

No. 697,019.

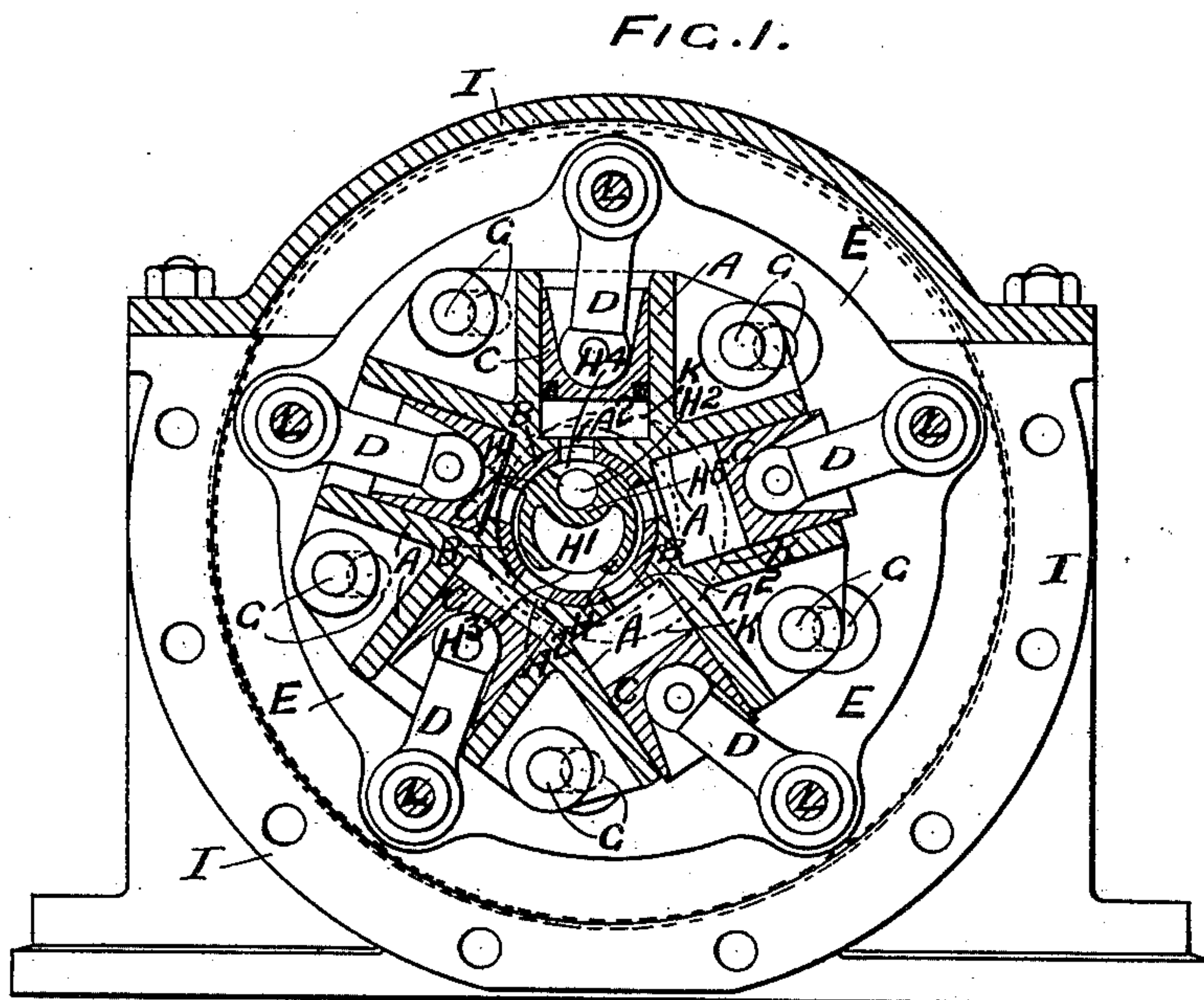
Patented Apr. 8, 1902.

R. RICHARDSON.
ROTATING CYLINDER PUMP.

(Application filed Feb. 3, 1900.)

(No Model.)

5 Sheets—Sheet 1.



Witnesses.
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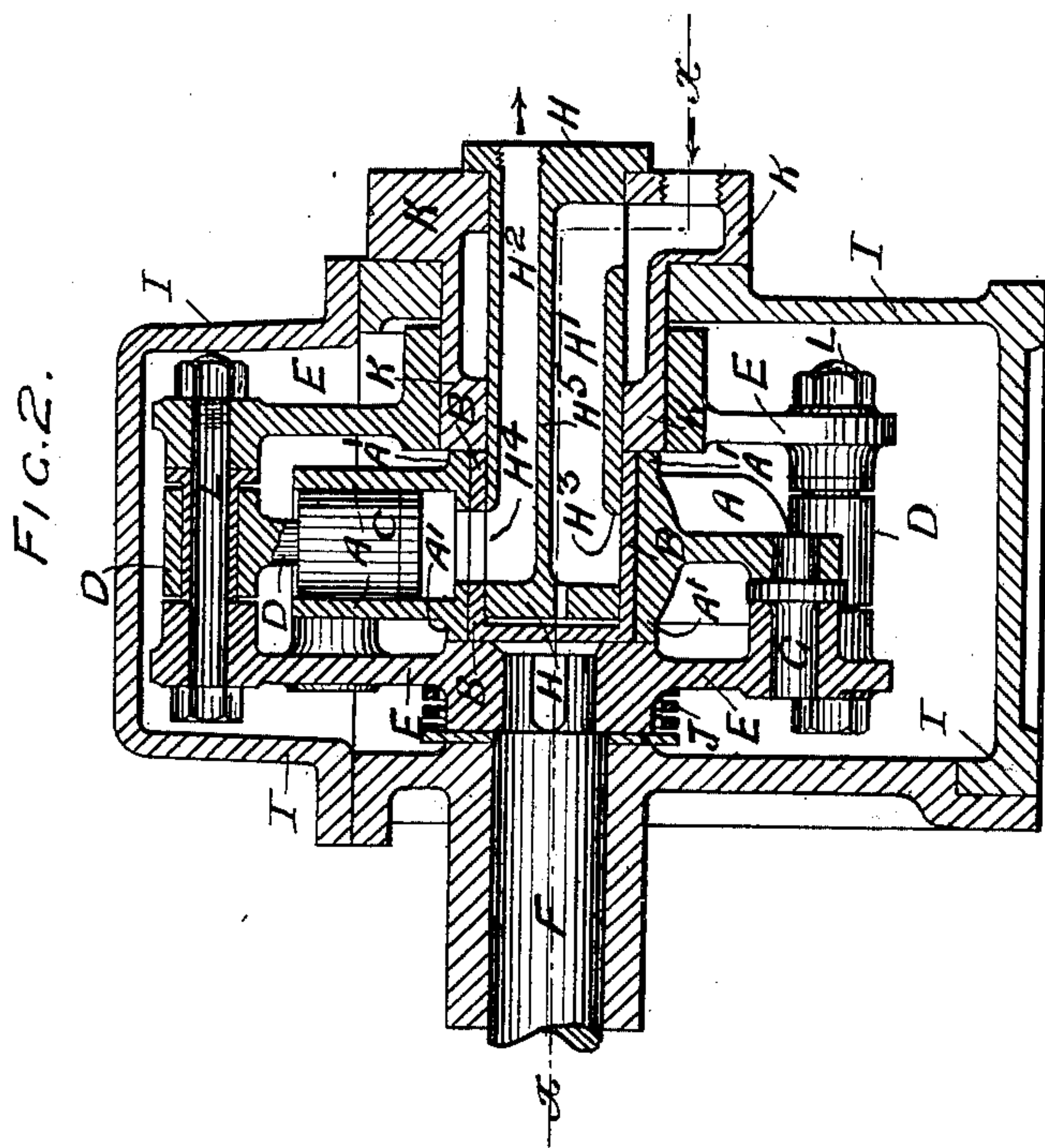
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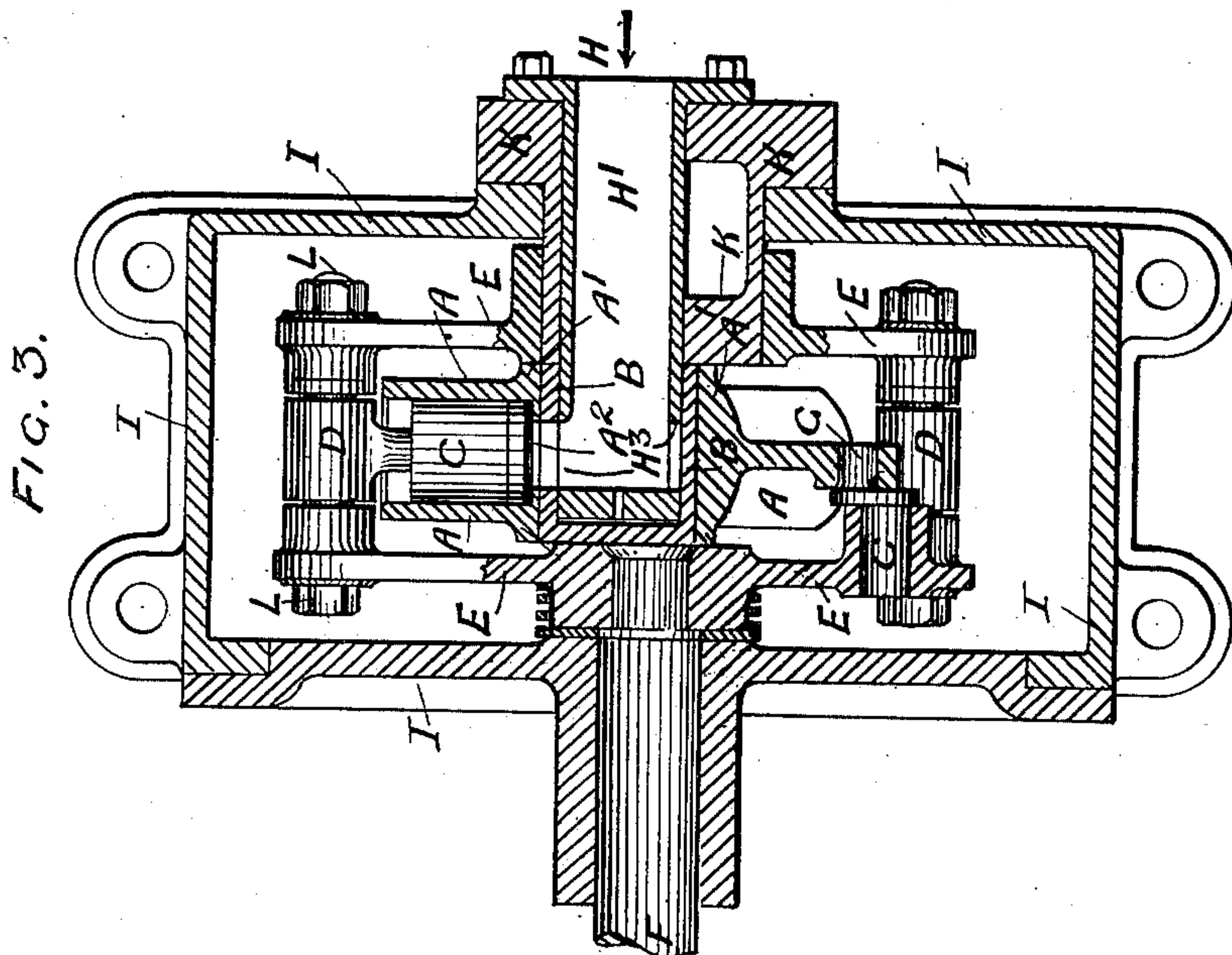
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FIG. 5.

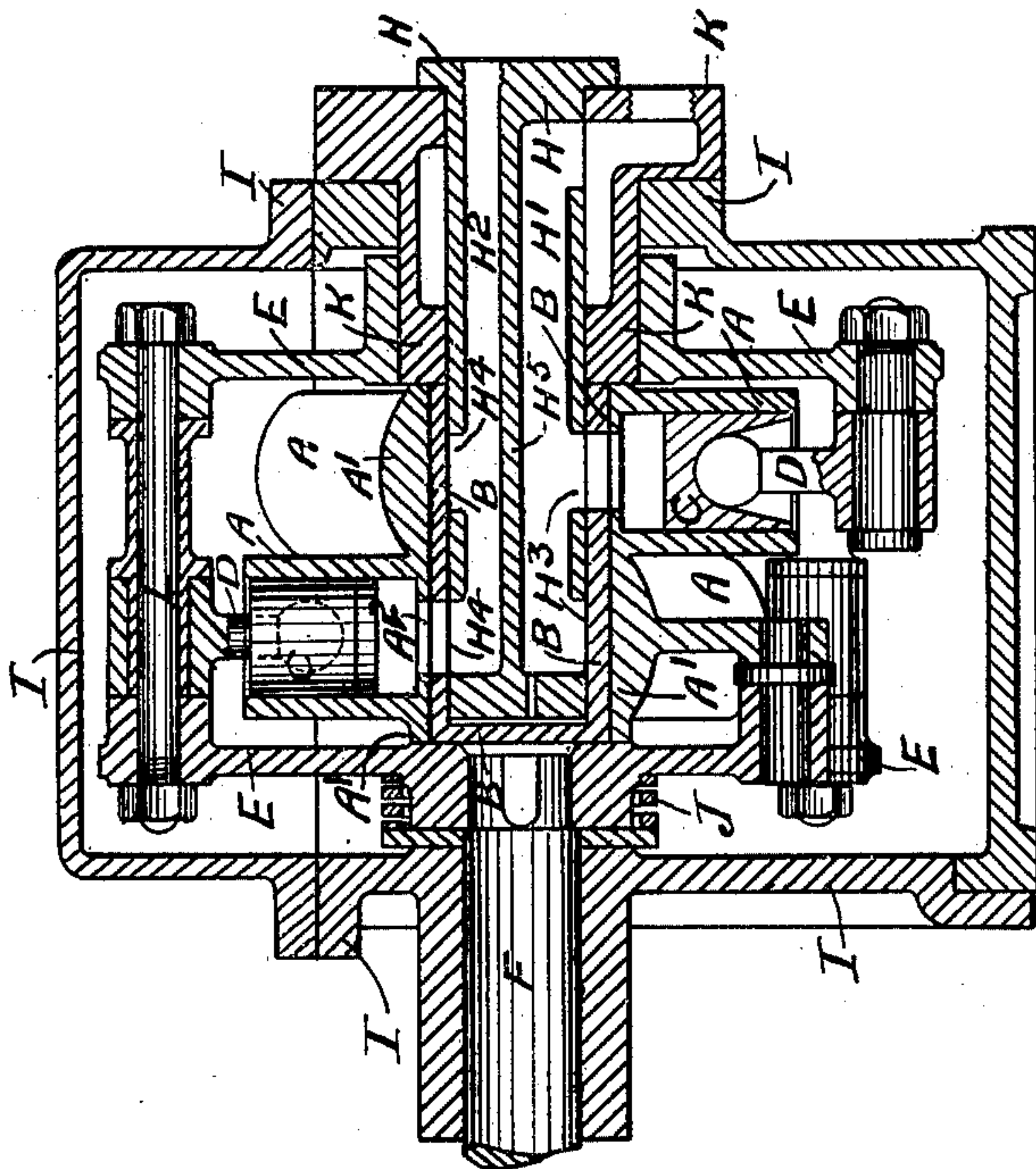
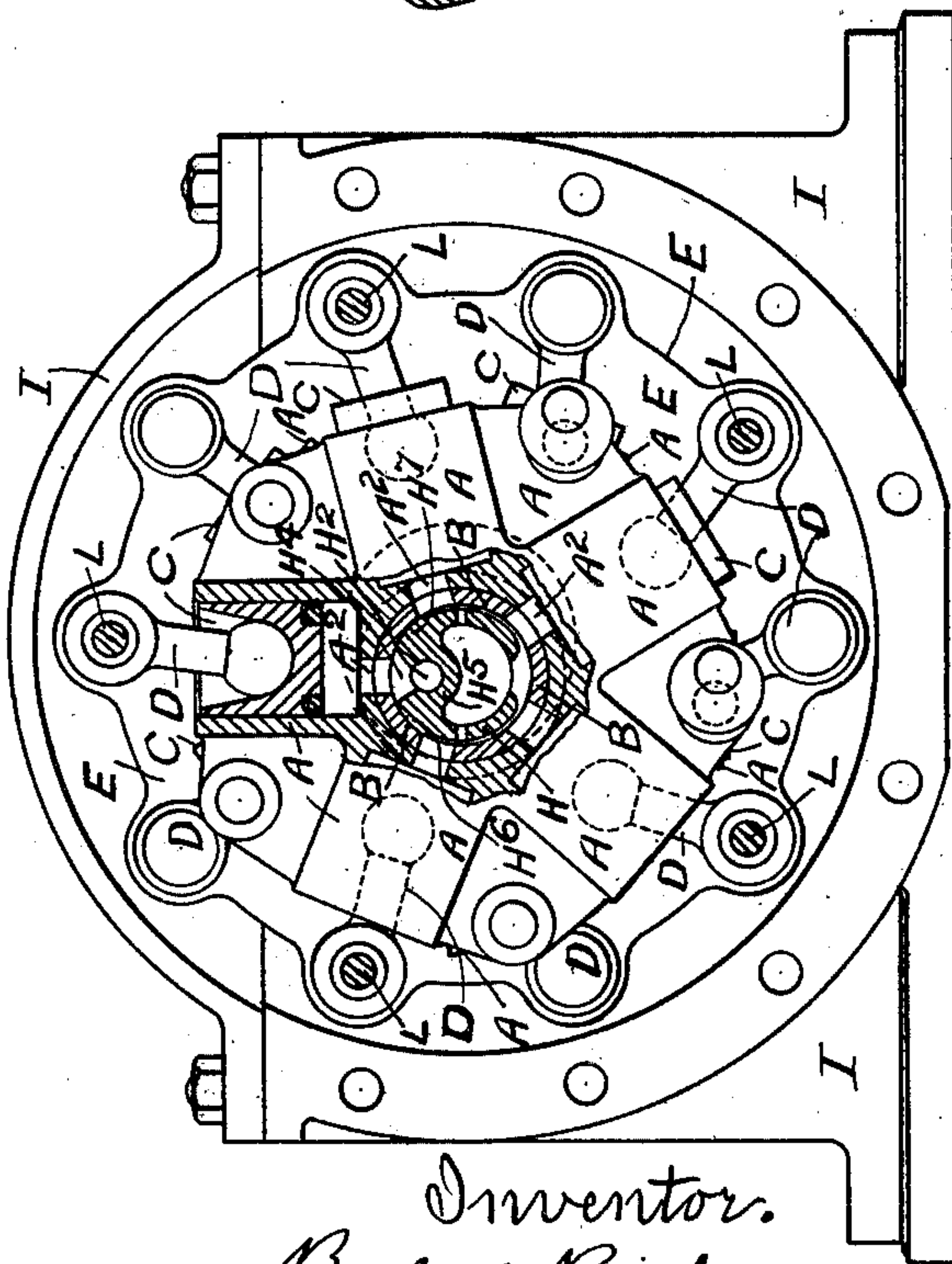


FIG. 4.



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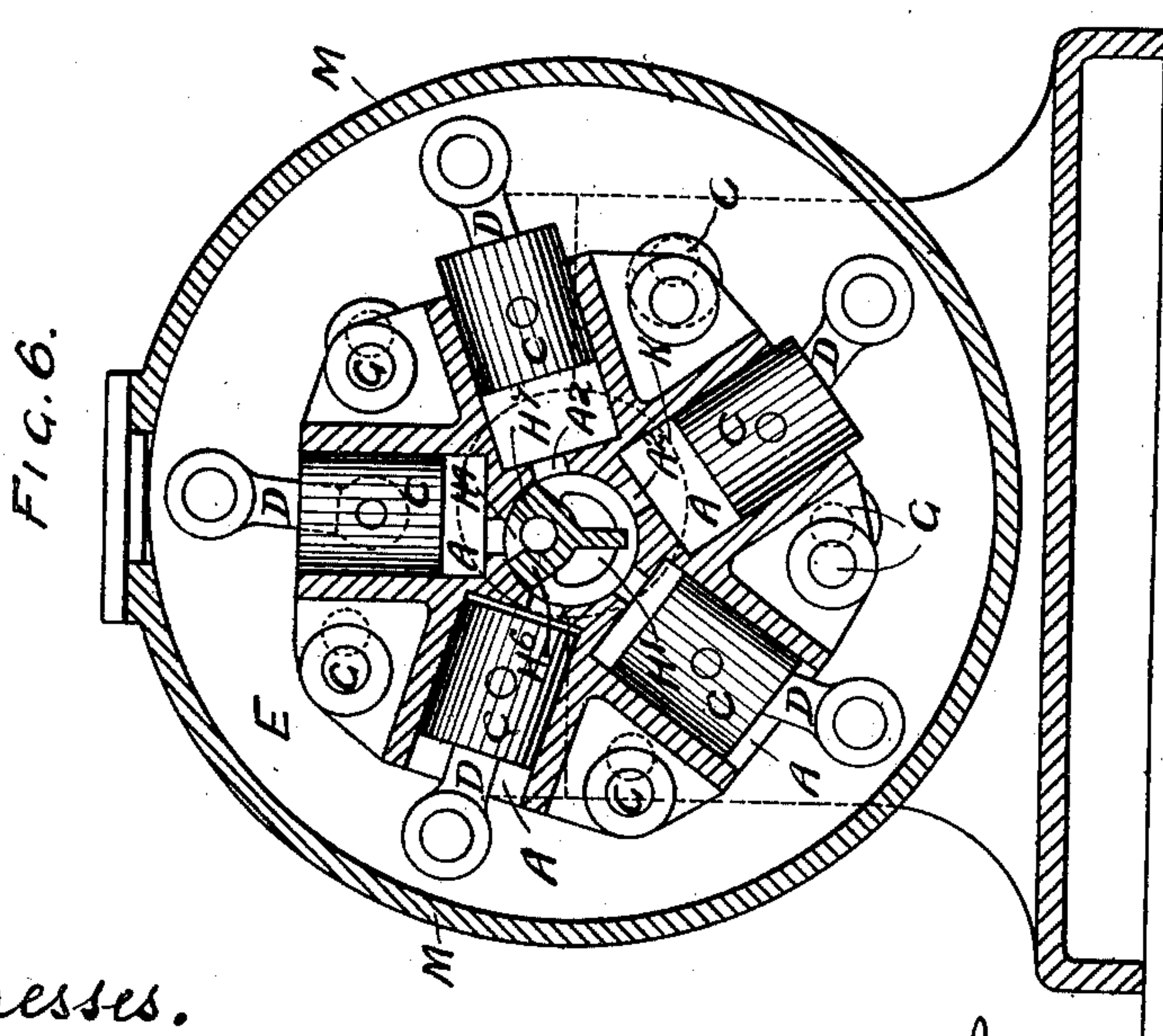
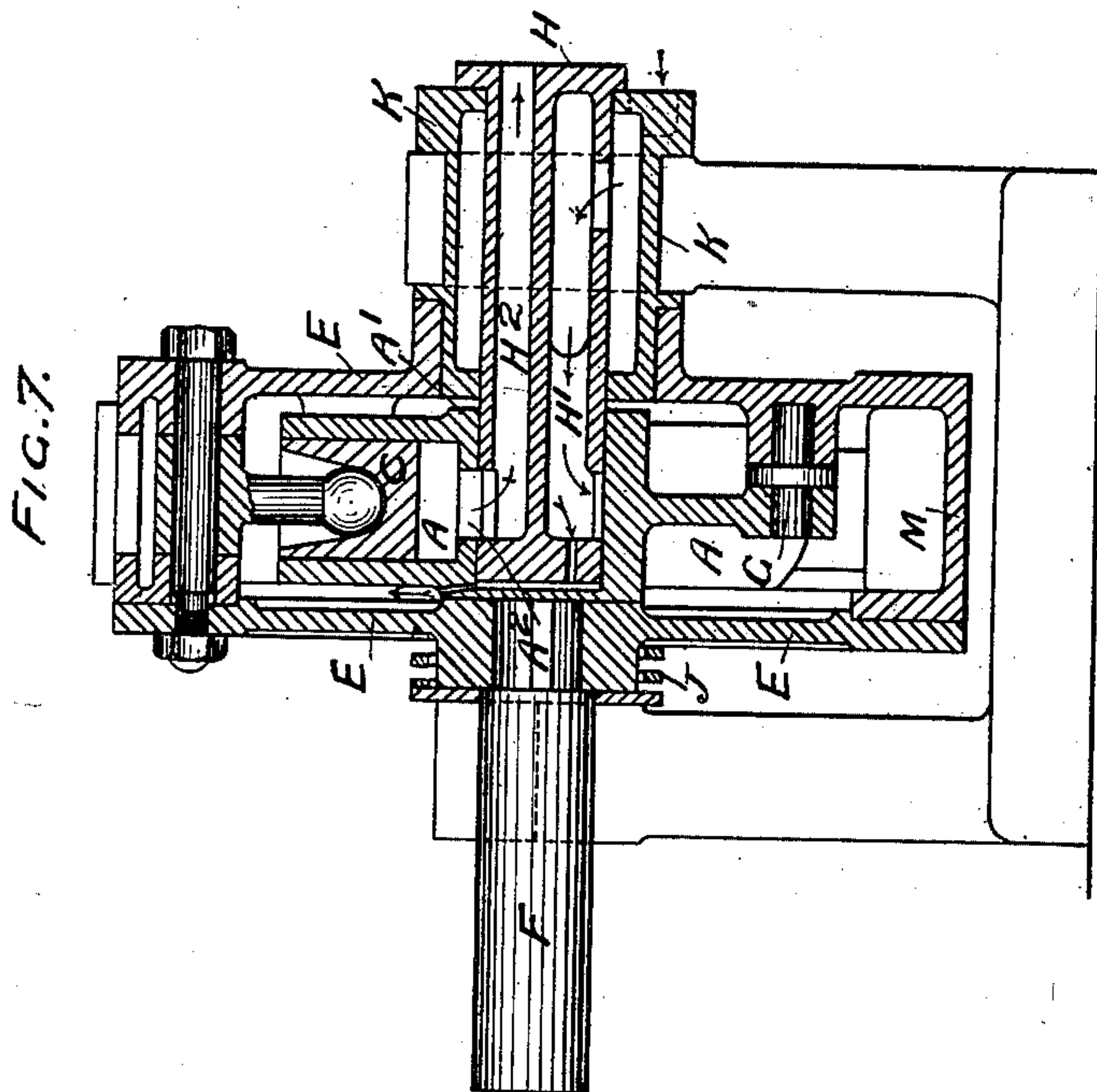
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5 Sheets—Sheet 5.



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UNITED STATES PATENT OFFICE.

ROBERT RICHARDSON, OF GLASGOW, SCOTLAND.

ROTATING-CYLINDER PUMP.

SPECIFICATION forming part of Letters Patent No. 697,019, dated April 8, 1902.

Application filed February 3, 1900. Serial No. 3,769. (No model.)

To all whom it may concern:

Be it known that I, ROBERT RICHARDSON, a citizen of the United Kingdom of Great Britain and Ireland, residing at 16 Jamieson street, Govanhill, Glasgow, Scotland, have invented certain new and useful Improvements in Rotating-Cylinder Pumps, (which have been patented in Great Britain on the 5th day of July, 1899, No. 13,866,) of which the following is a specification.

This invention relates to an improved construction of pump wherein a number of cylinders are disposed in approximately radial lines around a central boss, on which they are cast or fitted to rotate therewith upon a fixed shaft or center, through which the inlet and outlet passages for the water or other fluid are formed.

The invention is illustrated by the accompanying drawings, Figure 1 being an elevation with the front plate of the casing removed and showing part of the pump in section. Fig. 2 is a vertical section at right angles to Fig. 1; and Fig. 3 is a horizontal section on the line $x x$, Fig. 2. Fig. 4 is a view corresponding to Fig. 1, and Fig. 5 a view corresponding to Fig. 2, of a modification in which two series of cylinders are arranged along the central boss side by side, the center lines of one series being equidistant between the other series, so as to give a ten-cylinder effect. Figs. 6 and 7 are views corresponding to Figs. 1 and 2, but showing the outer casing dispensed with and a light box substituted.

As shown by the drawings, a number of cylinders A are formed in a single casting or carrier, which is fitted on or has a boss A' formed integral therewith. The inner ends of the cylinders A are formed with ports A², passing through the boss A' and preferably through an inner liner B, of brass, lignum-vitæ, or other material, revolving upon a fixed central stud H, secured to the casing I, while the outer ends are open and are fitted with pistons or plungers C, having connecting-rods D, whose ends are attached to a disk E, (or pair of disks,) bolted together, as in the modifications shown, carried by a driving-shaft F, which is eccentric to that whereon the boss revolves. The disk or disks E and cylinder casting or carrier are connected by cranked

coupling-rods G, so that they rotate in unison and a true relation is maintained between them, while reciprocating motion is imparted to the several pistons C through their connecting-rods D, owing to the disk or disks E and cylinder-casting rotating on different centers. In the fixed central stud H inlet and discharge passages H' and H² are formed longitudinally, and ports H³ H⁴, separated from each other by bridge-pieces H⁶ H⁷, communicate, respectively, with the inlet and discharge passages. The ports A² in the cylinder-carrier boss communicate alternately with the inlet and discharge ports H³ H⁴, so that the water from the inlet H' is forced by the action of the pistons C through the discharge-passage H². In lieu of the connecting-rods D, attached to the disk or disks E, other means may be employed for reciprocating the pistons or plungers C.

The fixed central stud H, on which the cylinder-casting revolves, is preferably placed horizontally, and the inlet-port H³ for the water is formed around the lower side, while the outlet-port H⁴ is formed at the upper part of the center, the center being thus reduced to a web H⁵, separating the inlet and discharge passages. In order that a water-tight joint may be maintained notwithstanding wear of the liner B and central stud H, the discharge or outlet H² is made much smaller than the inlet, and the liner B bears on a portion of the fixed central stud composed of the two bridge-pieces H⁶ H⁷, the portion embraced by the outer edges of these bridge-pieces preferably extending only around about a fourth of the circumference and placed in such a position relatively to the cylinder-carrier as to be pressed upon by said casting or its liner during the most effective portion of the piston-stroke. Thus while by wear the liner B may become an easy fit around the inlet H', with which the cylinders A are in communication for about two-thirds to three-fourths of the stroke, it continues to bear closely on the upper portion of the central stud H, within which the discharge-passage H² is formed, whereby leakage between the cylinder-casting or its liner and the fixed central stud is prevented. During a portion of the discharge-stroke of each piston C—viz., the commencement and finish of the stroke—the wa-

ter is allowed to return to the inlet-passage H' and the full stroke is not utilized, but only a portion, which may be taken at the most effective travel of the pistons or plungers C, and in order to permit of the return of the water the bridge-pieces H⁶ H⁷, which separate the inlet and discharge ports H³ H⁴, are preferably made slightly smaller than the ports A², leading to the cylinder ends. The flow of water from the cylinders is thus not at any time entirely shut off, and strain upon the pump is consequently avoided.

The driving-shaft F may be pressed by a spring J from its outer end, so as to press against the cylinder-boss A', which in turn bears against an enlarged part of the fixed central stud H, so as to prevent leakage of the inlet H', or the cylinder-boss may bear against a separate boss K, surrounding the fixed central stud H and to which the latter is secured, this boss K being provided in order that the fixed center may be more readily removable without disturbing the other parts of the pump.

The cylinders are intended to be rotated at a high speed, and the number of cylinders (of which there must be not less than five, as shown at Figs. 1, 2, and 3, and may be a multiple of five, as shown at Figs. 4 and 5) should be such as to give a continuous uniform flow and entirely do away with pulsation. Owing to the high speed it may be found necessary to force the water into the inlet H', and where pressure is not available a centrifugal pump may be fitted on the driving-spindle F, the discharge from which would go to the inlet H' of the improved rotating pump.

The outer casing I may be dispensed with and a light box M, preferably formed by the disks, as shown at Figs. 6 and 7, be substituted, the end of the central stud H (and also the liner B when such is used) being bored to admit free passage of the inlet water which would then fill the box. Any escape of water on the pressure side would thus pass into the box and thence into the inlet-passage, where it would be drawn into and finally expelled from the cylinder.

Having now described the invention, what I claim, and desire to secure by Letters Patent, is—

1. A rotating-cylinder pump consisting of not less than five cylinders disposed radially around a central hollow boss, ports communicating with the bottoms of the cylinders and the center of the boss, a fixed central stud upon which the boss of the cylinder casting or carrier revolves, said central stud having a bearing-surface of about one-fourth of its circumference which as the surfaces wear automatically maintains a fluid-tight joint and thus prevents leakage between the fixed center and the cylinder-boss without the aid of packing, inlet and outlet passages in said fixed central stud for the water or other liquid, ports communicating periodically with the ports in the bottom of the cylinders, pistons in said cylinders and rods connecting the pistons with a disk or disks driven by a shaft eccentric to the fixed central stud upon which the cylinder-carrier revolves, substantially as described.

2. In a rotating-cylinder pump having a rotating cylinder-carrier on which five cylinders or a multiple of five cylinders are disposed, and a disk or disks to which the cylinder-plungers are attached rotating eccentrically to said cylinder-carrier, a fixed central stud having inlet and outlet passages and ports and a bearing-surface consisting of the bridge-pieces between which the outlet-port is situated, said bearing-surface extending around about one-fourth of the periphery of the central stud, and being placed in such a position relatively to the cylinder-carrier as to be pressed upon by said carrier or its liner during the most effective portion of the piston-stroke whereby leakage between the fixed center and the boss of the cylinder-casting is prevented, substantially as described.

In witness whereof I have hereunto set my hand in presence of two witnesses.

ROBERT RICHARDSON.

Witnesses:

WALLACE FAIRWEATHER,
JNO. ARMSTRONG, Junr.