(No Model.) 3 Sheets—Sheet 1.

J. G. ALBEE.

ROTARY ENGINE.

No. 566,959. Patented Sept. 1, 1896.

Fig. 7.

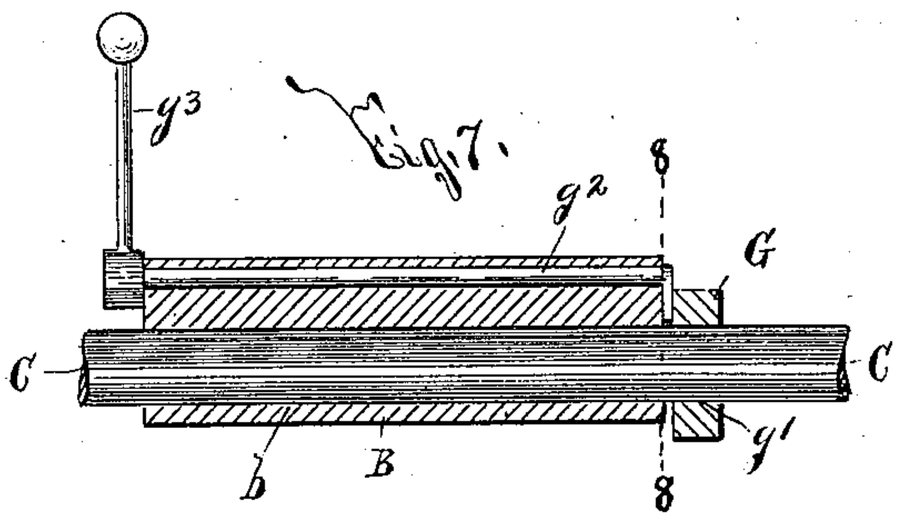


Fig. 1.

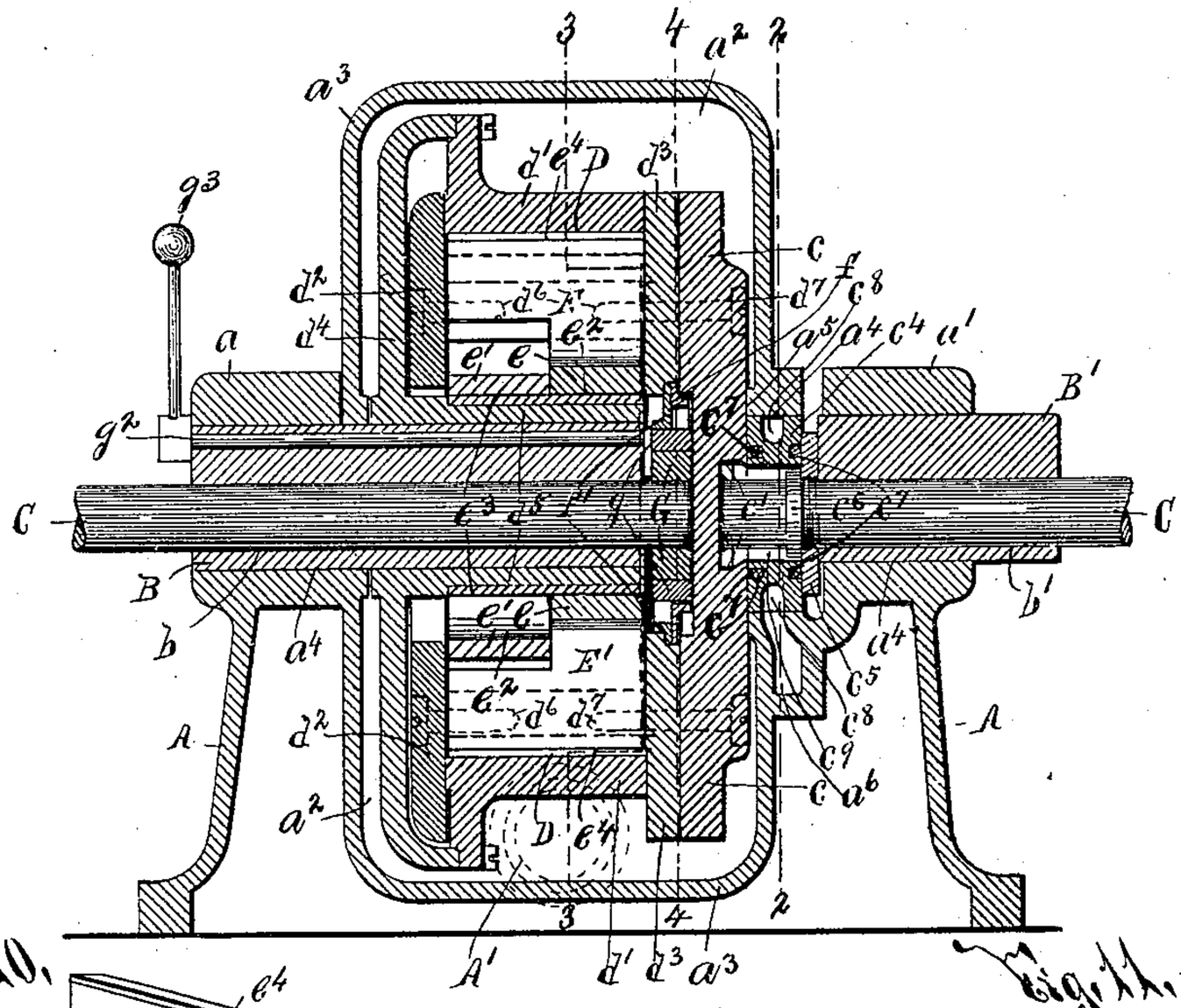


Fig. 10.

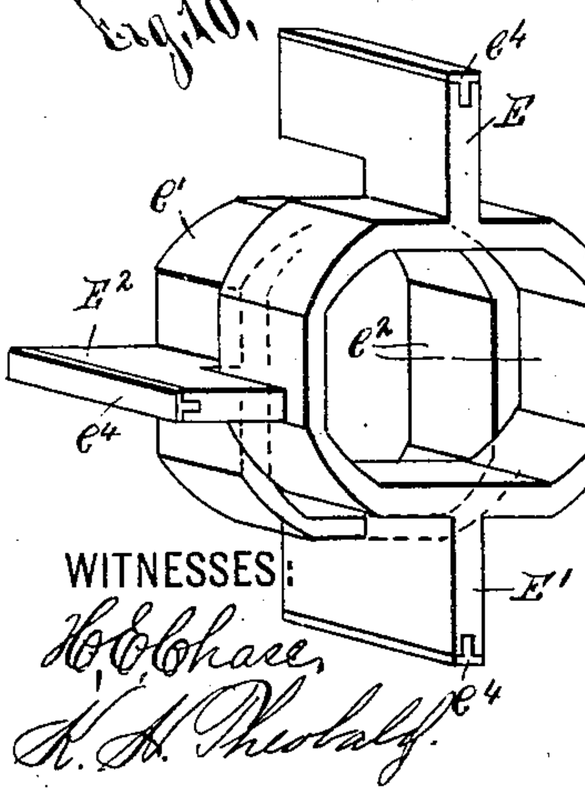


Fig. 8.

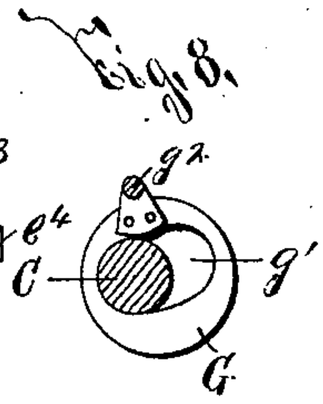
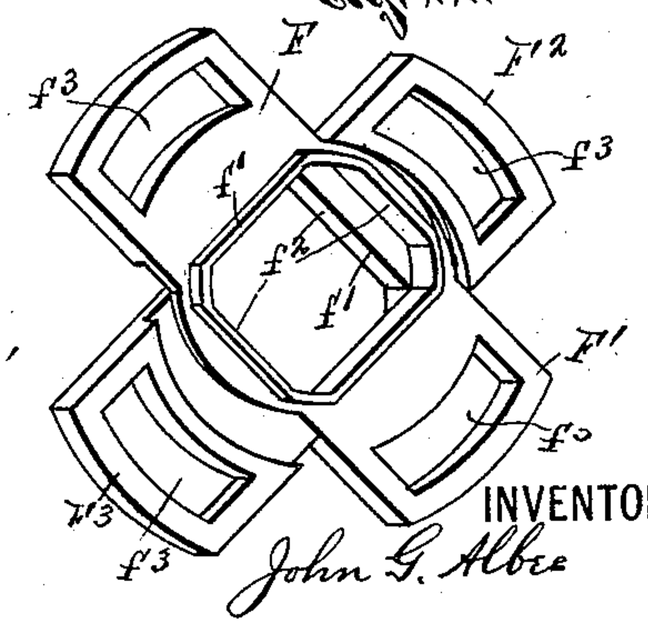


Fig. 11.



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(No Model.) 3 Sheets—Sheet 2.

J. G. ALBEE.

ROTARY ENGINE.

No. 566,959. Patented Sept. 1, 1896.

Fig. 2.

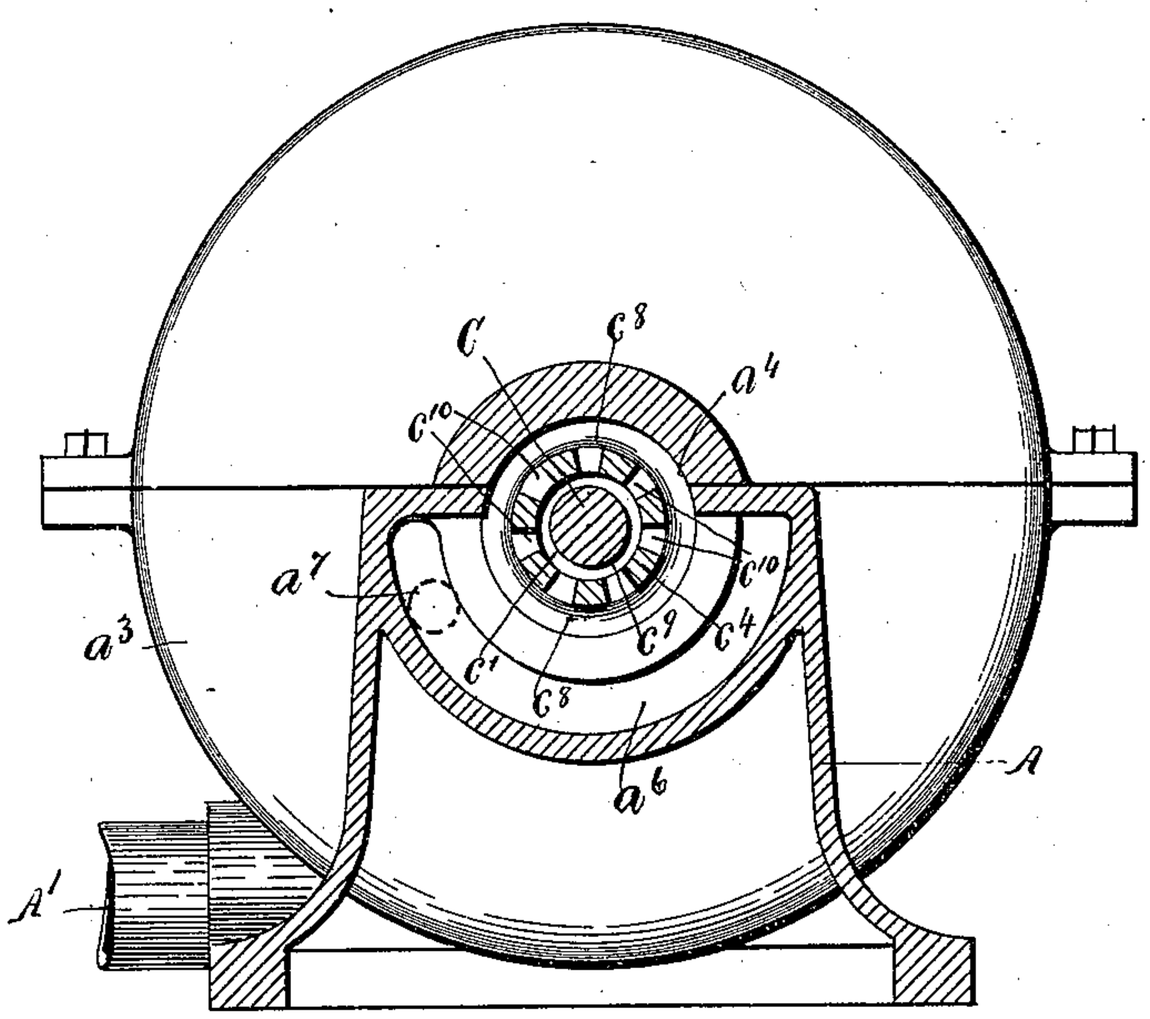
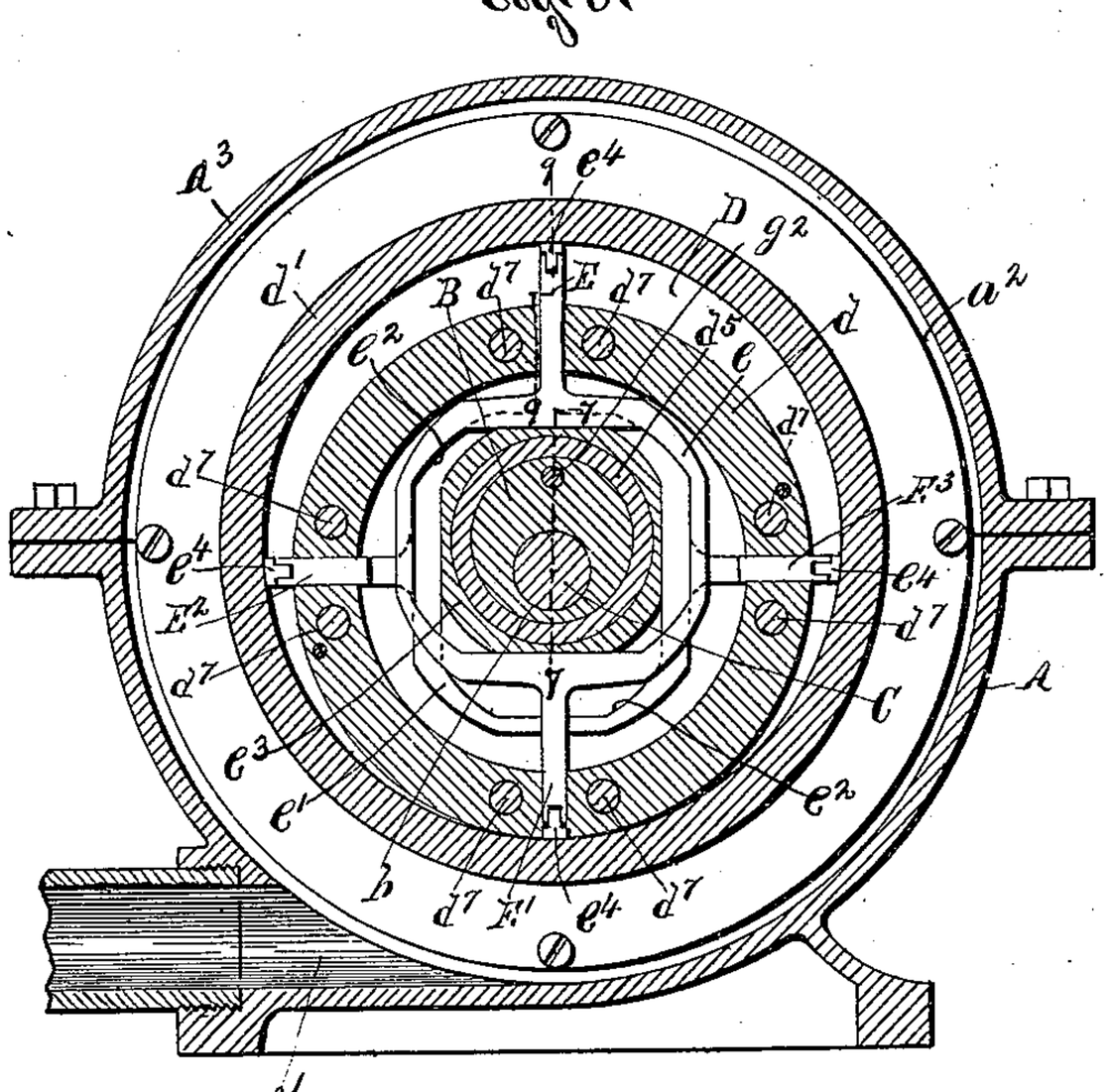


Fig. 3.



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(No Model.) 3 Sheets—Sheet 3.

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ROTARY ENGINE.

No. 566,959. Patented Sept. 1, 1896.

Fig. 4.

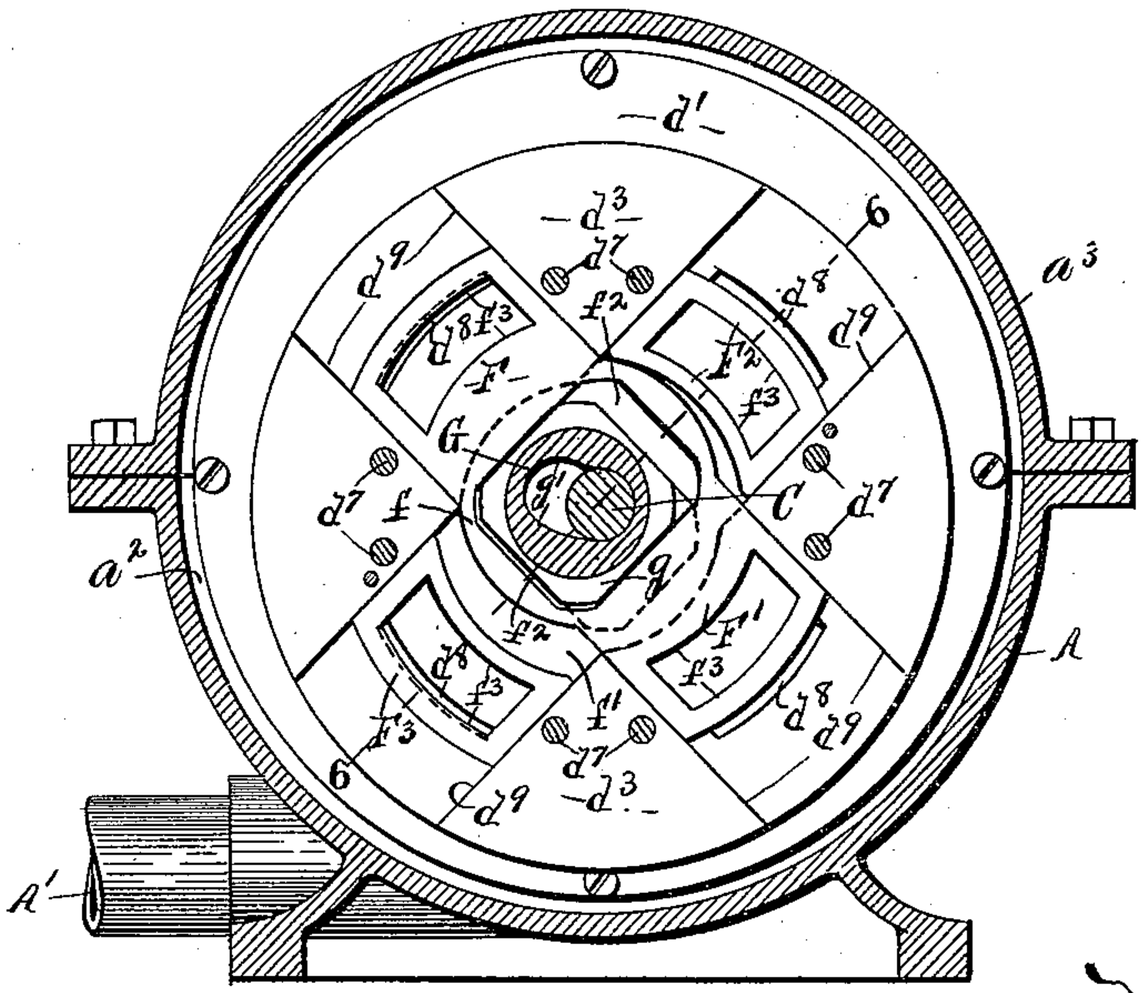


Fig. 6.

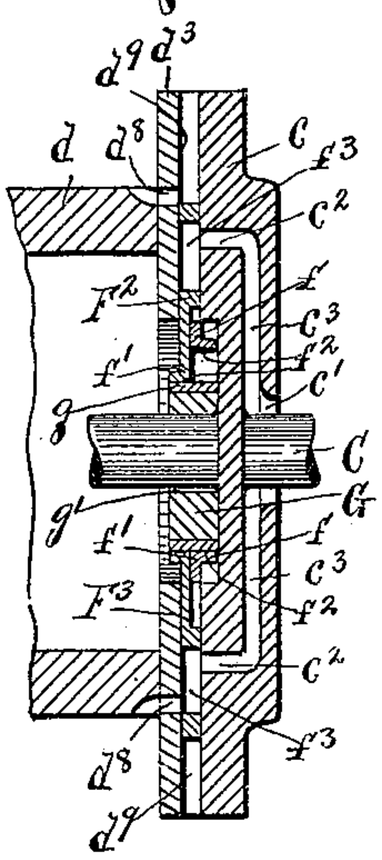


Fig. 5.

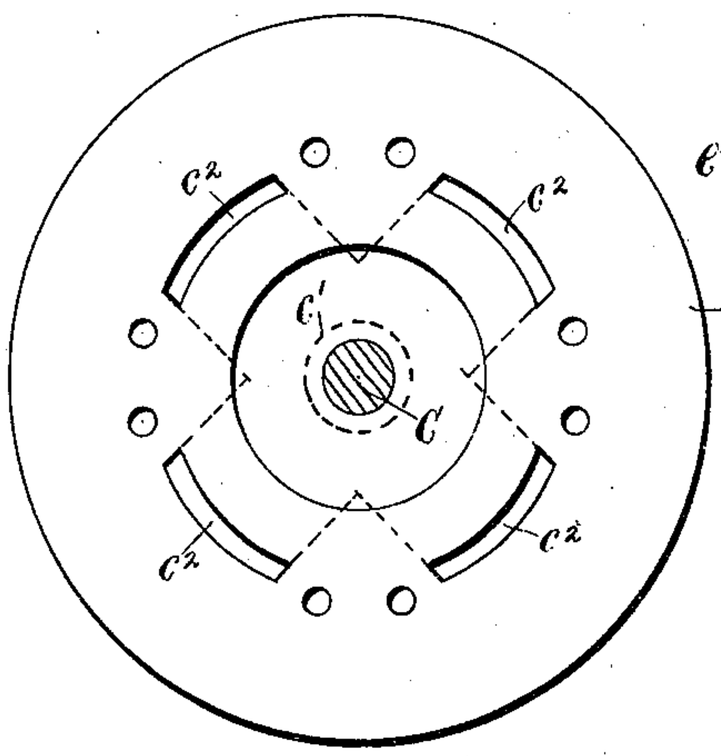
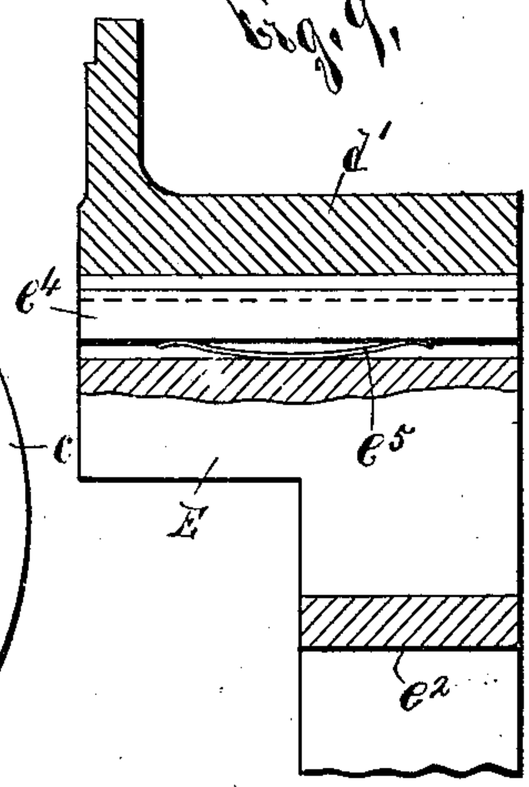


Fig. 9.



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UNITED STATES PATENT OFFICE.

JOHN G. ALBEE, OF FULTON, NEW YORK.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 566,959, dated September 1, 1896.

Application filed July 18, 1895. Serial No. 556,369. (No model.)

To all whom it may concern:

Be it known that I, JOHN G. ALBEE, of Fulton, in the county of Oswego, in the State of New York, have invented new and useful Improvements in Rotary Engines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to improvements in rotary engines, and has for its object the production of a device which is simple in construction, particularly effective in use, and operates with a minimum degree of friction; and to this end it consists, essentially, in the general construction and arrangement of the component parts of the rotary engine, all as hereinafter fully described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming a part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a longitudinal vertical section, partly in elevation, of my improved rotary engine. Figs. 2, 3, and 4 are transverse vertical sections taken, respectively, on lines 2 2, 3 3, and 4 4, Fig. 1. Fig. 5 is a transverse section of the detached driving-shaft, showing the disk thereon in elevation. Figs. 6, 7, and 8 are detail vertical sections taken, respectively, on lines 6 6, Fig. 4, 7 7, Fig. 3, and 8 8, Fig. 7. Fig. 9 is a detail section taken on line 9 9, Fig. 3; and Figs. 10 and 11 are isometric views showing, respectively, the pistons and the valves.

A is a supporting-frame of suitable construction provided with opposite bearings a a' and a substantially central chamber a^2, interposed between said bearings and inclosed by a shell a^3, which is formed with a steam-outlet A′ and a central aperture a^4 and is provided with a removable section for permitting the entrance of the operating parts of the rotary engine. Supported by the bearings a a' are fixed substantially cylindrical plugs or bearing-pieces B B′, one projecting within the shell a^3 through the aperture a^4 and the other having its inner end arranged in proximity to the adjacent wall of said shell. The plugs or bearing-pieces B B′ are formed of substantially the same diameter as the aperture a^4, and their lower portions are provided with eccentrically-arranged journal-openings b b', in which are mounted the opposite ends of a revoluble driving-shaft C, provided with a fixed disk c, arranged within the shell a^3 between the adjacent ends of said plugs or bearing-pieces. The outer face of the disk c bears against an inner face a^5 of the shell a^3, surrounding the opening a^4, and is provided with a steam-inlet opening c', which surrounds the shaft C, is formed of less diameter than the aperture a^4, and does not extend through said disk. The opposite or inner face of the disk c is provided with ports c^2, and leading from said ports through the disk to the opening c' are radial steam-passages c^3, which are of suitable size.

A collar c^4, surrounding the shaft C, closes the portion of the aperture a^4 adjacent to the disk c and is interposed between said disk and a shoulder or nut c^5, which is adjustably mounted on the shaft C and is arranged between a fixed shoulder c^6 on said shaft and the inner face of the plug or bearing-piece B′. The collar c^4 is formed with annular grooves c^7 c^8 in its side and outer peripheral faces, a central aperture c^9 communicating with the aperture c' and radial passages c^{10} connecting the groove c^8 and the aperture c^9. Suitable packing-rings are mounted in the grooves c^7 for engaging the disk c and the shoulder or nut c^5 and preventing the escape of steam between said parts. The groove c^8 communicates with a steam-inlet chamber a^6, opening into the aperture a^4 and provided with a steam-inlet pipe a^7, and said groove c^8, the passages c^{10}, and the aperture c^9 conduct the steam to the inlet-opening c', whence it passes through the passages c^3 to the ports c^2.

The cylinder D for the rotary engine is arranged within the shell a^3, between the disk c and the walls of the shell a^3 adjacent to the bearing a, and said cylinder encircles the inner projecting end of the plug or bearing-piece B, which forms a stationary eccentric for reciprocating the pistons in the cylinder, as presently described. The cylinder D is rotary and is inclosed by circular inner and outer walls d d' and substantially parallel side walls d^2 d^3, which are also preferably formed circular. The inner and outer walls d d', as best seen at Fig. 3, are arranged eccentric to each other and move independently, the inner wall being positively driven, as presently described, and the outer wall being suitably secured to a support d^4, provided with

a hub d^5, which is loosely mounted on the inner projecting end of the plug or bearing-piece B and is free to revolve thereon. The side wall d^2 is interposed between the support d^4 and walls d d' and is fixed to the inner wall d by suitable fastening means d^6, (shown by dotted lines in Fig. 1,) and the opposite side wall d^3 is interposed between the disk c and the walls d d', and is secured to said disk by fastening means d^7, which also engages the wall d'. Although the outer wall d' is not positively driven, the pistons, presently described, frictionally engage its inner face and effect its revolution, and the side walls d^2 d^3 also tend to effect the revolution of said outer wall, since the outer edges of their adjacent faces lap upon the adjacent edges of said outer wall a sufficient distance to prevent escape of the steam. It will be understood, however, that there is a slight rubbing movement between the adjacent surfaces of the outer and side walls d' d^2 d^3 as the cylinder revolves, since the outer wall revolves around an axis arranged eccentric to the axis of the shaft C.

E E' E^2 E^3 are pistons arranged at substantially right angles with each other, Fig. 3, and movable through guides in the inner cylinder-wall d' into the cylinder D. The outer ends of said pistons engage the inner face of the outer cylinder-wall d', and the cylinder D is thus divided into a series of chambers each of which is provided with a port d^8, formed in the side wall d^3 and arranged adjacent to one of the ports c^2. The opposite pistons E E' E^2 E^3 are fixed to opposite sides of frames e e', formed of substantially half the width of the pistons and lapped one upon the other between the cylinder-walls d^2 d^3. The frames e e' are provided with substantially central perforations e^2, which are formed with opposite substantially parallel engaging faces and receive an eccentric strap or ring e^3, formed with angularly-arranged flat engaging faces and encircling the hub d^5, as best seen at Figs. 1 and 3. The pistons E E' E^2 E^3 are positively revolved with the inner and side walls d d^2 d^3 of the cylinder D, and as their outer ends engage the wall d' they effect revoluble movement of said wall, as previously stated, and the friction incidental to their revolution is thus reduced to a minimum degree. As the pistons E E' E^2 E^3 revolve they reciprocate in the cylinder D, although their outer ends do not become disengaged from the inner face of the outer cylindrical wall d', and, in order that an efficient contact between the adjacent surfaces of said pistons and the outer cylinder-wall may be insured, the outer ends of the pistons are provided with movable engaging-pieces e^4, forced outwardly by suitable springs e^5, Fig. 9.

F F' F^2 F^3 are valves for regulating the passage of the steam to and from the separate chambers of the cylinder D formed by the pistons E E' E^2 E^3, and, as best seen at Fig. 4, these valves are preferably arranged at substantially right angles with each other. Opposite pairs of the valves F F' F^2 F^3 are fixed to frames f f', provided with perforations f^2, and said valves are reciprocally movable in guides d^9, formed in the side wall d^3 and extending through the periphery thereof, although it is obvious that these guides may be formed in the adjacent face of the disk c.

The frames f f' are lapped upon each other and the portions thereof immediately contiguous to the valves F F' F^2 F^3 are formed of substantially half the width of said valves in order that they may be movable side by side in the guides d^9.

The perforations f^2 of the frames f f' are formed with substantially parallel engaging faces, and a suitable stationary eccentric G is arranged in said perforations and is encircled by a strap g, having angularly-arranged faces engaged with the corresponding faces of the frames f f' for reciprocating the revolving valves.

The valves F F' F^2 F^3 are formed with perforations f^3, and during the revoluble and reciprocal movement of the valves said perforations are first alined with the ports c^2 d^8 for permitting the entrance of steam into the adjacent chambers of the cylinder D, and the outer edges of said valves are then substantially alined with the inner edges of the ports d^8 for permitting the escape of the steam from said chambers through the guides d^9 to the chamber a^2, whence it passes through the outlet A'. It is often desirable to adjust the throw of the valves F F' F^2 F^3, and consequently the eccentric G is provided with a curved slot g' for receiving the shaft C and is secured to one end of a rocking support or rod g^2, passed through the bearing-piece B and having its opposite end provided with a handpiece g^3.

The operation of my invention will be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be apparent that owing to the peculiar construction and arrangement of its cylinder, pistons, and valves the friction incidental to its operation is reduced to a minimum degree. The exact detail construction and arrangement of the parts of my rotary engine may be considerably varied without departing from the spirit of my invention, and consequently I do not herein specifically limit myself to such exact detail construction and arrangement.

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

1. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, a support for one of said walls revoluble around an axis arranged eccentric to the axis for the other wall, rotary pistons reciprocally movable in the cylinder, and rotary valves carried by the cylinder for admitting steam thereto, substantially as described.

2. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, opposite side walls fixed to the inner wall and lapping upon the outer wall, and rotary pistons reciprocally movable in the cylinder, substantially as specified.

3. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, opposite side walls fixed to the inner wall and lapping upon the outer wall, rotary pistons reciprocally movable in the cylinder, and valves carried by one of said side walls and revoluble therewith for admitting steam to the cylinder, substantially as set forth.

4. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, opposite side walls fixed to the inner wall and lapping upon the outer wall, a support for the outer wall arranged at the outer side of one of the side walls, and revoluble around an axis arranged eccentric to the axis for said inner and side walls, and rotary pistons reciprocally movable in the cylinder, substantially as and for the purpose described.

5. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, opposite side walls fixed to the inner wall and lapping upon the outer wall, a shaft for revolving the inner and opposite side walls, a stationary bearing-piece having an eccentrically-arranged journal-bearing for receiving the shaft, a support for the outer wall arranged at the outer side of one of the side walls and revoluble on the bearing-piece, and rotary pistons reciprocally movable in the cylinder, substantially as and for the purpose specified.

6. In a rotary engine, the combination of a cylinder, a piston movable in the cylinder and provided with a perforated frame fixed thereto, and an eccentric arranged in the perforation of the frame for actuating the piston, substantially as described.

7. In a rotary engine, the combination of a cylinder, a rotary piston reciprocally movable in the cylinder and provided with a frame fixed thereto and formed with a perforation having substantially parallel engaging faces, a stationary eccentric for actuating the piston, and an eccentric-strap encircling the eccentric and provided with opposite flat faces for engaging the former faces, substantially as specified.

8. In a rotary engine, the combination of a cylinder, a pair of pistons reciprocally movable in the cylinder in planes disposed at substantially right angles with each other and provided with perforated frames fixed thereto and lapping upon each other, and an eccentric arranged in the perforations of the frames for actuating the pistons, substantially as described.

9. In a rotary engine, the combination of a rotary cylinder having inner and outer walls independently revoluble, a support for one of said walls revoluble around an axis arranged eccentric to the axis for the other wall, rotary pistons reciprocally movable in the cylinder, and a stationary eccentric for actuating the pistons, substantially as specified.

10. In a rotary engine, the combination of a rotary cylinder provided with eccentrically-arranged inner and outer walls, rotary pistons reciprocally movable through the inner wall into the cylinder, a stationary eccentric for actuating the pistons and valves carried by the cylinder and movable therewith for admitting steam to the cylinder, substantially as described.

11. In a rotary engine, the combination of a rotary cylinder provided with eccentrically-arranged inner and outer walls, perforated frames arranged at substantially right angles with each other and having their perforations alined, and each provided with substantially parallel engaging faces, pistons projecting from opposite sides of each perforated frame, a stationary eccentric arranged within the perforations of said frames for actuating the pistons, and an eccentric-strap encircling the eccentric and provided with angularly-arranged faces for engaging the former faces, substantially as specified.

12. In a rotary engine, the combination of a cylinder provided with independently-revoluble outer and inner walls and a rotary side wall having a steam-port and a valve carried by the wall and revoluble therewith for governing the passage of the steam through said port, substantially as specified.

13. In a rotary engine, the combination of a cylinder provided with independently-revoluble outer and inner walls and a side wall having steam-ports, a rotary shaft having a disk fixed thereon and provided with steam-passages and reciprocally-movable oppositely-arranged valves supported by the disk and rigidly connected together for governing the passage of the steam through said ports and passages, substantially as described.

14. In a rotary engine, the combination of a cylinder provided with independently-revoluble outer and inner walls and a side wall having steam-ports, a rotary shaft having a disk fixed thereon and provided with steam-passages, reciprocally-movable valves supported by the disk for governing the passage of the steam through said ports and passages, a perforated frame fixed to the valves and a stationary eccentric arranged within the perforation of the frame for reciprocating the valves, substantially as set forth.

15. In a rotary engine, the combination of a cylinder provided with a steam-port, a supporting-frame formed with a cylindrical aperture and a steam-inlet chamber opening into the aperture, a shaft journaled in the frame and passed through said aperture, a disk projecting from the shaft and having a steam-port and a passage leading thereto, a collar encircling the shaft and provided with

a steam-passage for connecting the inlet-chamber and the passage of said disk, and a movable valve carried by the disk for controlling the passage of steam through the ports of the cylinder and disk, substantially as described.

16. In a rotary engine, the combination of a supporting-frame provided with an inclosing shell having a steam-outlet, a cylindrical aperture, and a steam-inlet chamber opening into the aperture, a rotary cylinder arranged within the inclosing shell and provided with steam-ports, rotary pistons reciprocally movable in the cylinder, a stationary eccentric supported by the frame for actuating the pistons, a shaft supported by the frame and having one end passed through the eccentric and its opposite end through said aperture, a disk fixed to the shaft and arranged within the inclosing shell and provided with steam ports and passages leading thereto, a collar encircling the shaft and provided with a steam-passage for connecting the steam-inlet chamber and the passages of said disk, and movable valves carried by the disk for controlling the passage of steam through the ports of the cylinder and disk, substantially as and for the purpose specified.

17. In a rotary engine, the combination of a frame provided with a bearing, a stationary bearing-piece mounted in said bearing, a cylinder having inner and outer walls independently revoluble around the bearing-piece, and a shaft eccentrically journaled in the bearing-piece and connected to the inner wall of the cylinder for revolving the same, substantially as described.

18. In a rotary engine, the combination of a frame provided with a bearing, a stationary bearing-piece mounted in said bearing, a support loosely revoluble around the bearing-piece, an outer cylinder-wall secured to said support, a shaft eccentrically journaled in the bearing-piece, and inner and opposite side cylinder-walls secured to said shaft, said side walls being lapped upon the adjacent edges of the outer cylinder-wall, substantially as specified.

19. In a rotary engine, the combination of a frame provided with a bearing, a stationary bearing-piece mounted in said bearing, a support provided with a projecting hub loosely revoluble around the bearing-piece, an outer cylinder-wall secured to said support, a shaft eccentrically journaled in the bearing-piece, inner and opposite side cylinder-walls secured to said shaft, said side walls being lapped upon the adjacent edges of the outer cylinder-wall, pistons reciprocally movable through the inner cylinder-wall, and an eccentric-strap surrounding the hub of said support for actuating the pistons, substantially as and for the purpose described.

20. In a rotary engine, the combination of a frame provided with a bearing, a stationary bearing-piece mounted in said bearing, a cylinder revoluble around the bearing-piece and provided with steam-ports, a shaft eccentrically journaled in the bearing-piece and connected to the cylinder for revolving the same, and reciprocating valves carried by the shaft for governing the passage of the steam through the ports, substantially as set forth.

21. In a rotary engine, the combination of a frame provided with a bearing, a stationary bearing-piece mounted in said bearing, a cylinder revoluble around the bearing-piece and provided with steam-ports, a shaft eccentrically journaled in the bearing-piece and connected to the cylinder for revolving the same, reciprocating valves carried by the shaft for governing the passage of the steam through the ports, a stationary eccentric for actuating the valves provided with a slot for receiving the shaft, and a rocking support passed through said bearing-piece and having one end secured to the eccentric and its opposite end provided with a handpiece, substantially as described.

22. In a rotary engine, the combination of a frame provided with a bearing and an inclosing shell arranged at one side of the bearing and formed with an aperture extending therethrough, and a steam-inlet chamber opening into the aperture, a stationary bearing-piece mounted in said bearing and projecting within the inclosing shell, a cylinder within said shell revoluble around the bearing-piece and having its side wall adjacent to the free end of the bearing-piece provided with steam-ports and guides communicating therewith and opening into the chamber inclosed by said shell, a shaft journaled in the bearing-piece and connected to the cylinder for revolving the same, a disk provided on the shaft adjacent to the free end of the bearing-piece and formed with ports in its inner face arranged in proximity to the former ports, a steam-inlet opening in its outer face of less depth than the thickness of the disk, and passages connecting the latter ports and the inlet-opening, a collar arranged in the portion of the aperture in the inclosing shell at the outside of the disk, formed of substantially the same diameter as said aperture, and provided with an annular groove in its peripheral face alined with the steam-inlet chamber, a central aperture communicating with the inlet-opening of the disk, and passages connecting said annular groove and central aperture, and a shoulder on the shaft engaged with said collar, substantially as specified.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this 6th day of June, 1895.

JOHN G. ALBEE.

Witnesses:
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H. E. CHACE.