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Patented Aug. 21, 1900.

C. H. HOPKINS.
APPARATUS FOR LINING ENGINES.

(Application filed Aug. 2, 1899.)

(No Model.)

2 Sheets—Sheet 1.

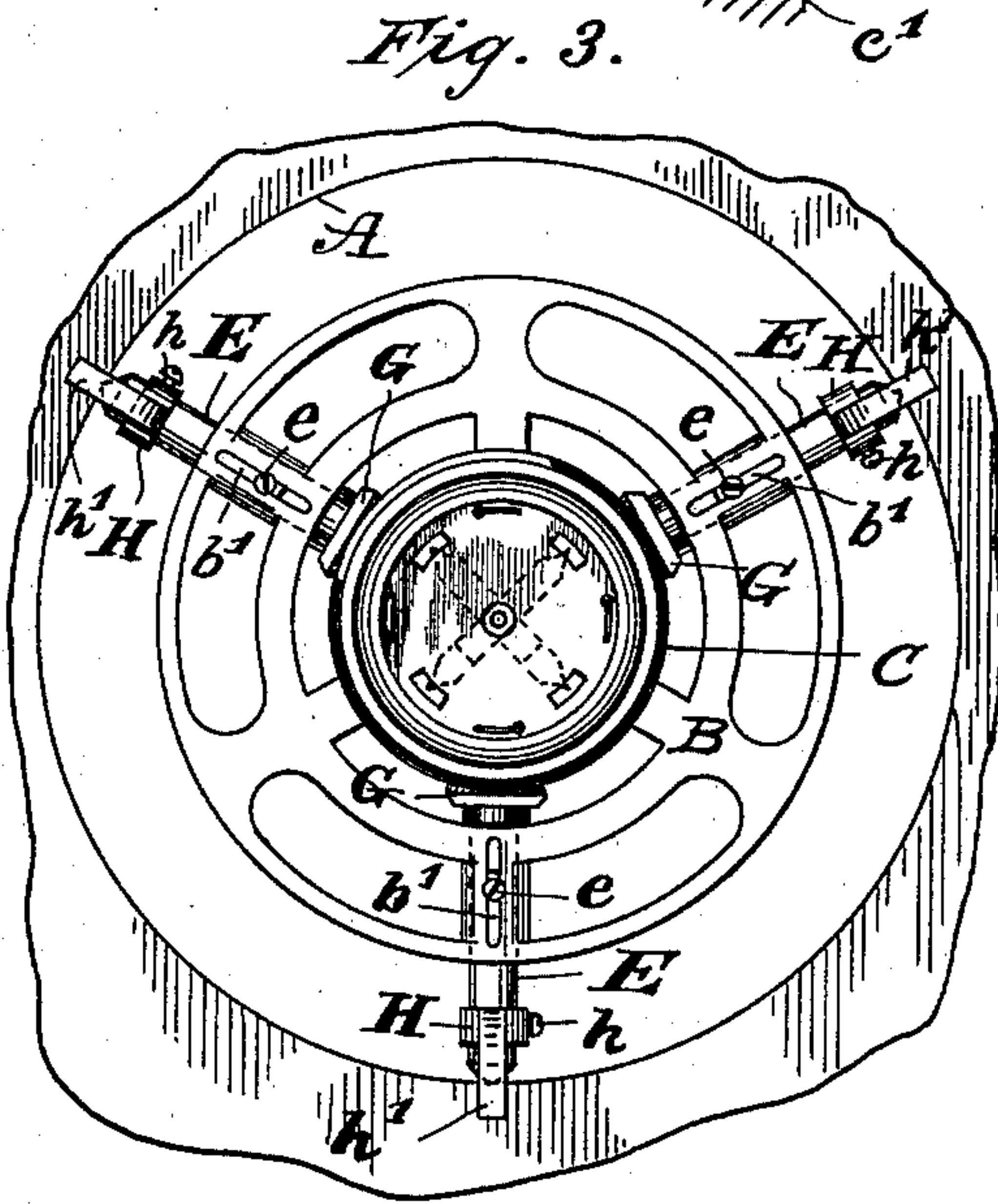
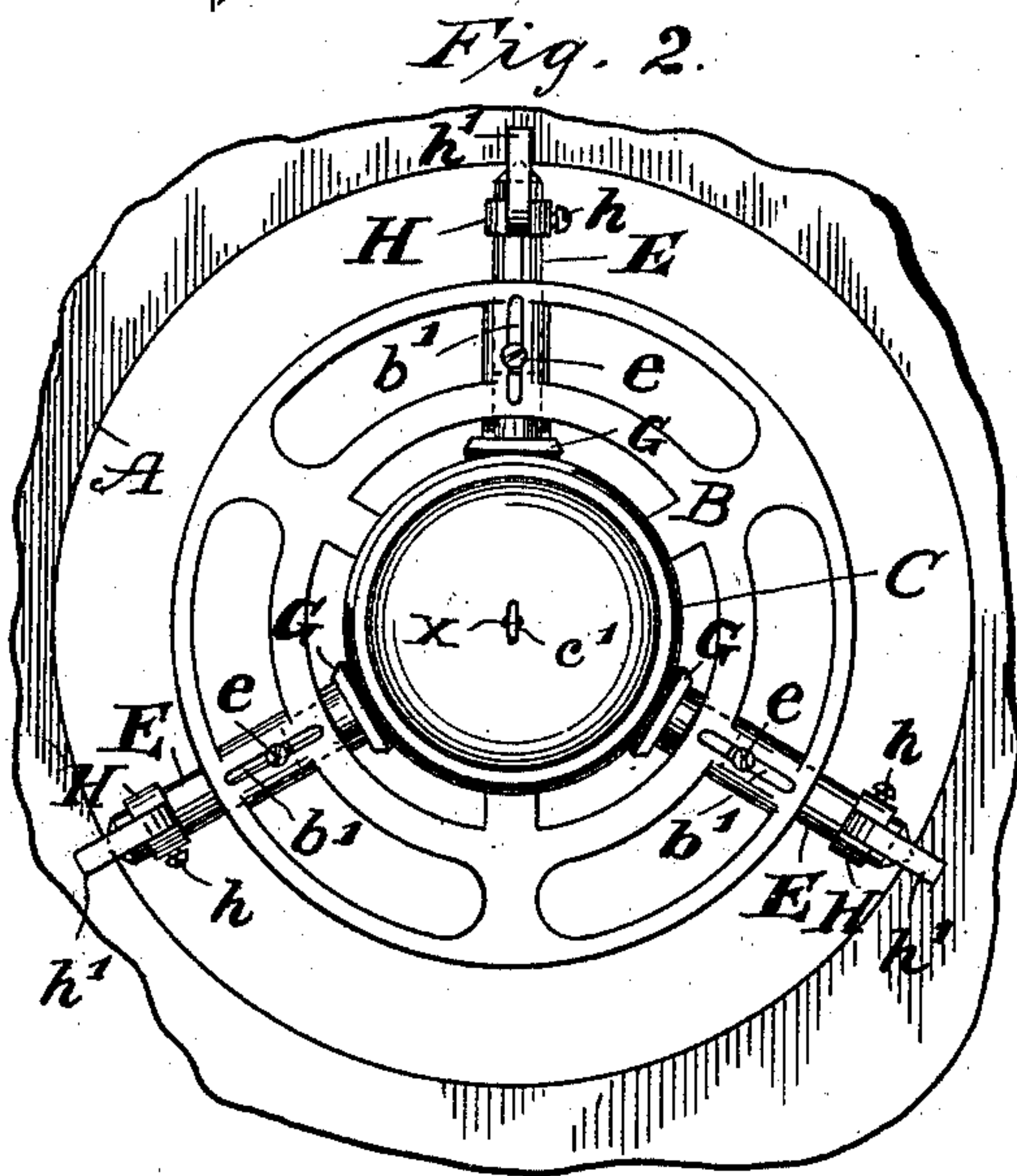
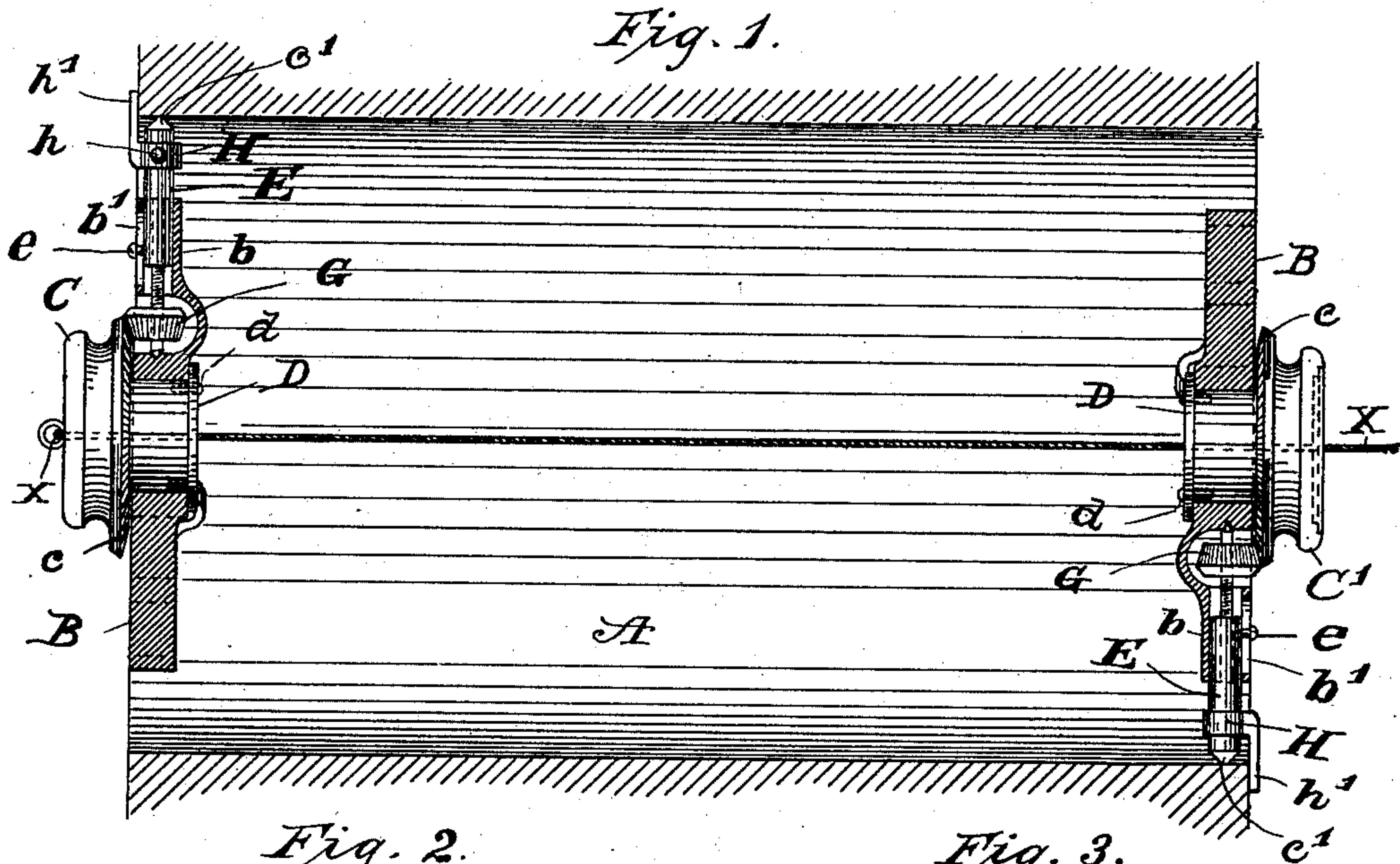
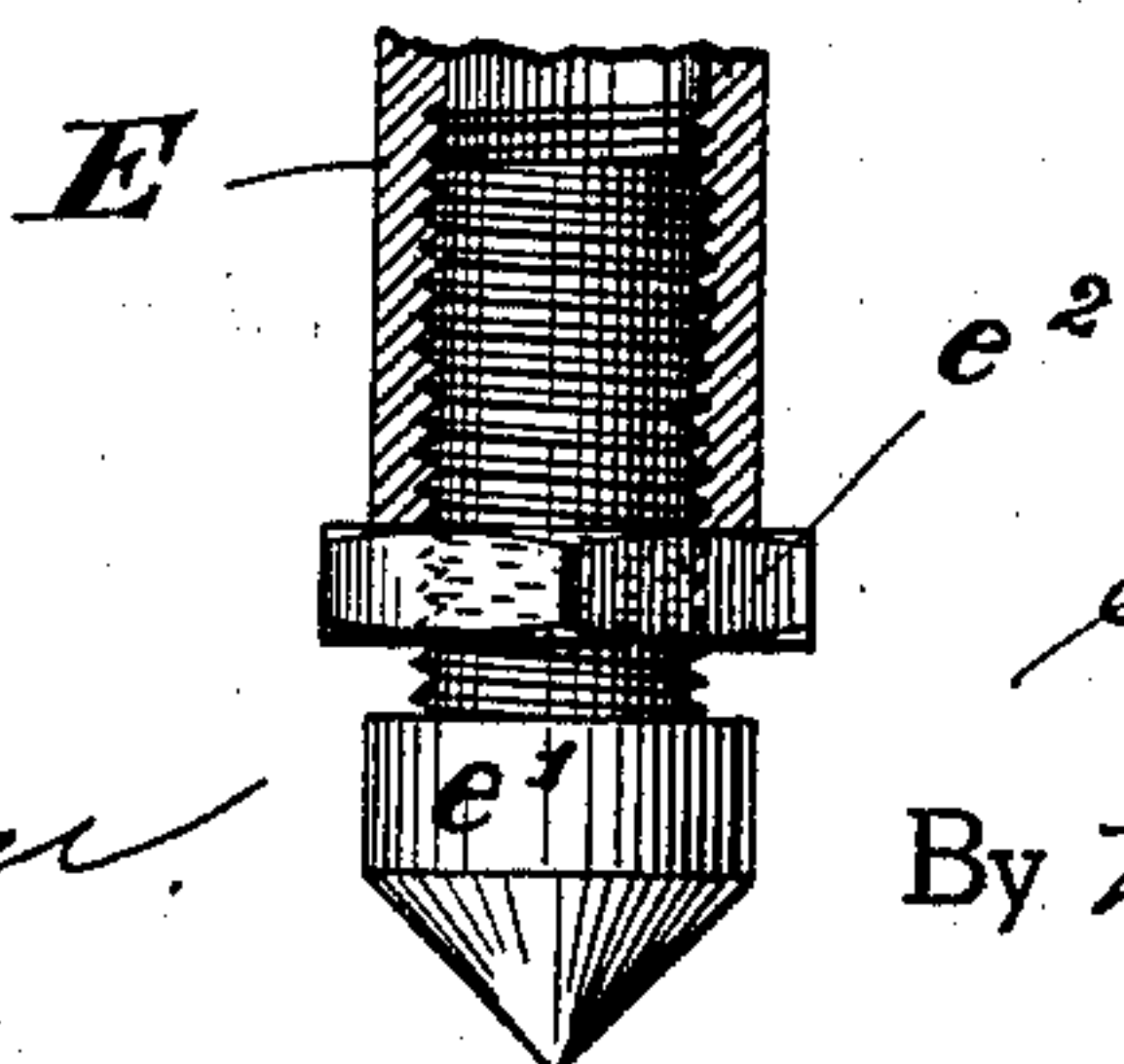


Fig. 8.



Witnesses

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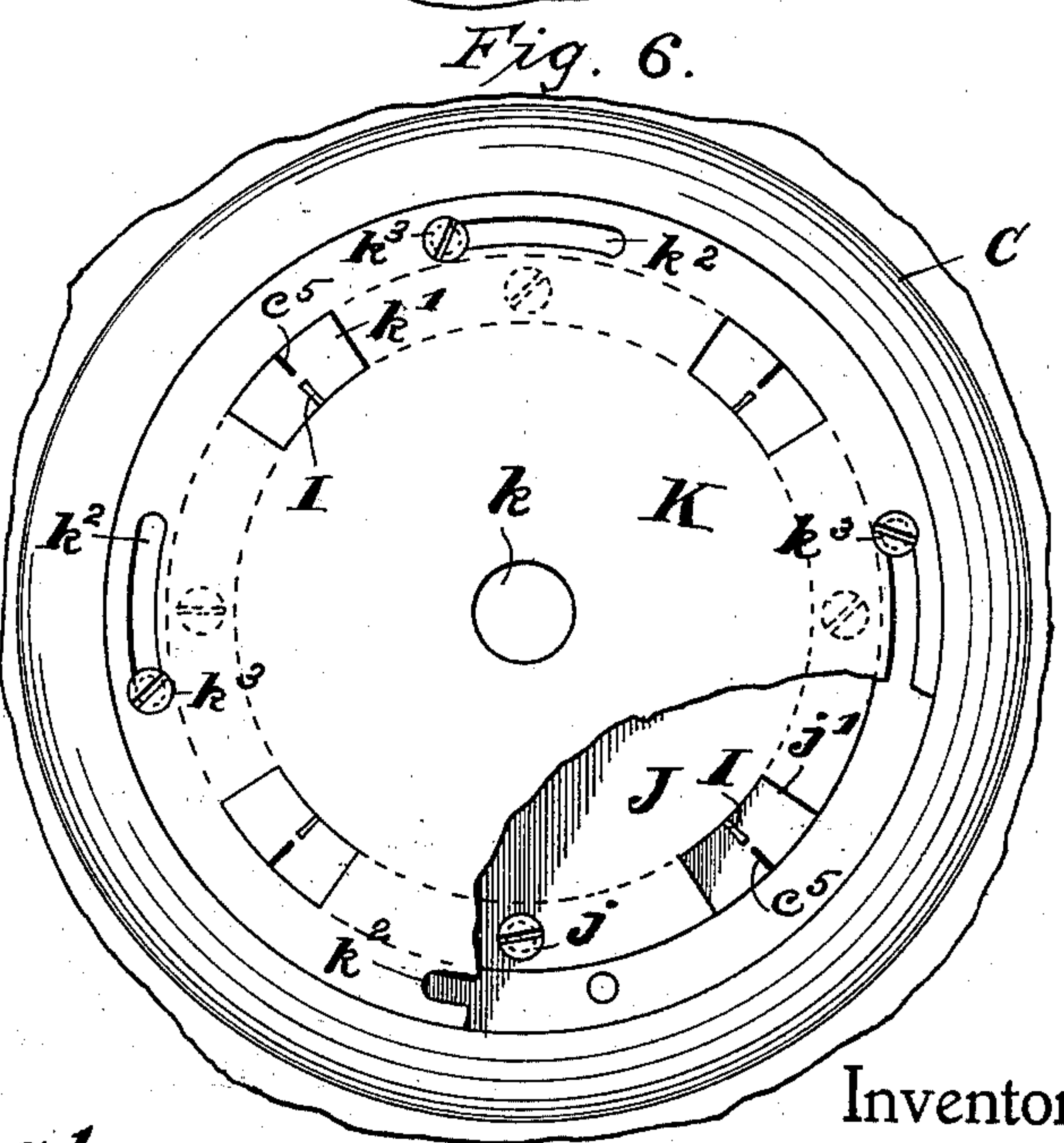
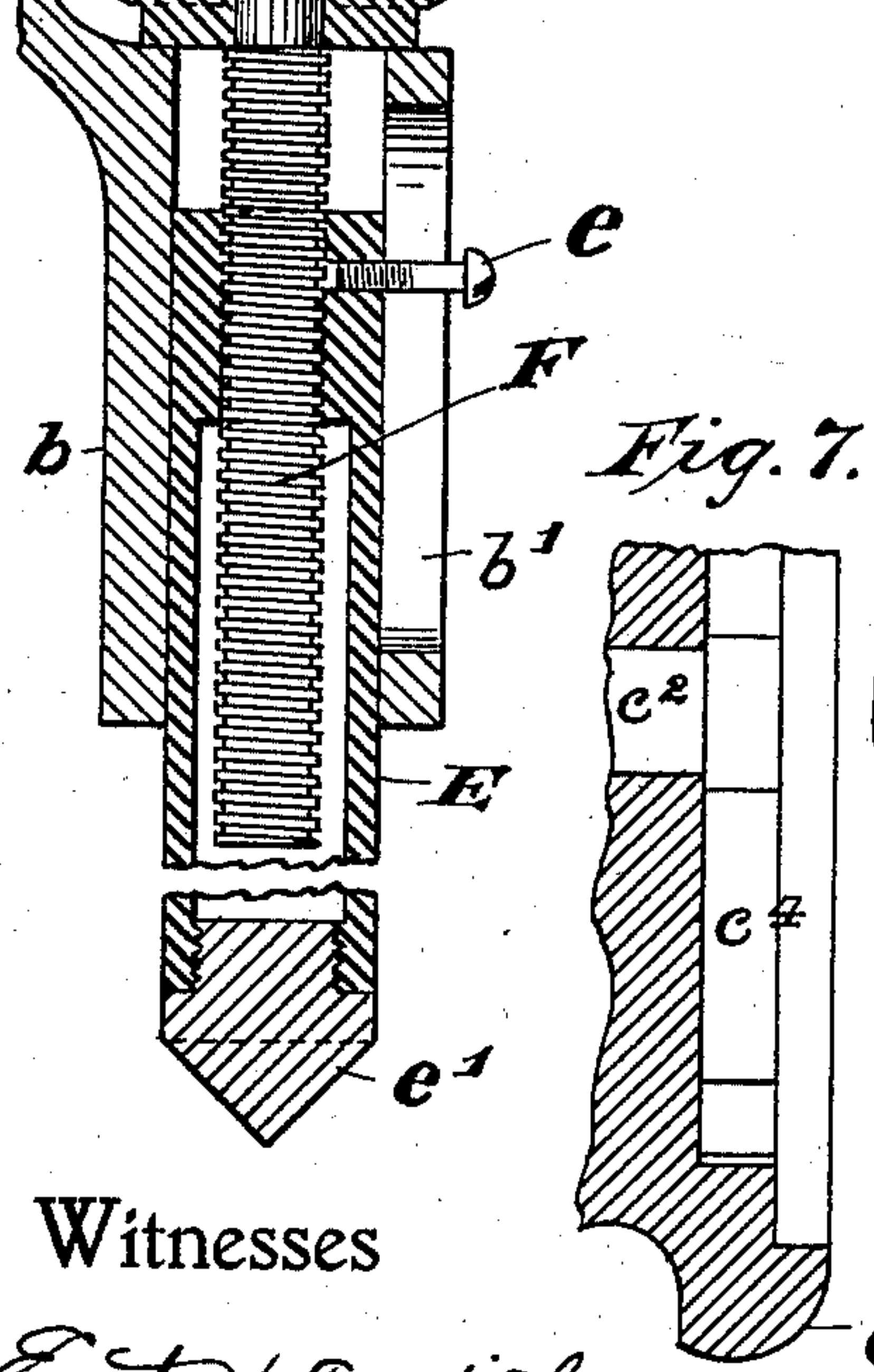
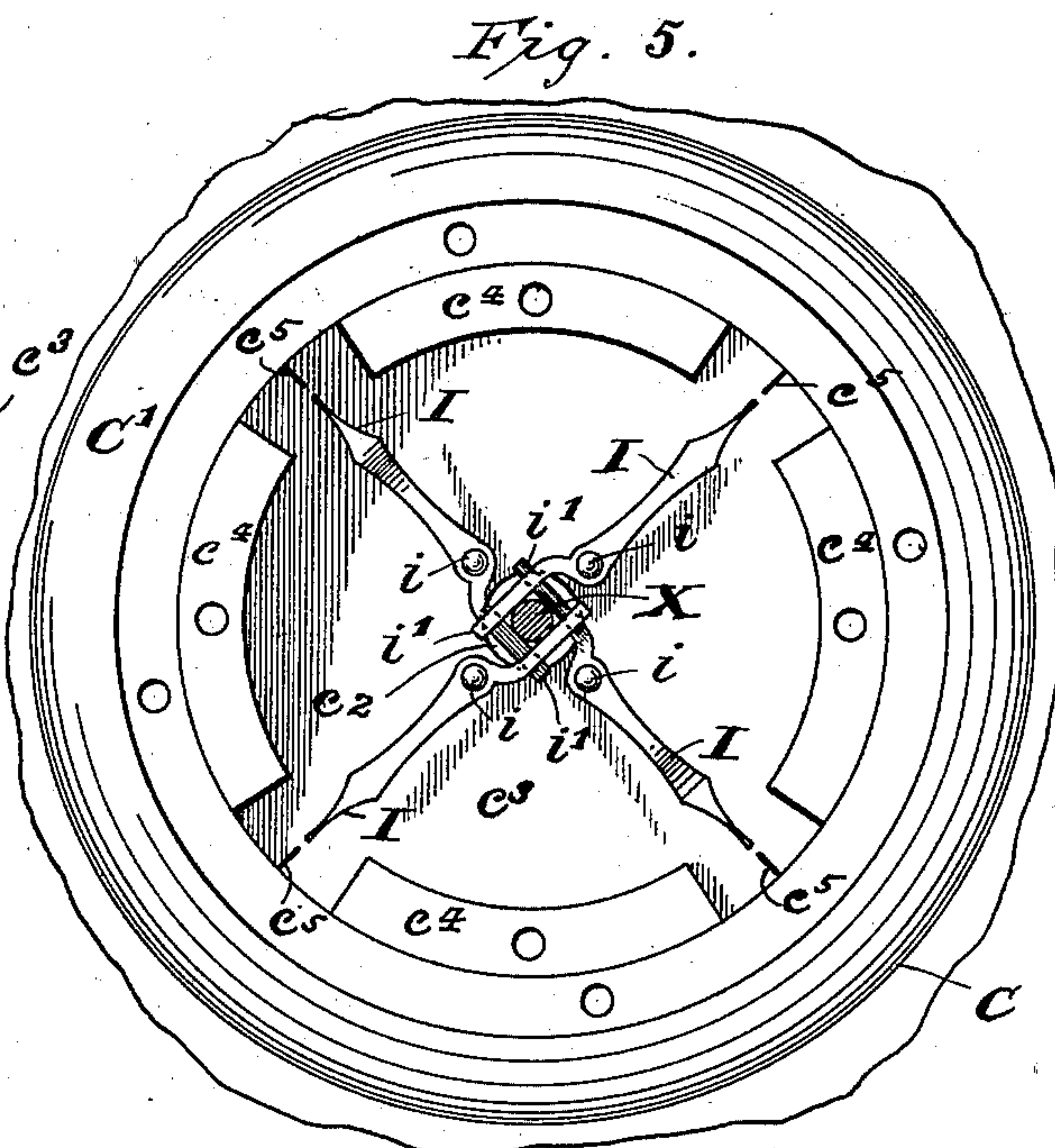
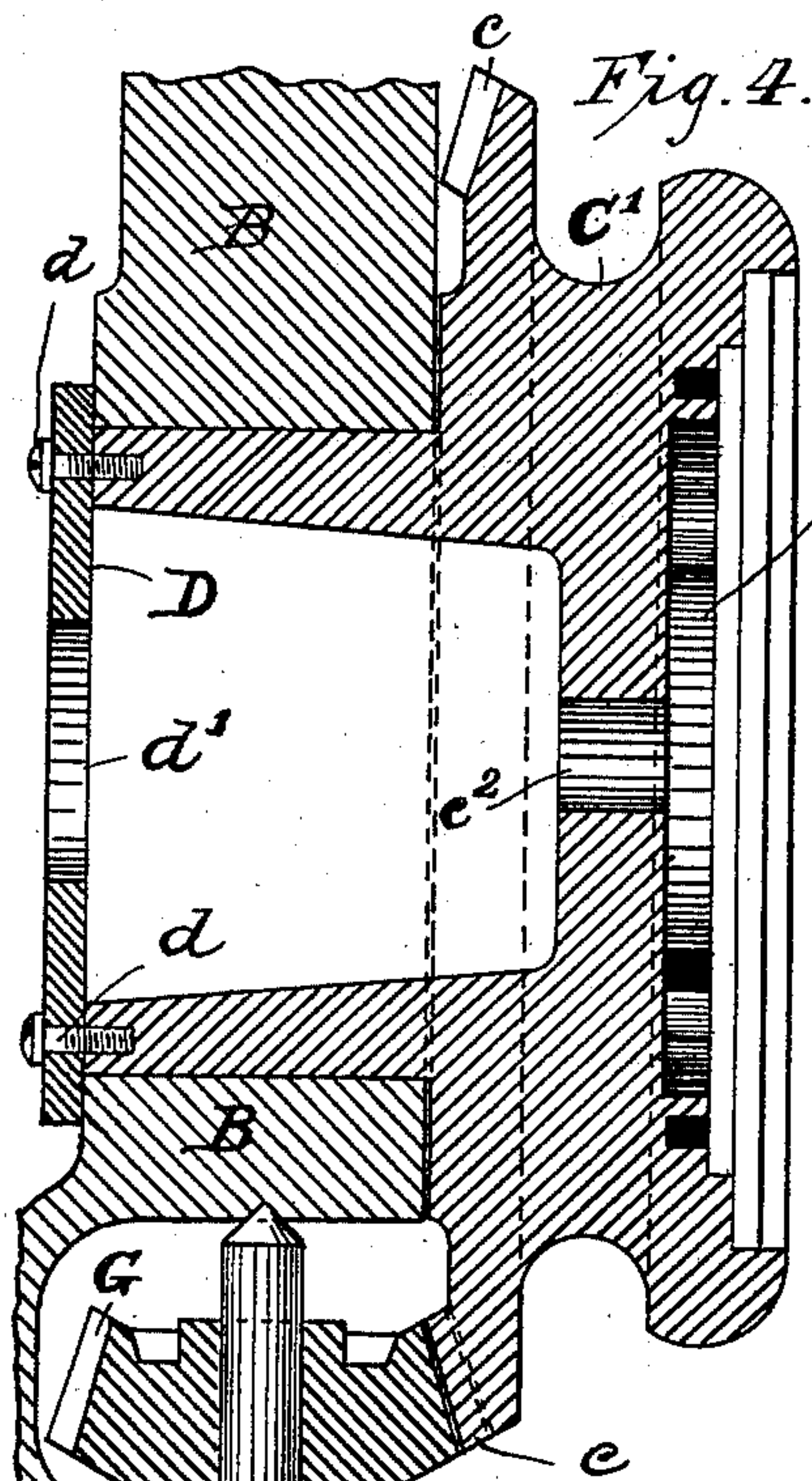
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UNITED STATES PATENT OFFICE.

CHARLES H. HOPKINS, OF MANCHESTER, NEW HAMPSHIRE.

APPARATUS FOR LINING ENGINES.

SPECIFICATION forming part of Letters Patent No. 656,406, dated August 21, 1900.

Application filed August 2, 1899. Serial No. 725,856. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. HOPKINS, a citizen of the United States, residing at Manchester, in the county of Hillsborough and State of New Hampshire, have invented certain new and useful Improvements in Apparatus for Lining Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to instruments for lining up engines, the objects being to economize time and labor and to do this work more accurately than it can be done in the ordinary way.

The invention will be fully set forth in the following specification and claims and clearly illustrated in the drawings accompanying and forming a part of the same, of which—

Figure 1 represents the interior or bore of a steam-engine cylinder in longitudinal section having my improvements shown in sectional elevation applied thereto. Fig. 2 shows a broken end elevation of a steam-cylinder in which is placed that portion of my improved apparatus adapted for use at that end of a cylinder farthest away from the engine-crank or driving-shaft. Fig. 3 is a similar view showing that portion of my improved apparatus which is adapted for use at the opposite end of a cylinder or at that end nearest the crank. Fig. 4 is an enlarged cross-section, showing a detail of my invention. Figs. 5 and 6 are enlarged details, in broken elevation, showing the center part of that portion of my apparatus designed for use at the end of a cylinder nearest the engine-crank. Fig. 7 is a detail in cross-section. Fig. 8 is a modification of one feature of my invention.

Similar reference-letters denote corresponding parts throughout the various views.

The invention comprises a pair of castings to which are attached three legs projecting radially and at triangular points, all the legs being capable of adjustment in unison by the manipulation of a suitable hand-wheel located in the center of said castings, together with other details to be hereinafter described.

Referring to the drawings by letters, A represents the interior of a steam-cylinder in

which I place my improved apparatus when required for use.

B is a casting which may be made in the form of a frame for the purpose of lightness. This frame has a central perforation to which is fitted the hub portion of a hand-wheel C, and for the purpose of retaining said hub in the perforation of the casting B a disk D, of larger diameter than the hub, may be secured thereto by screws *d*, as seen in Fig. 4, said disk being centrally perforated, as at *d'*.

The adjustable or extension legs E are mounted in bearings *b*, formed in the casting B, and may be limited in their radial motion and at the same time prevented from motion rotatively by means of a pin or screw *e*, which passes loosely through an elongated opening *b'* in one side of the bearing *b* and is threaded to the extension-legs, and said legs may be provided with detachable tips *e'*, having conical points for accommodating the improved instrument to various sizes of cylinders, all of which is shown in Fig. 4, the otherwise limited adjustment of the legs being provided more especially for setting the instrument firmly in position. The legs E are interiorly threaded to fit a threaded spindle F, which carries a beveled pinion G, all three of the pinions G meshing with beveled gear-teeth *c*, attached to or formed upon the hand-wheel C, so that by rotating the hand-wheel C in either direction all the legs E will be moved radially within their bearings *b* either outward or inward, according to the direction of rotation of said wheel C, the pin or screw *e* preventing said legs from rotating.

To facilitate placing the instrument properly in position in either end of a cylinder, the legs E may be provided near their outer ends with a collar H, which may be conveniently secured thereon by a set-screw *h*, said collars being provided with a laterally-projecting arm *h'*, extending beyond the point of the leg E, and when these arms *h'* come in contact with the end of a cylinder A, as in Fig. 1, the wheel C will be rotated in a direction to cause the legs E to be thrown outward until they bear sufficiently strong against the interior of the cylinder to hold the improved instrument in proper position.

In order to have the legs E interchangeable

one with another, a check-nut e^2 may be threaded to the threaded portion of the conical tip e' , as shown in Fig. 8. By this means the said tips may be adjusted accurately to make all three legs the same length, and then by turning said check-nut e^2 tightly against the lower end of the leg E said tips are prevented from rotating.

The description thus far defines the construction of my improved apparatus for either end of a cylinder; but the faces of the hand-wheels differ one from the other—for instance, the wheel C has simply a small hole c' through its center, in which is secured one end of cord X, as shown in Figs. 1 and 2, this cord being carried forward through a larger central perforation c^2 , formed in the other wheel C' at the opposite end of the cylinder.

My invention contemplates the indication of the true center of that end of the cylinder last mentioned (the one nearest the shaft) by means of two or more pointers which are operated by contact with said cord X, and when said pointers register with certain marks made for the purpose the free end of said cord will be secured and the mechanic having the work of lining the engine will be certain of the point at which the driving-shaft must be placed. The wheel C' has a circular recess, as at c^3 , in which suitable pointers I are pivoted, several perforated bearing-surfaces c^4 being provided therein, as in Fig. 5, to which will be secured by screws j a cap J, as in Fig. 6. This cap will be provided with a central perforation and with slots j' in its edge for exposing to view the graduations or marks c^5 and the pointers I, and in order to exclude as much as possible of the dirt and dust from the chamber containing said pointers which would otherwise enter the same I may provide an outer cap or cover K, having a central perforation k , openings k' , registering with the slots j' of the inner cap J, and elongated openings k^2 near its periphery through which the fastening-screws k^3 are passed and threaded to the hand-wheel C', the openings k^2 being sufficiently long to permit the disk or cap K to be rotated for covering or uncovering the slots j' of the cap J, as required.

Two or more pointers I may be pivoted in position, as at i , the short ends i' of which are adapted to bear upon the cord X, as seen in Fig. 5, so that the mechanic has only to draw the cord X tightly and move it slightly until the pointers register with the marks c^5 , by which may be determined the exact position for the center of the driving-shaft.

In practice my improved apparatus is preferably used with both cylinder-heads removed, and the casting or frame carrying the hand-wheel C' is adjusted in that end of a cylinder A which is nearest the crank-shaft of an en-

gine, while the frame carrying the hand-wheel C is adjusted in the opposite end of said cylinder. The cord X, which is secured within the center opening of the wheel C, is then passed through the center opening c^2 of the wheel C' and carried to a point beyond the crank-shaft of an engine. The cord is then moved slightly, while being drawn taut, up and down and to the right and left until the pointers I register with the marks c^5 , when said cord will be made fast to any convenient part of an engine, and the bearings of the crank-shaft will be so adjusted as to cause the center of said shaft to register with said cord, whereby the perfect alinement of an engine is effected.

Having described my invention, what I claim is—

1. In an engine lining-up apparatus, a pair of frames adapted for adjustment within a cylinder one at each end, a cord adapted for attachment to the center of one frame and to pass loosely through the center of the other, and means comprising pointers pivotally attached to the last-named frame and adapted for movement by said cord for determining when the cord assumes a position accurately central therein.

2. In an engine lining-up apparatus, a pair of frames one for the interior of each end of a cylinder, three or more extensible arms secured therein, means in each frame for simultaneously moving all said arms for contact with the interior of said cylinder, a cord attached to the center of one frame and passing loosely through the other, pointers pivotally attached to the last-named frame and adapted for movement by said cord, and suitable marks for determining the normal position of said pointers and the central position of the cord within the cylinder.

3. In an engine lining-up apparatus, a pair of frames one for the interior of each end of a cylinder, three or more radially-extensible arms secured therein and provided with extensions for contact with the end of said cylinder, a cord attached centrally to one of said frames and passing loosely through the center of other frame which is provided with suitable pivoted arms or pointers and marks showing the normal position of the latter, the said pointers adapted for movement by said cord, and means for simultaneously operating said radial arms for engaging or disengaging the cylinder.

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

CHARLES H. HOPKINS.

Witnesses:

J. B. THURSTON,
J. S. MASSECK.