

(No Model.)

W. GIBB.
ROTARY STEAM ENGINE.

No. 284,125.

Patented Aug. 28, 1883.

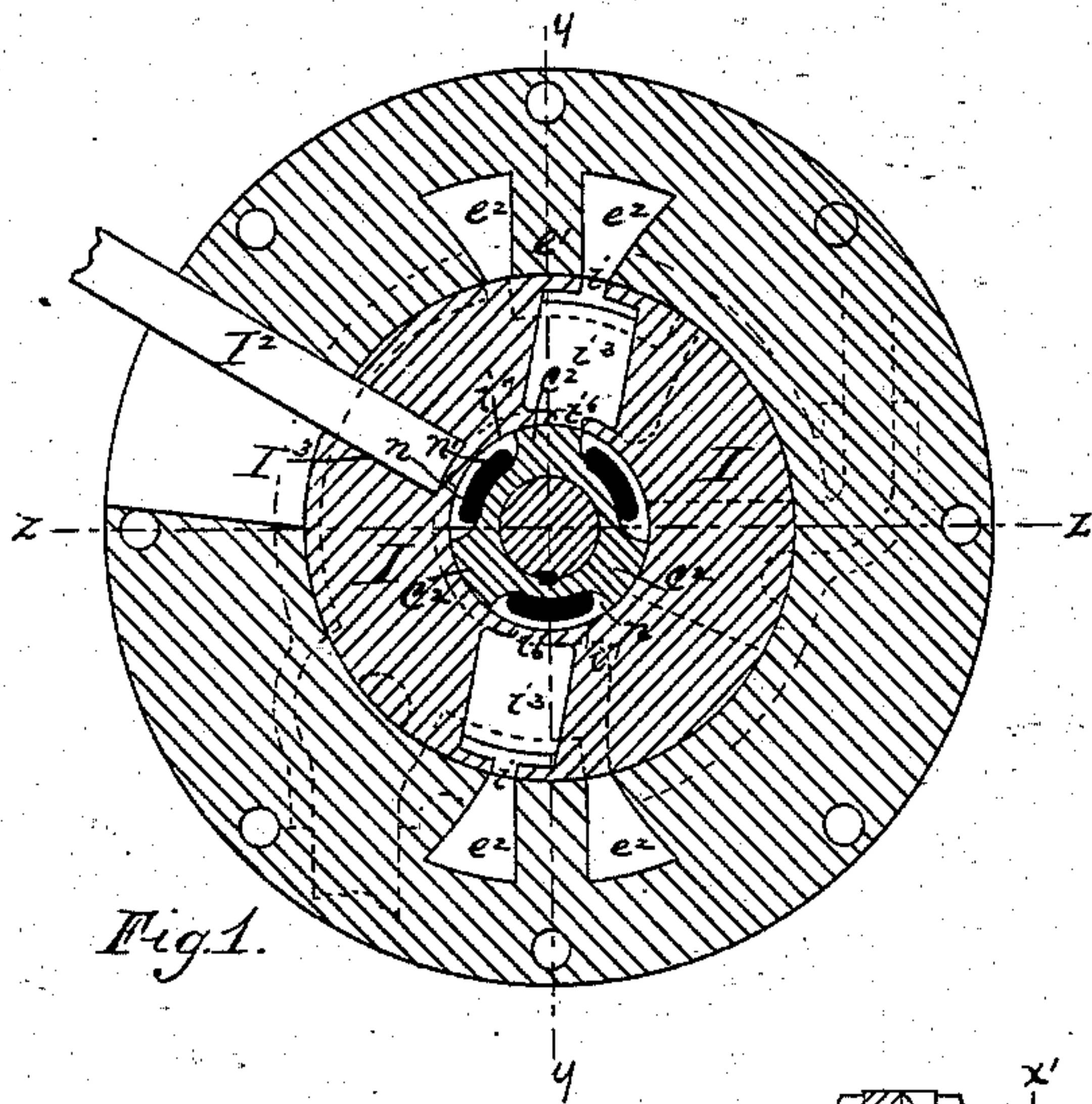


Fig. 1.

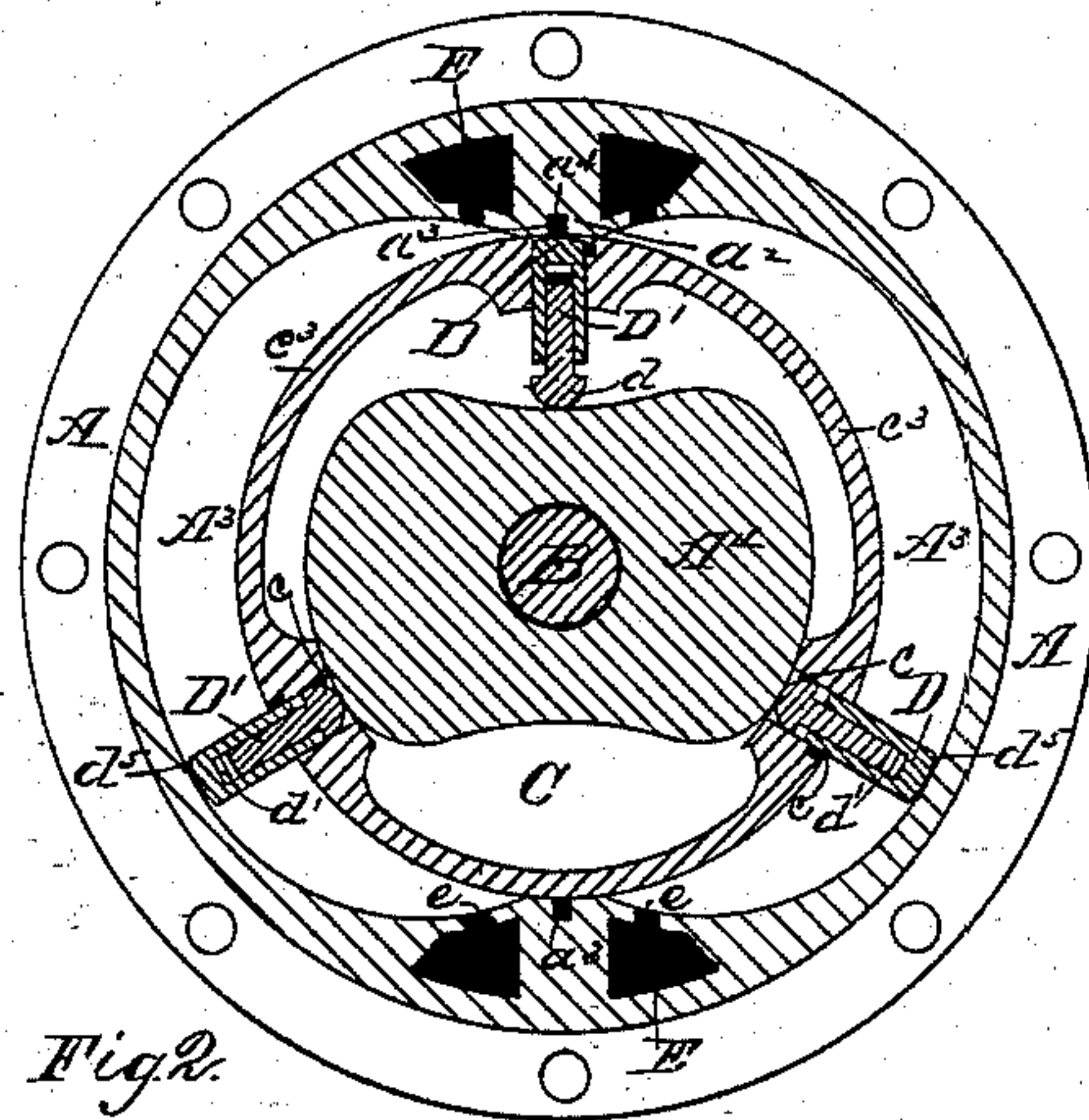


Fig. 2.

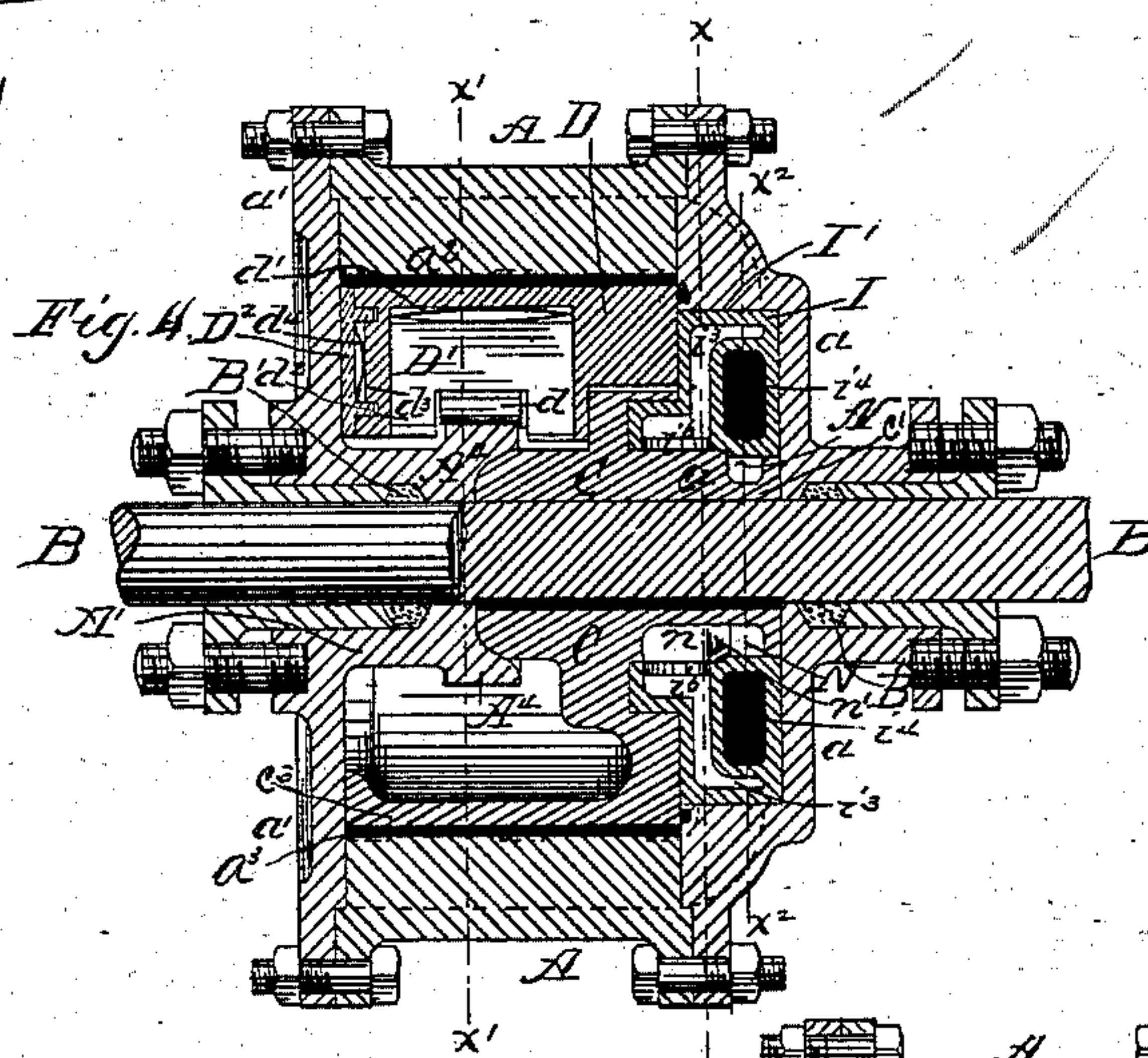


Fig. 3.

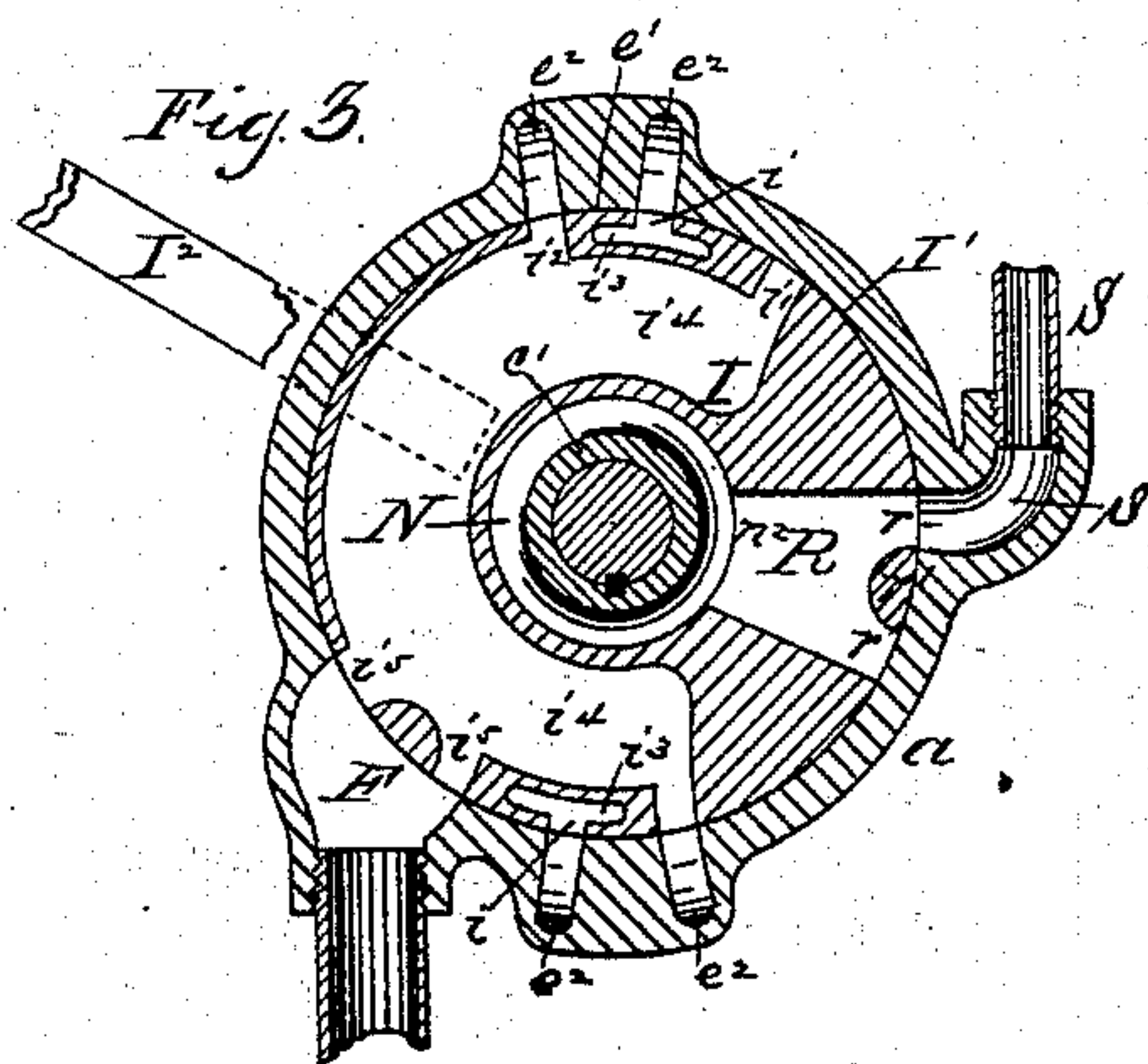


Fig. 4.

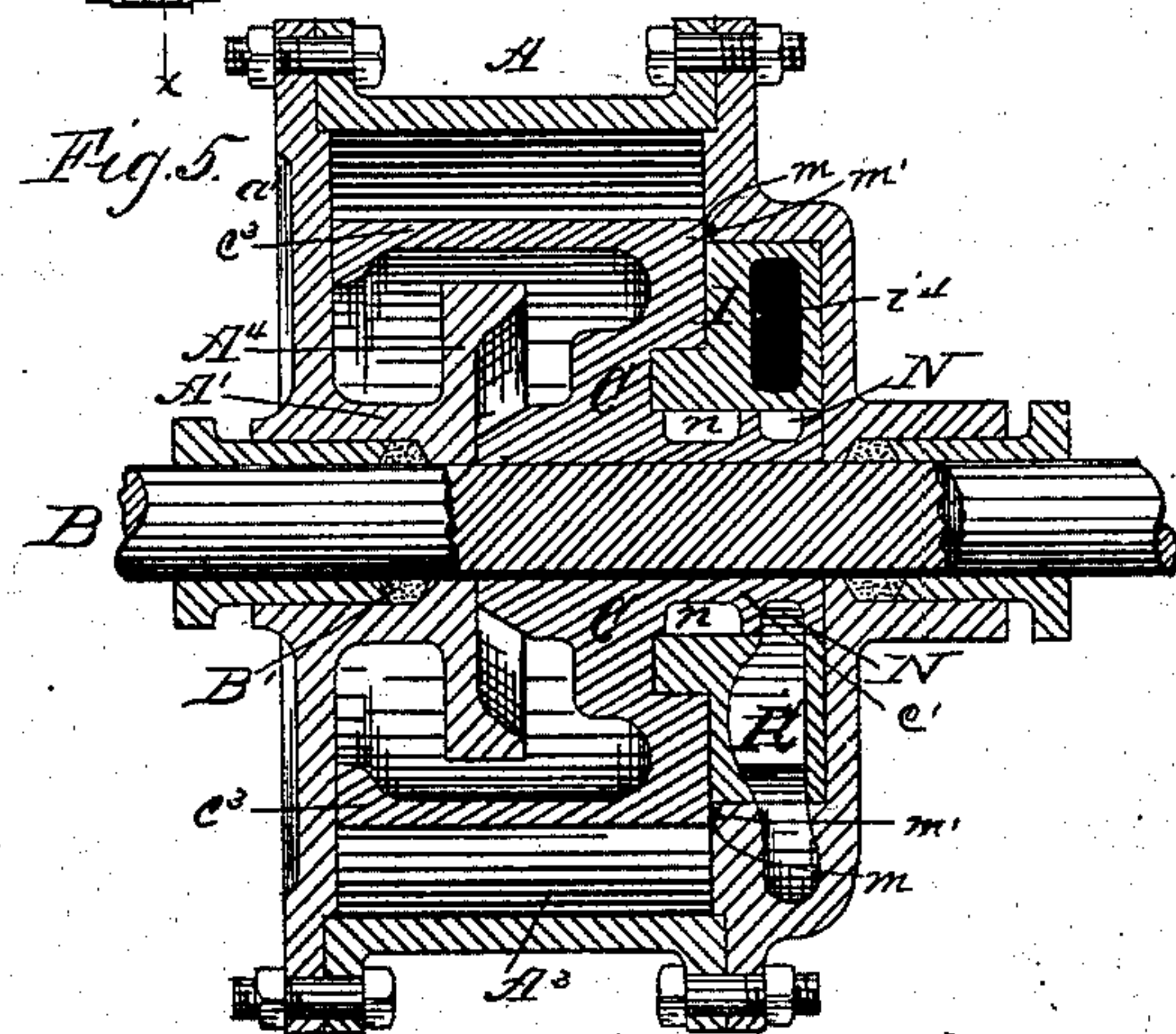


Fig. 5.

Witnesses:
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UNITED STATES PATENT OFFICE.

WALTER GIBB, OF PITTSBURG, ASSIGNOR TO HIMSELF AND A. C. MILLIKEN,
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ROTARY STEAM-ENGINE.

SPECIFICATION forming part of Letters Patent No. 284,125, dated August 28, 1883.

Application filed March 23, 1883. (No model.)

To all whom it may concern:

Be it known that I, WALTER GIBB, of Pittsburg, county of Allegheny, State of Pennsylvania, have invented or discovered a new and useful Improvement in Rotary Steam-Engines; and I do hereby declare the following to be a full, clear, concise, and exact description thereof, reference being had to the accompanying drawings, making a part of this specification, in which—like letters indicating like parts—

Figures 1, 2, and 3 are transverse sectional views of my improved engine, taken in the planes of the lines $x x$, $x' x'$, and $x'' x''$, Fig. 4; and Figs. 4 and 5 are longitudinal sectional views taken in the planes of the lines $y y$ and $z z$, Fig. 1.

My invention relates to certain improvements in rotary steam-engines; and in general terms it consists of certain combinations of a rotary head carrying radially-moving blades or pistons within a cylindrical case, with provision for packing such blades and head and compensating for wear, a reversing-valve containing ports and passages for conveying steam to and from the cylinder on either side of its abutments, and an automatically-operating cut-off for regulating supply of steam, as hereinafter more fully described and claimed.

In the drawings, A represents a cylindrical shell with heads $a a'$ mounted on an axial shaft, B. Hub extensions $A' A''$ are cast on these heads surrounding the shaft, one, A' , extending within the cylinder-chamber from head a' , and the other, A'' , extending without from head a . These hub extensions are employed in forming stuffing-boxes B' , of the usual or any suitable construction, to pack the shaft and prevent leakage.

On the shaft, between the hub A' and head a , is secured a rotary head, C, having a cylindrical body or shell, c^3 , extending from head to head of the cylinder, and equal in diameter to the distance between the curved abutments a^2 , formed on opposite sides of the inner surface of the cylindrical shell A. The interior of the cylinder, between the outer shell and inner head, is thus divided into two crescent-shaped or semi-annular chambers, $A^3 A^3$, by the curved abutment-walls. Within the body of the cylinder-head C are made longitudinal

slots or grooves c , having parallel walls, within which are mounted radially-movable blades D, which are moved outward by stems D' , of plate form, bearing by their inner enlarged and rounded heads, d , upon the periphery of a lobed cam, A^4 , which latter is cast upon the inner end of hub extension A' , and is inclosed within the chamber formed by the extended shell c^3 of the rotary head. The periphery of this cam is formed with reference to giving uniform distance between it and the inner surface of the cylinder-shell, so that the blades will be pushed inward as they pass the abutments, and outward against the shell-surface on either side of the abutments. In order to secure elastic pressure of the blades upon the shell-surface, springs d' are seated between the ends of stems D' and blades D, thereby compensating for wear in use. For like purposes packing-plates D^2 are secured to the end edges of the blades D by lugs d^2 , fitting into grooved recesses d^3 . Springs d^4 in rear of the packing-plates hold them against the inner face of head a' ; also, an annular groove, m , is made in the inner face of head a , in which is secured packing m' , to bear against the abutting end of the rotary head and prevent leakage of steam past such end. In order to prevent leakage past the abutments a^2 , packing a^3 of any suitable kind is inserted in inclined or diagonal grooves a^4 , formed in and across the abutments. The inclination thus given to the packing a^3 causes the blades to cross the same with a shear motion, thereby preventing the blades from catching thereon; also, by rounding or beveling off the outer corners of the blades D, as at d^5 , they will be prevented from catching on the packing a^3 or any other slightly angular or projecting surfaces that may be met in their rotation, and also better bearing will be secured between such corners and the curved approaches to the abutments.

Steam is supplied to and exhausted from the chambers $A^3 A^3$ through chambers E E, four in number, formed in the quarters of the abutments a^2 , which open into the chambers A^3 by slotted ports $e e$. Passages e^2 lead from these chambers E E and register with ports $i i'$, opening into chambered passages $i^3 i^4$ for supply and exhaust, which are formed in and

through the body of a circular reversing-valve, I. This valve is seated in a suitable recess, I', formed in the head *a* against one end of cylinder C. The valve is free to take rotary motion on its seat, a sufficient range being given it by hand-lever I² to cause the two supply-ports *i i* to register with either of the passages *e*², and thereby direct steam to either side of the abutments at pleasure. At the same time one or the other of the exhaust-ports *i' i'*² is made to register with the passage *e*² on the opposite side of the abutments. Consequently by shifting the valve on its seat steam-pressure may be applied to either side of the blades D, thereby causing them to rotate in either direction at pleasure. The exhaust-passage *i'*⁴ extends around one side of the valve, dipping under, and thus crossing the supply-passages *i*³, and also the lever-socket I³, opening on the lower side by one or the other of two ports, *i*⁵, into the escape F. These ports *i*⁵ are provided with reference to affording steam-escape for either position of the reversing-valve. The supply-passages *i*³ pass radially through the valve-opening by ports *i*⁶ into recessed chambers *n*, formed in the side extension, *c'*, of the head C. Radially-divergent wings or shoulders *c*², three in number, corresponding to the blades D, divide or separate the chambers *n*, bearing at their outer extremities against the inner circular wall, *i*⁷, of the valve. The arcs of these shoulders *c*² are greater than the corresponding width of ports *i*⁶. Consequently the ports are completely closed by such shoulders during a part of the rotation due to their connection with rotary head C. The occurrence and continuance of this closing of the ports is adjusted with relation to the position of the blades within the chambers A³, so as to be operative as a cut-off, admitting and arresting steam-supply with reference to securing its economical use in moving the blades in accordance with well-known principles of steam-engine construction. This may be varied within certain limits sufficient for ordinary requirements by setting the valve I at different positions within the range, giving through steam-passage at *i*. This co-operation of the reversing-valve and cut-off, in securing not only the separate functions of reversing motion and regulating supply, but also of varying such cut-off by adjustment of the valve, I consider an important feature in my invention.

Steam is admitted to the separate chambers *n* through ports *n'* from an annular chamber, N, which, like the chambers *n*, are formed in the extension *c'* of head C. The annular chamber N communicates by port *n*² with passage R in valve I. Two ports, *r r*, afford communication between the chambered passage R and the steam-inlet S, one of which registers with the inlet when the valve I is set for motion in either direction—say at or near either limit of its movement. Between such registering positions, however, the inlet through

S is covered or closed by the solid abutting wall *r'*, formed on the valve between the ports *r r*; also, if desired, the ports *i* may be closed at such intermediate position of the valve by the abutting surface of the valve-seat between the passages *e*², as at *e'*. Thus by short range of movement of valve I steam may be shut off entirely, or admitted in any desired amount to drive the blades and shaft in either direction, and the cut-off be regulated to admit and arrest such steam-supply at the desired points with reference to the position of the blades in their rotation.

The simplicity and compactness of the apparatus, and the facility afforded for regulating its movements, peculiarly fit it for many kinds of work—for example, on cranes and in shops for doing light work.

If desired, the cylinder may be fastened to any suitable support by base-plate P, the shaft being free to revolve; or the shaft—a tubular one by preference—may be fixed in position and the cylinder-shell A be rotated, steam supply and exhaust being through the tubular shaft, and in such case the cylinder A may be employed as a driving-belt pulley.

I claim herein as my invention—

1. The combination of cylinder A, having a hub, A', extending within the cylinder from one of its heads, a lobed cam, A⁴, cast with the inner end of such hub, a rotary chambered head, C, inclosing the cam within its chamber, and having radial slots *c* in its body, stems D', springs *d'*, and blades D, mounted in the grooves, substantially as set forth.

2. The cylinder A, having recessed head *a*, and separate passages leading from such recess to the cylinder-chamber, with a steam-supply leading to the recess through the axis of the cylinder, in combination with a reversing-valve, I, seated in the recess, such valve having separate passages therethrough, and suitable lever-connection for moving the valve on its seat to register its passages with the axial supply, and with different passages leading to the cylinder-chamber, substantially as set forth.

3. The combination of cylinder A, adjustable reversing-valve I, and a rotary cut-off inclosed axially within the valve, such valve and cut-off having registering-passages therethrough, the cut-off being operative during part of its rotation, inclosing the steam-supply passages through the valve, substantially as and for the purposes set forth.

4. The combination of cylinder A, having recessed head *a*, reversing-valve I, seated in such recess, having steam-passages therethrough, and rotary head C, having extension *c'* and radial shoulders *c*², covering and closing the ports leading to the valve-supply passages during a portion of the rotation of the head, substantially as set forth.

5. The combination of cylinder A, having recessed head *a* and steam-passages *e*², and a reversing-valve, I, seated in such recess, hav-

ing steam supply and exhaust passages there-
through, with separate ports i' i^2 , opening into
the exhaust-passage on either side of the sup-
ply-port i , and exhaust-ports i^5 , opening into
5 the escape from the exhaust-passage, substan-
tially as set forth.

6. The combination of cylinder A, having
opposite abutments a^2 , chambers E E, ports
 e e , and passages e^2 , in combination with re-
10 versing-valve I, having chambered passages
 i^3 , i^4 , and R therethrough, with ports i , i' , i^2 , i^5 ,

i^6 , and r r , rotary head C, carrying side exten-
sion, c' , having chambers n , separated by cut-
off c^2 , with annular chamber N, and ports n' ,
substantially as set forth.

In testimony whereof I have hereunto set
my hand.

WALTER GIBB.

Witnesses:

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C. L. PARKER.

15