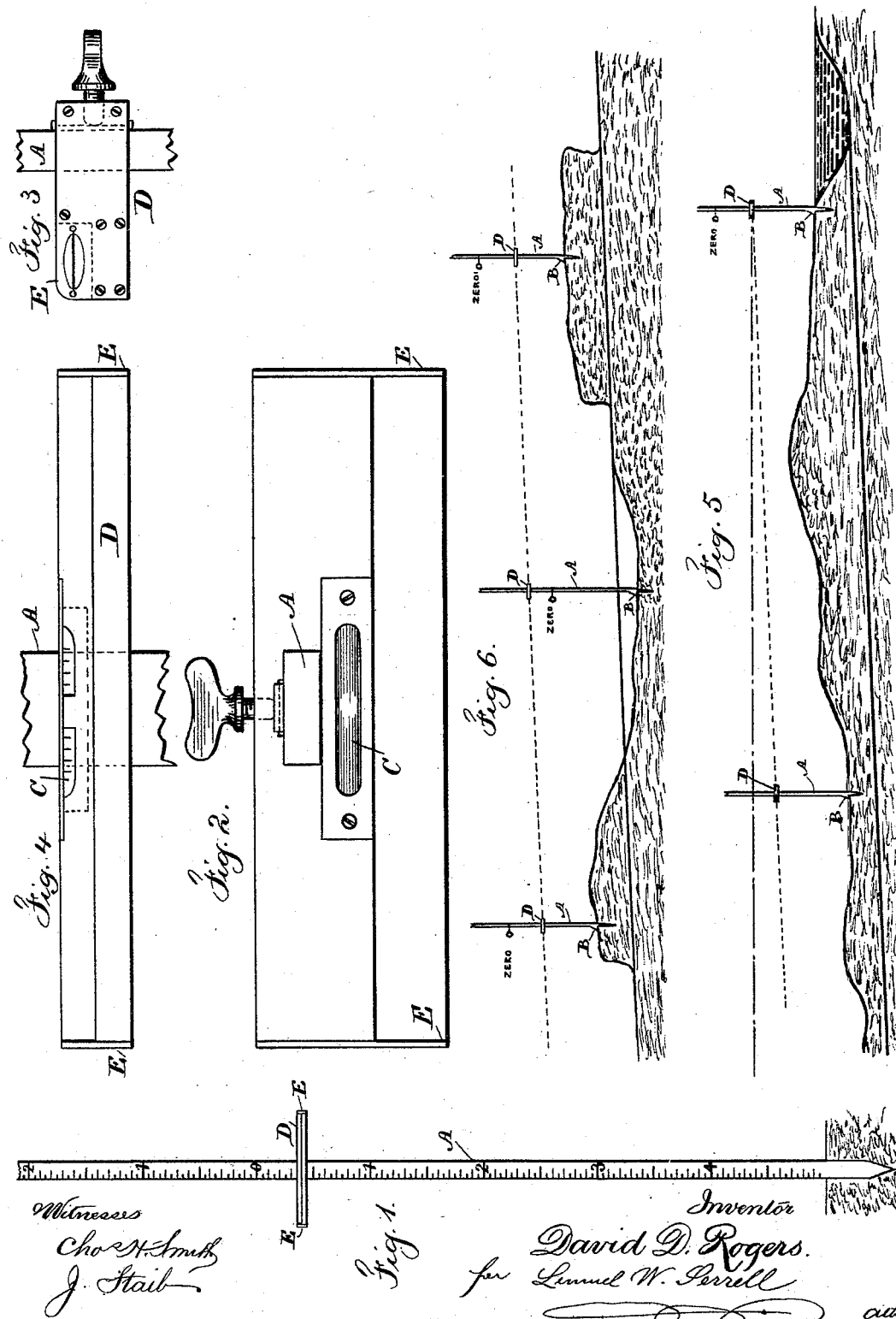


(No Model.)

D. D. ROGERS.
GRADING AND LEVELING INSTRUMENT.

No. 419,711.

Patented Jan. 21, 1890.



UNITED STATES PATENT OFFICE.

DAVID D. ROGERS, OF DAYTONA, FLORIDA.

GRADING AND LEVELING INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 419,711, dated January 21, 1890.

Application filed July 11, 1889. Serial No. 317,204. (No model.)

To all whom it may concern:

Be it known that I, DAVID D. ROGERS, of Daytona, Volusia county, in the State of Florida, have invented an Improvement in Grading and Leveling Instruments, of which the following is a specification.

In surveying and leveling for ditches, drains, railway-tracks, grading of streets, laying sewers, &c., it is usual to drive in stakes at intervals of one hundred feet and to mark upon the same the amount of "cut" or "fill" to bring the ditch, drain, track, street, &c., to a proper grade; but the laborers in working between these grade-stakes are liable to fill in too much or cut out too much, thereby increasing the cost of the work.

The object of this invention is to assume a grade by a line of targets, so that the laborer can catch his grade (in an instant) anywhere desired, and for the purposes hereinafter described.

First. In the grading of streets, railroads, laying sewers, drain-pipe, culverts, digging ditches, extending the grade of a tunnel, bedding cross-ties, &c., I assume a grade above the established grade at any convenient height, (say five feet.) The base of the rod being set at the surface at the grade-stake, (or, in tunneling, at the grade,) the target is raised or lowered on the rod and clamped, so that the targets on the rods (usually three rods and targets are used) would be in range and in line with each other, and the established grade will be parallel with the line of targets and five feet below them. The laborers can easily sight these targets, they being a convenient height to catch the eye, and by a rod, shovel-handle, or stick they can ascertain readily and with a reasonable degree of accuracy whether the grading, ditching, &c., is being properly done by measuring down to the grade.

Second. In laying the mud-sills and foundations to bridges, culverts, &c., it may be more convenient to work below the established grade.

Third. The leveling attachment hereinafter described may be used as a target on the rods or may be used as a leveling-instrument.

In the drawings, Figure 1 is an elevation of my improved rod and leveling-target. Fig.

2 is a plan view of the target; and Fig. 3 is an end view, and Fig. 4 an elevation, of the same. Figs. 5 and 6 illustrate the manner in which these targets can be made use of.

For convenience I provide three rods. Usually two of them have plain targets and one a leveling-target; but all may be used with plain targets. The rod is made any suitable height—say seven or eight feet, more or less, (and, if not wanted with an extension for fills, they may be made five (5) feet long from the base)—and, instead of being divided into feet, tenths, or inches, beginning at the bottom and measuring up to the top, the rod A is provided with a zero or 0 point about five feet from the bottom of the rod where the numbering begins, and in case of a continuous rod the numbers run upward and downward from zero, (0;) but in case an extension-rod is wanted the extension portion is numbered downward from a point near the top, so that the height of the target above the zero-point is thereby denoted, the target being clamped on said extension and the extension and target being raised or lowered together. The lower end of the main rod has a point projecting below the offset B sufficient for being driven into the ground, or it may have a base at the offset sufficient for standing firmly on the ground, and the rod is represented as divided up into feet and tenths; but the division may be in feet and inches or in meters or centimeters, &c. Upon this rod A is a cross-bar target D, provided with any suitable clamp—such as a screw, spring, or wedge—by which the target can be held at any point to which it may be raised or lowered, and in the middle portion of the target is a spirit-level C, formed of a horizontal glass tube containing alcohol, as usual, the bubble indicating whether the target is level or not, and at the end of this target D there are sight-plates E, slotted horizontally and having peep-holes, as usual with leveling and surveying instruments. This target, as well as the rods above referred to, may be made of metal or wood in whole or in part.

I find it convenient to make zero (0) or the starting-point of the division at five feet from the offset B on the rod, as that is a convenient

height for laborers in sighting the target; but I do not limit myself in this particular.

It is to be understood that the survey of a proposed ditch, drain, sewer, street, road, track, or improvement is to be made by an engineer in the usual manner and the stakes marked with the amount of the "cutting" and "filling." Two or more rods such as above described are provided with targets. If the stake is marked, for example, "Fill 2 ft.," the rod A is set up at the station-stake, bringing the base or offset B of the rod to the surface of the ground, or when the level-height has been taken the target D is raised two feet above zero, (marked "0,") and clamped, and if the next stake, or the second or third station, if more convenient, is marked "1½ feet cut," the rod A is set up, as above described, and the target D brought down to 1.5 below zero, (marked "0,") and so on, these rods usually being used so that laborers working in between them will have a line of targets to sight their grade by on the one side or the other, and when these rods are in position the targets will be all in range one with the other and occupy a place that is parallel to the grade-line and five feet above the same; hence in grading, digging ditches, laying drains, &c., it is only necessary to use a rod, stick, or shovel-handle of five feet in length and the grade is immediately determined, and as often as desired, by sighting over the line of targets, and when the work is done it will be practically accurate, and any common laborer can understand what is to be done without risk of error.

The level C is useful in placing the rod perpendicular, and it also enables the attendant to bring the surface of the earth, the mud-sills, culverts, &c., to the proper grade transversely of the line of track, street, &c., by sighting through the slot-plates E, and they are also useful in giving grades on streets, ditches, &c., in which case the rod A is used as a leveling-rod. To more particularly illustrate one of its uses, I will describe a plan or method of draining a pond by the use of these rods and targets, as illustrated in Fig. 5.

Set up rod A at the margin of the pond, bring offset B to the surface of the water, ascertain the depth it is desired to lower the

water in the pond, bring down target D below zero (0) as much as the water is to be lowered in the pond, set target D in the direction that the ditch is to be dug, and send an assistant with another rod with a plain target on it—say three hundred feet—down the line of the proposed ditch. Let the second rod be set up and get a level-height from the first target to the second rod, after which the target on the second rod is to be lowered—say one-tenth of a foot for each one hundred feet—so as to obtain a line of targets five feet above and parallel with the inclined bottom of the proposed ditch. A third rod beyond and in line with the second rod is to be set with the target on same in line of the two just set, and so produce the grade as far as desired.

The manner of using this rod and target under the circumstances arising in engineering-work will be apparent to those conversant with the subject.

I claim as my invention—

1. The cross-bar target D, having a level and slotted sight-plate and a clamping mechanism, in combination with a rod upon which it is fitted to slide and from which it projects horizontally to be used as a sight in grading, substantially as set forth.

2. The combination, with a rod having a zero-point and divisions numbered upwardly and downwardly therefrom, of a target formed as a horizontal cross-bar adjustable upon the rod and adapted to use as a target in grading, substantially as specified.

3. A rod having a zero-point at or near the middle portion thereof and divisions numbered upwardly and downwardly from such zero-point, in combination with the target adapted to slide upon such rod and to be clamped thereto, such target having a spirit-level and the slotted sight-plates at the end thereof, substantially as set forth.

Signed by me this 1st day of July, A. D. 1889.

DAVID D. ROGERS.

Witnesses:

GEO. H. CLARK,
G. R. PRICKETT,
F. W. BUSH.