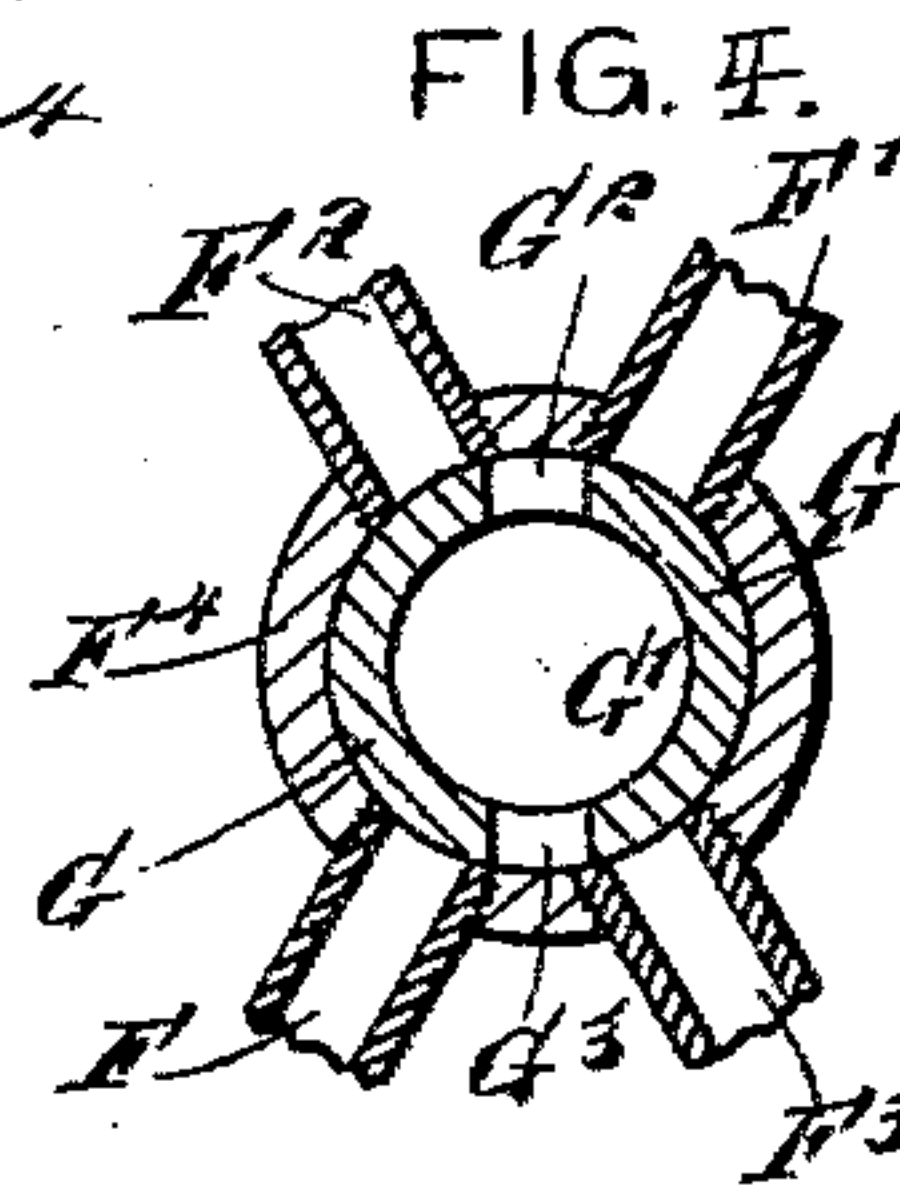
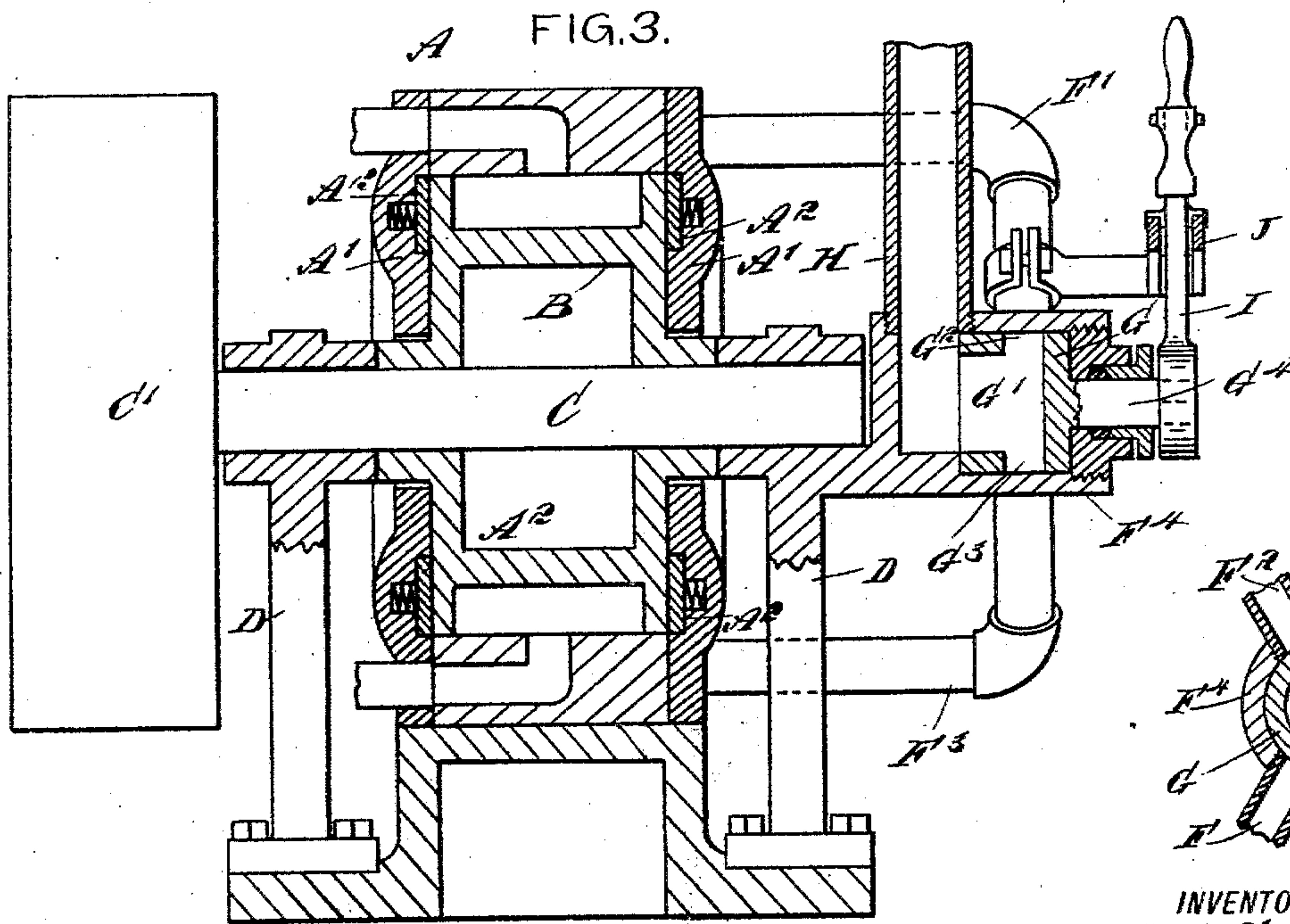
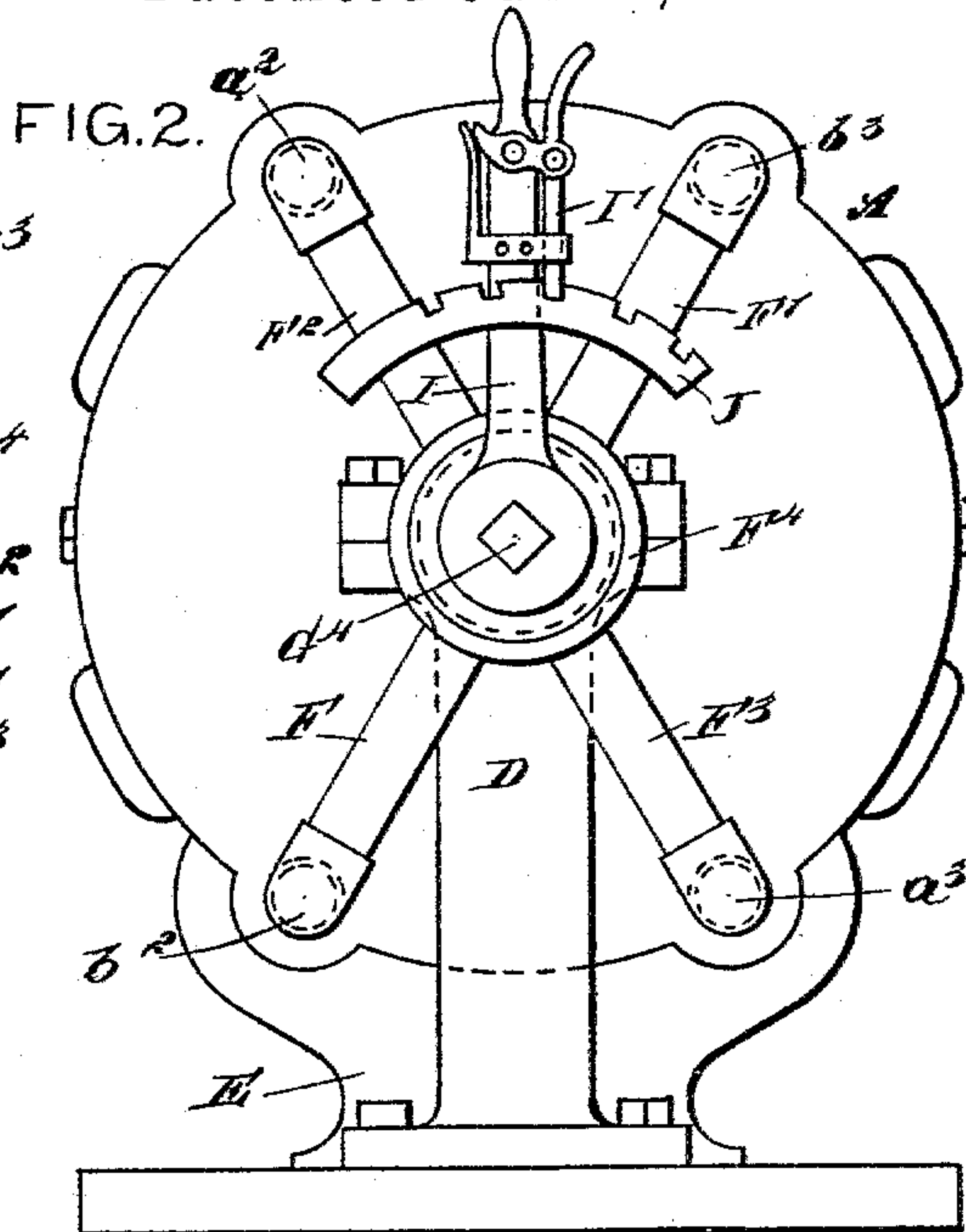
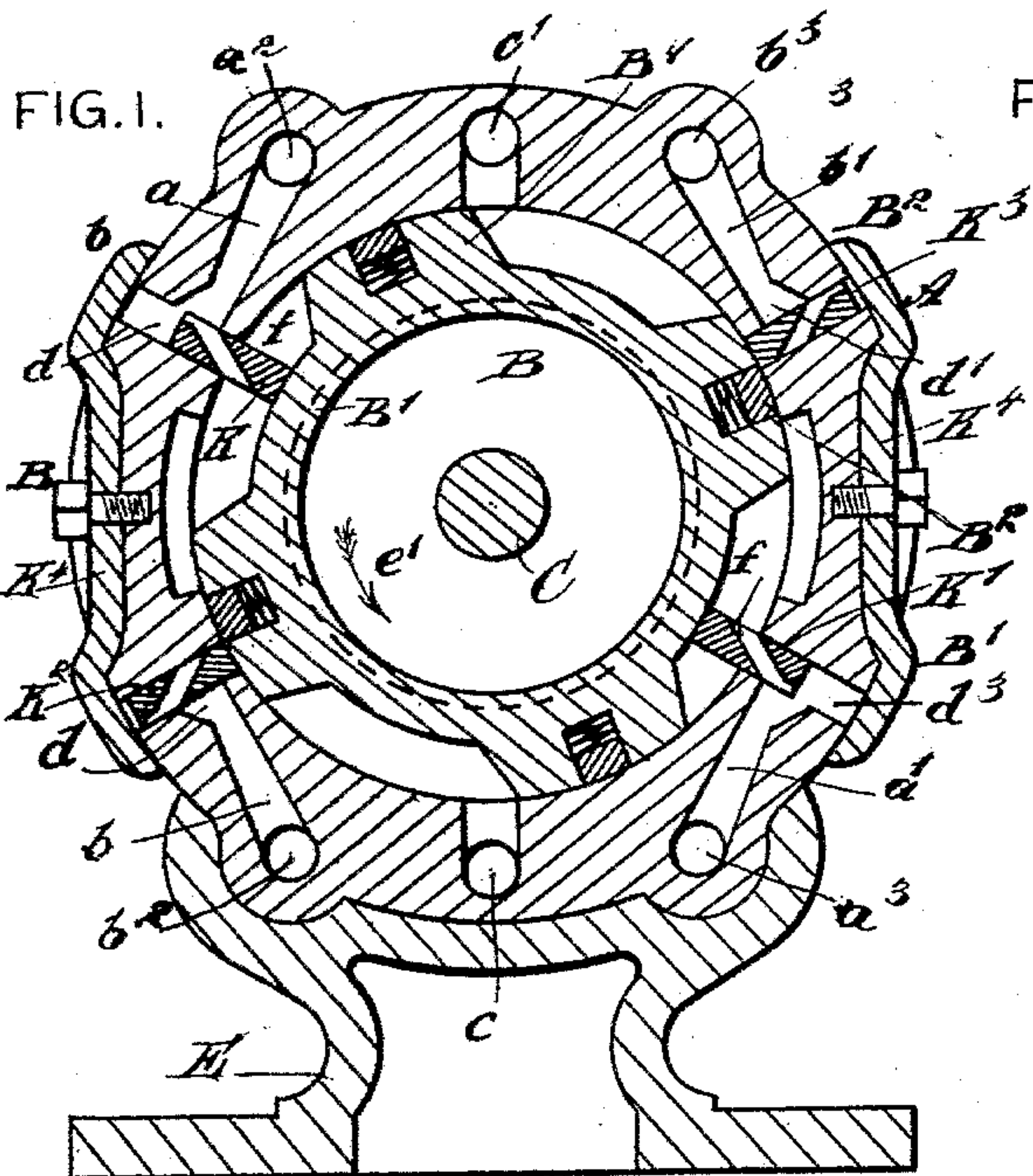


(No Model.)

G. W. SMITH.
REVERSIBLE ROTARY ENGINE.

No. 596,833.

Patented Jan. 4, 1898.



WITNESSES:

Donn Twitchell
Rev. G. Hooper

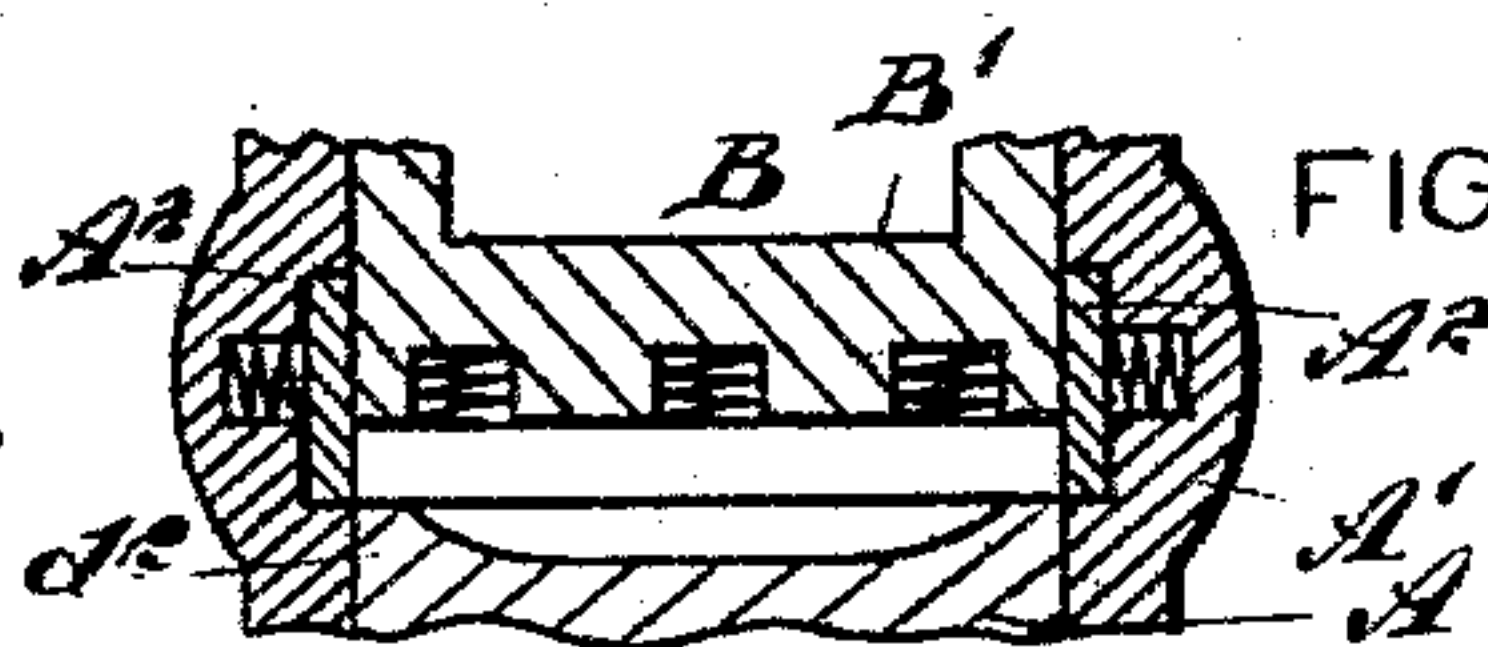


FIG. 5. BY

INVENTOR
G. W. Smith

ATTORNEYS.

UNITED STATES PATENT OFFICE.

GEORGE W. SMITH, OF PETERSBURG, ILLINOIS.

REVERSIBLE ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 596,833, dated January 4, 1898.

Application filed February 17, 1897. Serial No. 623,792. (No model.)

To all whom it may concern:

Be it known that I, GEORGE W. SMITH, of Petersburg, in the county of Menard and State of Illinois, have invented a new and Improved Reversible Rotary Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary engine which is simple and durable in construction, very effective in operation, and arranged to utilize the steam expansively and to permit of convenient reversing whenever required.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a cross-section of the improvement. Fig. 2 is an end elevation of the same. Fig. 3 is a longitudinal sectional elevation of the improvement. Fig. 4 is a cross-section of the reversing-valve, and Fig. 5 is a sectional plan view of the piston and cylinder packings.

The rotary engine is provided with a cylinder A, in which is mounted to turn a piston B, secured on the main shaft C, journaled in suitable bearings in the standards D, held on a suitable frame or base E, supporting the cylinder A. On one outer end of the shaft C is secured a pulley C' for transmitting the rotary motion of the main shaft C to other machinery.

On the periphery of the piston B are arranged or formed piston-heads B', forming recesses between the adjacent piston-heads for the motive agent to enter and act on the said heads, so as to turn the piston in either a forward or reverse direction, as hereinafter more fully described.

In the body of the cylinder A are arranged the channels $a a'$, located diametrically opposite each other, and channels $b b'$ are similarly arranged in the cylinder, but stand in the opposite direction to that of the channels $a a'$. (See Fig. 1.) The channels $a a'$ are connected with the inlet-ports $a^2 a^3$, connected with inlet-pipes $F^2 F^3$, respectively, and the

channels $b b'$ are similarly connected with inlet-ports b^2 and b^3 , connected with pipes $F F'$, respectively. The pipes F and F' open diametrically into a valve-casing F^4 , and the pipes F^2 and F^3 similarly connect with the said casing, in which is arranged a reversing-valve G, formed with a central bore G' , opening at all times into the supply-pipe H for the motive agent.

From the bore G' of the reversing-valve G lead the diametrical openings $G^2 G^3$, adapted to be connected either with the pipes $F F'$ or the pipes $F^2 F^3$, so as to allow the motive agent to pass into either set of pipes $F F'$ or $F^2 F^3$.

The reversing-valve G is provided with a stem G^4 , extending through a suitable stuffing-box in the end of the casing F^4 , said stem carrying at its outer end a reversing-lever I, provided with a hand-lever I' , adapted to engage notches in a segment J for locking the lever in position. When the lever I stands vertically, as shown in Fig. 2, then the openings $G^2 G^3$ are disconnected from either set of pipes $F F'$ or $F^2 F^3$, and consequently the motive agent cannot pass into any of the said pipes. By shifting the reversing-lever I to the left the openings G^2 and G^3 connect with the pipes F^2 and F^3 , and by shifting the lever I to the right the said openings connect with the pipes $F F'$. Thus the motive agent may be sent to either of the said sets of pipes to pass from the latter to the corresponding ports $a^2 a^3 b^2 b^3$ and their channels $a a' b b'$.

The inner ends of the channels $a a' b b'$ are adapted to connect with angular ports f , formed in the abutments K, K', K², and K³, respectively, fitted to slide in suitable guide-ways in the cylinder A and adapted to pass into the recesses of the piston B to hold the steam between the abutment and the advanced head B' to act on the same for rotating the piston B and shaft C. Each port f extends obliquely through the abutment to permit the steam to press the abutment from the front face thereof to its rear face inward in contact with the peripheral surface of the piston B, the outward movement of the abutments being accomplished by the inclined sides of the heads B' in forcing the abutments outward on the rotation of the piston B. The

ports f in the abutments $K K'$ stand in an opposite direction to the ports in the abutments $K^2 K^3$, so that the steam passes into the recesses of the piston at the proper side of the
 5 abutments when the engine is reversed. The outer ends of the guideways for two adjacent abutments are closed by a removable cap K^4 , which permits access to the abutments for repairs and other purposes.

10 In the cylinder A and between adjacent abutments are formed recesses or pockets $d d' d^2 d^3$, respectively, to permit the steam to expand and to act correspondingly upon the heads B' of the piston B as the latter rotates
 15 in the cylinder.

When the lever is shifted to the left and the supply-pipe H is connected with the pipes $F^2 F^3$, then the motive agent passes simultaneously through the ports $a^2 a^3$, channels $a a'$,
 20 and ports f in the abutments $K K'$ into the cylinder to act upon the corresponding piston-heads B' and rotate the piston in the direction of the arrow e' .

When the lever is shifted to the right and
 25 the openings $G^2 G^3$ connect with the pipes $F F'$, then the motive agent passes through the ports $b^2 b^3$, channels $b b'$, and ports f in the abutments $K^2 K^3$ into the cylinder to act on the heads B' , so as to rotate the latter in the
 30 inverse direction of the arrow e' . Thus by merely shifting the reversing-lever I the engine can be rotated in either direction.

Each of the heads B' is provided with spring-pressed packing-plates B^2 , adapted to abut
 35 against the inner wall of the cylinder A to render the heads steam-tight. Similar spring-pressed packing-plates A^2 in ring or segmental shape are arranged in the cylinder-heads A' to press against the faces of the piston B and render the latter and the cylinder-heads steam-tight.

Midway between the ports b^2 and a^3 is arranged an exhaust-port c , and a similar exhaust-port c' is arranged between the ports
 45 a^2 and b^3 . Thus when the piston B travels in either direction the exhaust from the cavities

between two adjacent piston-heads B' takes place through the ports $c c'$.

Having thus fully described my invention, I claim as new and desire to secure by Letters
 50 Patent—

1. A rotary engine comprising a cylinder formed in its body with sets of inlet-channels connected with a supply and arranged diametrically opposite each other, a set of abut-
 55 ments for each set of channels, and formed with angular ports, of which the ports of one set stand in an opposite direction to those of the other set, and a piston mounted to turn in the said cylinder and provided with piston-
 60 heads for the motive agent admitted by the said abutment-ports to act against, substantially as shown and described.

2. A rotary engine comprising a cylinder formed in its body with sets of inlet-channels
 65 connected with a supply and arranged diametrically opposite each other, a set of abutments for each set of channels and formed with angular ports, of which the ports of one set stand in an opposite direction to those of the
 70 other set, a piston mounted to turn in the said cylinder and provided with piston-heads for the motive agent admitted by the said abutment-ports to act against, and a reversing-valve for connecting either set of chan-
 75 nels with the motive-agent supply, substantially as shown and described.

3. A rotary engine, comprising a cylinder having exhaust-ports, a plurality of substan-
 80 tially radial slideways between one exhaust-port and its mate, a series of steam-channels leading to said slideways, the channels ranging in opposite directions so as to form two sets, a piston held to revolve within the cyl-
 85 inder, apertured abutments arranged to move in said slideways, and means for admitting steam to either set of channels, substantially as described.

GEORGE W. SMITH.

Witnesses:

JOHN C. JOHNSTON,
 JOHN H. WOOD.