

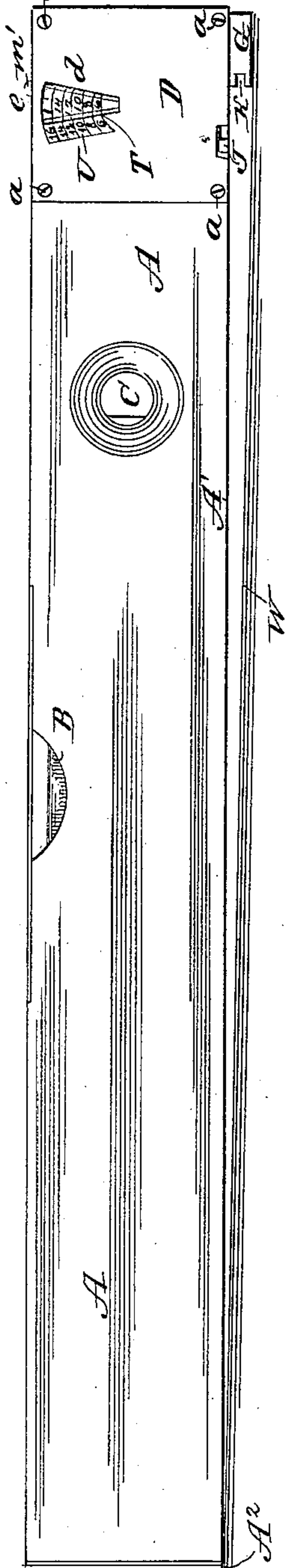
(Model.)

W. GRAMS.
SPIRIT LEVEL.

No. 310,048.

Patented Dec. 30, 1884.

Fig. 1.



WITNESSES:

Hotz & Co.
C. Sedgwick

Fig. 2.

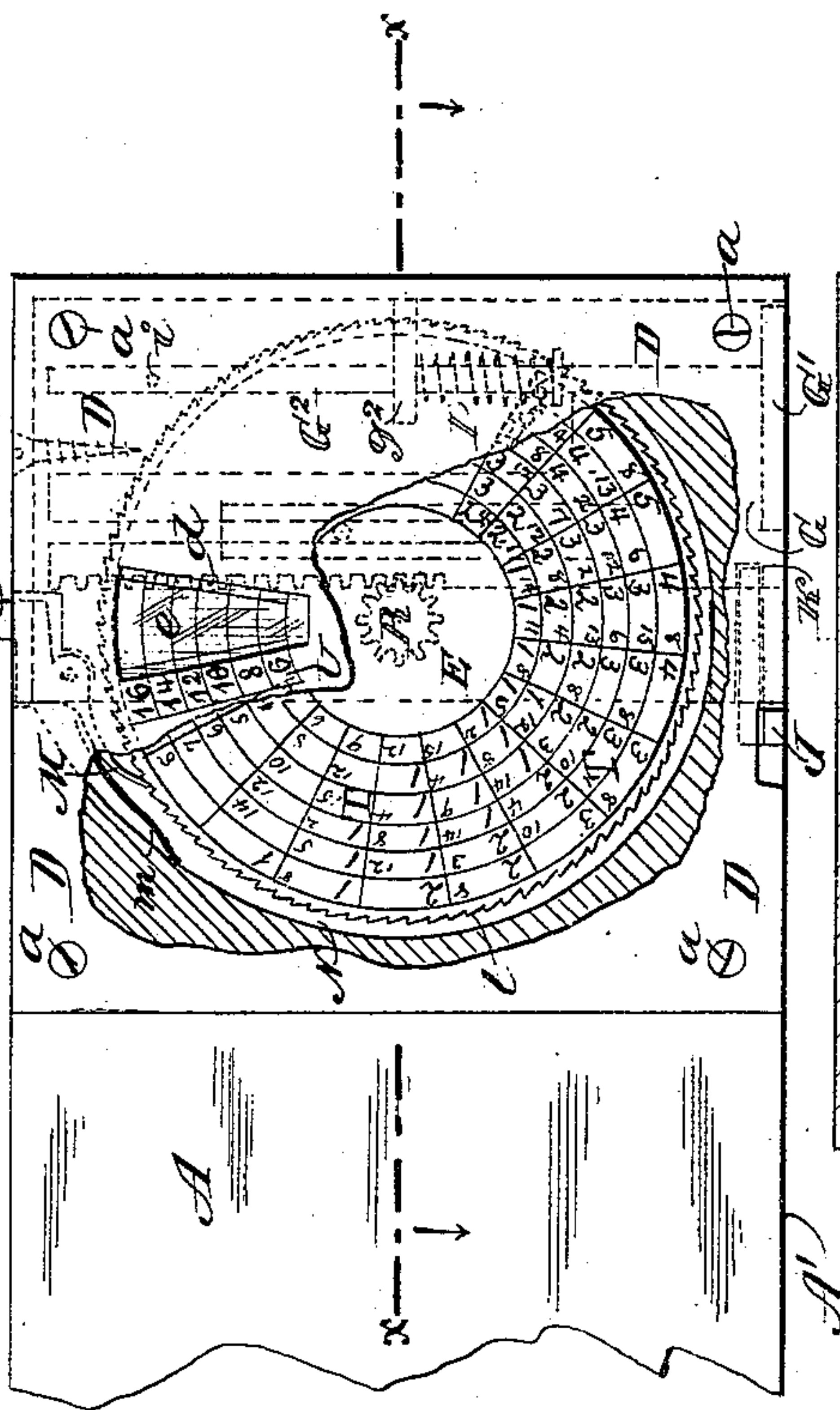


Fig. 3.

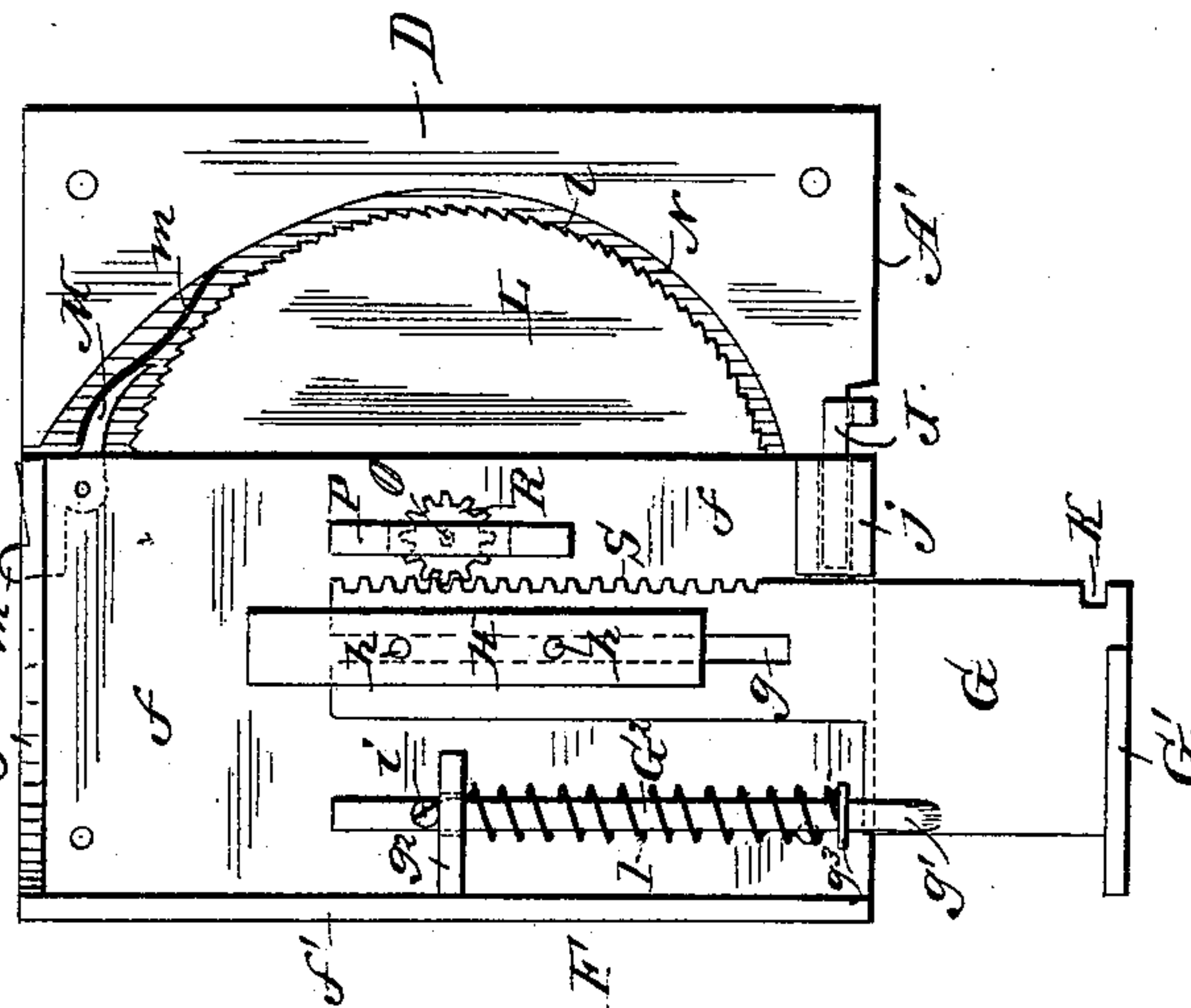
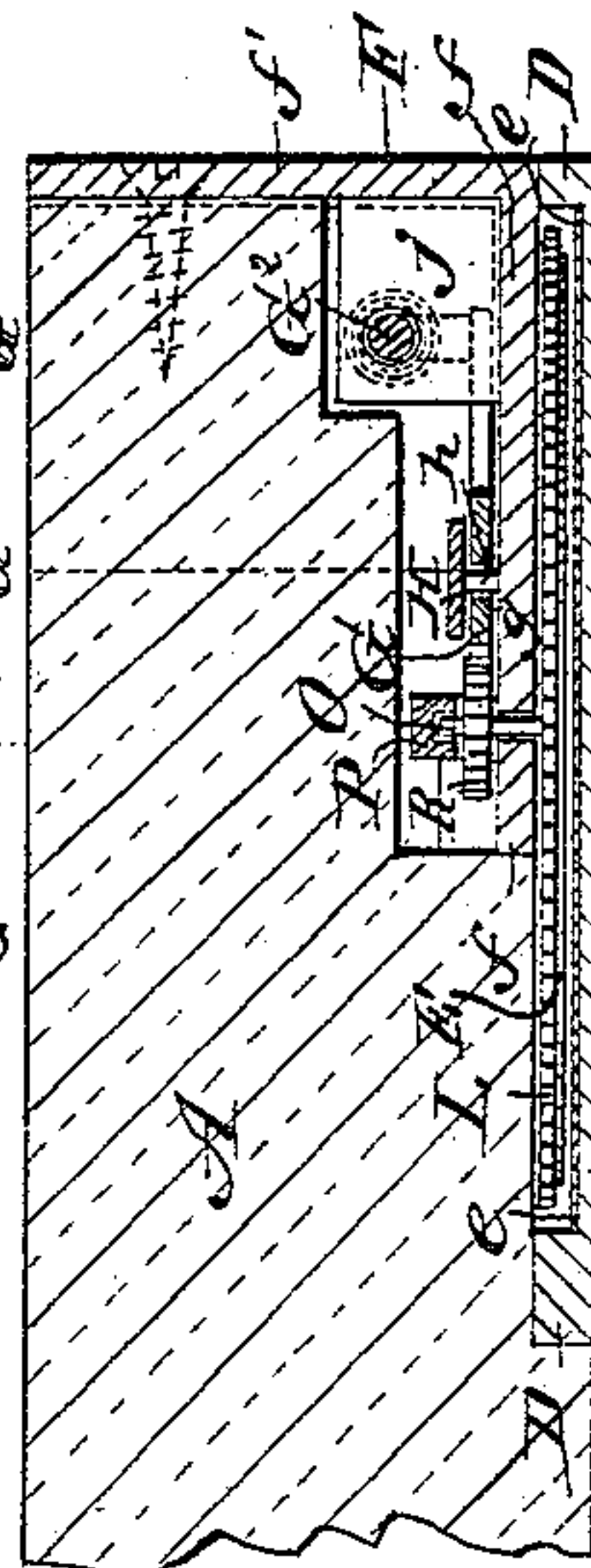


Fig. 4.



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WILLIAM GRAMS, OF STURGIS, DAKOTA TERRITORY.

SPIRIT-LEVEL.

SPECIFICATION forming part of Letters Patent No. 310,048, dated December 30, 1884.

Application filed June 6, 1884. (Model.)

To all whom it may concern:

Be it known that I, WILLIAM GRAMS, of Sturgis, in the county of Lawrence, Dakota Territory, have invented a new and Improved Spirit-Level, of which the following is a full, clear, and exact description.

The object of my invention is to provide a spirit-level which will indicate truly the extent to which timbers or other work of any given length stands out of level, to facilitate the leveling operation.

The invention consists in a spirit level having a slide fitted to move laterally from the edge of one end of the level, said slide being geared to rotate a dial having radial rows of numerals beneath an aperture in the face of the level, and a row of numerals being provided alongside of the face-aperture, which, in connection with the numerals on the dial, will show the extent to which work of a given length stands out of level.

The invention consists, also, in various details of construction and combinations of parts of the level, including the dial-operating mechanism, and the construction of the dial with reference to its graduations and those on the face of the level, all as hereinafter fully described and claimed.

Reference is to be had to the accompanying drawings, forming part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a side or face view of my improved spirit-level. Fig. 2 is an enlarged side view of one end of the level partly broken away. Fig. 3 is an inside view of the end plate or casing and its connected mechanism for moving the indicator-dial; and Fig. 4 is a sectional view on the line *x x*, Fig. 2.

The letter A indicates the body of the level, which is fitted with the usual horizontal leveling-tube or spirit-glass, B, and vertical or plumb spirit tube or glass C.

D is a metal plate, having an opening, *d*, through which the numerals on the indicator-dial E may be read through an isinglass or other transparent dial-covering plate, *e*, held in a recess of the plate D, which latter plate is let flush into the face of the level-body, where it is held by screws *a*, as shown.

F is an angle-plate having an inner flange-plate, *f*, which lies just behind the dial E; also an end plate, *f'*, which covers the end of the level-body A, and a brace-flange, *f''*, which is let flush into the upper edge of the level-body. Screws passed into the level-body through the end plate, *f'*, and flange *f''*, hold the angle-plate F firmly to place at the end of the level.

G is a slide-bar, which has a foot plate or piece, *G'*, which rests on the work to be leveled. The bar G may be held to the angle-plate F, to slide thereon in various ways. I show the bar slotted at *g*, to work by the slot along pins *h*, fixed in the flange *f* of the plate F, and an inner plate, H, fixed on the pins *h* and overlapping the flange, holds the bar G flatwise to the flange, so that said bar shall be guided to slide as truly as need be in and out of the side of the level. A rod, *G''*, fixed to the bar G at *g'*, passes loosely through a bearing lip or stud, *g''*, fixed to the angle-plate F, and serves not only as an additional guide to the sliding bar G, but as a support to a spring, I, which is placed upon the rod between the stud *g''* and a washer or shoulder, *g'''*, of the rod, and acts to force the slide-bar G outward, as in Fig. 3. A stop pin or screw, *i*, in the rod prevents disconnection of the slide-bar from the angle-plate, and a slide bolt or pin, J, fitted to move through a stud or boss, *j*, on the flange *f*, is adapted to be passed into a notch, K, in the slide-bar G, to hold the latter entirely within or flush with the edge A' of the level, so that the slide-bar shall not interfere with the use of the level in setting work plumb by the spirit-glass C and said edge A' of the level.

The indicator-dial E is fixed to or formed upon a plate, L, having circumferential ratchet-teeth *l*, to be engaged by a pawl, M, which is pivoted to the angle-plate F, or plate D, so as to be thrown against the teeth by a spring *m*, which is shown fixed to the pawl to act against the edge of the recess N, made in the plate to receive the dial. The dial is fixed rigidly to a shaft, O, which is journaled in the flange *f* of the angle-plate F, and in a bridge-piece P, fixed to the flange. The shaft O carries a pinion, R, which meshes with a series of teeth, S, formed along the edge of the slide-bar G, so

that as the slide-bar is moved in and out the dial will be turned to carry its radial rows of figures across in front of the opening d of the plate D. The dial E is subdivided by concentric and radial lines, forming by the radial lines face divisions or spaces T of the dial about the size of the face-opening d . Each dial-space T represents by one radial row of small figures or numerals sixteenths of an inch, while the larger radially-arranged numerals of the spaces represent full inches. These graduations of the dial-spaces T indicate the extent to which the work is out of level, and as each space T passes the opening d the numerals placed at U along one edge of said opening serve, by comparison with the numerals of the spaces, to show the extent to which the work stands out of level for any given length, all the numerals reading outward—that is to say, when the dial stands as in Fig. 1, it will indicate that for six feet in length the work is out of level six-sixteenths of an inch, for eight feet eight-sixteenths of an inch, and so on until for a length of sixteen feet the work stands one inch out of level. It is to be understood that the dial is to be graduated according to the length of the level. In the drawings it is shown graduated for a two-foot level. The level-body A is recessed to accommodate the angle-plate F and the dial and slide working mechanism. The pawl M extends beyond the upper edge of the level, as at m' , to be pressed by the finger.

The operation in leveling is as follows: The bolt J is withdrawn from the notch K, when the bolt is forced fully outward by the spring I, as in Fig. 3, the teeth l of the dial-plate escaping freely backward past the end of the pawl; or the pawl may be disengaged from the teeth while the bar G moves outward to avoid excessive wear of the teeth or pawl. With the slide-bar G projected, the level is laid on the timber or other work, W, as in Fig. 1, and the end m' of the pawl M is depressed by the finger to disengage the pawl from the dial-plate, and that end of the level is depressed to carry the slide-bar G inward until the spirit-glass at B indicates that the tool between its end A^2 and the foot G' of bar G stands truly level. The pawl M is now let go and engages with the teeth l of the dial-plate to hold the dial in the exact position to which it was carried by the slide when the true level was indicated, and the dial will show just how much the object or work stands out of level for any

given length in the level, shown up to sixteen feet in length, and for any length beyond that the variation from a true level may readily be calculated.

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

1. The combination, with a spirit-level, of a sliding rack-bar adapted to be projected to support one end of the level, and a dial geared with said bar, substantially as herein shown and described, whereby when the bar is pushed inward the dial will be revolved, as and for the purpose set forth.

2. The combination, with a spirit-level having an aperture in one side, of a sliding rack, the dial L, having the pinion R fixed to its shaft, and means for locking said dial in position, substantially as herein shown and described.

3. The combination, in a spirit-level, and with the dial-plate L, geared with the slide G, to be rotated thereby, of a pawl, M, engaging teeth l of the dial-plate, substantially as shown and described.

4. The combination, with a spirit-level, the dial-plate L, and a slide, G, geared to rotate the dial, of a spring, I, acting to force the slide outward, substantially as shown and described.

5. The combination, with a spirit-level and the dial-operating slide, G, provided with the notch K, of the sliding bolt J, substantially as herein shown and described.

6. The dial E, divided radially into spaces T, having radial rows of numerals indicating inches and fractions thereof, to show the extent to which the work is out of level, in combination with the row of numerals alongside of the face-aperture d of the level, to indicate the extent to which work of a given length stands out of level, substantially as shown and described.

7. The combination, with the spirit-level, the slide G, geared with the dial E to rotate it, and the stop-pawl M, engaging teeth l of the dial-plate, of the radial rows of numerals, indicating inches and fractions thereof, on the spaces T of the dial, and the numerals at U at the side of the face-aperture d , substantially as shown and described.

WILLIAM GRAMS.

Witnesses:

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JOHN FARLEY.