W. G. LENKER.

LEVELING ROD.

APPLICATION FILED OCT. 14, 1915.

1,224,938.

Patented May 8, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

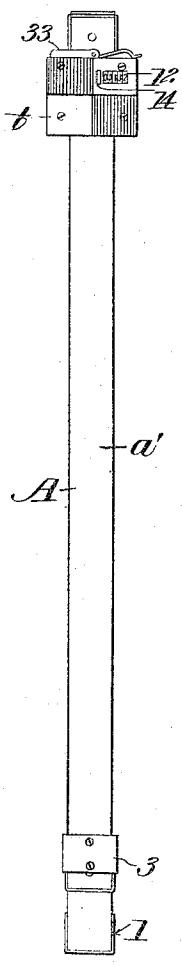


Fig. 2.

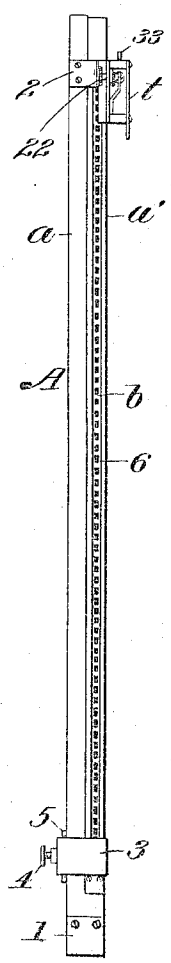


Fig. 3.

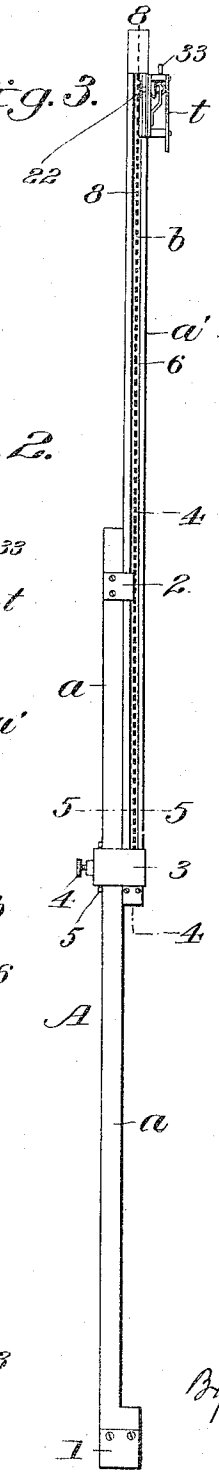
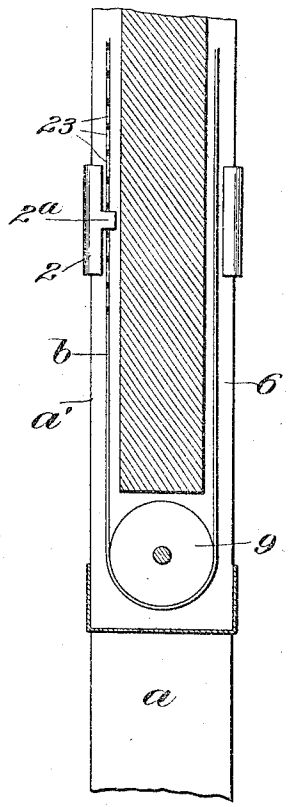


Fig. 4.



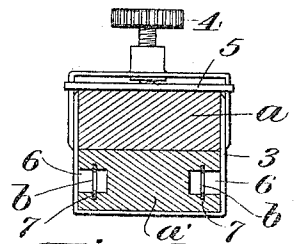


Fig. 5.

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2 SHEETS—SHEET 2.

Fig. 6.

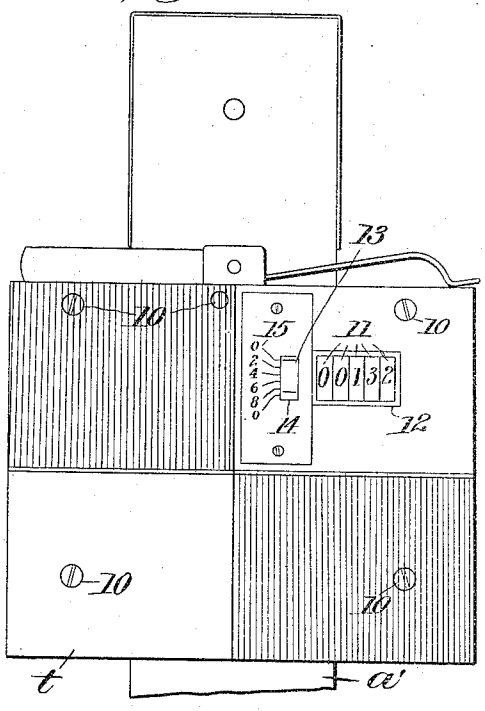


Fig. 7.

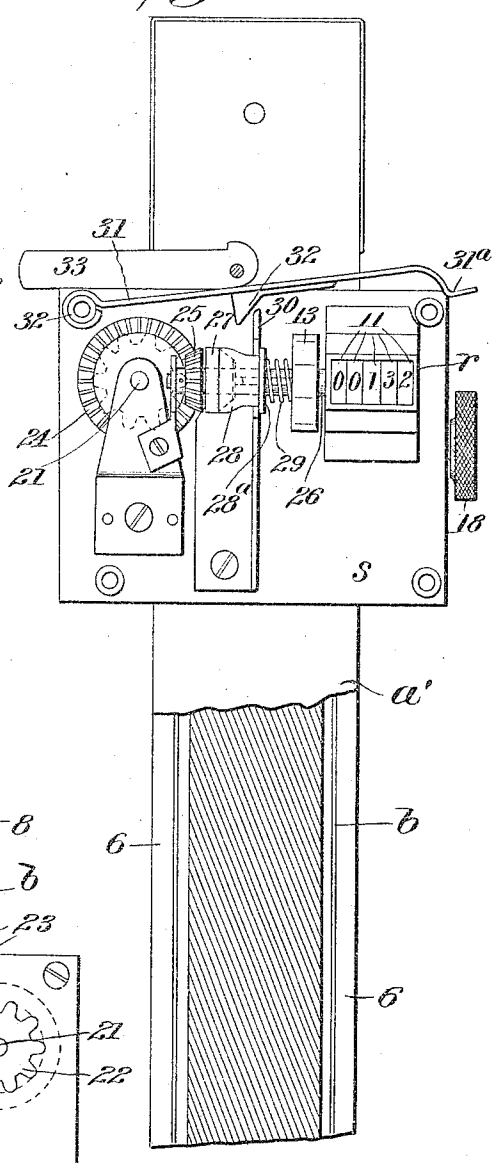
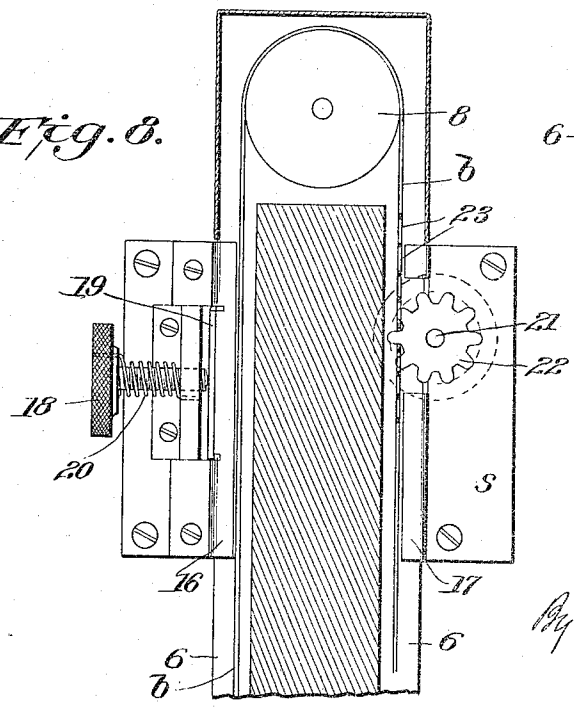


Fig. 8.



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LEVELING-ROD.

1,224,938. Specification of Letters Patent. Patented May 8, 1917.

Application filed October 14, 1915. Serial No. 55,869.

To all whom it may concern:

Be it known that I, WILL G. LENKER, a citizen of the United States, residing at Sunbury, in the county of Northumberland and State of Pennsylvania, have invented certain new and useful Improvements in Leveling-Rods, of which the following is a specification.

This invention relates to improvements in engineers' leveling rods, whereby the adjustment of a target upon the rod causes the operation of a registering device which registers the actual elevations. In my Patent No. 905,442, dated Dec. 1, 1908, I have shown a leveling rod composed of two relatively movable sections, one section having an endless scale-band, movable thereon but fixed at one point with respect to the other section, whereby relative movement of the sections causes the band to travel upon the first mentioned section and direct readings of the actual elevations may be taken from the band. In the present invention, the rod is made in two sections, but instead of using an endless scale-band, I provide, upon one section, an endless perforated tape, which serves as a sprocket chain or belt, and this belt is fixed at one point with respect to the other section. A slide, carrying a target, is adjustable upon the section carrying the belt, and connected to this slide is arranged a registering device which is operated by means of a sprocket wheel engaging the belt, so that any movement of the belt caused by relative movement of the sections, or any movement of the slide upon the section carrying the belt, will cause the operation of the registering device, which device registers in feet and fractions thereof, the movements of the slide and target with respect to the bottom of the rod. The registering device may be of any suitable design adapted to accumulate and to subtract and to register in units and tenths. The invention also includes means whereby the registering device may be disconnected from the operating means, either for the purpose of re-setting the register or of preventing the register from being operated while the leveling rod is being carried from place to place. The section of the rod carrying the belt, target, and register, may be used separately from the other section, where a long rod is not required, by simply adjusting the slide upon the rod, which causes the operation of the register; but it is particularly useful in connection with the other section, since the register also operates by the telescopic movement of the rod.

In the accompanying drawing, which illustrates my invention,

Figure 1 is a front elevation of a leveling rod, comprising two sections, embodying my improvements, the sections of the rod being telescoped or folded;

Fig. 2 is a side view of the same;

Fig. 3 is a side elevation of the rod showing the sections extended;

Fig. 4 is a section on the line 4—4 of Fig. 3;

Fig. 5 is a section on the line 5—5 of Fig. 3;

Fig. 6 is a front elevation of the target and odometer, showing also a portion of the upper section of the rod;

Fig. 7 is a view showing the support for the target and odometer, and the mechanism for operating the latter, the target being removed and a portion of the rod being shown; and,

Fig. 8 is a section on the line 8—8 of Fig. 3, showing the target and odometer support in rear view.

Referring to the drawing, A indicates the leveling rod comprising a section *a*, provided with a foot-piece 1, and a section *a'*, adapted to slide on the section *a*, in the usual manner. The two sections are held in sliding engagement with one another by a clip 2, secured to the upper end of the section *a* and extending into grooves in the sides of the section *a'*, and a strap 3, secured to the lower end of the section *a'* and extending around the section *a*. A clamping screw 4, in the strap 3, is adapted to bear upon a plate 5, upon the back of the section *a*, and by tightening this screw the sections may be clamped together in any position of adjustment.

The section *a'* has grooves 6 in its opposite edges and narrow cross grooves or slits 7 in the walls of the grooves 6. Within these narrow grooves 7 is arranged an endless perforated steel band *b*, constituting a sprocket chain or belt which extends over the rollers 8 and 9, arranged in the plane of the grooves 6 at the top and bottom of the section. The clip 2 has a tongue or extension 2^a, which projects into one of the perforations in the chain or belt, as shown in Fig. 4. It will be evident that with this arrangement, one portion of the endless belt

will be locked and held stationary with respect to the section a, and when the section a' is moved upward or downward, the belt will travel on the latter section a distance proportioned to the movement of said latter section.

The target t is carried by a slide s, to which it is secured by screws 10, and upon this support is also mounted a distance register or odometer r, the registering wheels 11 of which are visible through a suitable opening 12 in the target plate. These registering wheels, from right to left, will register, respectively, hundredths, tenths, units, tens of units, etc., of feet, while thousandths of a foot are registered upon a wheel 13, visible through an opening 14, adjacent a scale 15 upon the target plate. The slide s is adjustable upon the section a' of the rod. As shown in Fig. 8, the slide is provided with clips 16 and 17, which enter the grooves 6 to hold the slide upon the rod, and for clamping the slide in any position of adjustment, a clamping screw 18 is mounted upon the slide and engages a bearing plate or shoe 19, which rests against one side of the rod. A helical spring 20, coiled about the screw, normally holds the screw against the clamping plate with sufficient firmness to support the target wherever it may be set. By turning the screw against the action of the spring the clamp may be released, and whenever the operator releases the screw the latter is automatically forced against the clamping plate by the spring. With this clamping device there is no danger of the target falling at any time by accident when the operator releases the clamp, because the moment the operator releases the clamping screw, the latter will automatically return and clamp the slide to the rod.

Suitably mounted upon the slide is a shaft 21, carrying a sprocket wheel 22, the teeth of which engage the perforations or openings 23 in the sprocket belt. It will be evident that if the slide is moved upon the rod, while the belt is held stationary, or even if the chain is moved while the slide is held stationary, the sprocket wheel and shaft will be rotated. Upon the shaft is arranged a beveled gear 24, which meshes with a beveled pinion 25, upon an extension of the odometer shaft 26. The pinion 25 is secured to a clutch member 27, and both are rotatably mounted upon the shaft 26, but the clutch member 27 is normally engaged by a cooperating clutch member 28, keyed to said shaft, so that, normally, when the sprocket wheel 22 is rotated, the odometer shaft will be positively operated. The clutch members are held in engagement with one another by a spring 29 upon the shaft 26. The ratio of gearing between the endless sprocket belt and the odometer shaft is such that one foot of travel of the belt, or one foot of travel of the target slide along the belt will cause ten revolutions of the hundredths wheel in the odometer, one revolution of the tenths wheel, and one-tenth of a revolution of the units wheel, which latter will indicate one foot. The odometer may be of any well known form which adds and subtracts. Hence, it will be evident that with the target and odometer slide set in any given position upon the section a', if said rod is raised or lowered with respect to the section a, the odometer will be operated to register the distance which the target is raised or lowered; also, if the target slide be moved along the section on which it is mounted, the odometer will be operated to register the distance in feet and fractions of feet, unless the clutch 27—28 is disconnected. Provision is made for throwing out the clutch to disconnect the odometer when desired or necessary. As shown, a spring rod or fork 30, mounted upon the sliding support s, is adapted to engage a collar 28^a on the clutch member 28, and above the free end of this spring rod is arranged a lever 31, having a cam surface 32, adapted to engage and move the end of the spring rod when the lever is depressed and to thereby cause the clutch member 28 to be dis-engaged from the member 27. This lever 31 is pivoted at 32 and has a thumb-piece 31^a, adjacent the thumb screw 18, so that the operator may, with one hand, depress the lever to dis-engage the clutch and turn the thumb-screw so as to unclamp the slide, in order to move the latter without operating the register. When the lever is released, the clutch will be reëngaged by the action of the spring 29. In order to hold the clutch out of engagement, to prevent accidental operation of the register while the rod is being transported from place to place, a cam lever 33 is arranged above the rod and by swinging this lever to the right, in Fig. 7, the lever 31 will be locked in engagement with the spring fork 30 and the clutch will remain dis-engaged until the cam lever 33 is returned to its normal position, shown in Fig. 7.

In operation, in order to set the register to indicate a known elevation, the clutch is thrown out by pressing upon the lever 31 and the clamping screw 18 is released so that the slide carrying the register and target may be moved in one direction without operating the register, and the clutch lever is then released to engage the clutch and cause the register to be operated while the slide is moved in the opposite direction. In this manner, the register may be set to indicate any known elevation. Thereafter, if it is necessary to use only the shortened or telescoped rod, when the rod is moved from place to place, the target slide will be adjusted along the section a' as the sights are taken, and these movements of the target

relatively to the section a' will cause the registering wheels to operate to indicate higher or lower levels, as the case may be. When it is necessary to extend the rod, the section carrying the target and odometer is adjusted upwardly with respect to the other section, and since the belt is locked to said latter section, the extension of the rod causes the belt to travel on the section a' and thereby operate the register while said section is being moved upward or downward. As the register accumulates and subtracts, it will be evident that the actual elevations can be read on the register wheels. When it is desired to telescope the sections for the purpose of transporting the rod from place to place, the cam lever 33 may be thrown over to the right, in Fig. 7, and this will cause the clutch to be dis-engaged so that as the sections are telescoped the register will not be operated.

What I claim is:

1. A leveling rod comprising two relatively movable sections, an endless sprocket belt carried by one of said sections and adjustable lengthwise thereon, an odometer and a target carried by said latter section, gearing connecting said odometer with said belt, and means for holding one part of said belt stationary with respect to the other section.

2. A leveling rod comprising two relatively movable sections, an endless sprocket belt carried by one of said sections and adjustable lengthwise thereon, an odometer and a target connected together and adjustably mounted on said latter section, gearing connecting said odometer with said belt, and means for holding one part of said belt stationary with respect to the other section.

3. A leveling rod comprising a rod, an endless sprocket belt thereon, an odometer and target adjustable on the rod, gearing connecting the odometer with said belt, a clutch for disconnecting the odometer from said gearing, and means for locking said clutch in its disengaged position.

In testimony whereof I have affixed my signature.

WILL G. LENKER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."