

J. THORNLEY.
Grading Levels.

No. 147,198.

Patented Feb. 3, 1874.

Fig. 1.

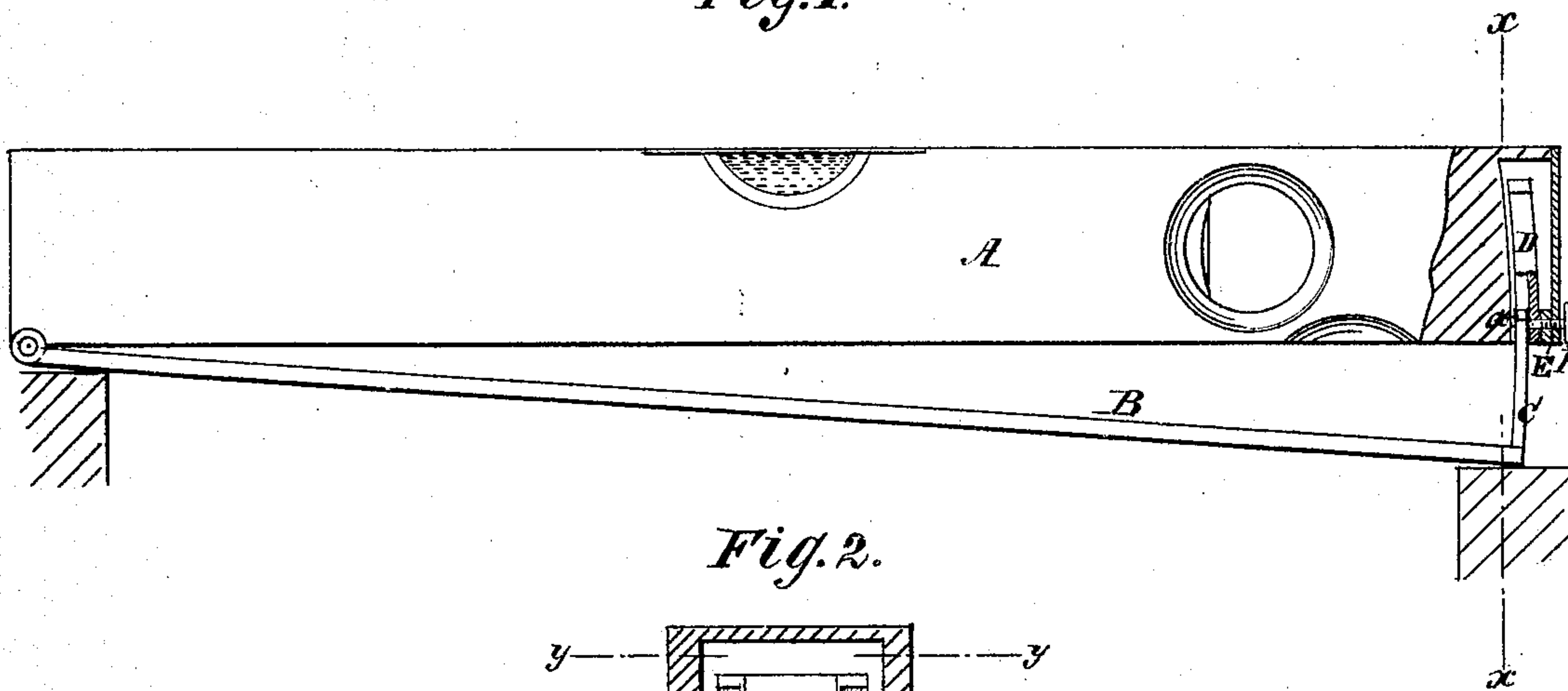


Fig. 2.

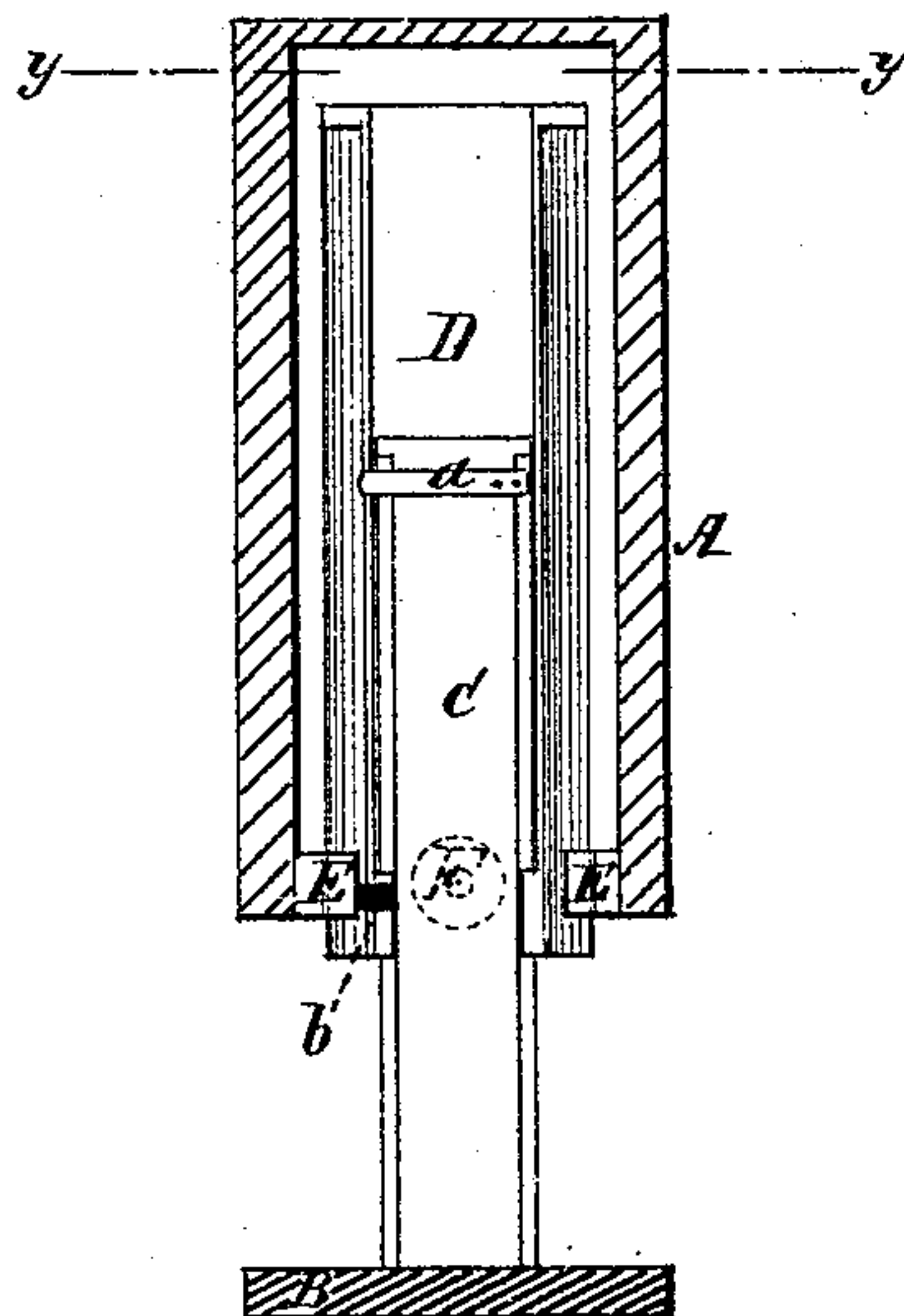
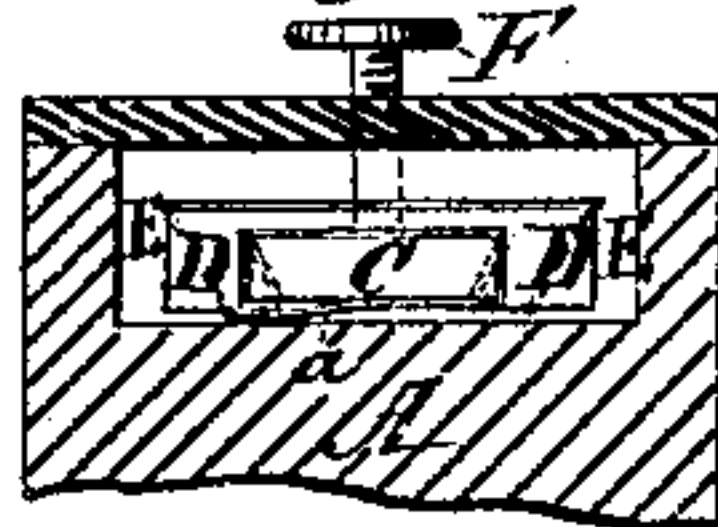


Fig. 3.



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UNITED STATES PATENT OFFICE.

JOHN THORNLEY, OF CHARLOTTESVILLE, VIRGINIA.

IMPROVEMENT IN GRADING-LEVELS.

Specification forming part of Letters Patent No. **147,198**, dated February 3, 1874; application filed December 4, 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 Grading Attachment for Levels; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawing forming a part of this specification, in which—

Figure 1 is a side elevation of the grading-instrument with part cut away. Fig. 2 is a cross-section on the line *x x* of Fig. 1. Fig. 3 is a detail sectional view on line *z z* of Fig. 1.

My present invention is an improvement upon the grading-level for which I obtained Letters Patent No. 143,942, dated October 21, 1873; and consists in so constructing and arranging the adjusting graduated bar and its sliding extension piece or pieces that a single screw secures them in the desired position, either extended or retracted, and whereby they may be locked together at their respective outer and inner ends by a spring-and-shoulder connection. The invention also consists in means for locking the two graduated bars together, when both are extended, as hereinafter described.

Referring to the drawing, the level A is provided with bubble-tubes, and otherwise constructed in the usual manner. A bar or piece, B, is hinged to the bottom and one end of the same, and preferably graduated in feet and inches, to adapt it for use as a carpenter's rule. To adjust this bar at its free end, at various distances from or angles to the level proper, I employ bars C and D, arranged to slide out of and into a metal box, E, which is constructed and secured in a recess in the end of the level, as described in the patent aforesaid. The bar D is beveled on its sides to form shoulders on its inner end, which prevent its complete withdrawal from the box E by coming in contact with corresponding shoulders or lugs at the lower end of the box. The smaller bar C is of similar form, and similarly provided with shoulders, to prevent its complete withdrawal from the bar D, which is grooved or recessed longitudinally to receive the same. The set-screw F passes through the outer plate or side of the case E, and through the bar D, so that its inner end bears against the smaller bar C, whereby the latter may be

set or held in any desired extension. The outer or lower end of the bar C rests against the free end of the hinged bottom piece B, or is preferably attached thereto, so that when the screw F is loosened to release said bar, the piece B can be set at that angle or inclination, to the level proper, which the grade may chance to require, and the screw being again turned in, it will be fixed in that position. The bar D comes actively into use only when the grade is very great, and to allow it to be then drawn out of the case or box, the set-screw F must, of course, be screwed back out of the hole in its side. To secure it in any adjustment, or when extended for part or the whole of its length, the screw is turned in to cause it to bear against it, in a manner obvious from the drawing, since, when the grooved bar is thus extended, the screw F can no longer act directly upon the bar C. I lock the two bars together, when extended, by means of a narrow plate-spring, *a*, which is attached to the bar C at its upper end, and engages with a notch, *b*, formed in the side of the hollow bar D near its lower end. Both bars C and D are curved correspondingly to the arc of a circle, of which the bar B is the radius, and are also graduated with reference to the length of the level. Thus, if the distance between the raised end of the level A and free end of the hinged piece B be one inch, (as indicated on the bar C,) the grade is one-half inch to the foot, the level being two feet long; but, of course, any other scale of graduation might be adopted.

It will also be perceived that the number of sections of the graduated bar may be increased to form the quadrant complete.

What I claim as new and of my invention is—

1. The combination of the screw F with the bar D, having a screw-hole at its lower end, and the bar C, arranged to slide in the groove thereof, as shown and described.

2. The combination, with the hinged bottom bar B and level A, of the bar C, provided with spring *a*, and hollow bar D, having notch *b*, as and for the purpose specified.

JOHN THORNLEY.

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