

No. 409,586.

Patented Aug. 20, 1889.

Fig1.

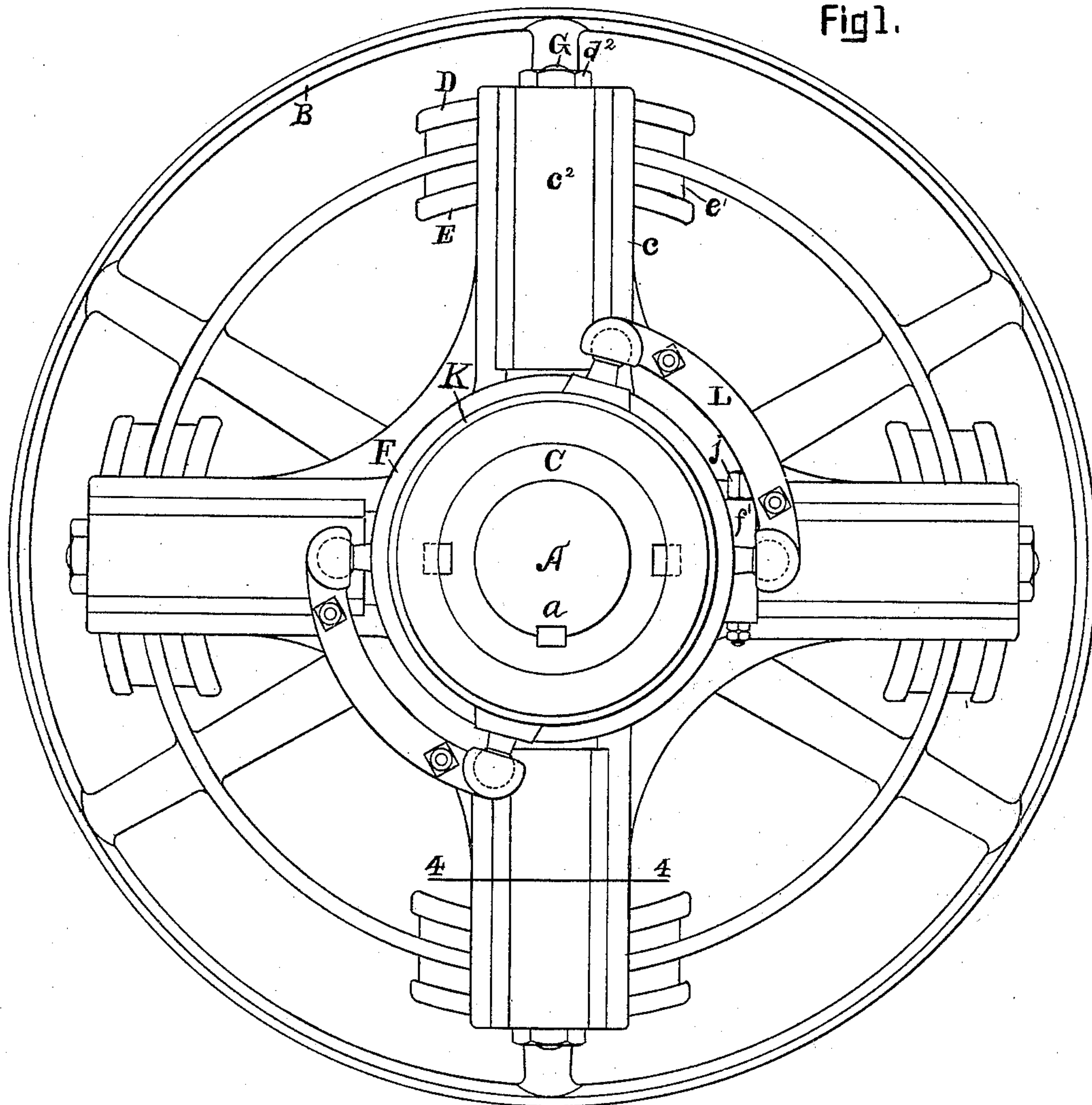
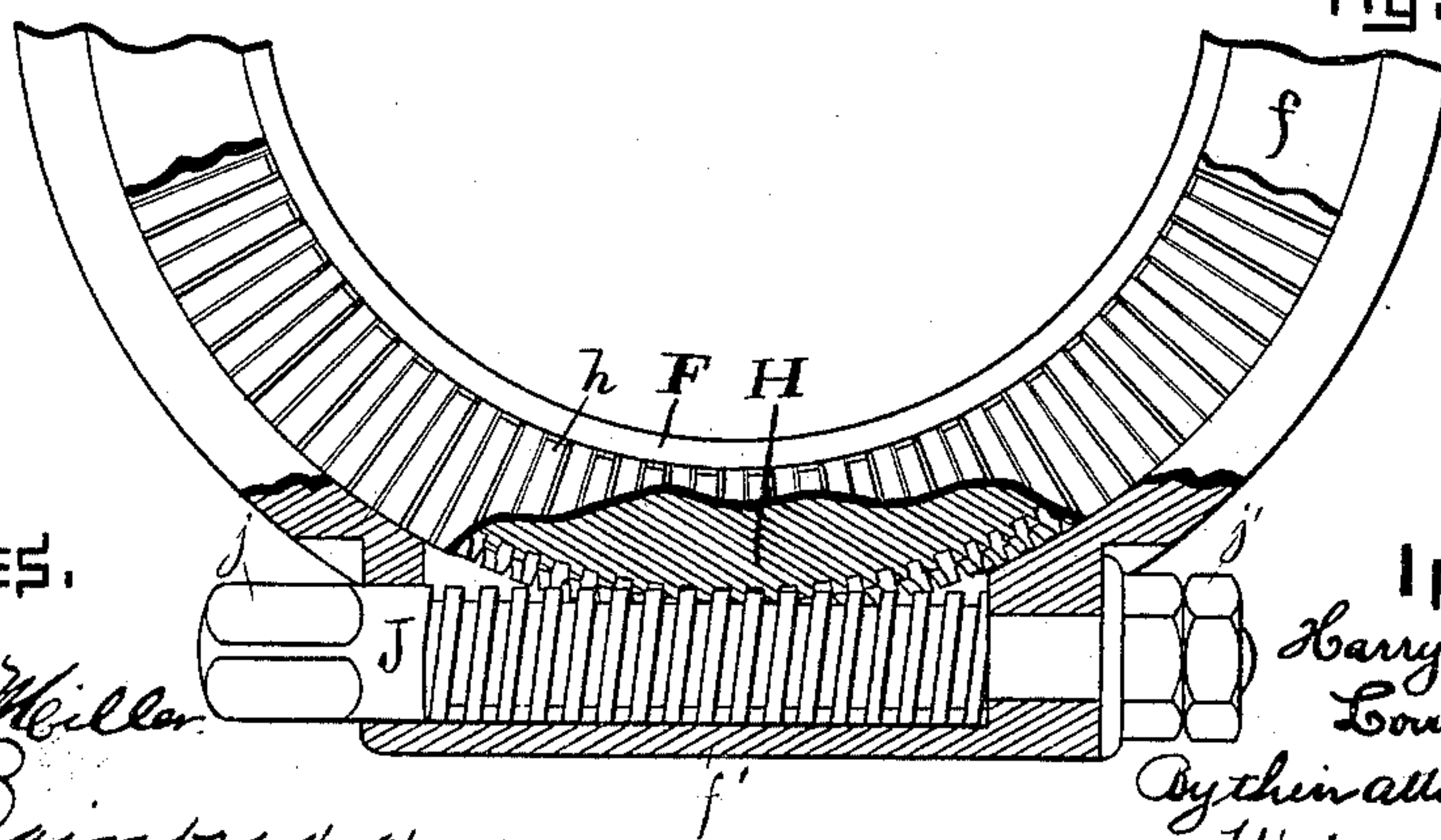


Fig 3.



WITNESSES.

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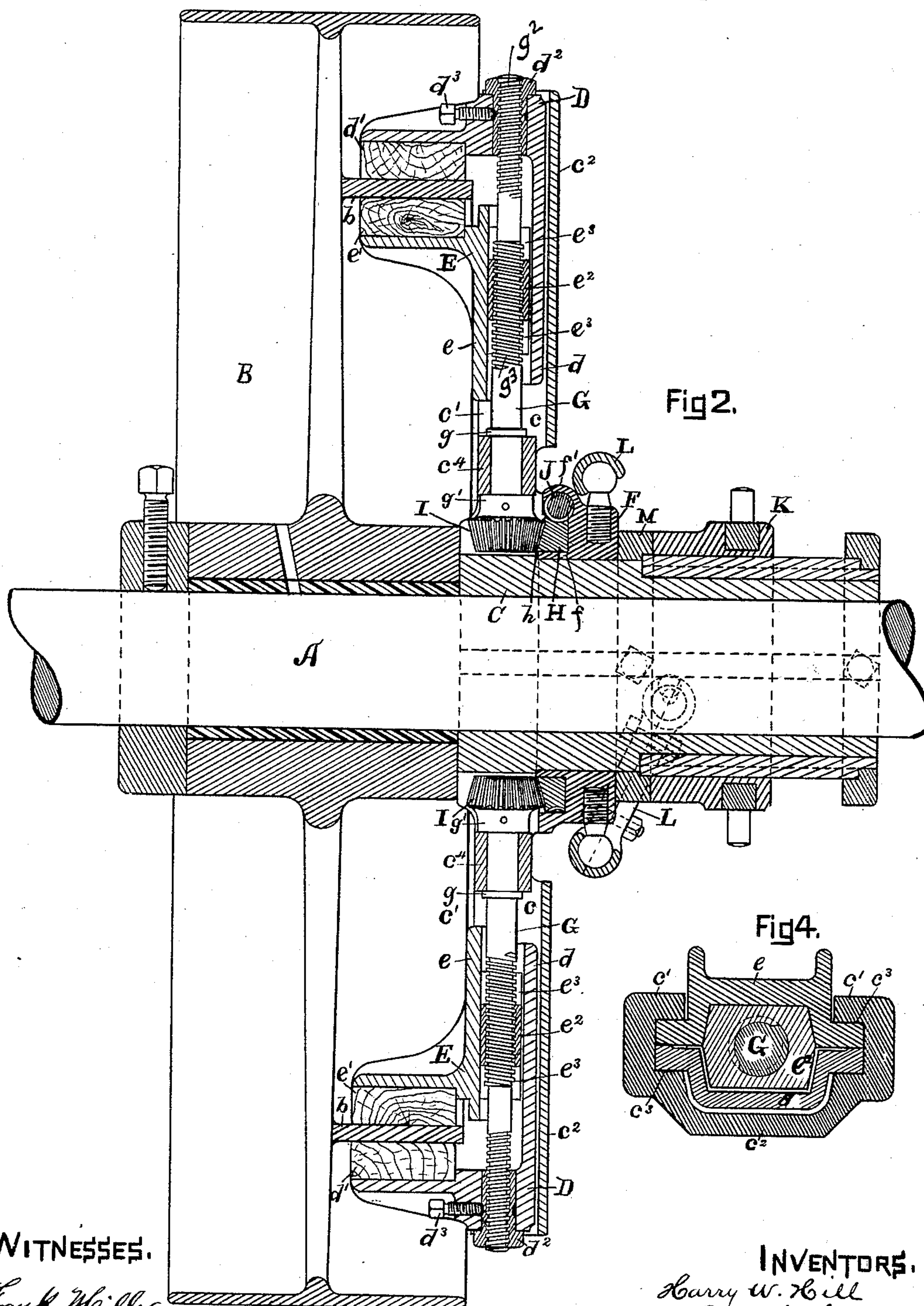
(No Model.)

3 Sheets—Sheet 2.

H. W. HILL & L. J. HIRT.
FRICTION CLUTCH.

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3 Sheets—Sheet 3.

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Fig 7.

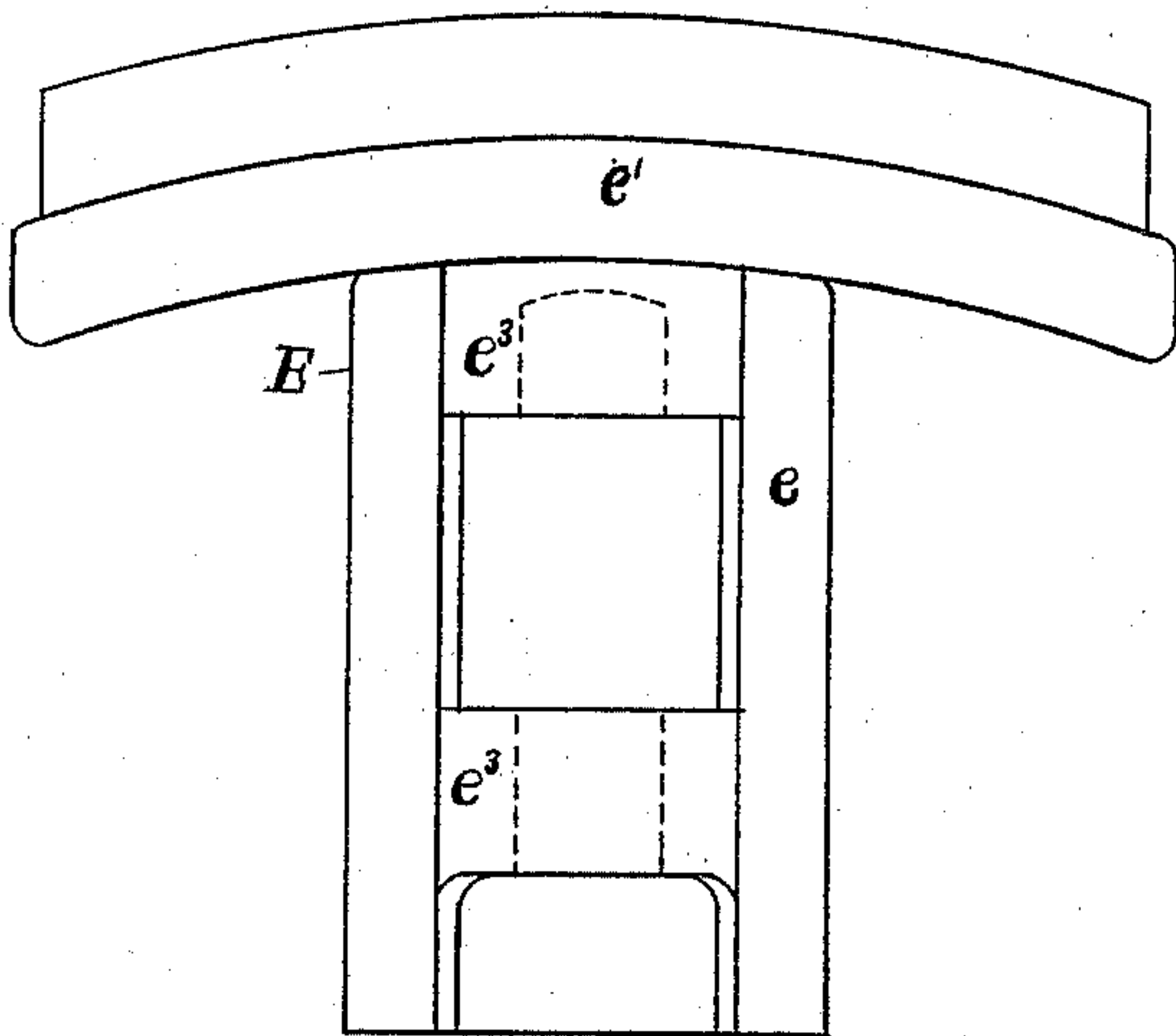


Fig 6.

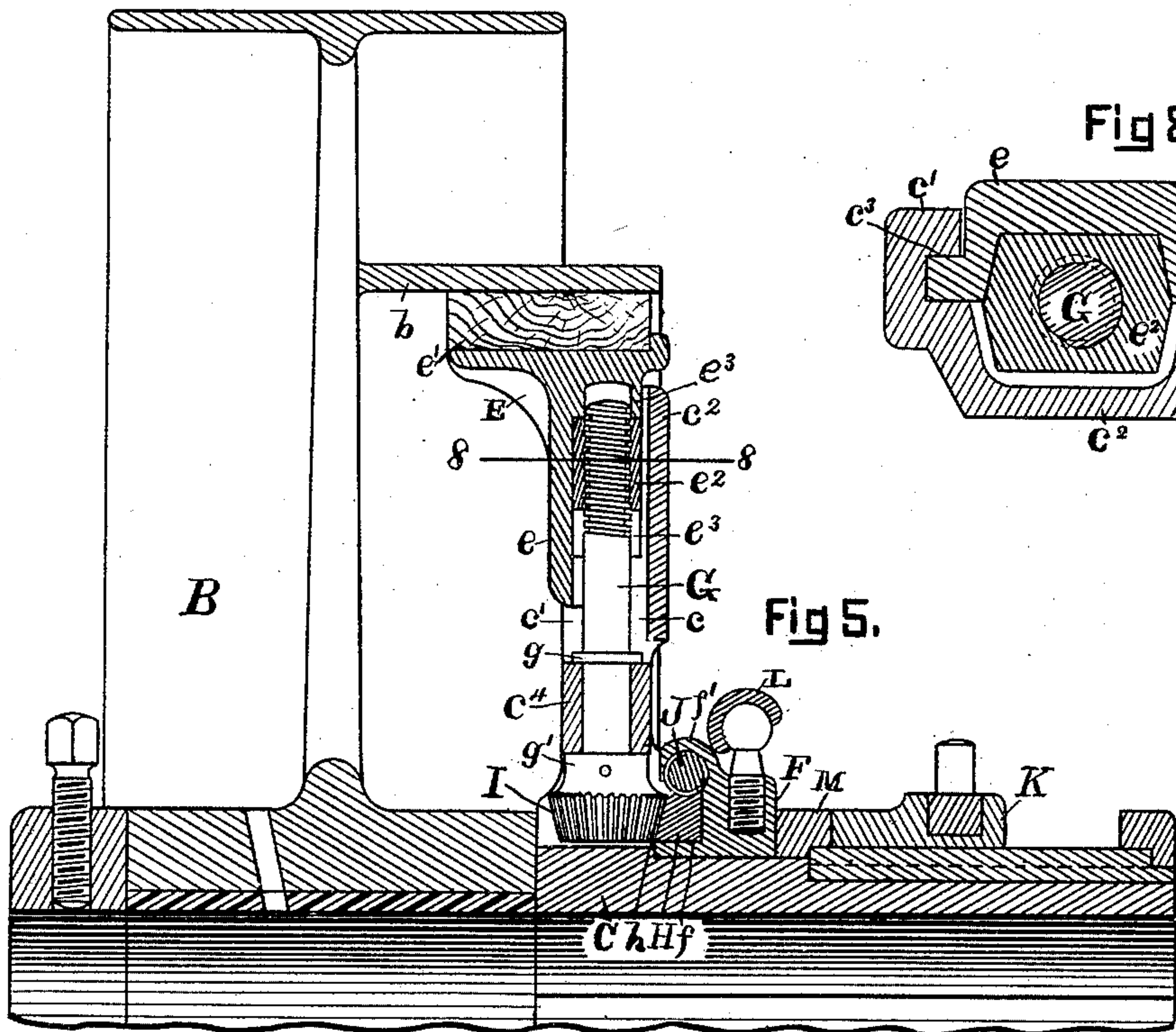
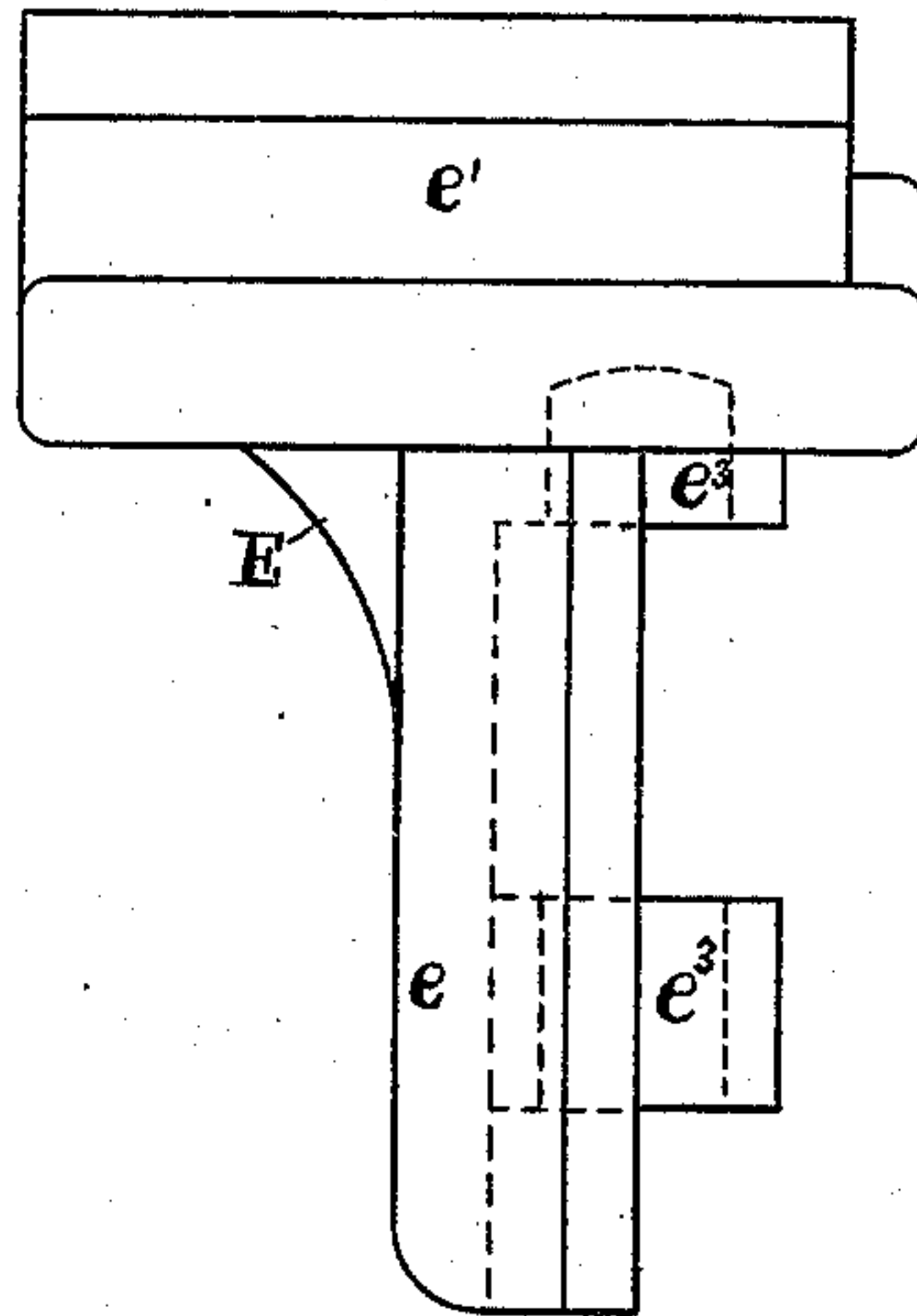


Fig 8.

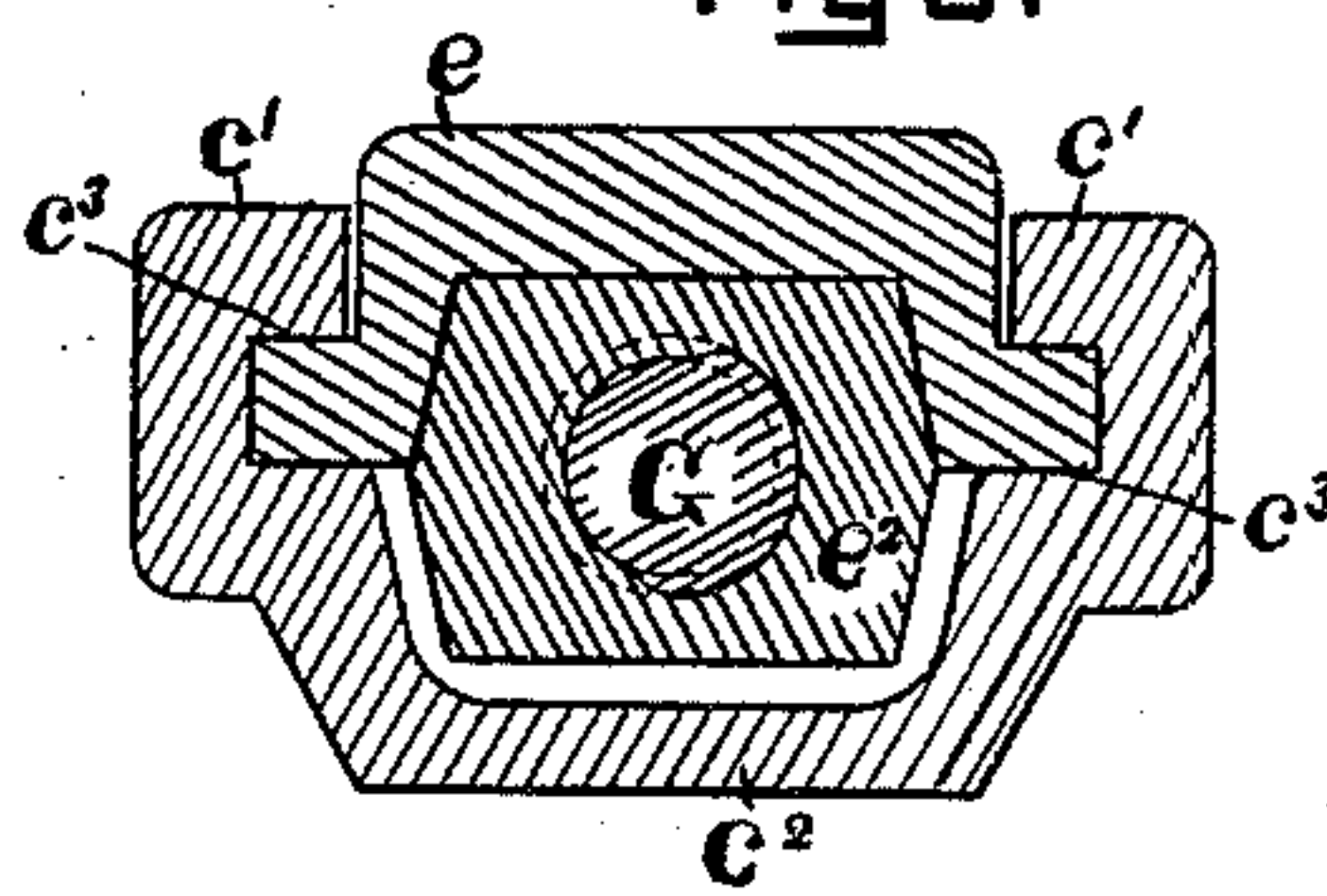


Fig 5.

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UNITED STATES PATENT OFFICE.

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FRICITION-CLUTCH.

SPECIFICATION forming part of Letters Patent No. 409,586, dated August 20, 1889.

Application filed April 29, 1889. Serial No. 309,036. (No model.)

To all whom it may concern:

Be it known that we, HARRY W. HILL and LOUIS J. HIRT, both citizens of the United States, and residents of Cleveland, county of Cuyahoga, and State of Ohio, have invented certain new and useful Improvements in Friction-Clutches, of which the following is a full, clear and exact description, reference being had to the accompanying drawings.

Our invention relates to that class of friction-clutches in which one or more members are caused to move in right lines toward and from a cylindric pulley-flange for the purpose of frictionally engaging and disengaging the same.

Our invention consists, first, in the combination of the clutch-frame having arms radiating therefrom, movable clutch members mounted on said arms, screws mounted on the clutch-frame, which extend in a direction parallel with the clutch-arms and engage with said clutch members, and a gear on said screw with a revoluble gear-ring upon the shaft and mechanism for revolving said gear-ring; second, in the means employed for simultaneously adjusting all the several similar clutch systems contained in the clutch to compensate for wear, and also in the sub-combinations and subordinate details of construction herein described, and pointed out definitely in the claims.

The invention herein claimed is equally applicable to what are known as "single-jaw" clutches and to that class of clutches in which the jaws are employed in pairs, which move simultaneously in opposite directions to grasp or release the interposed pulley-flange, and it is shown in the drawings applied to both classes of clutches. We believe, however, that our invention will be of greatest value where employed in the last-named class; and we have therefore shown in all its details this form of clutch as containing the best embodiment of our invention now known to us; but we do not intend nor desire that our claims shall be limited to the mechanism when used only in clutches where the jaws are arranged in pairs; nor do we intend to be understood as waving our claim to whatever invention may be shown and described herein, but not claimed, which is useful only in clutches where the jaws are arranged in pairs upon

each clutch-arm, as shown in Figs. 1 and 2. We have made such inventions the subject-matter of a separate application bearing even date herewith and serially numbered 309,035.

Referring now to the drawings, Figure 1 is a side elevation of a clutch which is the most satisfactory embodiment of our invention and in which four distinct clutch systems are employed. Fig. 2 is a central sectional view of the same. Fig. 3 is an end view of part of the collar F, the gear-ring H, which it carries, and the means for adjustably connecting the collar and ring together. Fig. 4 is an enlarged sectional view on line 4 4 in Fig. 1. Fig. 5 is a central sectional view of one clutch system of a clutch in which a single clutch member is employed. Fig. 6 is a side elevation, and Fig. 7 is a rear elevation, of said clutch member; and Fig. 8 is an enlarged sectional view on the line 8 8 in Fig. 5.

We will now proceed to describe in detail the clutch shown in Figs. 1 and 2.

Referring to the parts by letters, A represents the shaft.

B represents the pulley mounted thereon which is provided with a cylindric flange *b*.

C represents a hub, from which radiate as many clutch-arms *c* as it is desired to employ clutch systems. It is customary to secure the hub C to the shaft, and it is shown in the drawings so secured by means of the key *a*. It is well known in the art that these clutch-arms and clutch systems are arranged about the hub in such a manner as to balance the mechanism upon the shaft. We have shown four arms in the drawings, although the number of arms employed is not at all material to the invention. The clutch-arms *c*, as shown, consist of two parallel bars *c'*, which are connected by a yoke *c''*. These side bars *c'* are provided upon their proximate faces with parallel longitudinal grooves *c'''*. The clutch-arms and their hub constitute what is commonly called the "clutch-frame." The clutch members shown are of the same general form as those shown in Letters Patent No. 312,122, granted February 10, 1885, to H. W. Hill—*i. e.*, the outer clutch member D consists of an inwardly-directed shank *d* and an overhanging jaw *d'*, which is shaped to fit the outer periphery of the flange *b*. The inner clutch member E is also provided with an in-

wardly-directed shank e and jaw e' , which is shaped to fit against the inner surface of said pulley-flange. As shown in the drawings, the shanks d and e of the clutch members are
 5 grooved longitudinally, so that when they are mounted in the clutch-arm a recess will be left between them. The edges of the two shanks enter the grooves c^3 in the clutch-arm, and they are thereby supported and guided
 10 in their movements in straight radial lines. A screw G , having a right-hand thread g^2 in one part of its length and a left-hand thread g^3 in another, is mounted upon each of the clutch-arms and extends outward through the
 15 recess left between the two jaw-shanks d and e . This screw is prevented from having any movement but a rotary movement by a yoke c^4 , fastened to the clutch-arm, and the collars g g' on the screw. The outer screw-thread
 20 engages with the outer clutch member D and the inner screw-thread engages with the inner clutch member E .

The specific means whereby the screw-threads engage with the two clutch members,
 25 as shown in the drawings, consist, first, in a screw-box d^2 , having an enlarged bolt-head d^4 on its outer end, whereby it may be revolved. This bolt-head engages with the clutch member D , and causes the same to be moved in-
 30 ward as the box is screwed onto the screw. This box is free to revolve within its seat at the end of the clutch member D until said clutch member has been drawn to its proper position relative to the inner member and to
 35 the interposed pulley-flange, when it is locked by means of the set-screw d^3 . The inner clutch member is also provided with a removable box e^2 , through which the screw passes, and which is held in engagement with said
 40 inner clutch member by the lugs e^3 , which project from the shank e at both ends of said box. The box e^2 is prevented from becoming displaced sidewise by its position between the two jaw-shanks. This removable box e^2
 45 renders the device somewhat less expensive. A collar F surrounds the hub C , and is free to revolve thereon. In the face of this ring nearest to the clutch-arms an annular groove or socket f is cut, and into this groove is fit-
 50 ted, so that it may be revolved, a gear-ring H . Upon the face of this gear-ring H beveled gear-teeth h are cut, which engage with the beveled gear-wheels I , which are rigidly fastened to the inner ends of the screws G .
 55 Upon the outer periphery of this gear-ring H are cut teeth which form a rack h' . A worm J is mounted in a projection f' upon the collar F , substantially as shown, and extends through said collar to engage with the rack h' .
 60 It is provided at one end with a bolt-head j , by which it may be revolved, and at the other end with set-nuts j' , by which it may be locked at any desired point in its revolution. This worm J serves as the means whereby the gear-
 65 ring H is rigidly connected with the ring F , and it also serves as the means whereby the

simultaneous adjustment of all the clutch systems is effected.

K represents a sleeve which surrounds the shaft and is permitted to move longitudinally
 70 thereon. It is compelled to revolve with the hub C by means of a spline-connection therewith.

L L represent links which are secured at one end to the ring F and at the other end to
 75 the sliding sleeve K , both connections being in the form of a ball-and-socket joint. The points of attachment of the ends of each link are in different radial planes, and are distant from each other preferably about one-sixth of
 80 the circumference.

The parts above described may be assembled as follows: Screw G is first mounted in the clutch-arm in the manner shown. The inner clutch member E is then seated upon
 85 said clutch-arm with the box e^2 in its described position and the screw revolved until said member has been drawn to the desired position. The outer clutch member is then seated upon the clutch-arm and the box d^2 re-
 90 volved until said clutch member has been drawn to its proper relative position, when the screw d^3 is screwed against the box d^2 , and a further revolution thereof prevented. The collar F , with the gear-ring H connected
 95 therewith, is then slipped upon the hub to a position where the beveled gear I will engage with the teeth h . A collar M is next slipped over the hub against said ring F , and there fastened by means of a set-screw or some
 100 other suitable appliance. The purpose of this collar M is to prevent the ring F from moving laterally away from the clutch-arm and thereby permitting a disengagement of the gear-teeth before mentioned. The sliding
 105 sleeve K is then placed in position and connected with the collar F by means of links L L , as before explained.

In Fig. 5 a clutch is shown, which differs from that above described, principally in that
 110 the outer clutch member and that part of the screw G which is designed to operate the same are omitted. The clutch member E remaining is somewhat differently shaped, in order that the jaw e shall engage with the
 115 flange b at a point more nearly in line with the thrust of the screw. The removable screw-box e^2 is retained as a measure of economy, as before explained. It is held between lugs
 120 e^3 e^3 at its ends and between the jaw-shank and the yoke of the clutch-arm at its sides. In other respects, and in all respects relating to the invention herein claimed, the two forms shown are essentially alike.

When parts are assembled, as shown, their
 125 operation is as follows: When the sliding sleeve K is moved toward the collar F , said collar is caused to revolve by reason of its connection with said sliding sleeve by the links L L . The gear-ring H , being rigidly con-
 130 nected with the collar F , also revolves, and in its revolution causes all of the screws G to be

revolved simultaneously. The screws G in revolving move the clutch members into frictional engagement with the pulley-flange b. When it is desired to release the pulley-flange, the sliding sleeve K is moved in a contrary direction or away from the clutch-arms, and there follows a reverse movement of the various elements constituting the connecting mechanism between the clutch members and said sleeve.

Ordinarily the clutch-jaws are faced with wood blocks at the points where they engage with the pulley-flange, and these wood blocks are worn away with a greater or less rapidity by the friction between them and the pulley-flange. In a practical clutch, therefore, it is necessary to have some means to take up or compensate for this wear. The means provided, as before explained, consists of a rack in the outer periphery of the gear-ring H and the worm J, mounted upon the collar F. When the worm J is revolved, it causes the ring H to revolve in its socket in the collar F, thereby simultaneously moving the screws G and the clutch members, which are operated thereby, until said members are all in the proper position relative to the pulley-flange, so that the movement of the sleeve K will cause them to engage therewith.

It is obvious that, except for the purpose of adjustment, the collar F, as a separate element, is unnecessary. The gear-ring H could be alone used, and when the adjustment is once made in the construction shown the two are rigidly connected and operate as if there were but one ring.

As shown in the drawings, the hub C is made long for the purpose of giving it a large bearing on the shaft, and the collar F and sliding sleeve K are mounted thereon; but obviously these parts operate as described because of their position relative to the shaft, and if the hub C were shortened and said parts mounted directly on the shaft their mode of operation would not be modified.

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

1. In a friction-clutch, the combination of a clutch-arm and a clutch member supported thereby, with a screw mounted on the clutch-frame and engaging with said clutch member, a gear on said screw, a gear-ring revolvable upon the shaft, a sliding sleeve, and a mechanism connecting said ring and sleeve, whereby the former is revolved by the longitudinal sliding movement of the latter, substantially as and for the purpose specified.

2. In a friction-clutch, the combination of a clutch-arm and a clutch member supported thereby, with a screw mounted on the clutch-frame and engaging with said member, a gear

upon said screw, a gear-ring, a sliding sleeve, and a link connected at its ends with said sleeve and ring, respectively, in different radial planes, and by ball-and-socket joints, substantially as and for the purpose specified.

3. In a friction-clutch, the combination of a clutch-frame having arms radiating therefrom, movable clutch members supported on said arms, screws mounted on the clutch-frame, extending parallel to said arms and engaging with said clutch members, and gears secured to said screws, with a revoluble collar surrounding the shaft, a gear-ring, and mechanism for adjustably securing said gear-ring to said collar, substantially as and for the purpose specified.

4. In a friction-clutch, the combination of a clutch-arm and a clutch member supported thereby, with a screw mounted on the clutch-frame and engaging with said member, a gear on said screw, a revoluble collar having an annular groove, a gear-ring having a rack on its periphery, and a worm mounted on said collar, substantially as and for the purpose specified.

5. In a friction-clutch, the combination of a clutch-frame having clutch-arms radiating therefrom, clutch members mounted on said arms, screws mounted on the clutch-frame, extending in a direction parallel with the clutch-arms, a revoluble gear-ring, and mechanism for simultaneously adjusting all of said clutch members, substantially as and for the purpose specified.

6. In a friction-clutch, the combination of a clutch-arm and a clutch member supported thereby, having a longitudinal curved shank upon which are the lugs e^3 , with a screw-block e^2 , a screw mounted on the clutch-frame and engaging with said block, a gear on said screw, a gear-ring on the shaft, a sliding sleeve, and a mechanism connecting said sleeve and ring, whereby the latter is revolved by a longitudinal sliding movement of the former, substantially as and for the purpose specified.

7. In a friction-clutch, the combination of a clutch-arm having two parallel grooved bars and the yoke connecting them, and a clutch member having a longitudinal curved shank seated in said grooves, with a screw having the collars g g' , the yoke c^4 , the beveled gear I, the collar F, having annular groove f , the gear-ring H, having a rack on its periphery, the worm J, mounted on the collar, sleeve K, having sliding movement on the shaft, and link L, connecting said sleeve and collar, substantially as and for the purpose specified.

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Witnesses:

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