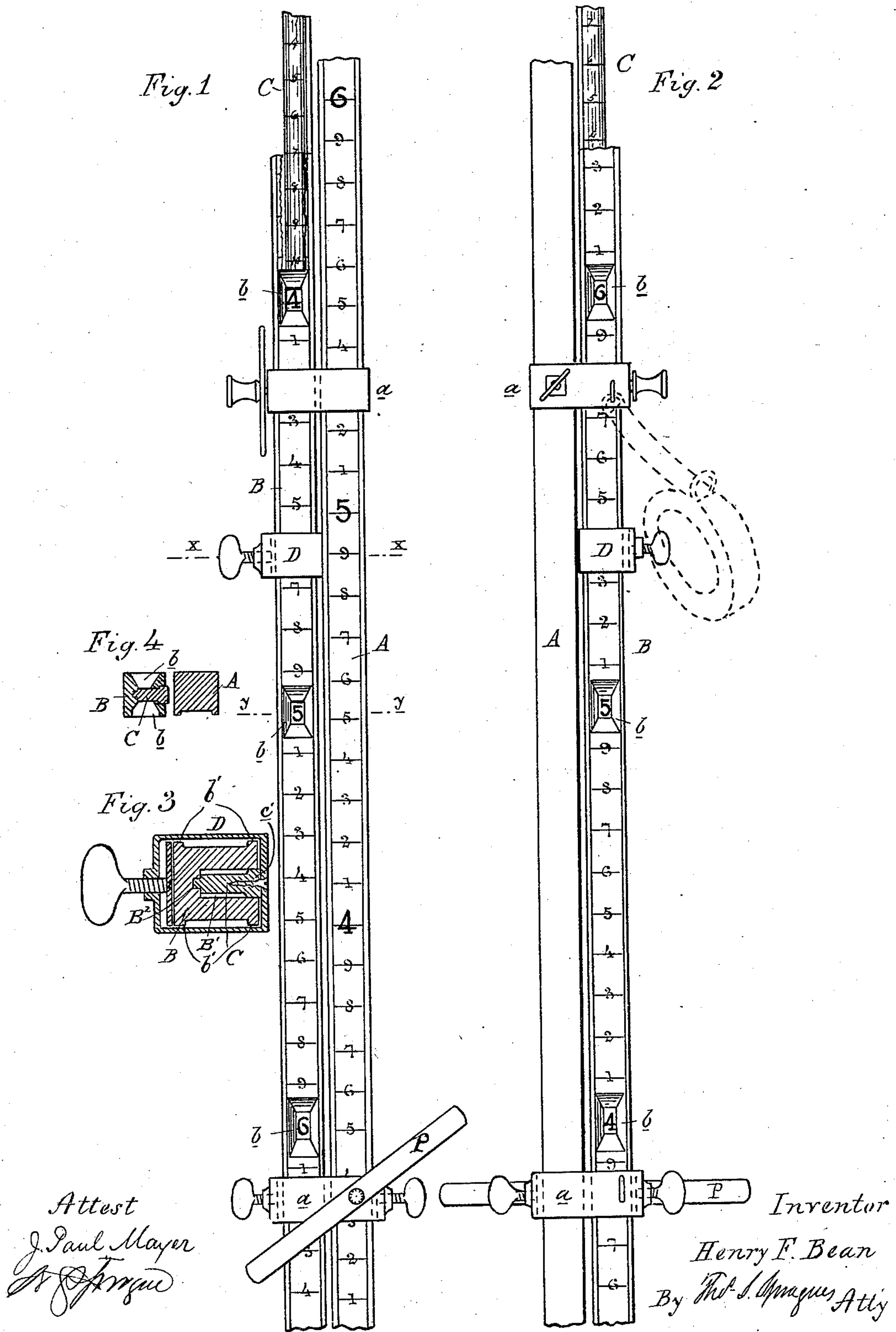


2 Sheets—Sheet 1.

No. 311,221.

Patented Jan. 27, 1885.



(No Model.)

2 Sheets—Sheet 2.

H. F. BEAN.
LEVELING ROD.

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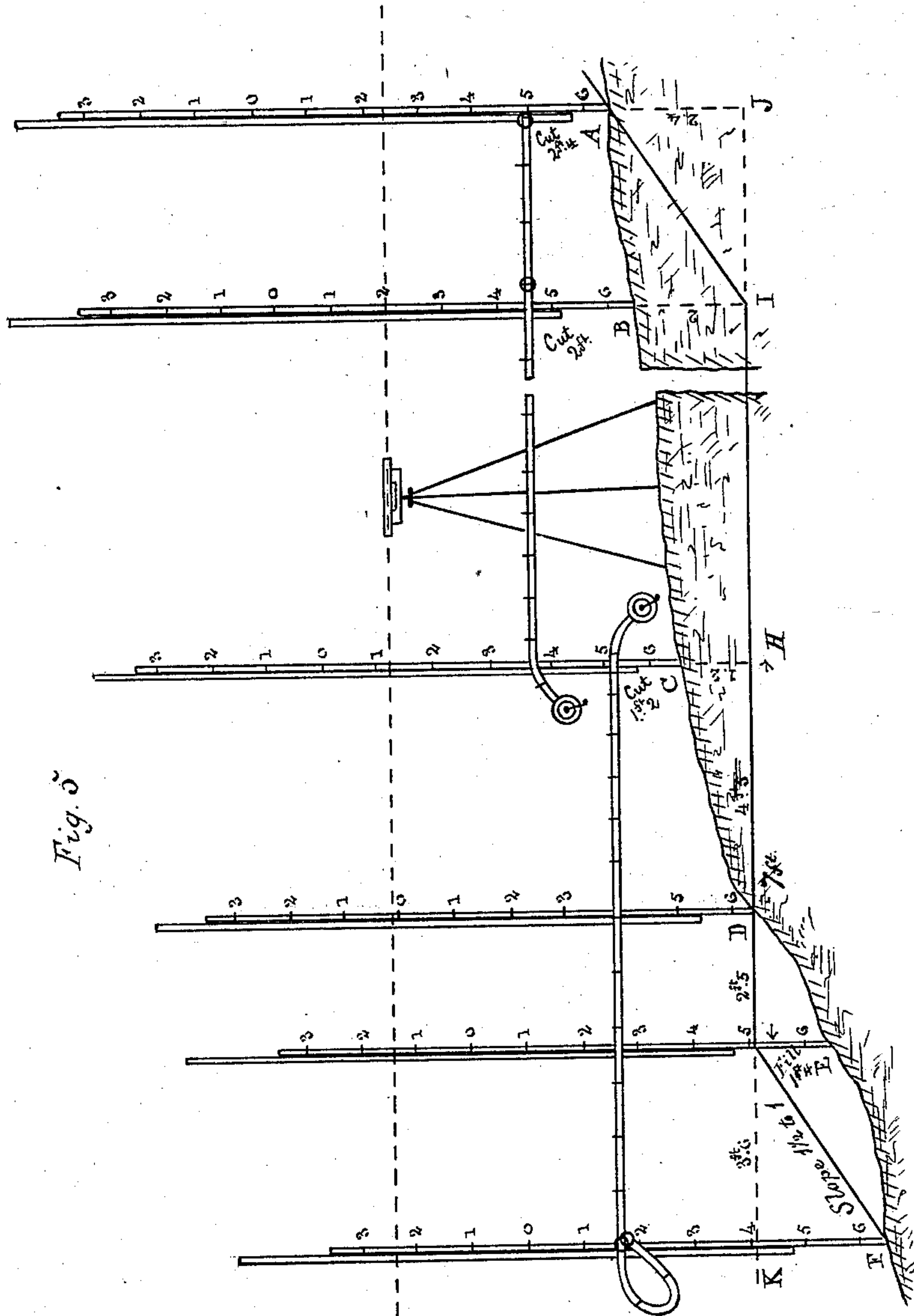


Fig. 3

Attest
J. Paul Mayer
[Signature]

Inventor
Henry F. Bean
By [Signature] Atty

UNITED STATES PATENT OFFICE.

HENRY FRANCIS BEAN, OF JACKSON, MICHIGAN.

LEVELING-ROD.

SPECIFICATION forming part of Letters Patent No. 311,221, dated January 27, 1885

Application filed July 9, 1884. (No model.)

To all whom it may concern:

Be it known that I, HENRY F. BEAN, of Jackson, in the county of Jackson and State of Michigan, have invented new and useful
5 Improvements in Leveling-Rods; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

10 This invention relates to certain new and useful improvements in the construction of leveling-rods for leveling and setting slope-stakes, and is designed as an improvement upon Letters Patent granted to me December 19,
15 1882, No. 269,254; and the invention consists in the peculiar construction, combination, and operation of the parts, all as more fully hereinafter set forth.

Figure 1 is a side elevation of my improved
20 rod. Fig. 2 is an elevation of the reverse side. Fig. 3 is a cross-section on the line xx , Fig. 1. Fig. 4 is a cross-section on the line yy , Fig. 1. Fig. 5 is a diagram cross-section of railroad earth-work.

25 In the accompanying drawings, which form a part of this specification, A represents an ordinary square leveling-rod, such as is usually employed in connection with a target.

B represents my improved rod, which is ad-
30 justably secured upon the rod A by suitable slides or clips, a . Upon one side of this rod are arranged the target-numbers, Fig. 1, dividing each foot of the rod into tenths, reading downward, these being the consecutive nine
35 numerals denoting nine-tenths, while that portion of the rod which should bear the numeral 10 is cut away, for the purpose hereinafter described. The reverse side of the rod is similarly divided into tenths, but arranged to read
40 upward. This rod B is longitudinally recessed and provided with a groove, B^2 , to receive the tongue on the sliding rod or bar C. Each foot of the two opposite sides or faces of this rod is divided into elevenths and arranged to read
45 downwardly and upwardly, corresponding to the side of the rod B, the readings being disclosed through the openings b therein. It will be noticed that the central portion of the rod C is much thinner than the recess in the rod
50 B, and it is provided on one edge with a tongue, c , which enters the groove B^2 of the recess B' , the other side being enlarged, as at c' , to fill

the space between the sides forming the recess. This arrangement prevents any abrasion of the scale on the sides of the rod C, as clearly shown
55 in Fig. 3. It will be further noticed that the clip D, which binds the rods B and C together, and serves as a means for moving the rod C, would in its movement mar and rub the scale
60 affixed to the sides of the bar B if it were not for the lateral extensions b' , which prevent all contact between the clip and the surface of the scale. The sliding rod is provided with a
65 clamp, D, by means of which it may be operated and secured at any desired point.

My improved rod is designed to take the place of the endless tape B described in the
hereinbefore-mentioned Letters Patent, and is to be used in connection with the out-tape
70 therein described. For illustration, let Fig. 5 represent a diagram cross-section of railroad earth-work. Having given the width of the roadway, in cuts, say, twenty feet and on embankments fourteen feet, ratio of side slopes
75 one and one-half to one, the depth of the center cutting at C H is known; but the depth of the cut at A B, depth of fill at E and F, grade-point at D, and the outs H J and H K remain to be ascertained. Set the level at any point
80 where the points A, B, C, D, E, and K can be seen, the rods having been previously placed in position and the instrument leveled. After
the level has been set up, set the rod A upon the center peg at the point C and raise or lower
85 the rod B until one of the apertures of the rod B shall be in the center of the line of sight of the instrument. Then slide the rod C until the unit-figure of the feet of the center cut is disclosed
90 through such aperture, and for the tenths, if any, raise or lower the rod B until the line of sight shall cut the figure representing the
tenths required. To find the depth of cut at
95 A J the tapeman will hold the out-tape over the center peg, C, as described at length in the patent hereinbefore referred to, the rodman at the same time holding the rod at or near
the point A. If the readings upon the rod and the out-tape are alike, the point A is found,
the engineer reading at once upon the down
100 side of the rod B the amount of cut to be made at that point. If, however, it be desired to find the fill at F, the same operation should be carried out, except that the up side of the rod B should be read, the base zero coming below

the line of sight of the instrument. The reading above such base zero on the rod B would indicate the amount of fill to be made at that point.

- 5 Pivotaly secured to the side clips are the bars P, which may be employed to assist the stakeman in setting his side stakes at right angles to the line of the road-bed.

What I claim as my invention is—

- 10 1. The rod B, longitudinally recessed and having lateral apertures at fixed intervals running at right angles to the recess, in combination with a rod, C, sliding wholly within said recess and having its sides exposed through
15 the aforesaid apertures, as and for the purposes set forth.

2. The rod B, longitudinally recessed and laterally apertured, in combination with the rod C, sliding wholly within the said recess,
20 and the clip D, performing the double function of binding the two rods together and adjusting the rod C within the rod B, substantially as and for the purposes described.

3. In combination, the rod B, provided with the lateral extensions b' , sliding rod C, and the clip D, all combined, arranged, and operating
25 as and for the purposes set forth.

4. The rod B, longitudinally recessed, in combination with the rod C, sliding wholly within the said recess and having its central
30 portion of less width than said recess, substantially as and for the purpose specified.

5. The combination, with the rods A and B, adjustably connected together, of the bars P,
35 pivotally connected with one of said rods and vertically adjustable thereon, substantially as and for the purpose set forth.

6. The rod A, in combination with the rod B, clips a , and the bars P, pivotally attached to said clips, the parts being combined and ar-
40 ranged substantially as and for the purposes specified.

HENRY FRANCIS BEAN.

Witnesses:

H. S. SPRAGUE,

E. SCULLY.