

(No Model.)

T. F. RANDOLPH.
SURVEYOR'S LEVEL.

No. 297,164.

Patented Apr. 22, 1884.

FIG. 1.

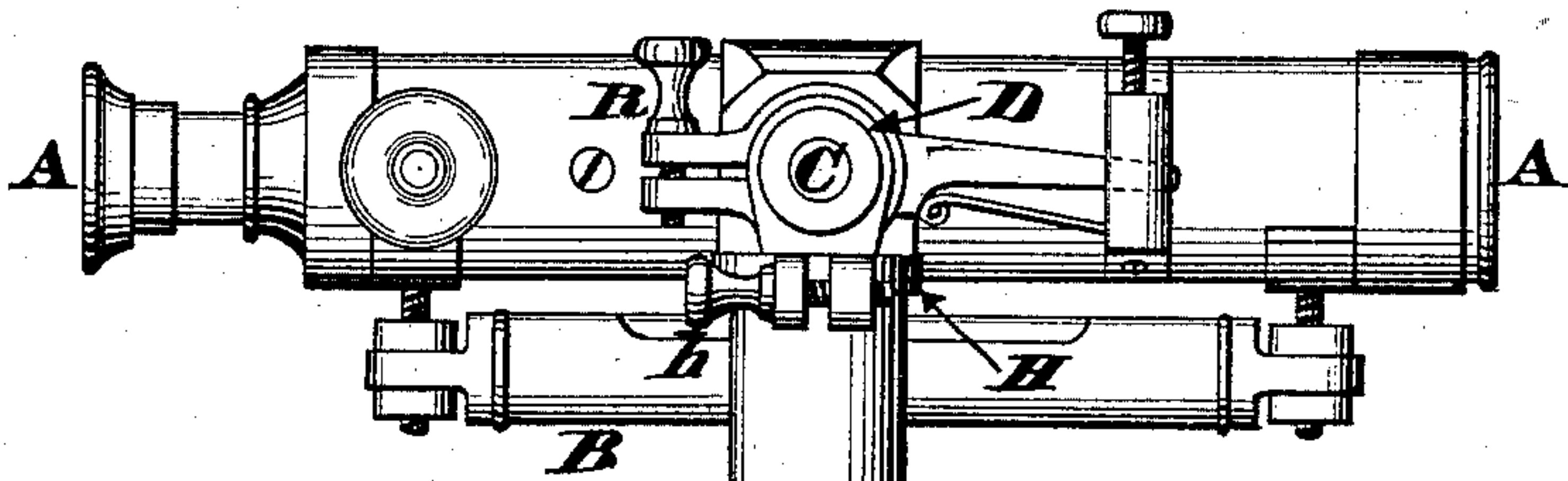


FIG. 2.

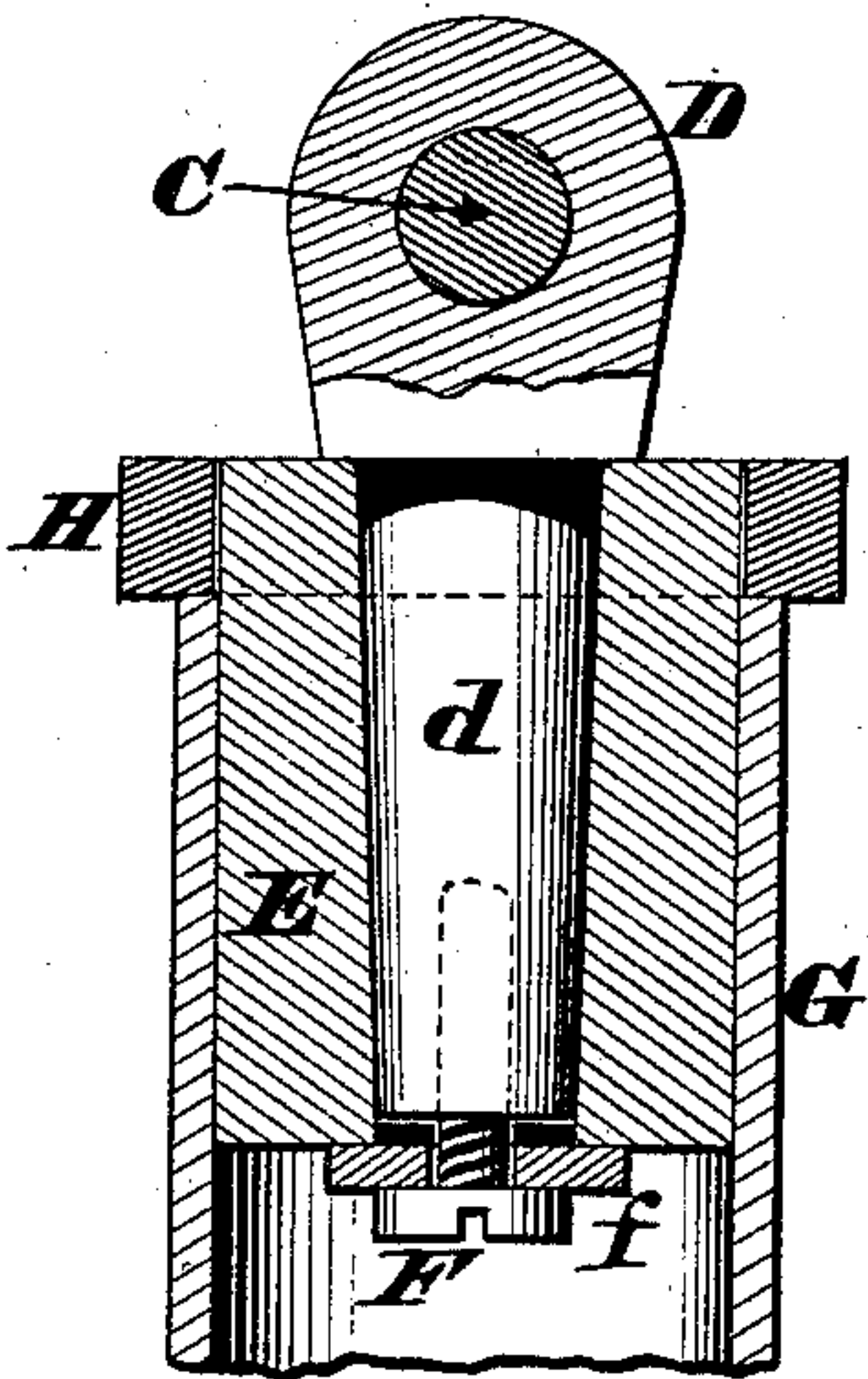
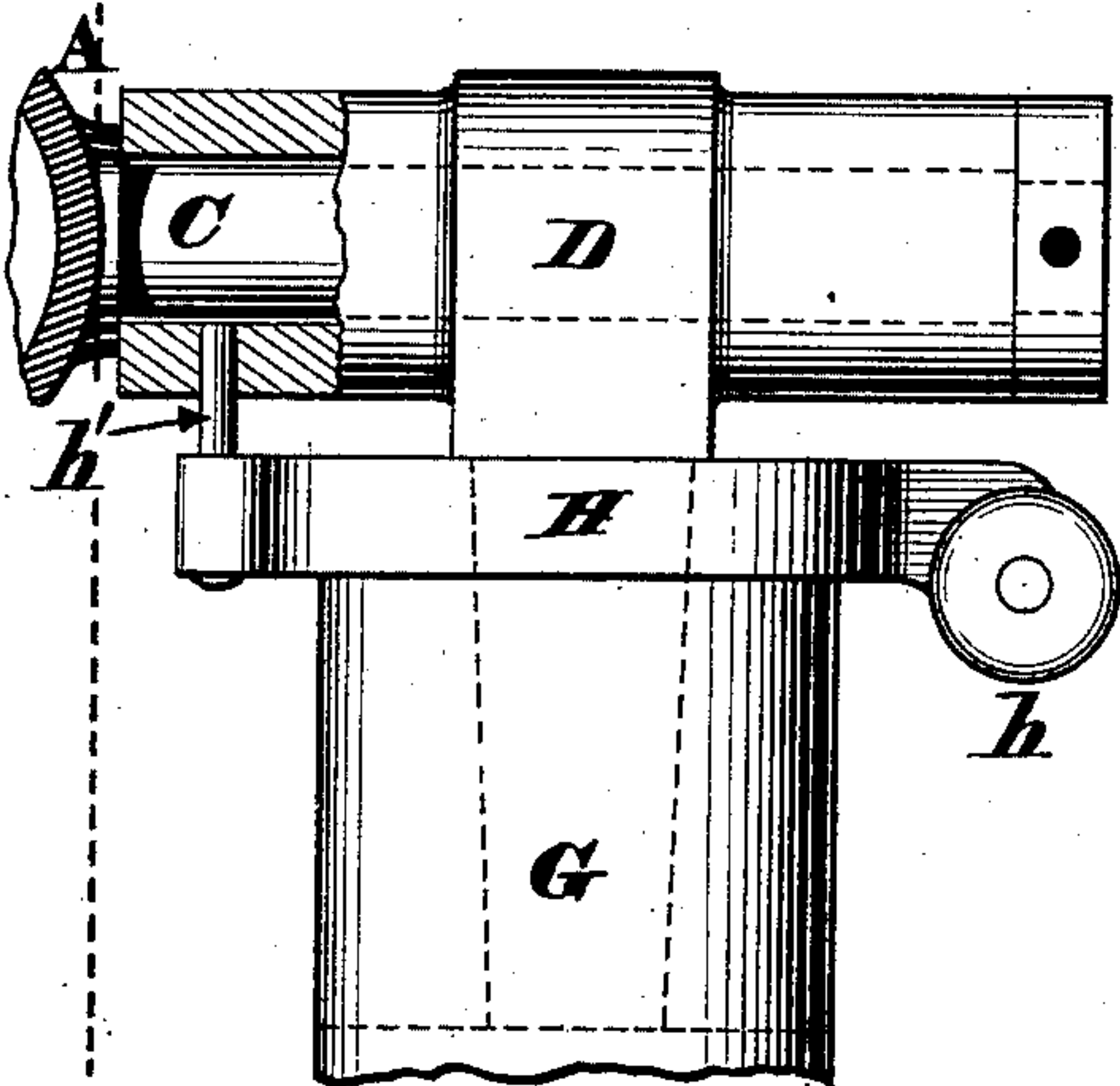


FIG. 3.



Attest.
S. S. Carpenter
Chas. Morath.

FIG. 4.

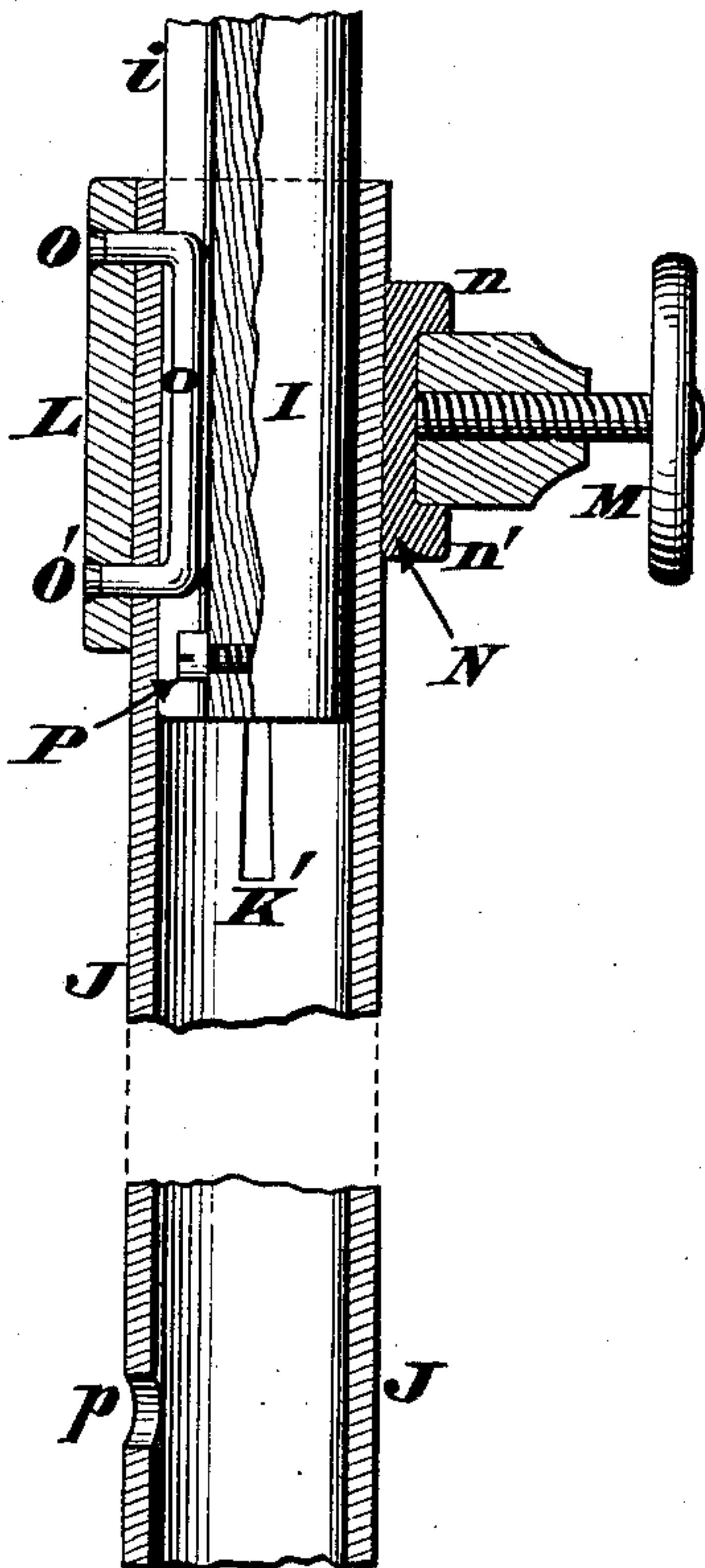
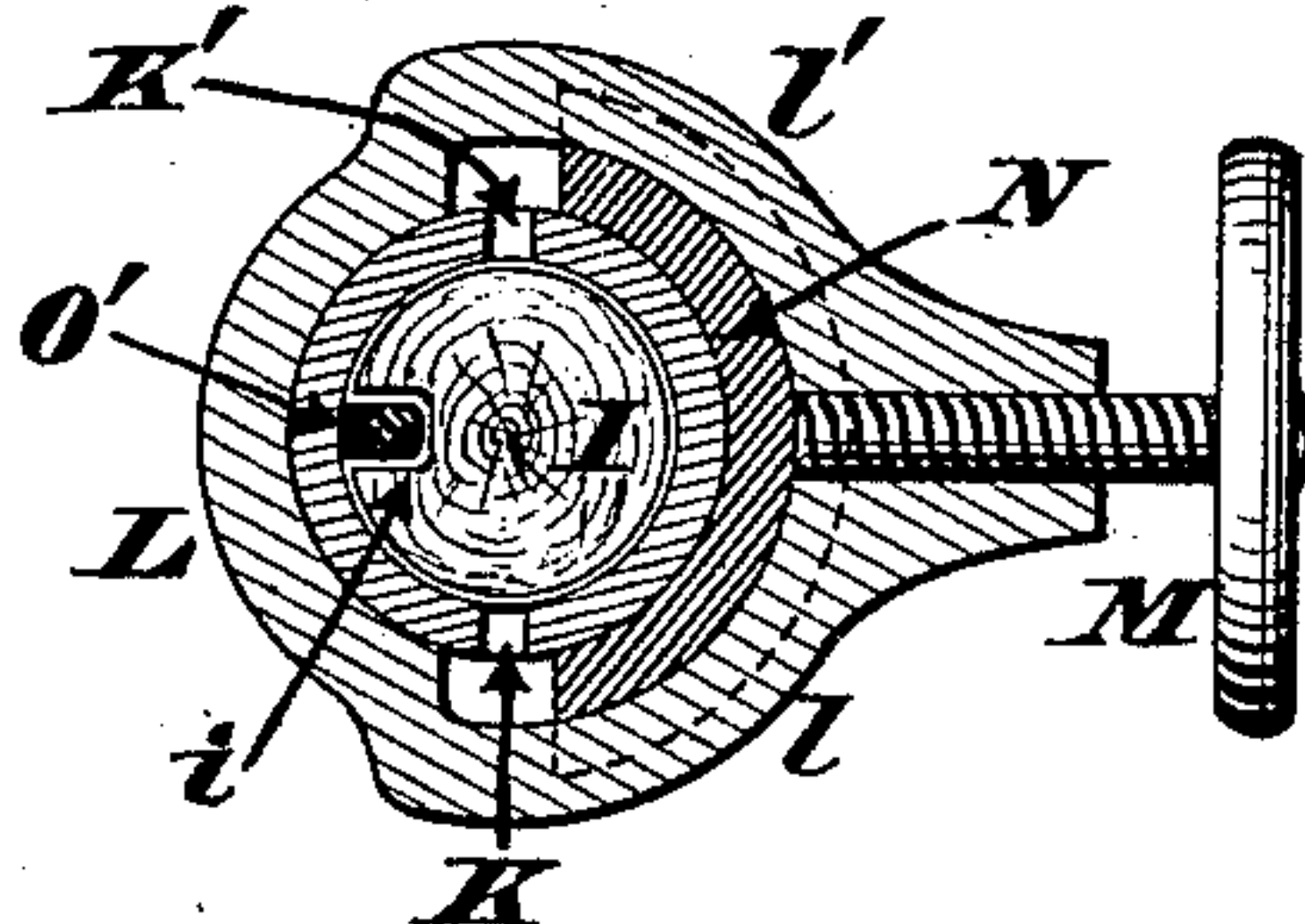


FIG. 5.



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Theodore F. Randolph
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Att'y.

UNITED STATES PATENT OFFICE.

THEODORE F. RANDOLPH, OF CINCINNATI, OHIO.

SURVEYOR'S LEVEL.

SPECIFICATION forming part of Letters Patent No. 297,164, dated April 22, 1884.

Application filed October 16, 1883. (No model.)

To all whom it may concern:

Be it known that I, THEODORE F. RANDOLPH, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Surveyors' Levels, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The object of the first part of my invention is to construct a surveyor's leveling-instrument in such a manner as to allow the telescope to be swung both vertically and horizontally, and without unduly increasing the height of the supporting tripod or staff. This construction includes a journal projecting horizontally or laterally from the telescope, which carries an ordinary level, a box or bearing for said journal, and a vertical spindle depending from said bearing and adapted to revolve within a suitable socket, which latter is either formed in the upper end of the tripod or staff, or is applied thereto. The horizontal journal is located near the upper end of the tripod, and is of such a length as to allow the telescope to swing vertically and clear the side of said tripod or shaft, while the vertical spindle permits the telescope to turn freely in a horizontal plane and describe a complete circle around the head of the tripod, a clamp-ring, screw, and pin being provided to maintain the telescope in any desired position. By this arrangement the two necessary movements of the telescope are provided for without employing the expensive and complicated attachments that have heretofore been used for such purposes. Furthermore, by thus bringing the telescope down quite near the head of the tripod or staff the instrument is rendered more stable, and can be used in very low passages—such, for example, as the galleries of mines, &c., as hereinafter more fully described.

45 The second part of my invention comprises an extensible leg or staff, which is so arranged as to enable the instrument to be either raised or lowered, according to the peculiarity of the place where the level is to be taken, this leg being provided with a stirrup, gib, screw, and key, that retain the implement at any desired adjustment, as hereinafter more fully described.

In the annexed drawings, Figure 1 is an elevation of a surveyor's level embodying my improvements, part of the tubular leg being broken away. Fig. 2 is an enlarged transverse section through the telescope journal and bearing. Fig. 3 is a partially sectionized side elevation of said journal-bearing. Fig. 4 is an enlarged axial section of a portion of the extensible leg or tripod. Fig. 5 is a transverse section of said leg, taken in the plane of the clamp-screw.

Referring to Fig. 1, A represents any approved form of telescope, having a customary level, B, and lateral or horizontal journal C, which journal is adapted to revolve in the box or bearing D, said bearing having near its mid-length a vertical spindle, *d*. (Seen in Fig. 2). This spindle is adapted to turn freely within a cylindrical plug, E, and is maintained in said plug by means of a screw, F, and washer *f*. This plug is either soldered or otherwise fastened in the upper end of a tubular socket, G, the top of said plug projecting a sufficient distance to receive a clamp-ring, H, whose split end is drawn together with a thumb-screw, *h*. Located diametrically opposite this thumb-screw is a pin, *h'*, that engages with the journal-bearing D, and thereby couples said bearing to the ring H, as seen in Fig. 3. Socket G is fitted on the upper end of a staff, I, adapted to slide freely within a tubular leg, J, which latter is shod with a steel point, *j*. As the object of this shaft and leg is to permit of the telescope A or other instrument being either raised or lowered and maintained at any desired height, some provision must be made for locking said staff within the tubular leg. Evidently this could be accomplished with a set-screw or similar device; but I prefer to use the appliance seen in Figs. 1, 4, and 5. In these illustrations the tubular leg J is shown provided with two longitudinal slots, K K', extending down far enough to render the upper portion of said tube somewhat yielding or compressible. Extending about half way around the tube J is a stirrup, L, having horizontal extensions *l l'*, the junction of which is tapped to receive a thumb-screw, M. Inserted between these extensions and the leg J is a semi-tubular gib, N, flanged at *n n'* to keep it in position.

Projecting inwardly from the stirrup L is a

staple-shaped key, *o*, adapted to traverse a longitudinal groove or keyway, *i*, cut in the side of staff *I*. The ends *O O'* of this key are riveted in the stirrup *L*.

5 *P* is a stop pin or screw at the lower end of keyway *i*. *p* is a hole in the tube *J* to permit the insertion of this screw.

R is any approved form of clamp for retaining the telescope in an inclined position. In
10 fitting together the extensible leg of the instrument, the gib *N* is first applied to the extensions *l l'*, and said gib, with the stirrup *L*, is slipped over the end of tube *J*, after which act the extensions *O O'* of key *o* are inserted
15 in suitable holes made in said stirrup and tube. These ends *O O'* of the key are then securely riveted or soldered in the stirrup *L*, and staff *I* is slipped into the leg *J*, so as to cause said key *o* to traverse the longitudinal
20 groove *i*, and as soon as said staff has descended far enough the screw *P* is passed through hole *p* and engaged with the sliding member *I*. It is apparent the staff *I* cannot now be withdrawn from the leg *J* until the
25 screw *P* is intentionally disengaged from said staff. Furthermore, it is apparent that by simply turning the set-screw *M*, so as to force the gib *N* against the tube or leg *J*, the slotted portion of the latter will be compressed, and
30 will hug the staff so tightly as to retain the latter in a more or less protruded position, according to the desired height of telescope *A*. By simply slackening the thumb-screw *h* the bearing *D* of journal *C* will be free to turn
35 in either direction, thereby permitting the telescope *A* to be swung around horizontally, after which act said screw is tightened so as to clamp the ring *H* firmly around the plug *E*, and thus retain said bearing or box *D* against

accidental rotation. This locking or bearing 40 *D*, however, does not in the least interfere with the free rotation of journal *C* in said bearing, but leaves the telescope at liberty to be used in the manner shown in Fig. 1, or to be completely inverted for the purpose of taking 45 a "back-sight," in which event the level *B* must be so turned in its hangers as to bring the "bubble" to the upper side of the level-tube.

The manner in which the telescope clears 50 the staff or tripod while being inverted is indicated by the vertical dotted line *a a*. (Seen in Fig. 3.) Finally, the extensible leg and its clamping attachment may be applied to an ordinary tripod or to a "Jacob's-staff," or any 55 other instrument or device that requires to be adjusted vertically and then locked in position.

I claim as my invention—

1. The combination, in a leveling-instrument, of telescope *A*, journal *C*, bearing *D*, spindle *d*, socket *E*, clamp-ring *H*, screw *h*, and pin *h'*, which pin couples said bearing 60 *D* and ring *H* in the manner described, and for the purpose set forth. 65

2. The combination, in a surveyor's instrument, of grooved staff *I i*, slotted tubular leg *J K K'*, stirrup *L l l'*, gib *N n n'*, screw *M*, and key *o O O'*, which latter is fastened to said stirrup *L* and traverses the groove *i*, for the 70 purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

THEODORE F. RANDOLPH.

Witnesses:

JAMES H. LAYMAN,
SAML. S. CARPENTER.