

J. THORNLEY.
Grading-Levels.

No. 143,942.

Patented Oct. 21, 1873.

Fig. 1.

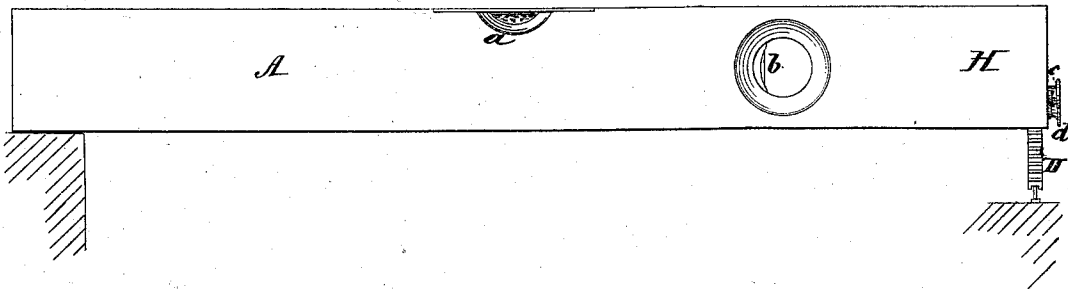


Fig. 2.

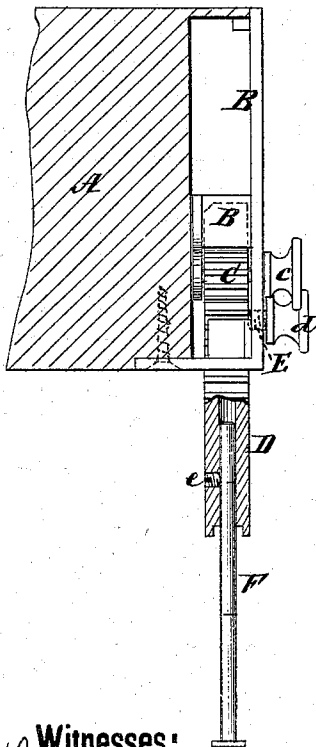


Fig. 3.

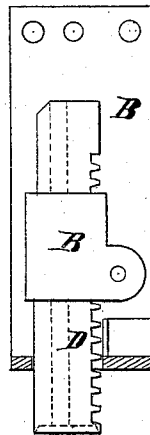
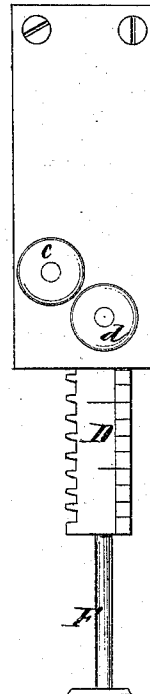


Fig. 4.



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UNITED STATES PATENT OFFICE.

JOHN THORNLEY, OF CHARLOTTESVILLE, VIRGINIA.

IMPROVEMENT IN GRADING-LEVELS.

Specification forming part of Letters Patent No. **143,942**, dated October 21, 1873; application filed July 21, 1873.

To all whom it may concern:

Be it known that I, Dr. JOHN THORNLEY, of Charlottesville, in the county of Albemarle and State of Virginia, have invented a new and Improved Inclinator or Grading-Level; and I do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawing, forming part of this specification, in which—

Figure 1 is a side elevation of the instrument as applied in practice. Fig. 2 is a vertical section of the adjusting devices applied to the level. Figs. 3 and 4 are elevations of the inner and outer faces or sides of the adjusting attachment.

The invention is an improvement in the class of grading instruments formed by providing an ordinary spirit-level with an adjustable or extensible graduated bar.

My improvement consists in a hollow rack-bar and an extension-bar arranged to slide into and out of the same, both operated by a pinion, or equivalent means, and adapted to be secured in any desired adjustment by means of a clamp-screw, all as heretofore described.

In the drawing, the bar A is shown provided with the ordinary bubble-tubes *a b*, forming thus a level of the kind in common use. One end of the level is recessed to receive a box or tube, B, containing a pinion, C, and rack-bar D, whose teeth mesh into each other, so that, by turning the exterior milled head *e*, the bar bar can be caused to project from the tube. A clamp-screw, *d*, also provided with a milled head, is suitably arranged to secure the bar in any desired position. The bar is graduated in inches and fractions of an inch, one inch on the same indicating a grade of one-half inch to the lineal foot. The bar is made hollow or tubular to receive an extension, F, which is similarly graduated and of the same length. By means of the screw *d*, said bar may be clamped or secured in like manner as the bar

D, and independently thereof; but in practical operation the bar F will be extended from the bar D when and so far as the grade seems to require, and, having been secured by the screw *e*, both it and the bar D may be adjusted together. The ease, rapidity, and accuracy with which the bar or bars may be adjusted, and a grade thereby indicated, are obvious, while the peculiar arrangement of the extension-bar F enables grades to be ascertained which have twice the inclination that bar D is competent to indicate.

To use the implement, the level is applied to the surface whose inclination or angle is to be determined, the bubble-tube *a* being uppermost. The end H of the level is then elevated until the bubble indicates the horizon, whereupon the milled head *e* is turned until the rack-bar projects far enough to come in contact with the surface on which the level rests. The screw *d* is then made to clamp the bar, so that it will support the raised end of the level at the determined angle. By noting on the bar the inches or fractions of an inch which it projects below the level, the required elevation will be ascertained. Thus, if the bar project one inch below the level, the grade or inclination is one-half inch to the foot; if two inches, then the grade is one inch to the foot. Any other scale of graduation may be adopted.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

In combination with the graduated rack-bar D, operated by pinion C, or equivalent, and clamped by screw E, the extension-bar F, arranged to slide in and out of the same, all applied to a level, A, as shown and described, to operate as specified.

DR. JOHN THORNLEY.

Witnesses:

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