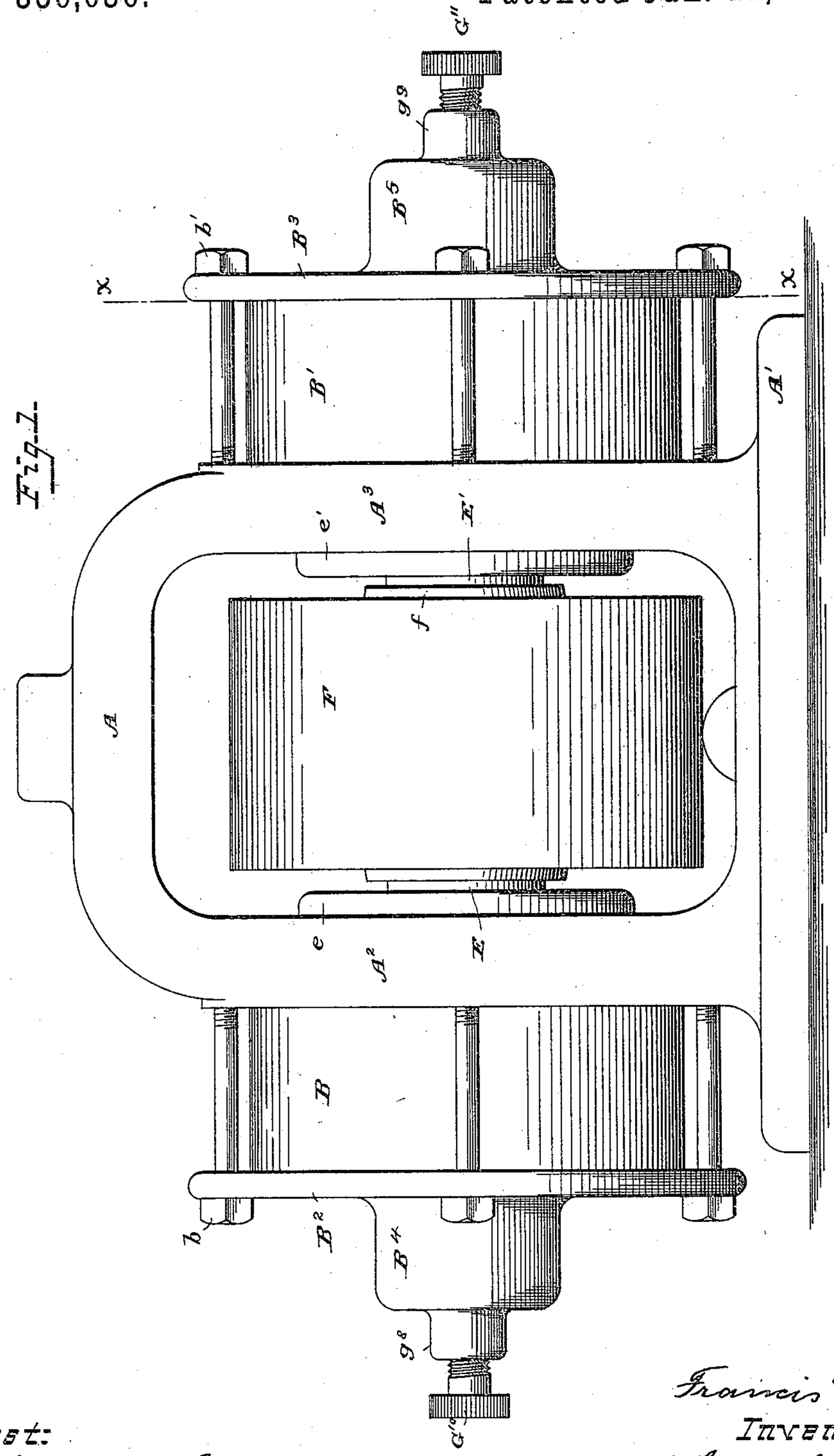
(No Model.) 5 Sheets—Sheet 1.

F. GLEASON.

ROLLER PISTON ENGINE.

No. 356,036. Patented Jan. 11, 1887.

Fig. 1.



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F. GLEASON.

ROLLER PISTON ENGINE.

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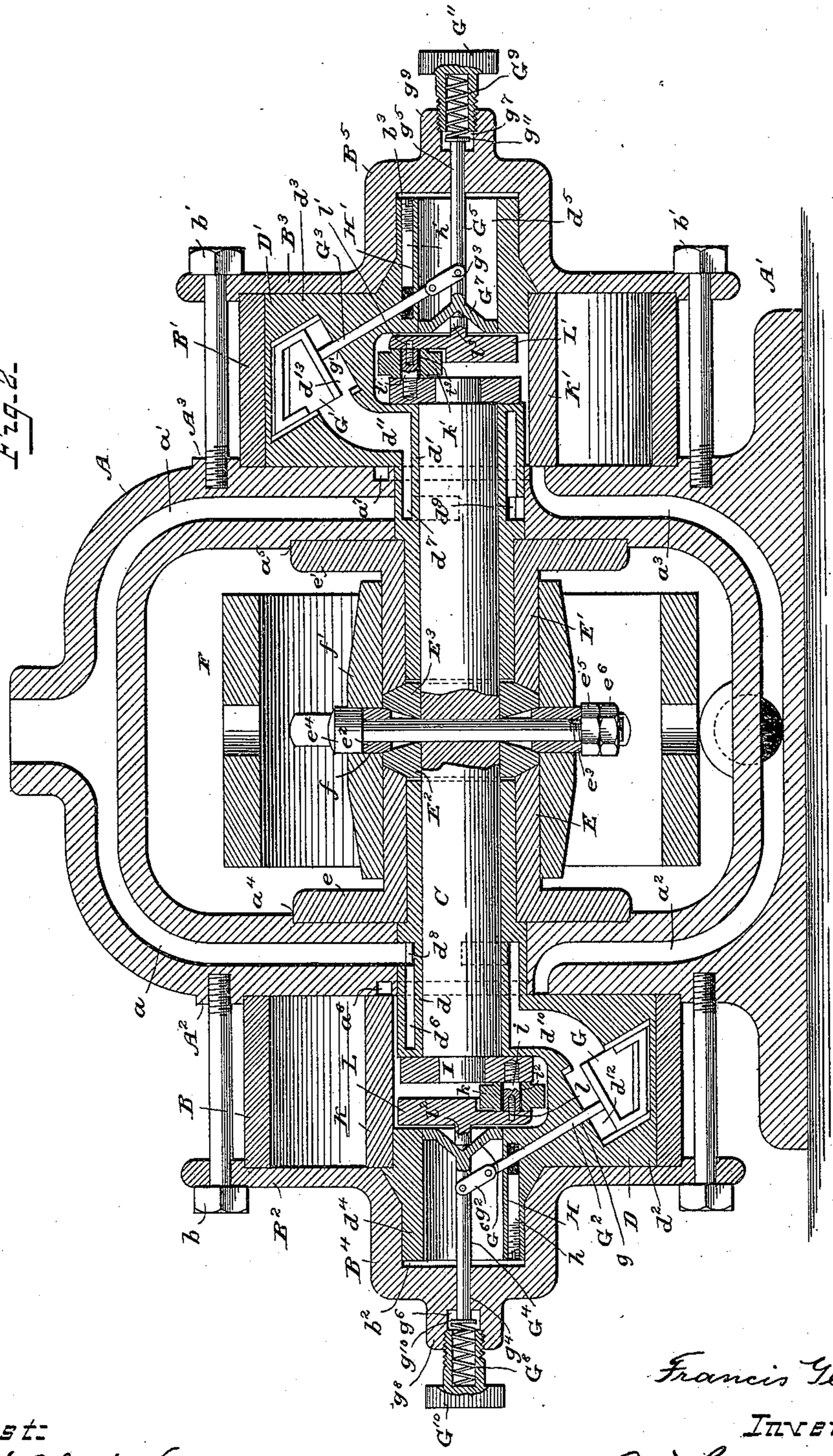
Fig. 2.



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(No Model.) 5 Sheets—Sheet 3.

F. GLEASON.

ROLLER PISTON ENGINE.

No. 356,036. Patented Jan. 11, 1887.

Fig. 4.

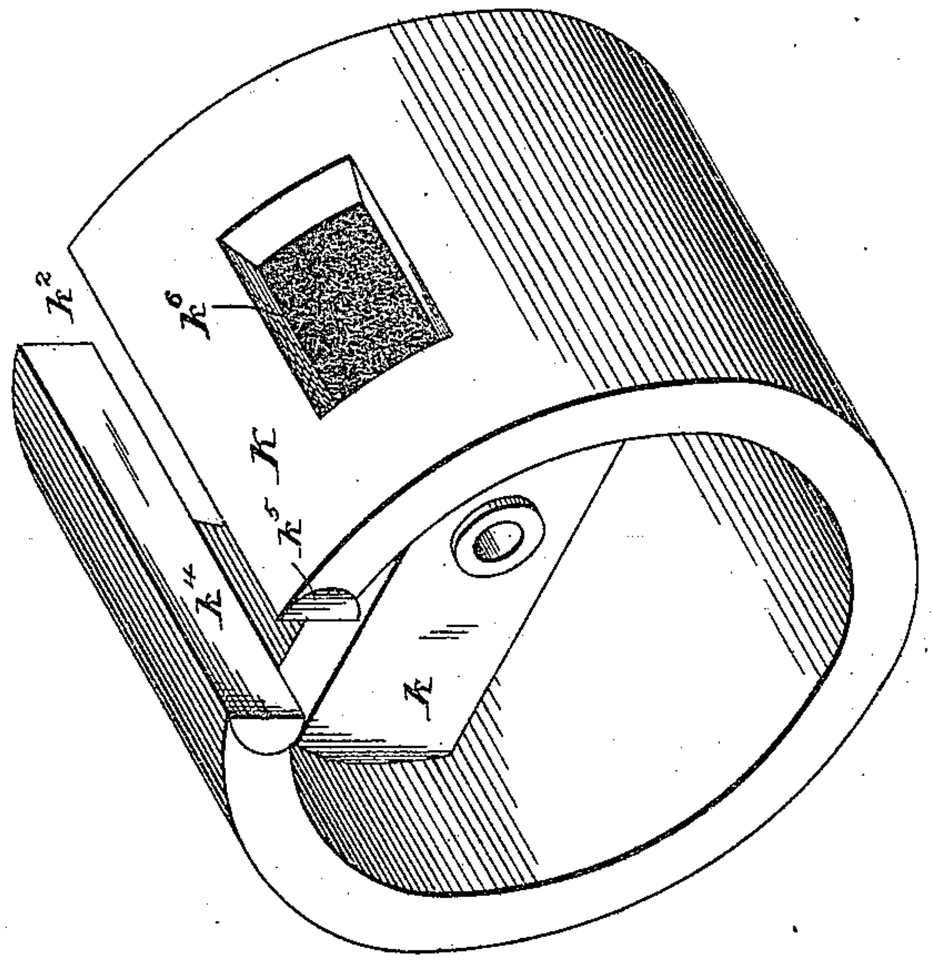
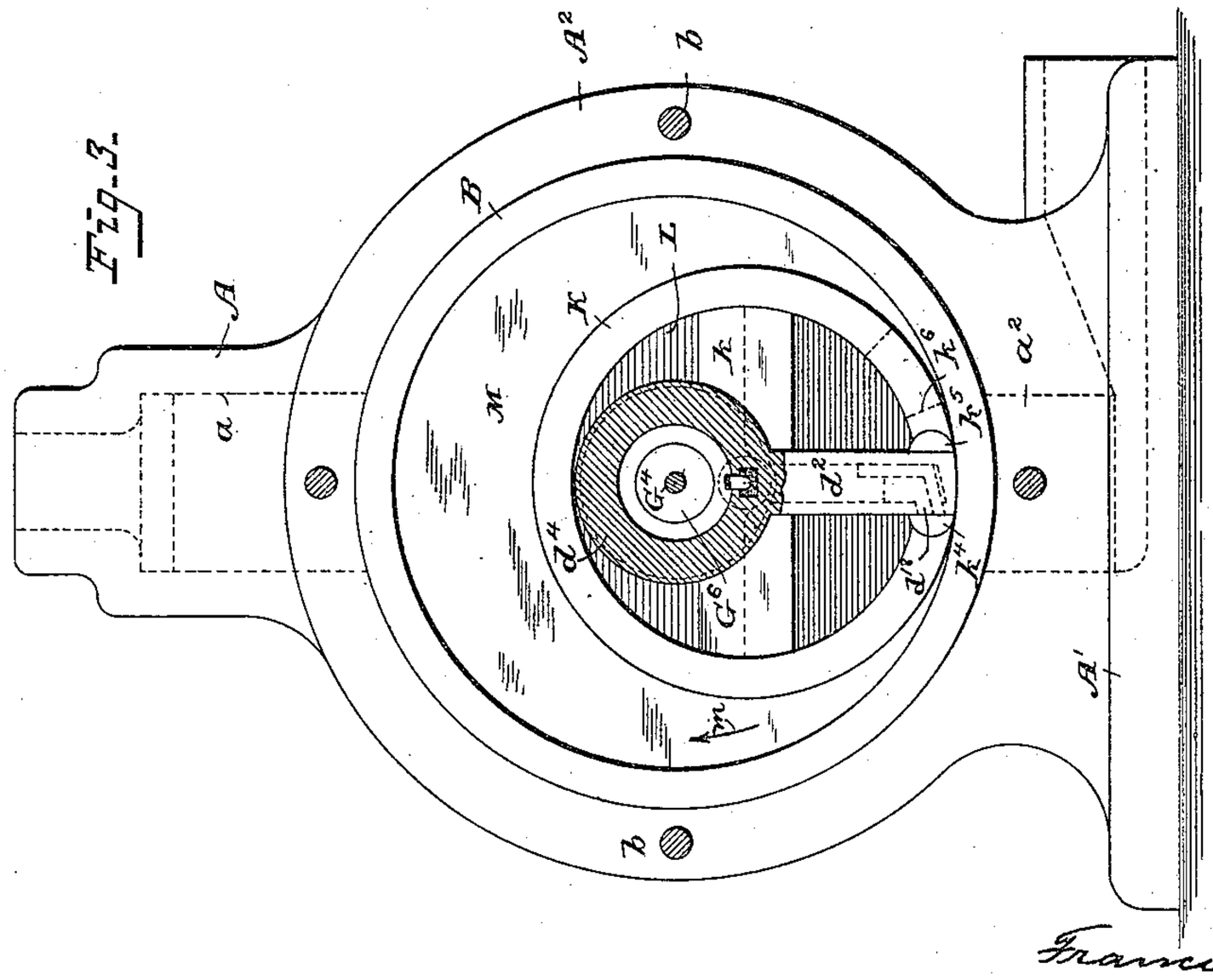


Fig. 3.



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(No Model.) 5 Sheets—Sheet 4.

F. GLEASON.

ROLLER PISTON ENGINE.

No. 356,036. Patented Jan. 11, 1887.

Fig. 4.

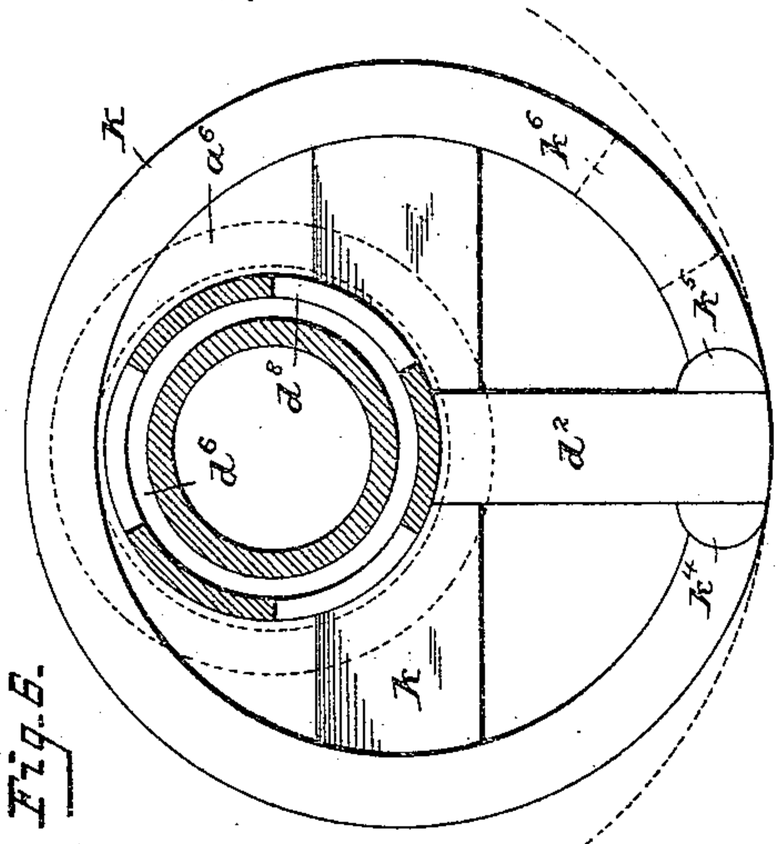


Fig. 7.

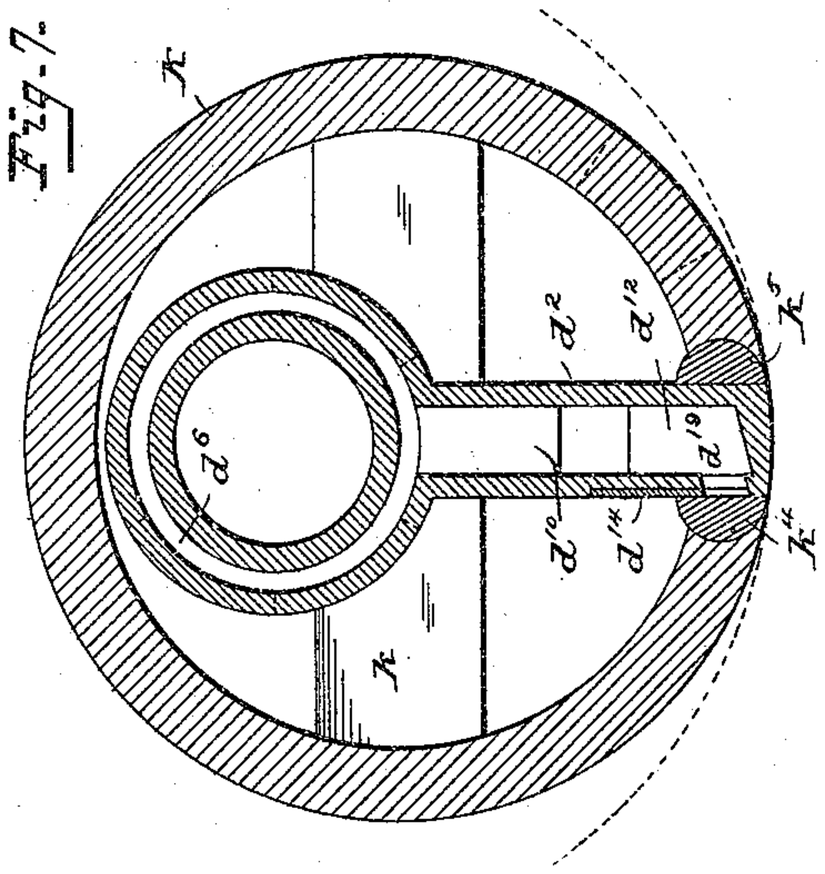


Fig. 5.

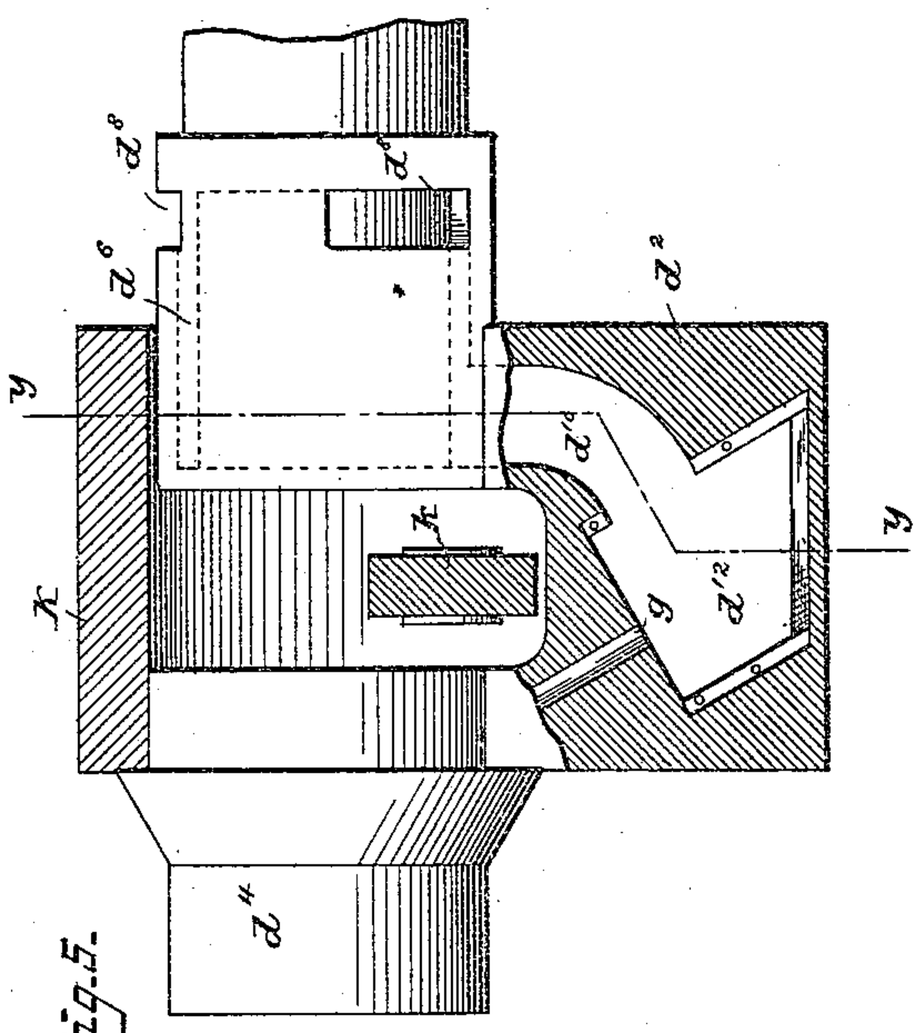


Fig. 6.

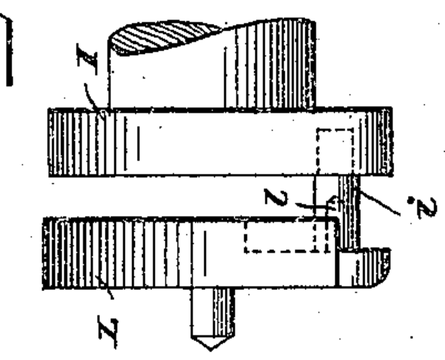


Fig. 10.

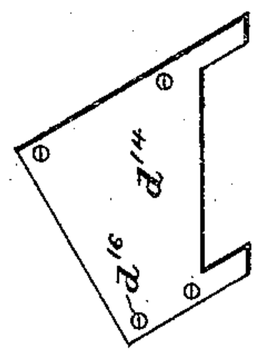


Fig. 8.

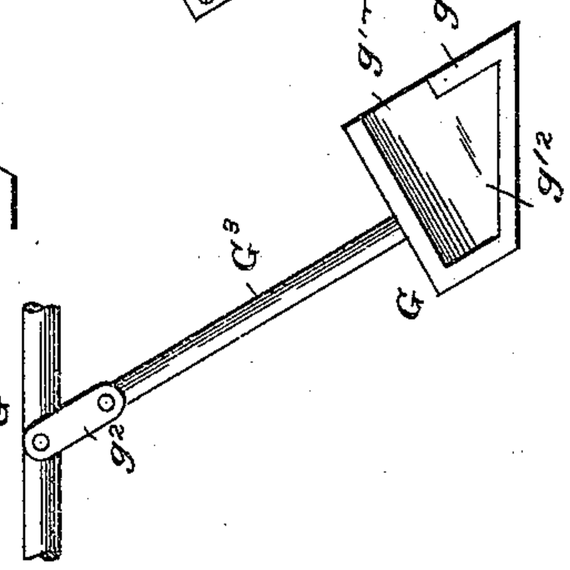
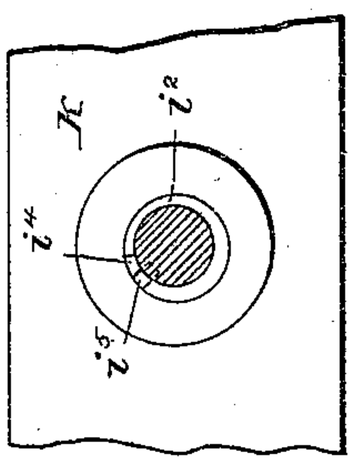


Fig. 11.



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F. GLEASON.

ROLLER PISTON ENGINE.

No. 356,036. Patented Jan. 11, 1887.

Fig. 15.

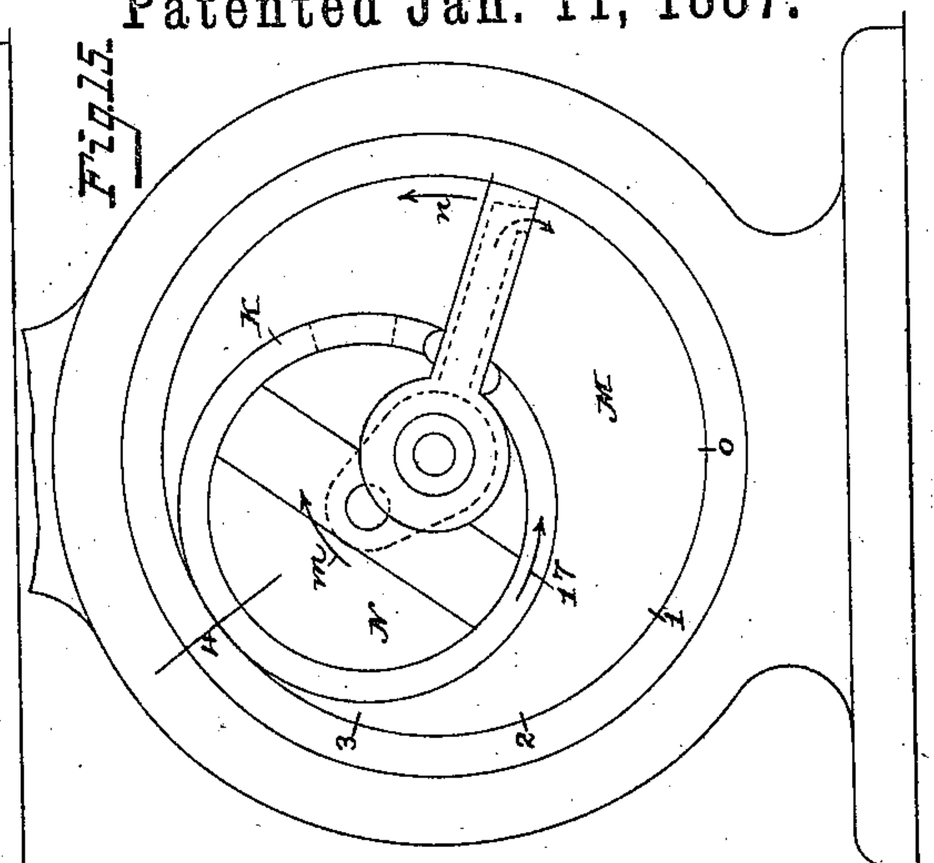


Fig. 16.

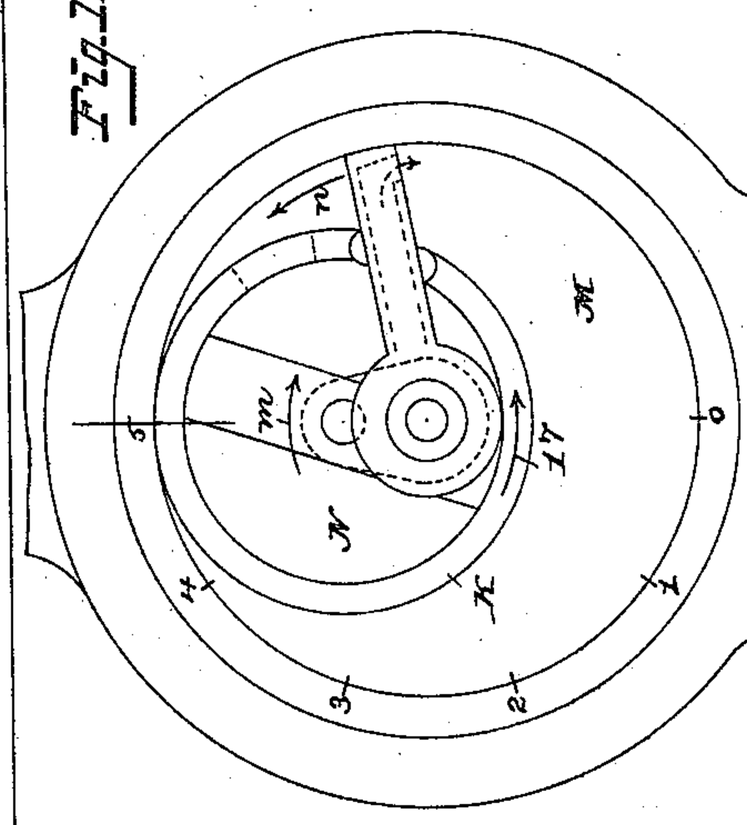


Fig. 17.

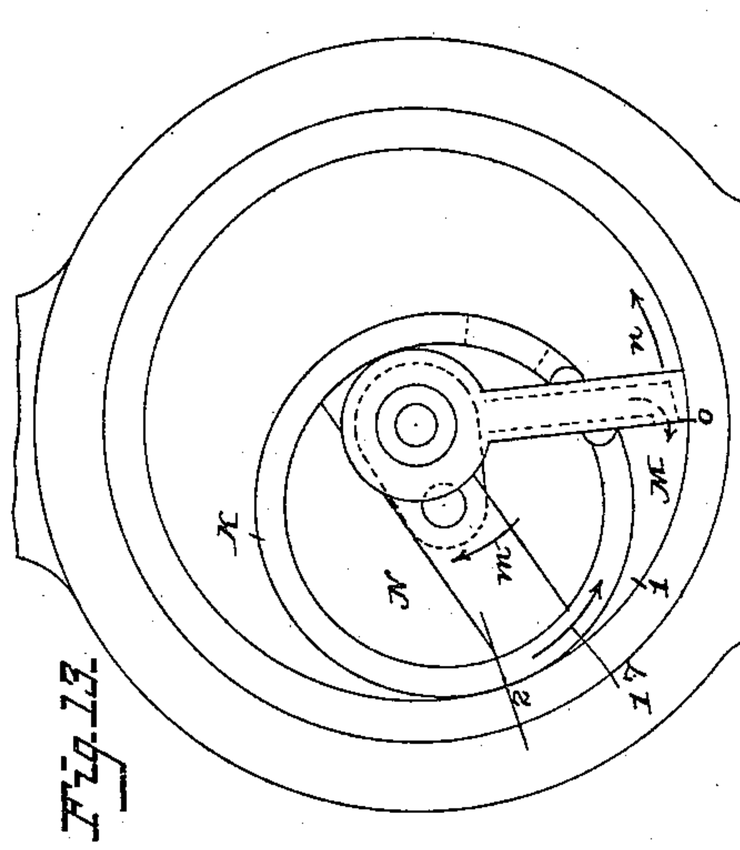
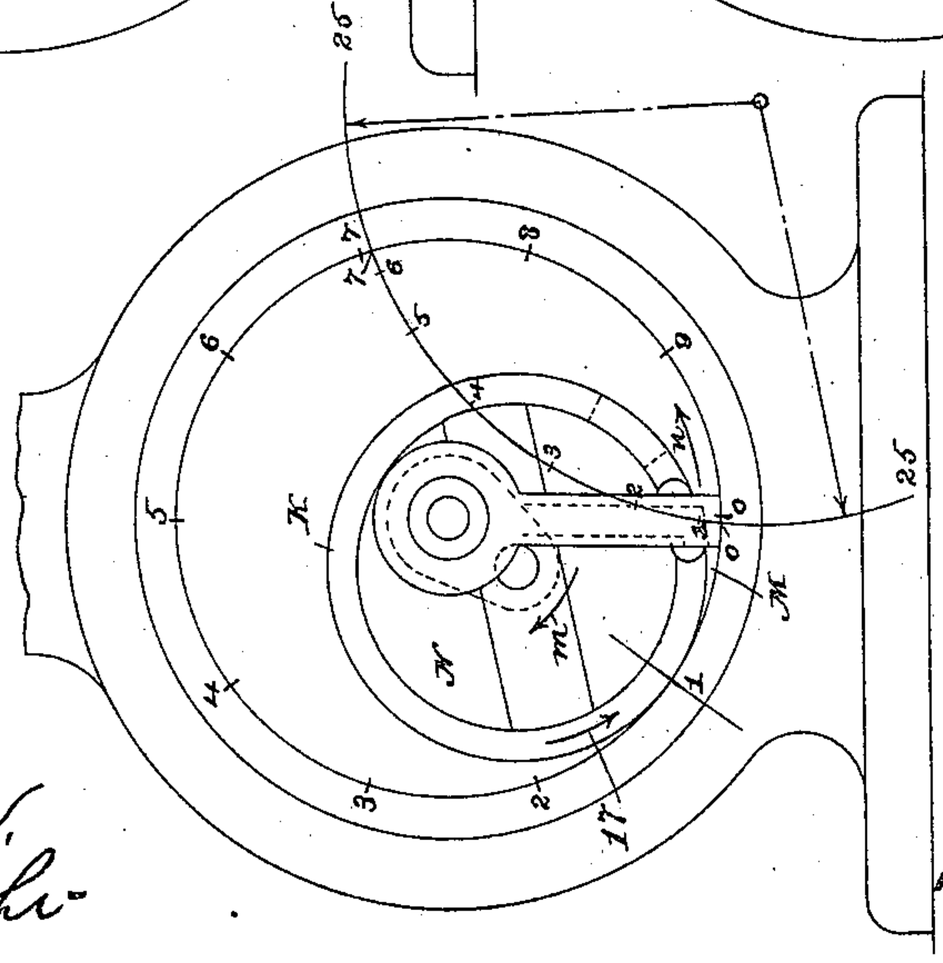


Fig. 18.

Fig. 14.



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Inventor:
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per Foster & Freeman
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UNITED STATES PATENT OFFICE.

FRANCIS GLEASON, OF PHILADELPHIA, PENNSYLVANIA.

ROLLER-PISTON ENGINE.

SPECIFICATION forming part of Letters Patent No. 356,036, dated January 11, 1887.

Application filed May 18, 1886. Serial No. 202,505. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS GLEASON, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have made certain new and useful Improvements in Roller-Piston Engines; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to improvements in rotary engines, and has for its object the provision, in an engine of the class named, of a main cylinder having suitable heads and centrally-arranged driving-shaft, a roller-piston pivoted to said shaft eccentrically of the same and in contact with the main cylinder, a wing hung or pivoted to said shaft within and projecting through said roller-piston to the inner surface of the main cylinder, and means for introducing steam to the space between said wing and the periphery of said roller-piston, to move said wing and piston in opposite directions.

To the accomplishment of the above the invention consists in the construction of the several elements comprised in my improved engine, and in the arrangement and combination of said elements for service in the complete machine, substantially as hereinafter described.

In the drawings, Figure 1 represents a side elevation of a roller-piston engine constructed in accordance with my invention. Fig. 2 is a vertical longitudinal section thereof. Fig. 3 is a transverse sectional view taken on the line *x x* of Fig. 1. Fig. 4 represents a detached detail perspective view of the piston. Figs. 5 and 6 represent detached detail side and end elevations of the steam-receiving wing. Fig. 7 is a transverse sectional view of said wing, taken on the line *y y* of Fig. 5. Fig. 8 represents a detached detail view of the mechanism that operates the governor-rods. Figs. 9, 10, and 11 are detail views of parts of the operating mechanism. Figs. 12 to 16, inclusive, illustrate diagram views showing the position of the roller-piston and moving abutment or wing at different points of the revolution of the main shaft.

Referring to the drawings, in which similar letters of reference denote similar parts, I will first describe the construction of the several elements comprised in my invention, and thereafter will explain the operation thereof.

Proceeding, A designates the main supporting-frame, to and by which the several elements of the engine are secured and supported.

A′ designates the bed-plate, preferably formed integral with the frame and provided with apertures to receive bolts, whereby it is secured in position upon any suitable foundation.

I provide the frame A with passages *a a′* and a^2 a^3 for "live" and "exhaust" steam, preferably forming said passages within the body of the frame. (See Fig. 2.) I provide the frame A, at each side, upon the outer surfaces thereof, with outwardly-swelled portions, to form heads A^2 A^3 for the cylinders B B′, and plane the outer faces of said heads to accommodate the rotating piston and wings within said cylinders, hereinafter described. I provide the cylinders with outer heads, B^2 B^3, and secure said heads, together with the cylinders, to the heads A^2 A^3 by bolts *b b′*.

B^4 B^5 designate projections integral with the heads B^2 B^3, at the middles thereof, within which are formed chambers b^2 b^3, for a purpose hereinafter described.

C designates the main shaft, which extends from one to the other of the cylinders B B′, at the middle of the inner sides thereof, and is journaled in hollow sleeves *d d′*, formed integral with rotatable wings D D′, that operate within the cylinders B B′. The adjacent inner ends of the sleeves *d d′* are journaled in sleeve-sections E E′, the outer ends of which are provided with circular flanged heads *e e′*, which are placed in circular recesses a^4 a^5, formed in the frame A at opposite sides thereof. The inner ends of the sleeves E E′ are beveled and bear against the beveled faces of packing-rings E^2 E^3, placed upon the shaft C, at or near its middle, to prevent leakage of steam, as will be hereinafter explained. The rings E^2 E^3 are adjusted outward against the sleeves E E′ by short tapering sleeve-sections e^2 e^3, placed at opposite sides of the shaft upon a headed screw-threaded bolt, e^4, that passes through the shaft and is provided with jam-nuts e^5 e^6, by operating which the sections e^2 e^3 are forced inward against the beveled adjacent faces of the packing-rings, whereby said rings are moved outward, as stated.

F designates the driving-wheel, which is

mounted between the sides of the frame upon the sleeves E E′, and is held and moves in unison with the shaft C by the sleeves e^2 e^3, which project into apertures *f* formed in the hub *f′* of said wheel.

In practice, I prefer that the sleeves E E′ and shaft C shall rotate in unison; but, if desired, said shaft may remain stationary, the driving-wheel rotating thereon.

D D′ designate the wings, which operate within the cylinders B B′. In practice, as movable abutments, said wings consist of flat sections d^2 d^3, provided upon their side edges at one end with hollow bosses or sleeves *d d′*, hereinbefore described, and hollow bosses or sleeves d^4 d^5 in alignment therewith, that project, when the wings are in position, into the chambers b^2 b^3 of the heads B^2 B^3, for a purpose hereinafter to be described.

The side and end edges of the sections d^2 d^3 of the wings bear snugly, when said wings are in position, against the inner surfaces of the heads and sides of the cylinders B B′. I provide the sleeves *d d′* at their outer ends with annular chambers d^6 d^7, that communicate through a series of ports, d^8 d^9, with the live-steam passages *a a′* and through ports d^{10} d^{11} with chambers d^{12} d^{13}, formed in the sections d^2 d^3 of the wings. These chambers open outward through the rear faces of the wings, and are each provided with covers or plates d^{14} d^{15}, preferably held in position upon the sections by countersunk screws. d^{16} d^{17} designate cut-away portions of the lower ends of the covers d^{14} d^{15}, whereby ports are formed for the passage of steam.

G G′ designate slide-valves, that are operated within the chambers d^{12} d^{13} through rods G^2 G^3, that extend from said valves through apertures *g g′* to and into the hollow bosses or sleeves d^4 d^5, and are connected by links g^2 g^3 with rods G^4 G^5, that extend through apertures g^4 g^5, formed through the heads B^2 B^3 at the middles thereof, and are provided within the sleeves d^4 d^5 with cup-shaped disks G^6 G^7, that slide freely within said sleeves, and upon their outer ends, within chambers g^6 g^7, formed in bosses g^8 g^9, with disks g^{10} g^{11}, against which bear the inner ends of springs G^8 G^9, to which tension is applied by adjusting-screws G^{10} G^{11}, that take into the screw-threaded sides of the chambers g^6 g^7.

H H′ designate apertures formed in the bosses d^4 d^5 at angles with and intersecting the apertures *g g′* therein, to receive packing material, and screws *h h′* to prevent escape of steam about the valve-rods G^2 G^3.

The valves G G′ each consist in a single side, g^{12}, and ribs g^{13}, having a cut-away portion, g^{14}, through which steam passes to the interior thereof. In practice the side g^{12} is placed against the side of the chambers d^{12} or d^{13} of the wings D or D′ farthest from the steam-ports therein. This valve, together with its operating mechanism, is applicable to engines differing in construction from that herein described. I have therefore made said parts the subject-matter of a separate application for Letters Patent, filed May 12, 1886, and bearing Serial No. 201,979, and while showing and describing the construction and operation of the parts named, I yet do not claim said parts herein.

I I′ designate short cranks, which are secured to the opposite ends of the shaft C and provided with crank-pieces *i i′*, that are journaled in cross-heads *k k′*, that extend from side to side of open-ended cylinders K K′, that constitute the roller-piston, the ends of which abut against the opposite heads of the cylinders B B′.

The roller-pistons K K′ have diameters of such length that when they are in position the inner surfaces thereof shall just clear the ends of the sleeves *d d′* within the cylinders B B′, while the exterior surfaces of said cylinders K K′ are in contact with the inner surfaces of said cylinders B B′. (See Fig. 3.) To insure that the peripheries of the pistons K K′ shall constantly be in contact with the inner surfaces of the cylinders B B′, I provide that the apertures in the cross-heads *k k′* of K K′ shall be somewhat larger than the crank-pins *i i′*, and place therein eccentric rings i^2 i^3, having slots i^4 to receive pins i^5, which project from said crank-pins. The rings i^2 i^3 have motion in but one direction—that in which the cranks move—and will consequently hold the peripheries of the rollers or cylinders K K′ in constant contact, under the pressure of steam, with the inner surfaces of the cylinders B B′.

By reference to the drawings, Fig. 3, it will be observed that the outer ends of the wings D D′ project through the roller-pistons K K′, at one side thereof, and that the angles formed by said wings and the diametrical axis of said pistons K K′ are constantly changing. I therefore provide said pistons with longitudinal slots k^2 k^3, having concave adjacent faces that receive semi cylindrical blocks k^4 k^5, the faces of which bear against the surfaces of the wings D D′.

I provide the pistons K K′ with ports k^6, locating said ports in advance of the wings, through which the steam may pass at stated periods from the exterior of said rollers K K′ to the interior thereof, and thence through annular grooves a^6 a^7, formed in the heads A^2 A^3, to the exhaust-passages a^2 a^3.

I control the quantity of steam admitted to the chambers d^{12} d^{13} through the centrifugal action of semi-cylindrical weights L L′, which are provided with pivotal pins *l l′*, that enter the ends of the crank-pins *i i′*, and projecting studs l^2 l^3, that project into the cup-shaped disks G^6 G^7 of the rods G^4 G^5.

Figs. 3 and 12 to 16, inclusive, represent diagrams of the various positions assumed by the roller-piston at one end of the engine and its movable abutment or wing during a half-revolution of the main shaft. In one of said figures—to wit, Fig. 12—I have shown the distance around the main cylinder, measured upon the interior surface thereof, divided into ten equal parts, and in said Figs. 12 to 16, respect-

ively, have shown the piston as touching said cylinder upon the points 1 to 5, at which time the movable abutment or wing which projects through said roller-piston, as hereinbefore described, will intersect the epicycloid 25 25 at the points 1 to 5, respectively, said points corresponding with the points, 1 to 5, at which the roller-piston touches the cylinder, as will be understood.

From the figures named it will be seen that the piston rotates upon its axis in the direction indicated by the arrow 17, and that as its periphery is in contact with the interior surface of the main cylinder its pivotal point must move in the direction indicated by the arrow *m*, whereby, as will be apparent, the piston has motion in two directions—viz., upon its axis, as shown by arrow 17, and in forward direction as regards the main cylinder, as shown by arrow *m*—the result of which opposite motions operate to cause the movable abutment or wing to move in the direction indicated by the arrow *n*, which, as regards the inner surface of the main cylinder, is in direction opposite that in which the roller-piston moves thereon, as will readily be seen. The movement thus described I deem of great importance, inasmuch as thereby I am enabled to produce results not heretofore produced in this art.

The operation of my improved engine is as follows: The cranks I I′ being "off centers"—that is to say, at angles with the wings D D′, as shown in Fig. 12—steam is now admitted through the passages *a a′* to the annular chambers d^6 d^7, thence through the passages d^{10} d^{11} to the chambers d^{12} d^{13}, and through the ports d^{18} d^{18} to the space indicated by the letter M, outside of the pistons K K′ and in advance of the wings D D′, whereby said pistons are forced forward in the direction of the arrow *m*, and as the peripheries of said pistons are in contact with the inner surfaces of the cylinders B B′ such forward motion will cause them to rotate, whereby the wings D D′ are caused to move in the direction of the arrow *n*, in direction opposite to that taken by the pistons, as hereinbefore described. The shaft C will be rotated by the above-described movements of the pistons K K′, as will be readily understood. The discharge of steam from the chamber or space M to the interior N of the pistons K K′ will take place slightly in advance of the movement into alignment of the wings D D′ and cranks I I′ by the opening to the steam-space M of the ports k^6 k^7, the steam passing through said ports to the interior N of the pistons K K′, and thence to the exhaust-passages a^2 a^3. An excess of speed of the shaft C will, through centrifugal force, cause the weights L L′ to move outward and the studs 12 13 thereon to press the rods G^4 G^5 outward through the cup shaped disks G^6 G^7, thereby, through the links g^2 g^3 and rods G^2 G^3, moving the valves G G′ inward and closing the openings d^{16} d^{17}, to a greater or less extent, against the passage of steam. The speed of the engine may be determined by imparting to the springs G^8 G^9, through the adjusting-screws G^{10} G^{11}, a greater or less degree of tension.

I have herein shown and described an engine provided with double cylinders. It will, however, be apparent that said cylinders may be used independently of each other with good results. I prefer, however, to employ two cylinders, as herein shown, and as in this construction there occur "dead-points," I prefer to secure the cranks I I′ to the shaft C at right angles to each other.

If desired, the projection B^4 B^5 may be separate from the heads B^2 B^3, and secured thereto in any desired manner to secure ready access to the cylinders.

The within-described machine may, with some slight modification, be used as a pump for fluids of different kinds—as, for instance, air, water, &c.—or as a meter for measuring fluids, as well as in the capacity herein described, it only being necessary in such use to apply power to the main driving-wheel of the device, as will be readily understood.

Without limiting myself to the exact construction of parts shown and described, I claim—

1. In a rotary engine, a main cylinder inclosing a piston adapted to rotate upon its axis and to roll around said main cylinder in contact with the interior surface thereof, substantially as described.

2. In a rotary engine, a main cylinder inclosing a rotatable piston and a movable abutment or wing, said piston and wing adapted to move in opposite directions as regards the interior surface of said main cylinder, substantially as described.

3. A main cylinder, a rotating piston, and a movable abutment or wing within and moving in opposite direction as regards the interior of said main cylinder, and means, substantially as described, to move said parts, as and for the purpose described.

4. A main cylinder, a shaft centrally arranged thereon, a rotatable piston eccentrically arranged as regards said shaft, and a movable abutment or wing, said piston and wing adapted to move in opposite directions as regards the interior surface of said main cylinder, substantially as described.

5. A main cylinder, a shaft centrally arranged therein, a rotatable piston eccentrically arranged as regards said shaft, a movable abutment or wing hung upon said shaft, and means, substantially as described, to cause said piston and wing to move in opposite directions as regards the interior surface of said main cylinder, as and for the purpose described.

6. In a rotary engine, a main cylinder provided with heads, a shaft journaled in one of said heads and provided within the main cylinder with a crank having a crank-pin, a rotatable piston-cylinder pivoted to said crank-

pin, and a traveling wing journaled upon said shaft, substantially as described.

7. A main cylinder having a rotating piston within and adapted to roll around said main cylinder in contact with the inner surface thereof, in combination with a movable abutment or wing having steam-passages therein, substantially as described.

8. A main cylinder having a shaft centrally arranged therein, a rotating piston eccentrically arranged as regards said shaft, and a movable abutment or wing hung upon said shaft and provided with steam-passages, said piston and wing adapted to be moved in opposite directions as regards the interior surface of said main cylinder, substantially as described.

9. In combination, a main cylinder having a head, a shaft centrally arranged as regards said head and the cylinder and provided with a crank, a piston pivoted to said crank and adapted to roll around the interior of the cylinder in contact therewith, and a traveling abutment or wing having steam-passages formed in its body, substantially as described.

10. A main cylinder having heads, one of which is provided with live-steam and exhaust passages, a shaft journaled in said head, and a piston eccentrically pivoted to said shaft, in combination with a traveling wing journaled upon said shaft within the main cylinder, and means, substantially as described, for admitting steam to the interior of said main cylinder to operate said wing, as and for the purpose specified.

11. In a rotary engine, a main cylinder having heads, one of which is provided with steam-passages, a traveling wing provided with a sleeve journaled in said head, and a rotatable crank-shaft journaled in said sleeve, in combination with a rotatable piston pivoted to said crank-shaft and provided with a slot, as k^2 k^3, having semi-cylindrical blocks, as k^4 k^5, to permit the passage of the wing, substantially as described.

12. A main cylinder having a head, a shaft centrally arranged as regards said head, and a rotating piston eccentrically arranged as regards said shaft, in combination with a traveling abutment or wing hung upon said shaft and provided with a steam-receiving chamber and passages to and from said chamber, to move said piston and wing in opposite directions as regards the interior surface of said main cylinder, as and for the purpose described.

13. In a rotary engine, a main cylinder having heads, a shaft journaled in one of said heads, and a wing journaled upon said shaft within the cylinder and provided with a steam-receiving chamber and passages to and from said chamber, in combination with a governor-valve within said chamber, and means, substantially as described, for operating said valve.

14. A main cylinder provided with heads having steam-passages, a shaft, as C, journaled in one of said heads and provided with a crank, a rotatable piston pivoted to said crank, in combination with a wing journaled within said main cylinder upon the shaft C and provided with a steam-receiving chamber, a governor-valve therein, and passages to and from said chamber, substantially as described.

15. In a rotary engine, a traveling wing, as D or D′, having hollow bosses or sleeves, an annular chamber in one of said sleeves, passages from said chamber to a steam-receiving chamber in the body of said wing, and passages therefrom, substantially as described.

16. In a rotary engine, a main cylinder having heads provided with steam-passages, a shaft journaled in one of said heads and provided within said cylinder with a crank, and a piston pivoted to said crank, in combination with a traveling wing having hollow bosses or sleeves and steam-receiving chamber and passages, and means, substantially as described, for operating said valve, as and for the purpose specified.

17. In a rotary engine, a main cylinder, a traveling wing placed therein and provided with steam-receiving chamber, passages to and from said chamber, and governor-valve within said chamber, in combination with an eccentrically-hung governor-weight, and means, substantially as described, for connecting said weight and valve, as and for the purpose specified.

18. In a rotary engine, a main cylinder, a head therefor having a centrally-arranged chamber, as b^2 b^3, and a rod having a cup-shaped or concave disk operating in said chamber, in combination with a traveling wing journaled in said main cylinder and provided with steam-receiving chamber and passages and a governor-valve, substantially as described.

19. In a rotary engine, a main cylinder having a head provided with a centrally-arranged chamber, a rod provided with a disk operating within said chamber and connected to a governor-valve placed within a steam-receiving chamber formed in a traveling wing journaled in said main cylinder, in combination with a rotatable shaft having a crank, a piston pivoted to said crank, and the live and exhaust steam passages, substantially as described.

20. In a rotary engine, the main cylinder, a shaft journaled in one head thereof, a sleeve, as E or E′, journaled upon said shaft, in combination with a packing-ring, as E^2 or E^3, beveled sleeves e^2 e^3, bolt e^4, and jam-nuts e^5 e^6, substantially as described.

21. In a rotary engine, a frame, as A, having steam-passages, cylinders B B′ at opposite sides of said frame, shaft C, extending from one to the other of said cylinders and provided within the same with crank-arms, pistons pivoted to said cranks and moving in contact with the inner surfaces of the main cyl-

inders, traveling wings journaled upon the shaft within said pistons and provided with steam-receiving chambers, passages, and governor-valves, in combination with flanged sleeves, as E E′, packing-rings E^2 E^3, adjusting-sleeves e^2 e^3, bolt e^4, nuts e^5 e^6, and the driving-wheel, substantially as described.

22. In a rotary engine, a main cylinder having heads, a shaft journaled in one of said heads and provided with a crank-arm having a crank-pin, and an eccentric ring, as i^2 i^3, mounted thereon, in combination with a hollow roller-piston mounted upon said eccentric ring and rotated by contact with the inner surface of said main cylinder, substantially as described.

23. In a rotary engine, a main cylinder having heads, a shaft journaled in one of said heads and provided within said cylinder with a crank-arm, to which is pivoted a hollow roller-piston having a slot, as k^2 k^3, and steam-ports, as k^6 k^7, in combination with a wing journaled upon said shaft and provided with a steam-receiving chamber having a removable cover, as d^{14} d^{15}, provided with cut-away part, as d^{16} d^{17}, sliding governor-valve, and mechanism, substantially as described, for operating said valve, as and for the purpose specified.

24. In a rotary engine, a main cylinder, a rotatable shaft therein, provided with a crank-arm, a hollow roller-piston mounted upon said crank-arm and rolling in contact with and rotated by said main cylinder, and a wing journaled upon said shaft within and projecting thence through said roller-piston to the inner surface of the main cylinder, and means, substantially as described, for introducing steam between the wing and periphery of said roller-cylinder, whereby to move said wing and cylinder in opposite directions as regards the inner surface of said main cylinder.

25. In a rotary engine, a main cylinder, in combination with a piston adapted to rotate upon its axis and to roll around the interior of said cylinder, substantially as described.

26. In a rotary engine, a main cylinder, a shaft centrally arranged as regards said cylinder, and a piston-cylinder adapted to rotate upon its axis and about said shaft, eccentrically of the latter, substantially as described.

27. In a rotary engine, a stationary main cylinder, a shaft centrally arranged as regards said cylinder, and a piston-cylinder eccentrically pivoted to said shaft and adapted to rotate upon its axis and about said shaft, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FRANCIS GLEASON.

Witnesses:
SAMUEL P. COURTNEY,
E. A. RIGGS.