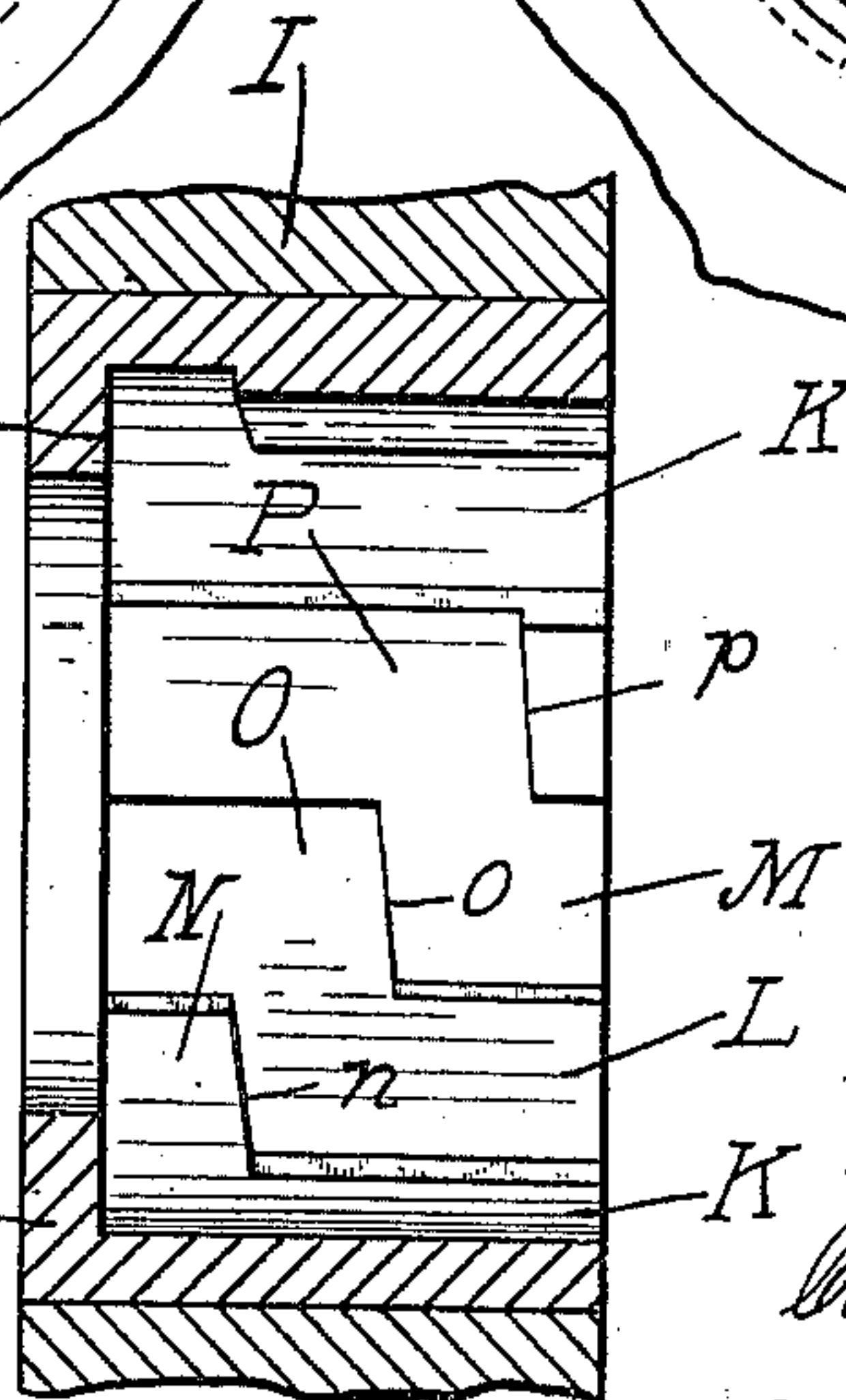
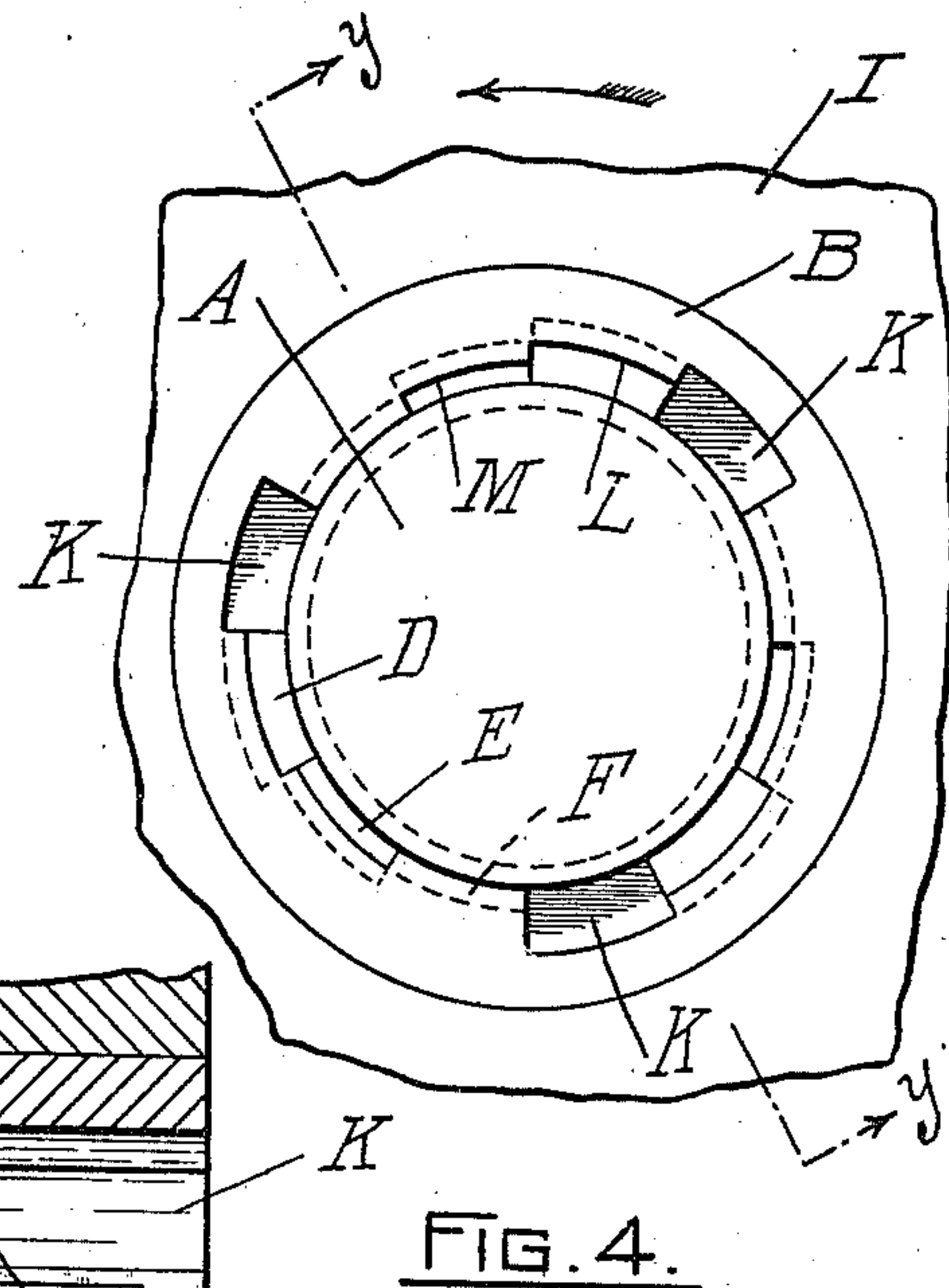
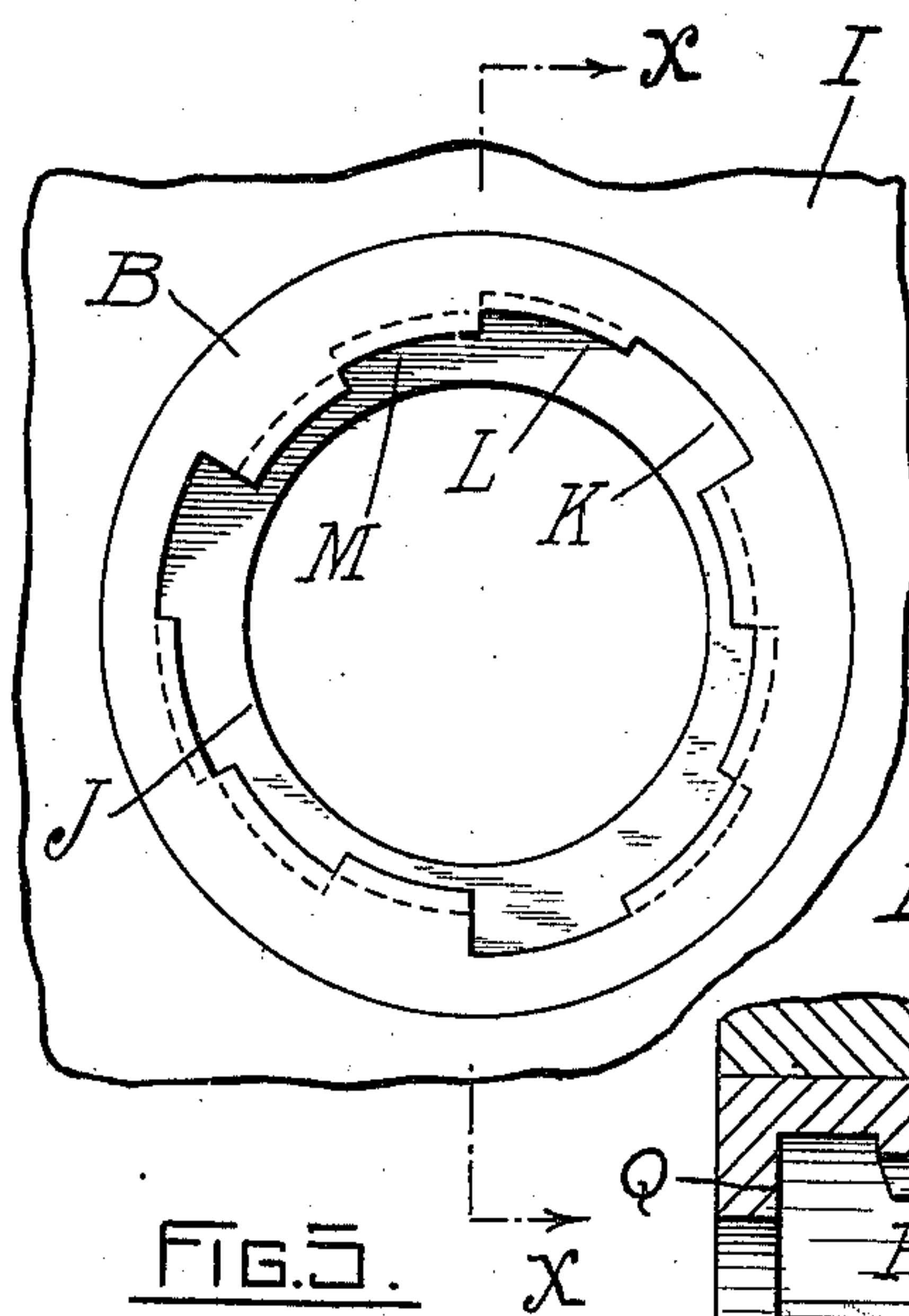
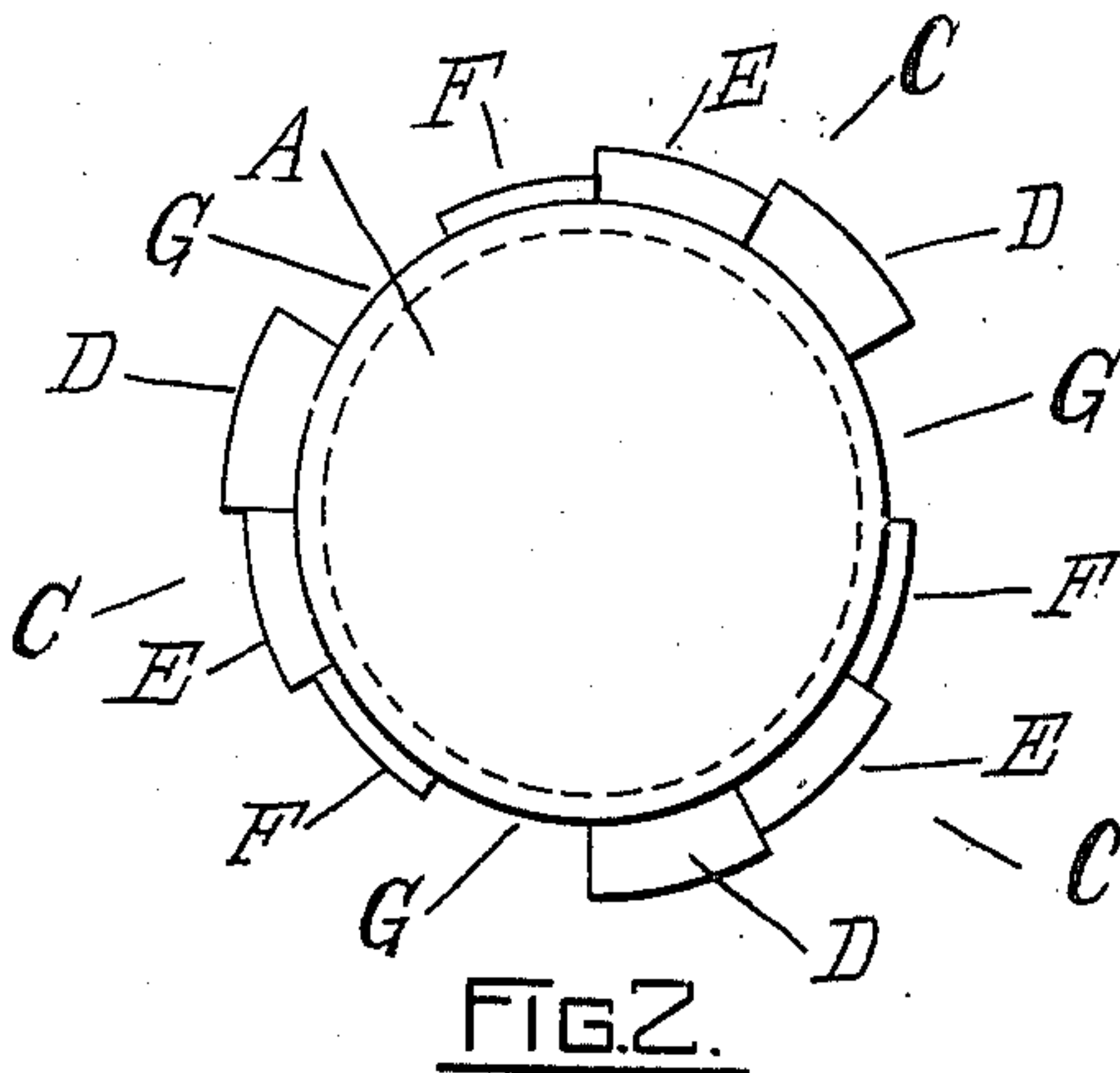
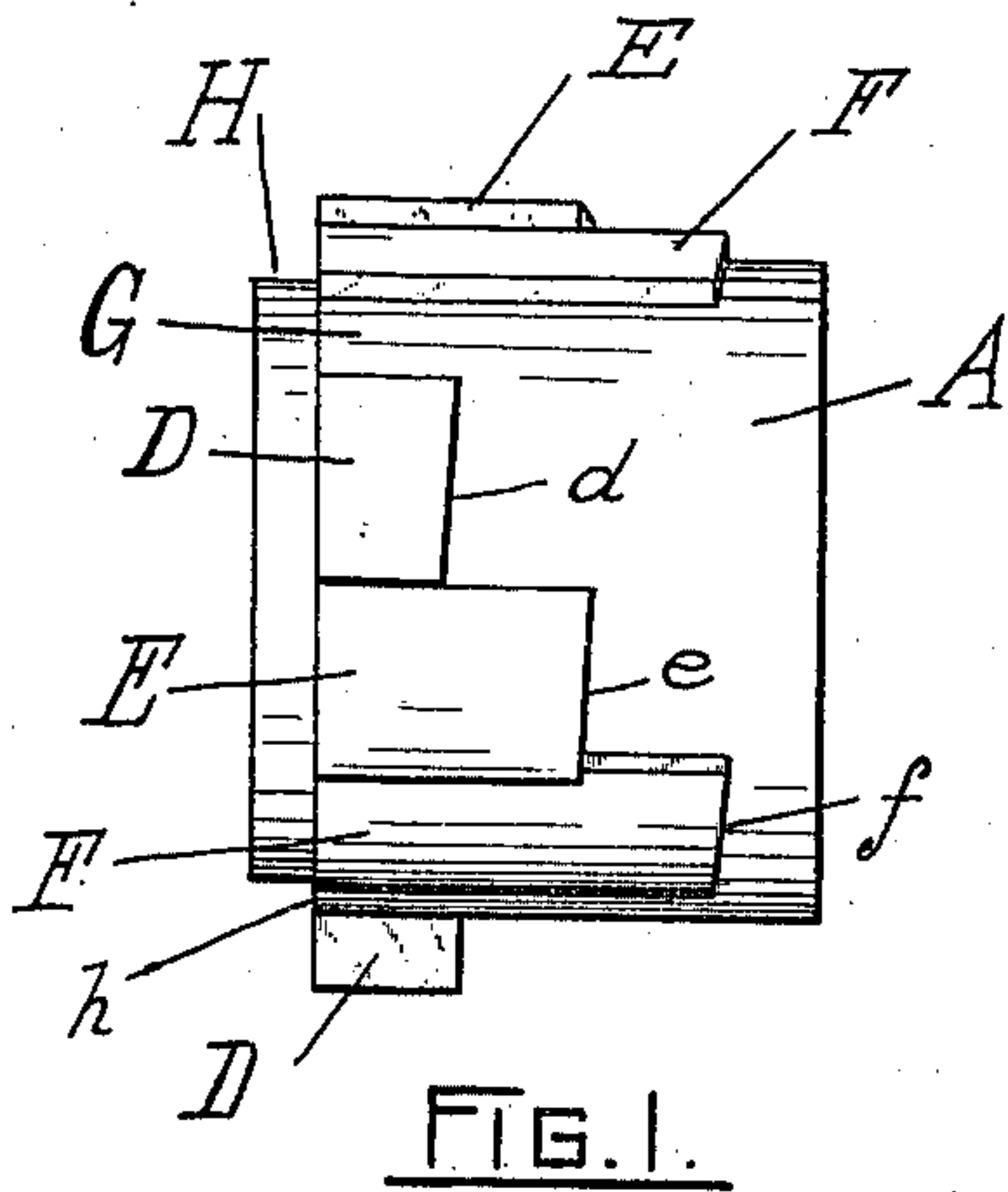


C. J. LJUNGGREN.  
CLOSURE LOCKING MEANS.  
APPLICATION FILED SEPT. 21, 1909.

974,897.

Patented Nov. 8, 1910.

2 SHEETS-SHEET 1.



WITNESSES.

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2 SHEETS—SHEET 2.

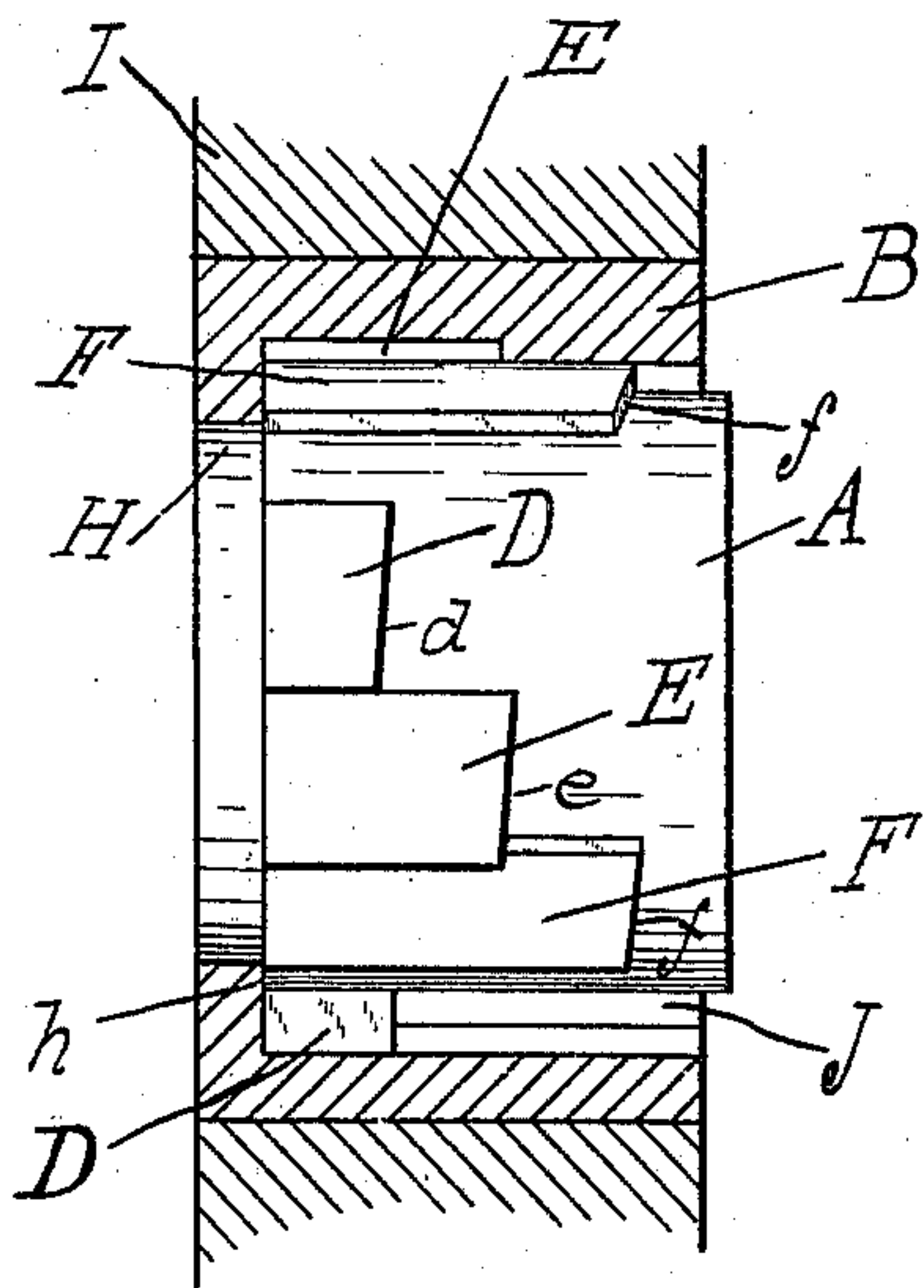


FIG. 6.

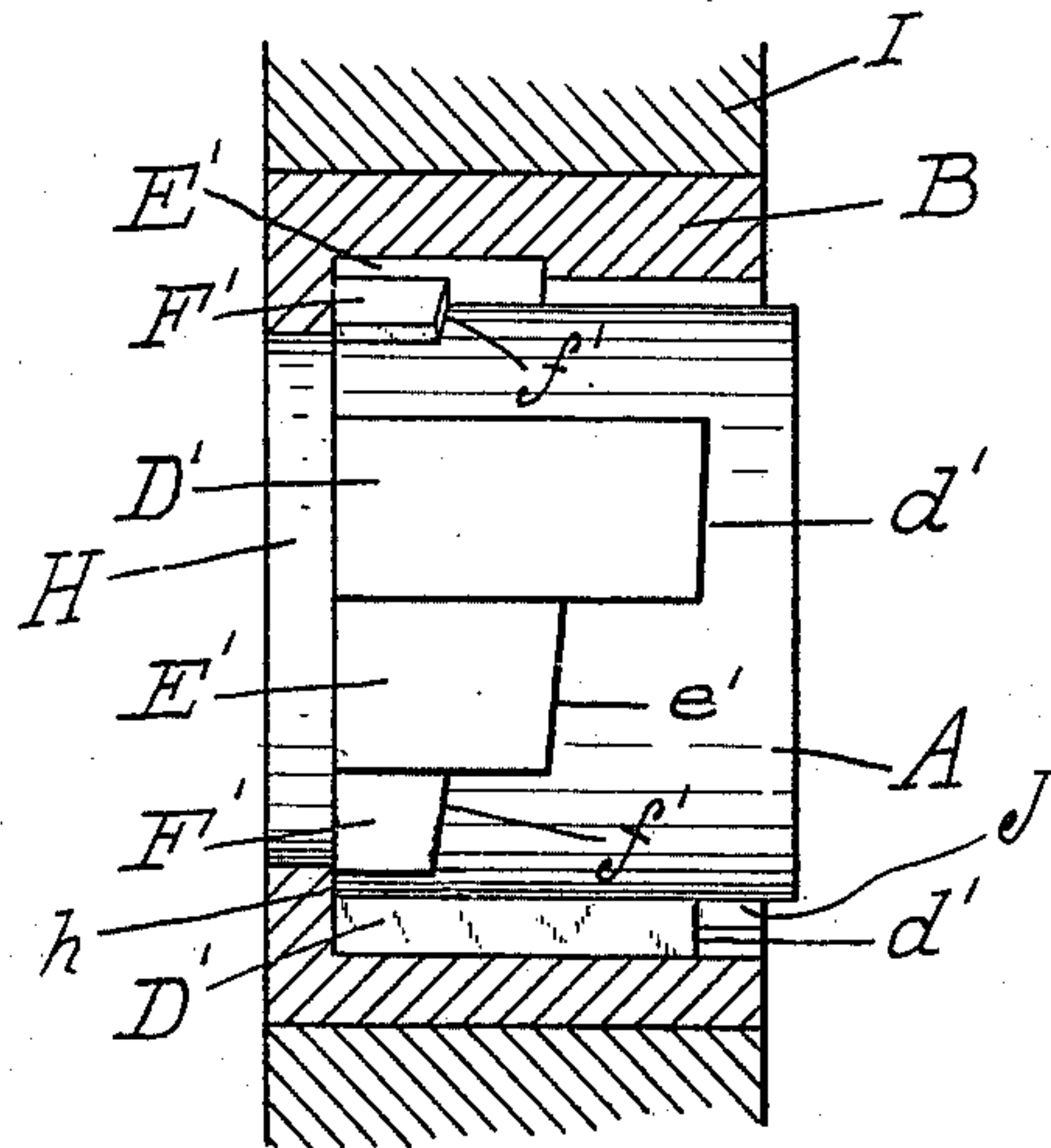


FIG. 7.

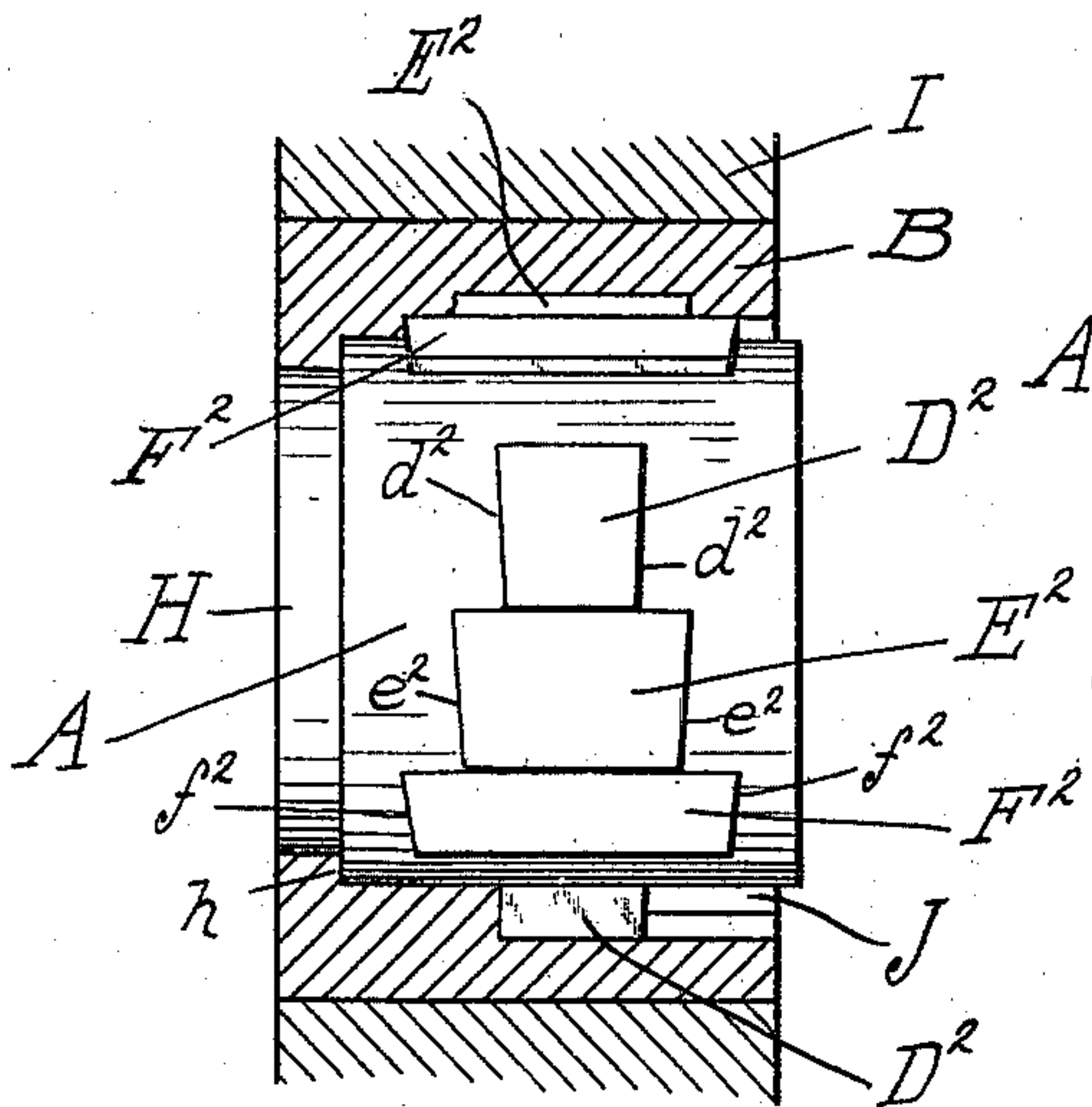


FIG. 8.

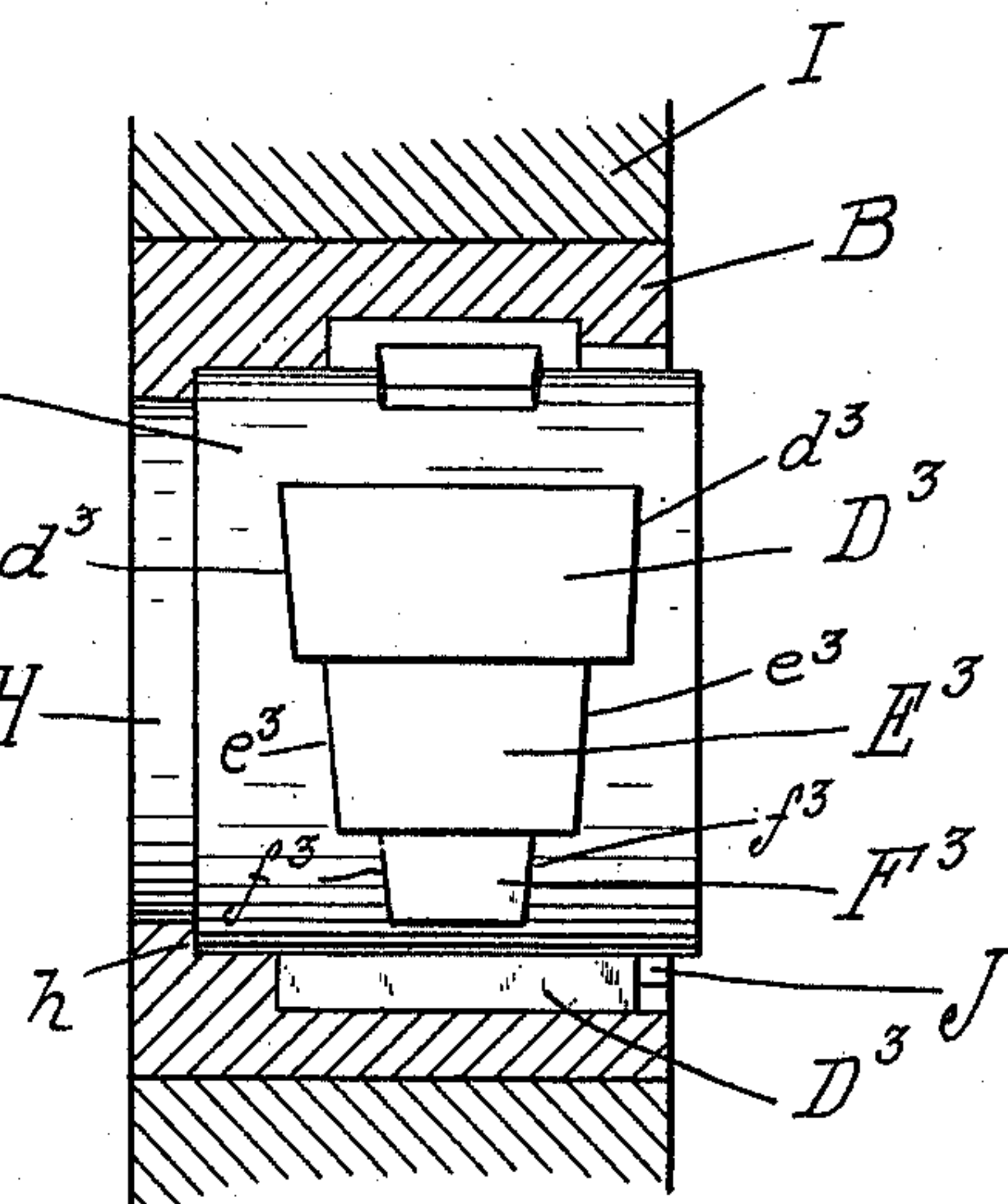


FIG. 9.

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# UNITED STATES PATENT OFFICE.

CARL J. LJUNGGREN, OF PROVIDENCE, RHODE ISLAND.

## CLOSURE-LOCKING MEANS.

974,897.

Specification of Letters Patent.

Patented Nov. 8, 1910.

Original application filed September 2, 1908, Serial No. 451,444. Divided and this application filed September 21, 1909. Serial No. 518,796.

*To all whom it may concern:*

Be it known that I, CARL J. LJUNGGREN, a subject of the King of Sweden, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Closure-Locking Means, of which the following is a specification.

My invention relates to closure locking means purposed for use in structures of various characters such as vault doors, port holes, man holes, and gun breeches, and is a division of my pending patent application, Serial No. 451,444, filed Sept. 2, 1908.

The general objects of my invention are to increase resistance against pressure, to render the closure member self seating and adapted to compensate for wear, to minimize the cost of construction and the number of parts, and to make it possible to limit the number of or entirely dispense with screw threads, which develop weakness under repeated or violent strains, accumulate dirt, and are susceptible to injury.

Further objects are to prevent longitudinal play of the closure member, to distribute the strain or pressure upon said member both radially and longitudinally, to insure security against longitudinal movement before the closure is completely engaged, and to render the interior parts inaccessible when engaged.

My invention consists in providing the closure and stationary members with interengaging smooth stepped segments; in graduating the stepped portions longitudinally; and in inclining the abutting ends or shoulders of the same transversely.

My invention further consists in the construction, combination, and mode of operation of the parts set forth in and falling within the scope of the claims hereto appended.

In the accompanying drawings which form a part of this specification Figures 1 and 2 are side and rear end elevations respectively of the novel closure member, Fig. 3, a rear end view of the receiving orifice, Fig. 4, a rear elevation of the closure member in engaged position within the orifice of the stationary member, Fig. 5, a section on line *x x* of Fig. 3, Fig. 6, a partial section on line *y y* of Fig. 4, and Figs. 7, 8, and 9 side ele-

vations, partially in central section, of modified forms of my invention.

Like reference characters indicate like parts throughout the views.

My invention is embodied in a closure member A which is either a plug or a door, adapted to be engaged in a stationary member B which is either a breech or a jamb. The mechanism for supporting, inserting, rotating, and withdrawing the member A forms no part of the present invention and is well known in the art; therefore is not herein illustrated.

In detail the closure member A is cylindrical in general outline and is provided with a plurality, in this instance three, smooth peripheral segments C interspaced equidistant from each other, each of which segments comprises a plurality of radially graduated, longitudinally disposed steps D E F of graduated lengths. The ends of the steps are transversely inclined as at *d*, *e*, and *f* respectively. The spaces or intervals between the segments C are indicated at G. In the construction illustrated the forward end of the member A is of reduced diameter as at H forming a shoulder *h*.

The stationary member is in this instance a collar B fixed in any suitable manner in the wall I, and incloses a substantially cylindrical orifice J having a circumferential series of radially graduated longitudinally disposed entrance channels K, L, and M, corresponding in relative dimensions with the steps D, E and F respectively. At their inner ends the channels are extended transversely of and at an inclination to their former course, as at N, O, and P respectively, whereby are formed a series of seats terminating at their outer ends in a series of transversely disposed inclined abutments or shoulders *n*, *o*, and *p* respectively. Since the lengths of the channels K, L, and M are of regularly graduated lengths, the shoulders *n*, *o*, and *p* are disposed in a diagonal series within the orifice J. And as the depths of the channels are regularly graduated the said shoulders are in stepped relation. The orifice J is preferably of reduced diameter at its rear end to form an abutment Q.

The members A and B are interengaged as follows. The member A, disposed as in



Fig. 1, is introduced as a sliding fit into the member B from right to left as viewed in Fig. 5; the stepped portions D E F entering respectively the channels K, L, M. The member A is then turned in the direction of the arrows, bringing the portions D E F into the areas or seats N O P respectively, with the inclined faces *d e f* in frictional contact with one end of the inclined shoulders *n o p* respectively. The shoulder *h* bears against the abutment Q. In this engaged position the members are tightly and securely held against longitudinal movement in both directions under shock or pressure. A reversal of the described movements serve to disengage the members.

The invention herein above described may be embodied in various modified forms. In Fig. 1 the upper of the graduated step portions D E F is the shortest. In Fig. 7 the corresponding portions D' E' F' have their respective lengths oppositely graduated, with the member D' longest. In Fig. 8 the stepped portions D<sup>2</sup> E<sup>2</sup> F<sup>2</sup> are of constantly increasing length downwardly and centrally superimposed upon each other, and each is provided with inclined shoulders *d<sup>2</sup> e<sup>2</sup> f<sup>2</sup>* upon both ends. The stepped portions D<sup>3</sup> E<sup>3</sup> F<sup>3</sup> in the structure of Fig. 9 are arranged as disclosed in Fig. 8 but decrease in length in a downward direction.

My novel structure has a maximum of pressure resisting power resultant upon the relatively extensive circumferential area of the interengaged bearing surfaces; and upon the distribution of the strain by virtue of the radially and longitudinally graduated character of the stepped portions. The inclined character of the ends of the abutting shoulders insures self seating of the parts and the absence of longitudinal play as well as compensation for wear of the contiguous parts. The internal joint formed by the abutting surfaces *h* and Q is so disposed as to make the insertion of an explosive into the locked parts impracticable.

When the member A is employed as a safe door it is preferably supported and seated in the jamb from the inside of the safe. The front or outside of the safe is in Fig. 6 the surface coincident with the exposed face of portion H of the closure body.

What I claim is—

1. In a device of the type set forth, the combination with a stationary member, of a closure body, and a segment upon the body comprising longitudinally disposed portions of differing lengths.

2. In a device of the type set forth, the combination with a stationary member, of a

closure body, and a segment upon the body comprising radially graduated longitudinally disposed portions of differing lengths.

3. In a device of the type set forth, the combination with a stationary member, of a closure body, and a segment upon the body comprising longitudinally stepped portions, the end faces of the stepped portions being transversely inclined.

4. In a device of the type set forth, the combination with a stationary member, of a closure body, and a segment upon the body comprising stepped portions graduated both radially and longitudinally, said stepped portions terminating in transversely inclined faces.

5. In a device of the type set forth, the combination of a hollow stationary member provided with a series of internal radially graduated longitudinally disposed entrance channels, and with transversely disposed seats extending from the channels, a rotatable closure body, a segment upon the body provided with radially and longitudinally graduated stepped portions adapted to enter the channels as a sliding fit, and to register in the seats when the body is rotated.

6. In a device of the type set forth, the combination of a hollow stationary member provided with a series of internal radially graduated longitudinally disposed entrance channels, and with seats provided with vertical faces extending from the channels and transversely inclined with relation to the channels, a rotatable closure body, a segment upon the body provided with radially graduated stepped portions adapted to enter the channels, said stepped portions being provided with inclined ends adapted to register in the seats when the body is rotated.

7. In a device of the type set forth, the combination of a hollow stationary member provided with a series of internally radially graduated longitudinally disposed entrance channels, and with longitudinally graduated seats extending from the channels and transversely inclined with relation to the channels, a rotatable closure body, a segment upon the body provided with radially graduated stepped portions adapted to enter the channels, said stepped portions being longitudinally graduated and provided with inclined ends adapted to register in the seats when the body is rotated.

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

CARL J. LJUNGGREN.

Witnesses:

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HORATIO E. BELLOWS.