

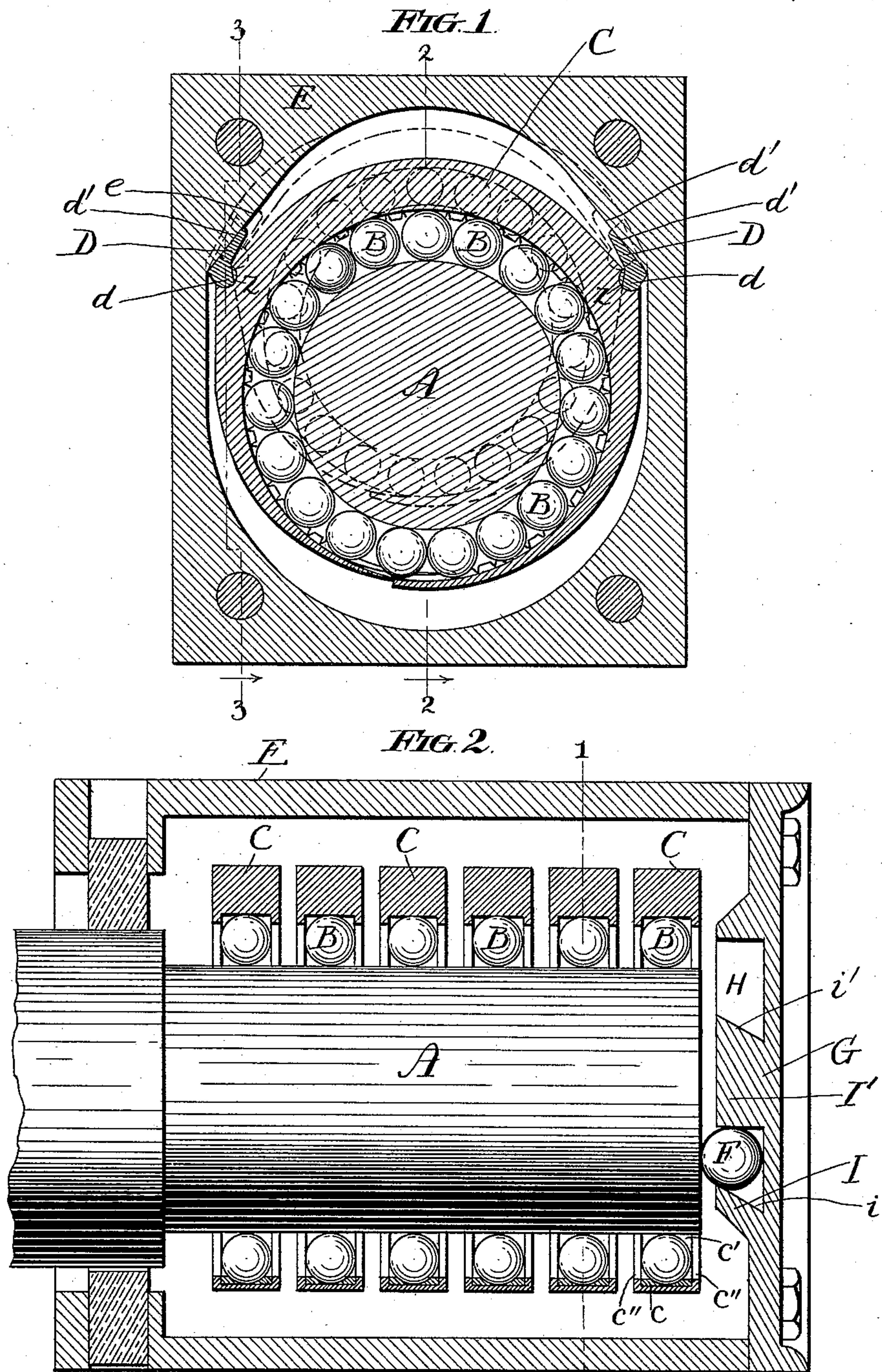
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3 Sheets—Sheet 1.

C. H. WOODWORTH.
JOURNAL BEARING.

No. 572,236.

Patented Dec. 1, 1896.



Witnesses:
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S. E. Sharon

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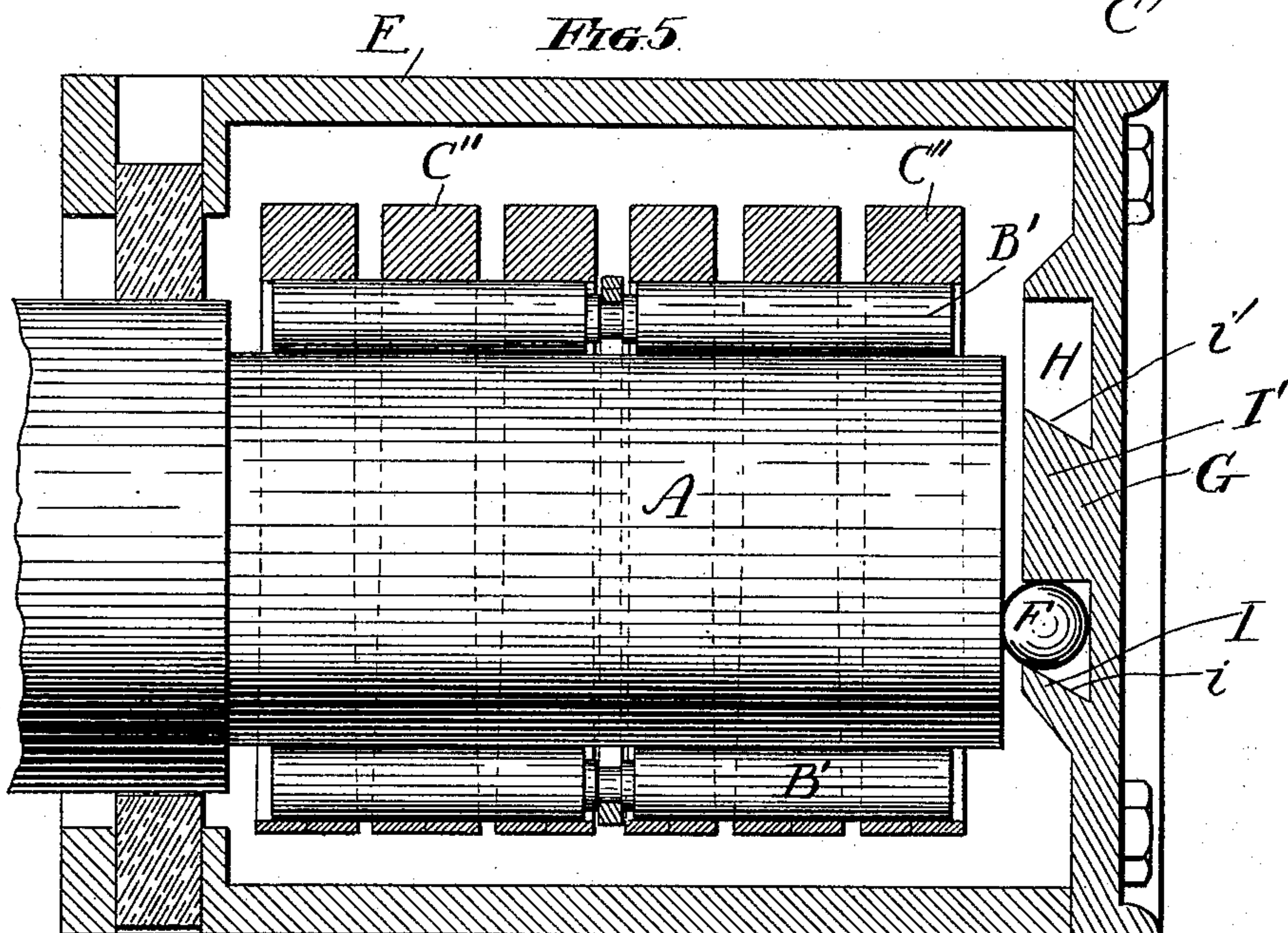
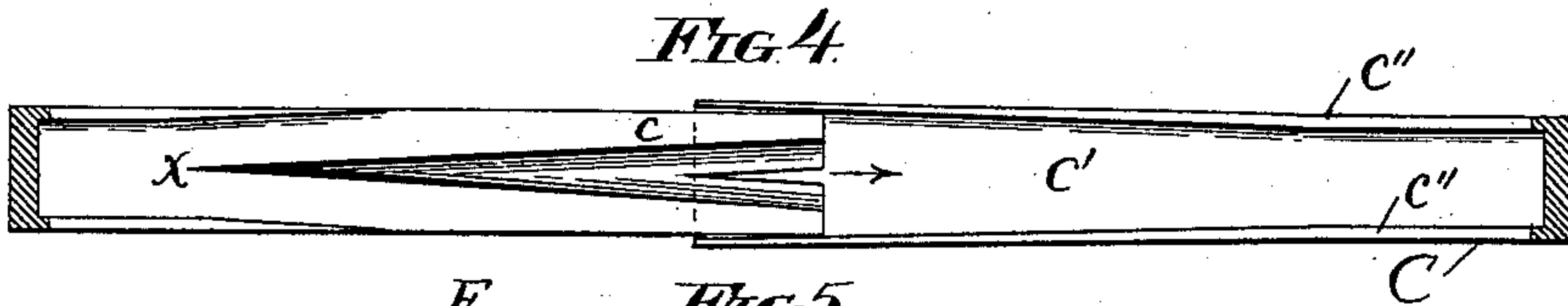
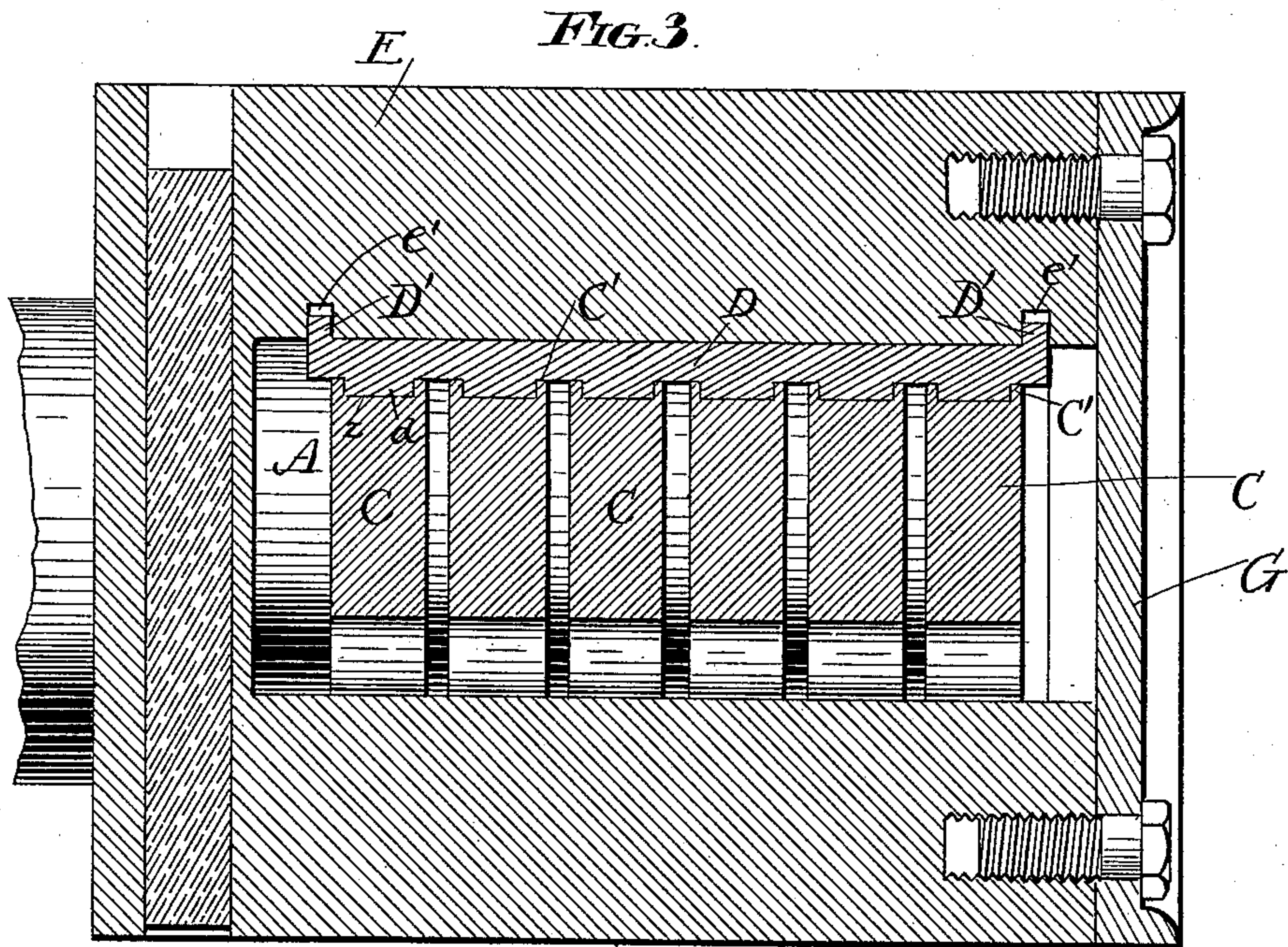
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(No Model.)

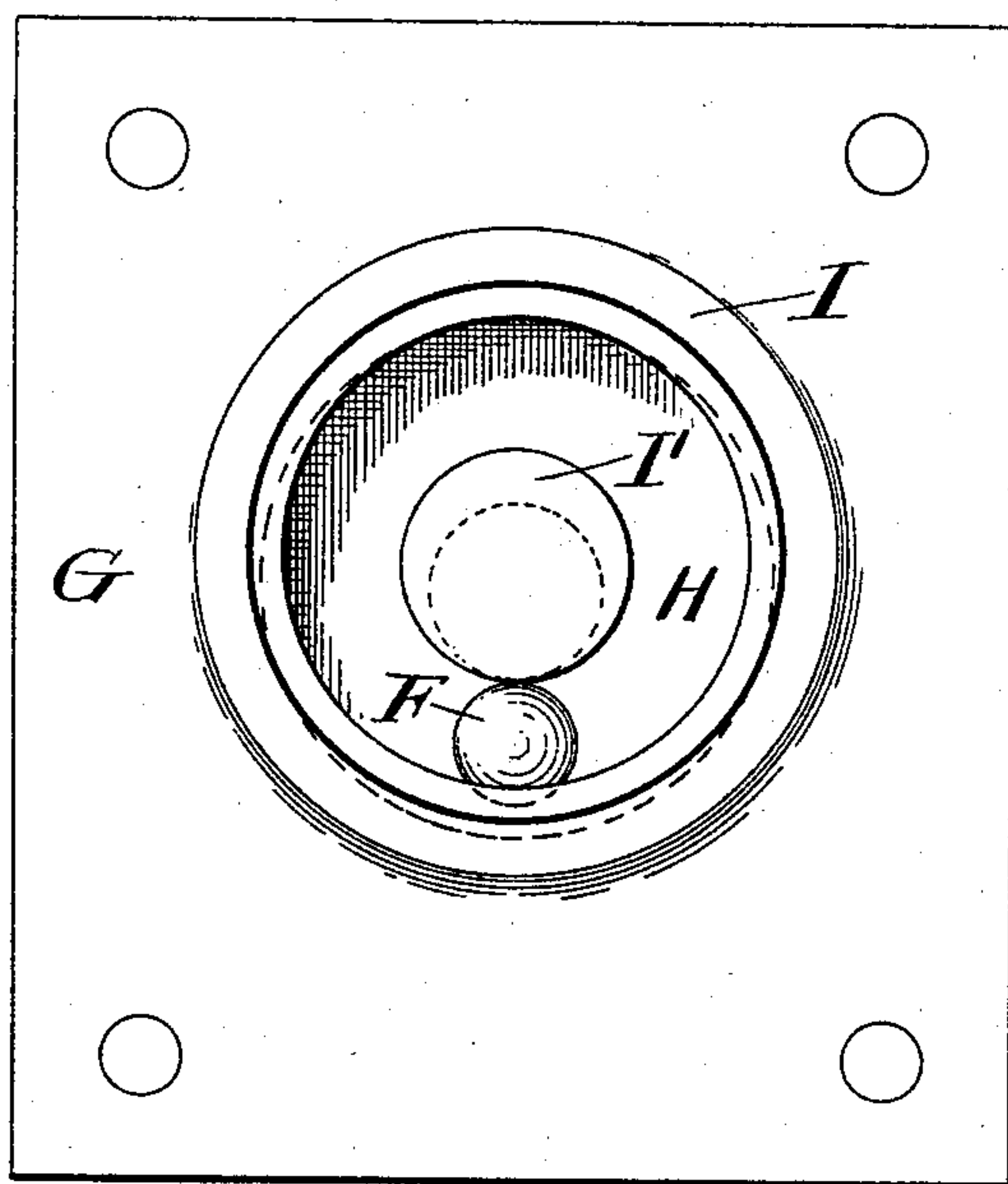
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Fig. 6.



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UNITED STATES PATENT OFFICE.

CHARLES H. WOODWORTH, OF CHICAGO, ILLINOIS, ASSIGNOR OF ONE-HALF
TO CHARLES F. DAVIS, OF EL PASO, TEXAS.

JOURNAL-BEARING.

SPECIFICATION forming part of Letters Patent No. 572,236, dated December 1, 1896.

Application filed November 11, 1895. Serial No. 568,514. (No model.)

To all whom it may concern:

Be it known that I, CHARLES H. WOODWORTH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Journal-Bearings, of which the following is a specification.

The present invention relates to that class of journal-bearings in which antifriction devices (either balls or rollers) are interposed between the journal and its bearing, the bearing being arranged upon the inner surface of a ring or a series of rings arranged side by side.

The object of the invention is to provide a journal-bearing of such construction that the concentricity of the outer surface of the journal and the inner surface of the bearing will be maintained and the wearing of all the parts compensated for automatically. This object I accomplish by using an open spring-ring, which must be expanded in order to receive within it the journal and the antifriction devices when these parts are new, the normal circumference of its interior being such that it will contract, when permitted to do so, to the minimum circumference, that will include the journal and antifriction devices when the parts shall have been worn to such an extent as to be no longer serviceable.

I am aware that it has been proposed to surround the antifriction-rollers of a roller-bearing with a sleeve having a tendency to contract and to transmit the load to this sleeve through the medium of a pair of shoes having curved surfaces which, when the bearing is new, are concentric with the axis of the journal, a packing of rubber being arranged between the shoes and the sleeve and the load being put upon each of the shoes at only one point. These shoes are rigid, and hence as the bearing wears the concentricity of their inner curved surfaces with the axis of the bearing will be destroyed. This construction is open to the objection that a circular seat of unchangeable radius is provided for a sleeve of changeable radius, and hence as the parts wear and the sleeve contracts its external surface will become eccentric with relation to its seat, and as a consequence the load will not be properly distributed, and this

fact is not altered by the fact that the circular seat is in the shape of a pair of shoes which are to a limited extent movable independent of each other.

A bearing constructed in accordance with the present invention differs from that above described in that there is no circular seat for the bearing-ring. It is provided with a seat of such nature that it accommodates itself to the ring and permits it to contract without altering the disposition of the load. A bearing constructed in accordance with the present invention includes as an essential feature a compensating seat for the bearing-ring, and this compensating seat I prefer to arrange upon two shoes which have pivotal engagement with the bearing-ring and a sliding engagement with the journal-box. So far as this essential feature of the invention is concerned it is immaterial whether balls or rollers be used as antifriction devices, albeit I prefer to use balls.

The invention consists in the features of novelty that are particularly pointed out in the claims hereinafter, and in order that it may be fully understood I will describe it with reference to the accompanying drawings, which are made a part of this specification, and in which—

Figure 1 is a vertical transverse section of a journal-bearing embodying the invention in its preferred form, the parts being shown in full lines in the positions that they occupy when they are new and by dotted lines in the positions that they occupy after they have been worn to a considerable extent. Figs. 2 and 3 are vertical longitudinal sections thereof on the lines 2 2 and 3 3, Fig. 1. Fig. 4 is a plan view of a fragment of one of the bearing-rings, showing the construction of its overlapping ends. Fig. 5 is a vertical longitudinal section of a journal-bearing embodying such features of the invention as are applicable to journal-bearings in which rollers are used as antifriction devices. Fig. 6 is an elevation of the cap of the journal-box viewed from the inner side.

A represents the journal, B a series of antifriction-balls, and C the bearing-rings, any desired number of which may be used, depending upon the number of ball-circles it is

desired the bearing shall have. In the drawings I have shown six of these rings, but as they are all of similar construction this description will, for the sake of brevity, be confined to but one of them, excepting where it becomes necessary to include others.

The upper half of the bearing-ring is very much heavier and thicker than the lower half, since it is the upper half that is called upon to sustain the load, the lower half being provided simply for the purpose of holding the balls in place. On its under side it is open and its ends overlap, the inner one *c* of the overlapping ends being bifurcated, as shown more clearly in Figs. 2 and 4. Ordinarily the balls will travel in a path midway between the edges of the ring, and hence it follows that even though the end *c* of the ring terminates abruptly, still it will not present a shoulder over which the balls must pass, because, as will be seen on reference to Fig 2, by bifurcating the inner end *c* two bearings with which the ball comes in contact before it reaches the extremity of the end *c'* are provided. When the extremity *c'* is reached, two points on the ball will be bearing upon the inner edges of the two divisions of the bifurcated end *c*. In order that these two bearings for the balls shall be of ample area, the inner edges of the two divisions of the bifurcated end of the ring are curved, as shown more clearly in Fig. 2. The bearings thus provided converge from their extremities to the crotch *x*, and hence it follows that the distance between the points on the balls with which they have contact varies and gradually increases or decreases, according to the direction in which the balls travel.

From the extremity of the end *c'*, proceeding in the direction of the arrow, the inner surface of the ring is a true circle until the point *x* is reached, and from here to the extremity of the bifurcated end *c* its inner surface gradually approaches the center from which the circular portion is struck. If this were not so, there would be somewhere or other a shoulder which the balls would have to pass over. The flanges *c²*, with which the ring is provided for the purpose of preventing the balls from becoming displaced, terminate somewhere between the point *x* and the extremity of the bifurcated end of the ring and are preferably notched, as shown in Fig. 1. This ring when new and not under tension has an internal circumference that is considerably less than the circle that will include the journal and the balls when they are new, so that it will have a constant tendency to contract and will contract as the parts wear to the minimum circumference that will include them when they shall have worn to such an extent as to be no longer of any use. This tendency to contract is aided by putting the load upon the ring at two points located above its horizontal diameter and upon opposite sides of its vertical diameter. Preferably in order to accomplish this the ring is

provided at each of these points with a socket *z* for receiving a cylindrical portion *d* of a shoe D, which has a flat surface *d'*, that bears against a seat *e*, formed for it on the journal-box E. By making the portions *d* of these shoes and the sockets in which they fit circular and complementary a relative movement between the ring and shoe is permitted and the latter will accommodate itself to the position of the former. In consequence thereof as the parts wear the ring contracts, bringing the points *z z* closer together, and as this takes place the shoes D accommodate themselves to the changed positions of these points *z* by sliding along their seats *e*. As may be seen more clearly in Fig. 3, the sockets *z* for receiving the cylindrical projections *d* of the shoes do not extend the entire width of the ring, shoulders *C'* being left to engage the ends of said projections, whereby movement of the ring in the direction of its axis relatively to the shoes is prevented, the movement of the shoes in the same direction being prevented by projections *D'*, that are formed on them and occupy sockets *e'* in the box.

Where a number of rings such as above described are used, they are arranged side by side, as shown in Figs. 2 and 3, and the shoes D constitute the means whereby they are spaced or held in proper positions with relation to each other.

Where rollers are used as antifriction devices, the bearing may be constructed as shown in Fig. 5, where *B'* represents the rollers and *C''* the rings, which differ from the rings shown in Figs. 1 to 4, inclusive, in that they are without marginal flanges and their overlapping portions lie in the same circle, instead of being arranged one within the other, as above described.

F is an antifriction-ball arranged upon a race supported by the inner face of the cover G of the journal-box and so disposed that the ball is in position to take the end thrust of the journal.

I do not claim to be the first to use an antifriction-ball for this purpose, and so far as this feature of the invention is concerned it is limited to the construction of the race, the peculiarity of which is that it slopes downward away from the end of the journal and has contact with the ball at a point located between the end of the journal and a vertical plane which is perpendicular to the axis of the journal and cuts the center of the ball, so that the ball will have a constant tendency to roll away from the end of the journal. This race is formed in two parts, one of which, *i*, is on a circular flange I, and the other of which, *i'*, is on a projection I', located within the flange I.

It will be understood that while the ball is below the horizontal diameter of the journal it will be supported by the part *i* of the race, and while it is above the horizontal diameter it will be supported by the part *i'*.

While I have shown in the drawings only

one antifriction-ball for taking the end thrust, (this being the number customarily used,) still I desire to have it understood that the invention is not limited thereto and a greater number may be used, if desired.

Having thus described my invention, the following is what I claim as new therein and desire to secure by Letters Patent:

1. The combination with a journal and a series of antifriction devices surrounding it, of an open spring-ring encircling said antifriction devices, said ring being of such diameter that when in use it has a constant tendency to contract, and means for transmitting the load to said ring at two points located upon opposite sides of the vertical diameter of the journal, substantially as set forth.

2. The combination with a journal and a series of antifriction devices surrounding it, of an open spring-ring encircling said antifriction devices, said ring being of such diameter that when in use it has a constant tendency to contract, and a pair of shoes for transmitting the load directly to said ring at two points located upon opposite sides of the vertical diameter of the journal, substantially as set forth.

3. The combination with a journal and a series of antifriction devices surrounding it, of an open spring-ring encircling said antifriction devices, a pair of movable shoes through which the load is transmitted to the ring, said shoes being in engagement with the ring upon opposite sides of its vertical diameter, and seats upon which said shoes bear and are adapted to slide in order to accommodate themselves to the position of the ring, substantially as set forth.

4. The combination with a journal, of a series of antifriction devices surrounding it, a ring encircling said antifriction devices, a pair of movable shoes through which the load is transmitted to the ring, said shoes being in engagement with the ring upon opposite sides of its vertical diameter, and seats against which said shoes bear and upon which they are adapted to slide, said shoes having rocking engagement with the ring, substantially as set forth.

5. The combination with a journal and a series of antifriction devices surrounding it, of an open spring-ring having a constant tendency to contract encircling said antifriction devices, a pair of movable shoes having circular projections, and seats upon which said shoes bear and are movable, the ring being provided upon opposite sides of its vertical

diameter with circular sockets in which the projections of the shoes fit, substantially as set forth.

6. The combination with a journal and a series of antifriction devices surrounding it, of an open spring-ring having a constant tendency to contract, encircling said antifriction devices, a pair of movable shoes having circular projections, and seats upon which said shoes bear, the ring being provided with circular sockets in which the circular projections of the shoes fit and with shoulders engaging the ends of said projections, substantially as set forth.

7. The combination with a journal and a plural series of antifriction devices surrounding it, of a plurality of open spring-rings encircling said antifriction devices, means for transmitting the load to each of the rings at two points located upon opposite sides of its vertical diameter and means for holding said rings at the proper distance apart, substantially as set forth.

8. The combination with a journal and a series of antifriction-balls surrounding it, of an open spring-ring having a constant tendency to contract encircling said balls, said ring being provided with overlapping ends the inner one of which is bifurcated and provided along the inner edges of its two divisions with converging bearings for the balls, substantially as set forth.

9. The combination with a journal and a bearing therefor, of a journal-box having opposite the end of the journal an annular race and an antifriction-ball arranged on said race, the point of contact between the race and ball being between the end of the journal and a vertical plane which is perpendicular to the axis of the journal and cuts the center of the ball, whereby the ball is given a tendency to roll away from the end of the journal, substantially as set forth.

10. The combination with a journal and a bearing therefor, of a journal-box having opposite the end of the journal an annular race, the outer wall of which, below the horizontal diameter of the journal, slopes downward and away from the end of the journal, and the inner wall of which, above the horizontal diameter of the journal, slopes downward and away from the end of the journal, and a ball arranged in said race, substantially as set forth.

CHARLES H. WOODWORTH.

Witnesses:

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