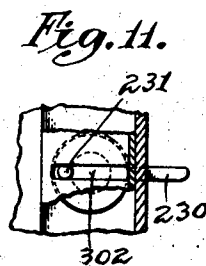
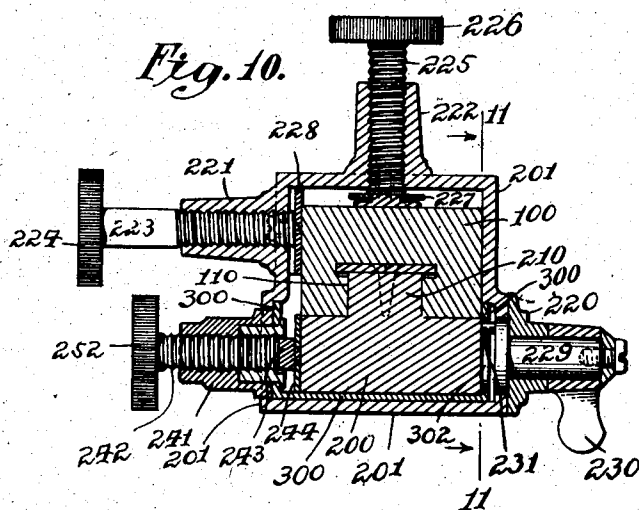
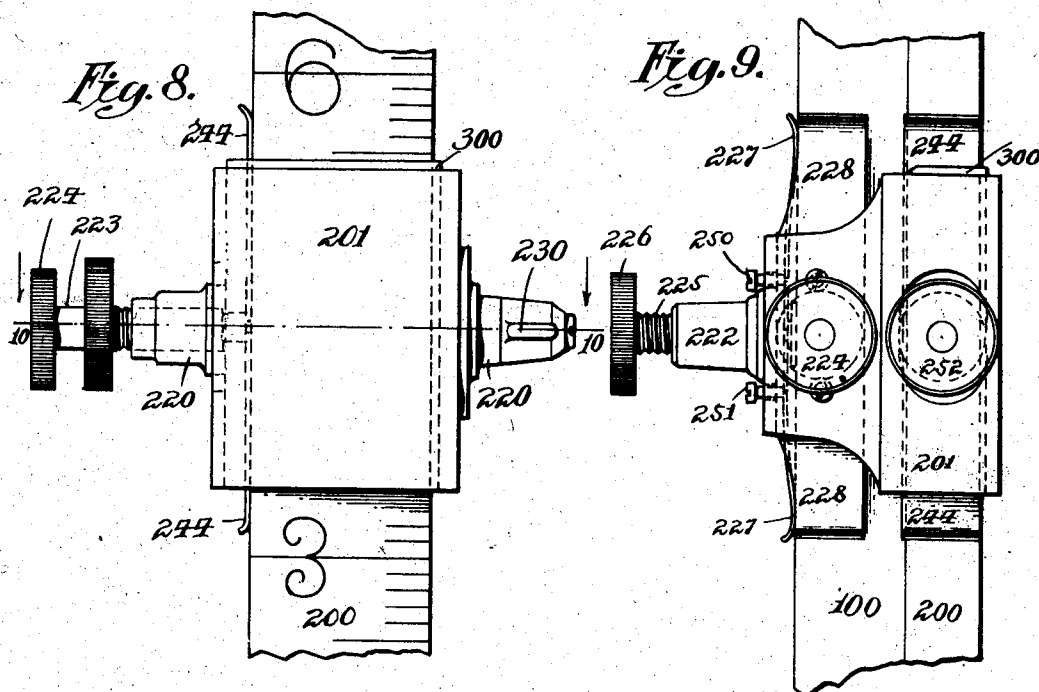
No. 833,880.

PATENTED OCT. 23, 1906.

W. L. E. KEUFFEL.
LEVELING ROD.

APPLICATION FILED JAN. 4, 1905.

3 SHEETS--SHEET 3.



Attest:
Alan McDonnell.
SJC

Willie L. E. Keuffel Inventor:
by William R. Baird
His Atty.

UNITED STATES PATENT OFFICE.

WILLIE L. E. KEUFFEL, OF HOBOKEN, NEW JERSEY, ASSIGNOR TO THE
KEUFFEL & ESSER COMPANY, OF HOBOKEN, NEW JERSEY, A CORPO-
RATION OF NEW JERSEY.

LEVELING-ROD.

No. 833,880.

Specification of Letters Patent.

Patented Oct. 23, 1906.

Application filed January 4, 1905. Serial No. 239,606.

To all whom it may concern:

Be it known that I, WILLIE L. E. KEUFFEL, a citizen of the United States, residing at Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Leveling-Rods, of which the following is a specification.

This invention relates to leveling-rods for surveyors or civil engineers, and the targets carried thereon, and has particular reference to the means for adjusting the several members of the rods with relation to each other and for adjusting the targets on the rods.

In this class of devices the rod usually comprises two or more members so connected as to slide longitudinally upon each other in order that the rod may be of sufficient length when in use and be capable of being reduced in extent to a size handy for transportation or storage, and a target is usually provided slidable upon one of the members of the rod, there being also provided suitable clamping means for securing the several members of the rod and the target in their usual adjustments. In adjusting these parts the operation is usually performed by manually actuating the parts, and it has been found that the nicety of adjustment required is very difficult to obtain by such manner of adjustment. Moreover, the rodman has to watch the transit-man at the same time as he is making the adjustment and is liable to err because his attention is distracted at an improper time. It is therefore desirable that auxiliary means be provided, to be brought into operation after the manual adjustment, for completing the adjustment with great accuracy without further manual manipulation of the parts in the usual manner, and which auxiliary means may be operated without being watched by the rodman, who can adjust such means while he is looking at the transit-man.

The object of this invention is to provide improved means for performing this secondary or auxiliary adjustment; and with this object in view the invention consists in the improved construction, arrangement, and combination of parts hereinafter fully described and afterward specifically claimed.

In the accompanying drawings, Figure 1 is a front elevation of a leveling-rod and target with parts broken out to shorten the figure.

Fig. 2 is a rear elevation of the upper part of the rod and the target, some parts being broken away and some other parts being shown in section. Fig. 3 is a rear elevation of one of the clamps and its vernier. Fig. 4 is a rear elevation of the same clamps for securing two adjacent members of the rod, some parts being broken away and some parts being shown in section. Fig. 5 is a transverse section on the line 5 5 in Fig. 1. Fig. 6 is a transverse section on the plane of the broken line 6 6 of Fig. 1, and Fig. 7 is a transverse section on the plane of the broken line 7 7 of Fig. 1. Fig. 8 is a front view of a modified form of rod, showing two adjacent members and the means of adjusting them with respect to each other. Fig. 9 is a side view of the same parts. Fig. 10 is a transverse section on the plane of the line 10 10 in Fig. 8. Fig. 11 is a detail section on the plane of the line 11 11 in Fig. 10 and a partial side elevation looking toward the right.

The rod herein illustrated comprises members 10 and 20, Fig. 5, longitudinally adjustable with relation to each other, the member 20 of which carries a metal clamp 21, which embraces the member 10. Within the clamp 21 is a metal sleeve 30, surrounding the member 10 and slidable in the clamp. Secured to or formed with the clamp 21 on one side is a boss 22, in which is threaded a set-screw 23, having a milled head 24. This screw passes through an opening in the clamp 21 and sleeve 30 and its inner end bears against a friction spring-strip 25, resting against the member 10, whereby said member may be pressed tightly against the opposite side 31 of the sleeve and held thereto with sufficient pressure to cause the member 10 and sleeve 30 to move together when either of them is moved, the spring having a pin-and-slot connection, as at 36 37, with the clamp 21. On the opposite side of the clamp 21 from the boss 22 is a second boss 26, in which is swiveled a bar 27, having a handle 28 and a crank or wrist pin 29 in its inner end. This wrist-pin projects into a horizontal slot 32 in the side 31 of the sleeve 30. Both the clamp 21 and sleeve 30 are cut away in front, as at 33, exposing the front of the member 10, which is properly graduated, as at 34. A vernier 35 is secured on the edge of the front of the clamp 21 and is bent in-

ward so that its edge rests quite close to or upon the graduated face of the member 10.

In operation the screw 23 is loosened and the member 20 adjusted manually to approximately the height desired, (sliding it in the sleeve 30,) when the screw 23 is turned inwardly, pressing the member 10 against the side 31 of the sleeve 30. The rodman, guided by the signals of the surveyor, now rotates the bar 27 by means of the handle 28, thus causing the wrist-pin 29 to operate in the slot 32 of the side 31 of the sleeve 30 and raise or lower the sleeve and the member 10 to the exact position required, which position will be accurately indicated by the graduations 34 of the vernier 35 and the member 10.

Referring now especially to Figs. 1 and 4, 20^a indicates another member of the rod secured to the member 10 by any suitable means—such, for instance, as the screw 41, Fig. 6—or it might be that member 20^a be made adjustable with relation to the member 10 in the manner heretofore described or in any other suitable manner.

50 indicates the fourth member of the combination, being the target, provided with a suitable clamp 51, projecting rearwardly and embracing said member 20^a. Within the clamp 51 is a partial sleeve 52, also embracing the member 20^a. On one side of the clamp 51 is a boss 53, through which is threaded a set-screw 54, having a milled head 55. This screw passes through the clamp 51 and the sleeve 52 and bears at its inner end against a spring friction-strip 56, resting against the side of the member 20^a. A second spring-strip 566, secured to the sleeve 52, bears constantly against the member 20^a to prevent slipping. The lower part of the spring 56 serves a similar purpose.

The target is cut away in front at 57 to expose the graduated front face of the member 20^a and is provided with a vernier 58, bent inward to bring its edge close to said graduated front face. In a boss 59 projecting from the face of the target is swiveled a bar 60, carrying a handle 61 on its outer end and a wrist-pin 62 on its inner end, which projects into a transverse slot 63 in the sleeve 52.

In operation the target is manually adjusted to approximately the position desired, the clamp 51 and the sleeve 52 moving with it, when the set-screw 54 is turned in sufficiently to temporarily hold the target in such position. Guided now by the signals of the surveyor the rodman turns the bar 60 by means of the handle 61, causing the wrist-pin 62 to move in the slot 63 and to raise or lower the sleeve 52, and with it the clamp 51 and the target 50, to the exact position desired. By tightening the set-screw 54 the target is rigidly held in its adjusted position, which position is accurately indicated on the

vernier and the graduated front face of the member 10.

From the foregoing it will be seen that either the various members of the rod or the target may be quickly adjusted to a very close approximation to the accurate adjustment required in surveying and that by means of the described auxiliary adjusting devices the further adjustment of extreme accuracy is made easily and rapidly.

The member 10 near the bottom of the rod carries a metal sleeve 70, Fig. 5, which embraces the member 20 loosely to serve as a guide. The front of this sleeve is cut away at 71 to permit of the graduations upon the member 20 being easily read.

In Figs. 8 to 11 there is illustrated a modified form of the invention, showing two adjacent members 100 and 200, longitudinally adjustable with relation to each other, the member 200 being provided with a tongue 210 and the member 100 with a corresponding groove 110 to secure proper alinement. A metal clamp 201 embraces both of these members. Within the clamp 201 is a metal sleeve 300, which embraces only the member 200. Secured to or formed integral with the clamp 201 are three bosses 220, 221, and 222. In the boss 221 is threaded a set-screw 223, having a head 224. In the boss 222 is similarly threaded a set-screw 225, having a head 226. This screw passes through an opening in the clamp 201, and its inner end is provided with an annular groove which is encircled by a friction spring-strip 227, which in turn rests against the member 100, whereby said member may be tightly pressed against the opposite side of the member 200 and held thereto with sufficient force to cause the two members to move together. The set-screw 223 passes through an aperture in the clamp 201, and its inner end presses against a spring-strip 228, causing the member 100 to press against the clamp 201 to move them together. The boss 220 has swiveled in it a bar 229, having a handle 230 and a crank or wrist pin 231 at its inner end which projects into a horizontal slot 302 in the side of the sleeve 300. The clamp 201 is apertured to permit of the passage of a boss 241, which is secured to or made integral with the sleeve 300. A set-screw 242, having a head 252, passes through a suitably-threaded aperture in this boss, and its inner end rests upon a flange 243 of a spring-strip 244, which rests against the member 200, so that when this set-screw is pressed inwardly it causes the member 200 and the sleeve 300 to move together. Set-screws 250 and 251 pass through the clamp 201 and into the spring-strip 227 to regulate the tension upon the latter.

In operation the clamp 201 is placed over the members 100 and 200. If all of the set-screws 225, 223, and 242 are loosened, it may be moved to any desired position with re-

spect to both members. If the screw 242 be set, the clamp 201 is fixed with respect to the member 200, but the member 100 is free to move. When the set-screw 225 or 223 is set, however, the members are no longer free to move, except that a rotation of the handle 230 moves the wrist-pin 231 in the slot 302, and so moves the member 200 with respect to the member 100.

10 What I claim is—

1. In a leveling-rod, the combination with one member and a sleeve carried thereby having a transverse slot in one of its sides, of another member, a rotatable bar carried thereby, and a wrist-pin on said bar engaging in the transverse slot of the sleeve.

2. In a leveling-rod, the combination with a member and a clamp secured thereto, of a sleeve within the clamp having a transverse slot in one of its sides, a member in said sleeve, and a rotatable wrist-pin carried by the clamp and engaging in the transverse slot of the sleeve.

3. In a leveling-rod, the combination with a member and a clamp secured thereto, of a sleeve within the clamp having a transverse slot in one of its sides, a member in said sleeve, a boss on the clamp, a bar swiveled in

the boss and a wrist-pin carried by said bar and engaging in the transverse slot of the sleeve.

4. In a leveling-rod, the combination with a member and a clamp secured thereto, of a sleeve within the clamp having a transverse slot in one of its sides, a member in said sleeve, a set-screw carried by the clamp and bearing against said last-named member, and a rotatable wrist-pin carried by the clamp and engaging in the transverse slot of the sleeve.

5. In a leveling-rod, the combination with a member and a clamp secured thereto, of a sleeve within the clamp having a transverse slot in one of its sides, a member in said sleeve, a boss on the clamp, a set-screw threaded through the boss and bearing on said last-named member, a second boss carried by the clamp, a bar swiveled therein, and a wrist-pin carried by said rod and engaging in the transverse slot of the sleeve.

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

WILLIE L. E. KEUFFEL.

Witnesses:

WILLIAM F. HAUSSTENO,
CLARENCE S. HAMMELL.