(No Model.)

M. B. SHERMAN.

HYDROSTATIC SURVEYING INSTRUMENT.

No. 547,864. Patented Oct. 15, 1895.

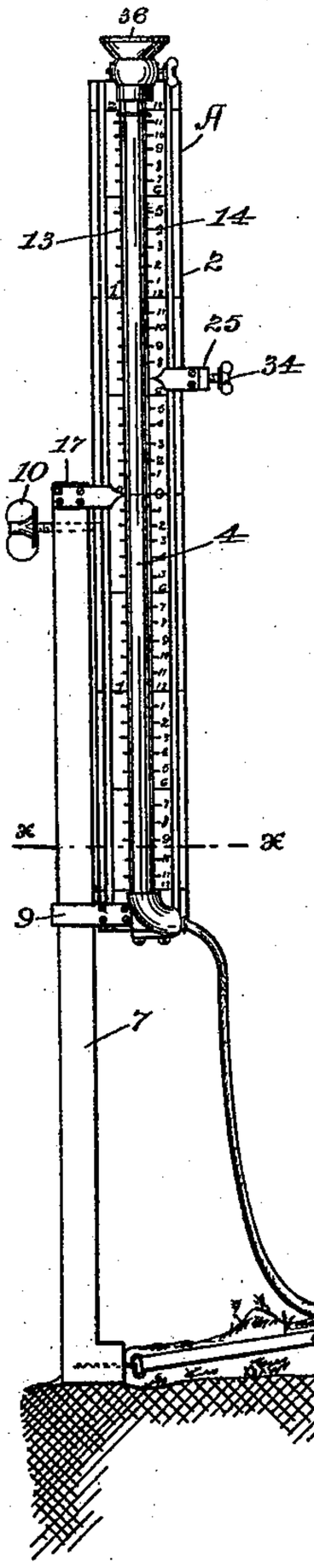
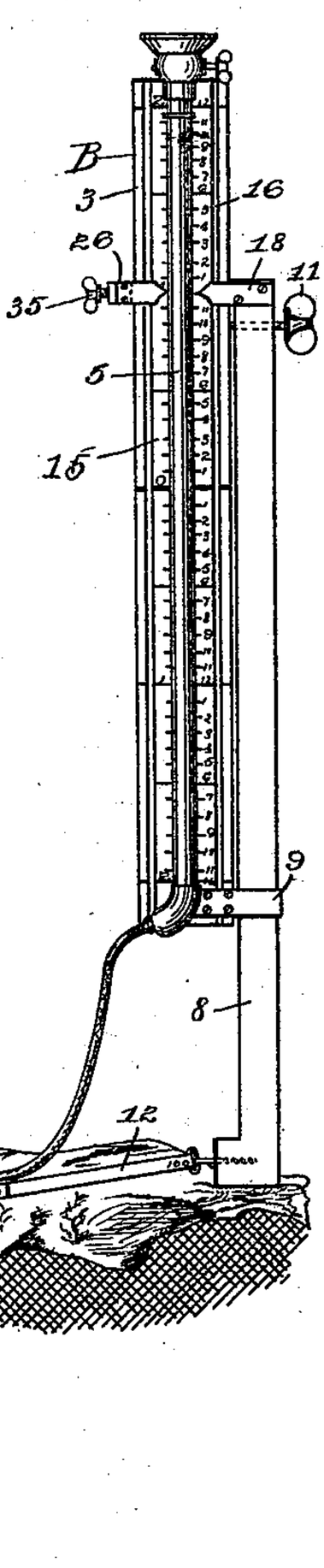


Fig. 1.



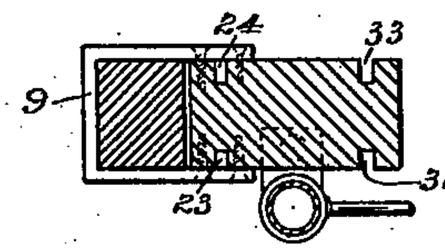


Fig. 2.

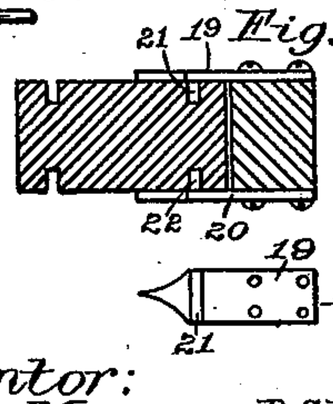


Fig. 3

Fig. 4.

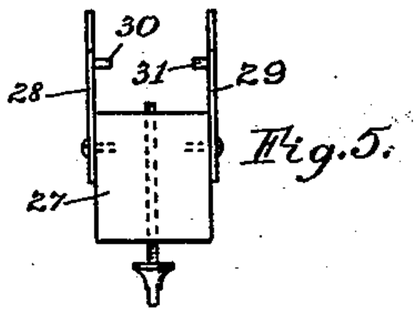


Fig. 5.

Fig. 6.

Witnesses:

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UNITED STATES PATENT OFFICE.

MARENUS B. SHERMAN, OF PAYETTE, IDAHO, ASSIGNOR OF ONE-HALF TO HAROLD GIBSON, OF ST. PAUL, MINNESOTA.

HYDROSTATIC SURVEYING-INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 547,864, dated October 15, 1895.

Application filed February 25, 1895. Serial No. 539,554. (No model.)

To all whom it may concern:

Be it known that I, MARENUS B. SHERMAN, of Payette, Canyon county, Idaho, have invented certain Improvements in Hydrostatic Surveying-Instruments, of which the following is a specification.

My invention relates to hydrostatic surveying-instruments for use in grading or laying out water-courses, by means of which the survey between any two points on a predetermined grade is indicated on a direct-reading scale and the totals of a number of surveys recorded without the use of a note-book.

To this end my invention consists in providing a pair of similar open-end glass tubes mounted on rods or other suitable carriers adjustable upon vertical standards, the tubes being connected by means of a hose and provided at their outer ends with stop-cocks for closing the same. Adjacent to each tube I arrange two scales, preferably one on each side of the tube, each scale being provided with an adjustable indicator, by means of which the reading of each survey is indicated on one and the totals of the surveys are recorded on the other.

My invention further consists in the construction and combination hereinafter particularly described and claimed.

In the accompanying drawings, forming part of this specification, Figure 1 is a front elevation of my device, shown in position for use. Fig. 2 is a cross-section of one of the rods and its supporting-standard, taken on line *x x* of Fig. 1. Fig. 3 is a cross-section of the rod B, showing the pointers secured to the supporting-standard. Fig. 4 is a detail of one of the pointers, and Figs. 5 and 6 are details of the indicators for use upon the inside scales upon the measuring-rods.

In the accompanying drawings, A and B represent a pair of similar measuring-instruments, consisting of the rods or carriers 2 and 3, secured to the face of which are the straight open-end tubes 4 and 5, connected by the hose 6. The rods are mounted upon the standards 7 and 8, sliding in the guides 9, and are held in adjusted positions by means of the set-screws 10 and 11. The standards are connected by the surveyor's chain 12, equal in length to the distance to be surveyed. The rods upon each side of the tubes are inscribed with scales 13 and 14 and 15 and 16, respectively, numbered up and down from a central point "0," the divisions upon one side indicating the rise or fall in one survey and the scale on the other side being used to register the total rise or fall of all the surveys made, as hereinafter more fully explained. The tops of the standards are provided with indicators 17 and 18, respectively, for use with the scales 13 and 16. These indicators are composed of the similar pointers 19 and 20, secured on opposite sides of the standards and provided with spurs or lugs 21 and 22, working in guides 23 and 24 in opposite sides of the rod. The scales on the opposite sides of the tubes are provided with indicators 25 and 26, each being composed of the block 27, having secured to its opposite sides the pointers 28 and 29, provided with the lugs 30 and 31, working in grooves 32 and 33 in opposite sides of the rod, the indicators being provided with the set-screws 34 and 35, respectively, to secure them in the desired position. The tops of the tubes are provided with stop-cocks 36, through which the tubes are filled and by means of which the tubes may be closed to prevent spilling of the contained water.

In preparing my apparatus for use in laying out a water-course or lines on a predetermined grade enough water is poured into the tubes through the cocks 36 to entirely fill the hose and each of the tubes part way, so that when the instruments stand at the same level the reading, as indicated by the height of the water, will be the same in both tubes. In surveying down the course the instrument B is carried forward and the instruments A B placed at the points between which it is desired to ascertain the rise or fall from grade, the indicator 17 being set as many inches below "0" as the desired fall in the grade-line between the two instruments. The rod 3 is then raised or lowered until the water in each tube rests at the same reading. The reading then shown by the indicator 18, if above "0," will be the rise from grade-line between A and B, and if below "0" the fall from grade-line between the two instruments. The amount of the rise or fall is then recorded by the indicator 26 upon its scale, the instruments being carried for-

ward until the instrument A occupies the place before occupied by the instrument B, and another survey is made as before, the amount of the rise or fall in each survey being added to or subtracted from the indication recorded by the indicator 26. When the indicator 26 has reached the top of the scale, the indication is reported back to the rod-carrier at A, who records it with his indicator 25, inches in this being preferably used for feet, the indicator 26 being moved back to "0" and used as before. It will be evident that a total rise or fall can thus be indicated of as many feet as there are feet on the scale 15 and inches on the scale 14.

It will be evident that my device can also be used as a leveling-instrument when desired, it being used in such case in substantially the same manner as above described.

I claim—

1. In an apparatus of the class described, the combination of the pair of tubes open at top and bottom, the flexible pipe connecting the bottoms of said tubes, the scale graduated from a central "0" point in combination with said tube for indicating the rise or fall from grade between two points, and the scale for indicating the total rise or fall between a number of points.

2. In a hydrostatic surveying apparatus, the combination of the standards having a flexible connection between of predetermined length, the indicators fixed upon said standards at equal heights, the rods vertically adjustable on said standards, the hose connected open end tubes carried by said rods, the scale on each rod adjacent the indicator on its standard, the indicator slidable on each rod, and the scale for such indicator.

3. In an apparatus of the class described, the combination with the connected standards, the rods vertically adjustable thereon, and the hose connected tubes carried by said rods, of the means upon said standards for measuring the deviation from a given grade between the standards, and the means also arranged in combination with said standards for registering the totals of a plurality of such readings.

4. In an apparatus of the class described, the combination of the similar standards, the flexible connection between of predetermined length, the similar vertically arranged tubes carried by the standards, and the hose connecting said tubes, means for adjusting the relative height of said tubes on said standards, means arranged in combination with said standards for marking the level on said tubes and for indicating the deviation from grade between said standards, and similar means for registering the totals of a plurality of such readings.

5. The combination with the similar standards, of the similar rods vertically adjustable thereon, the vertical glass tubes carried by said rods, the hose connection between said tubes, the pair of scales on each of said rods, the indicator fixed upon said standard adjacent to one of said scales, and the indicator slidable upon said rod adjacent said other scale.

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

MARENUS B. SHERMAN.

Witnesses:
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A. L. PENCE.