J. HARMAN.

MOTOR ENGINE.

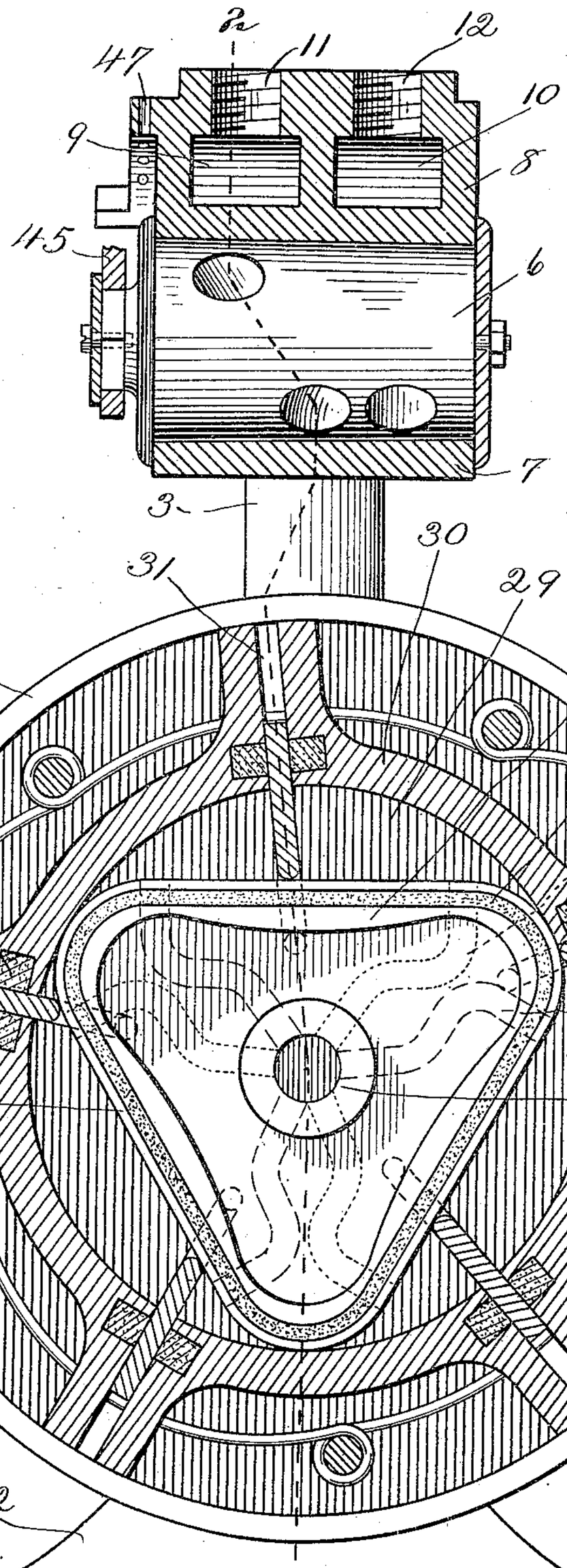
APPLICATION FILED JAN. 30, 1909.

934,968.

Patented Sept. 21, 1909.

3 SHEETS—SHEET 1.

Fig. 1.



Witnesses

T. P. Britt

E. C. Murphy

Inventor

Joseph Harman

By C. C. Dumbrell

Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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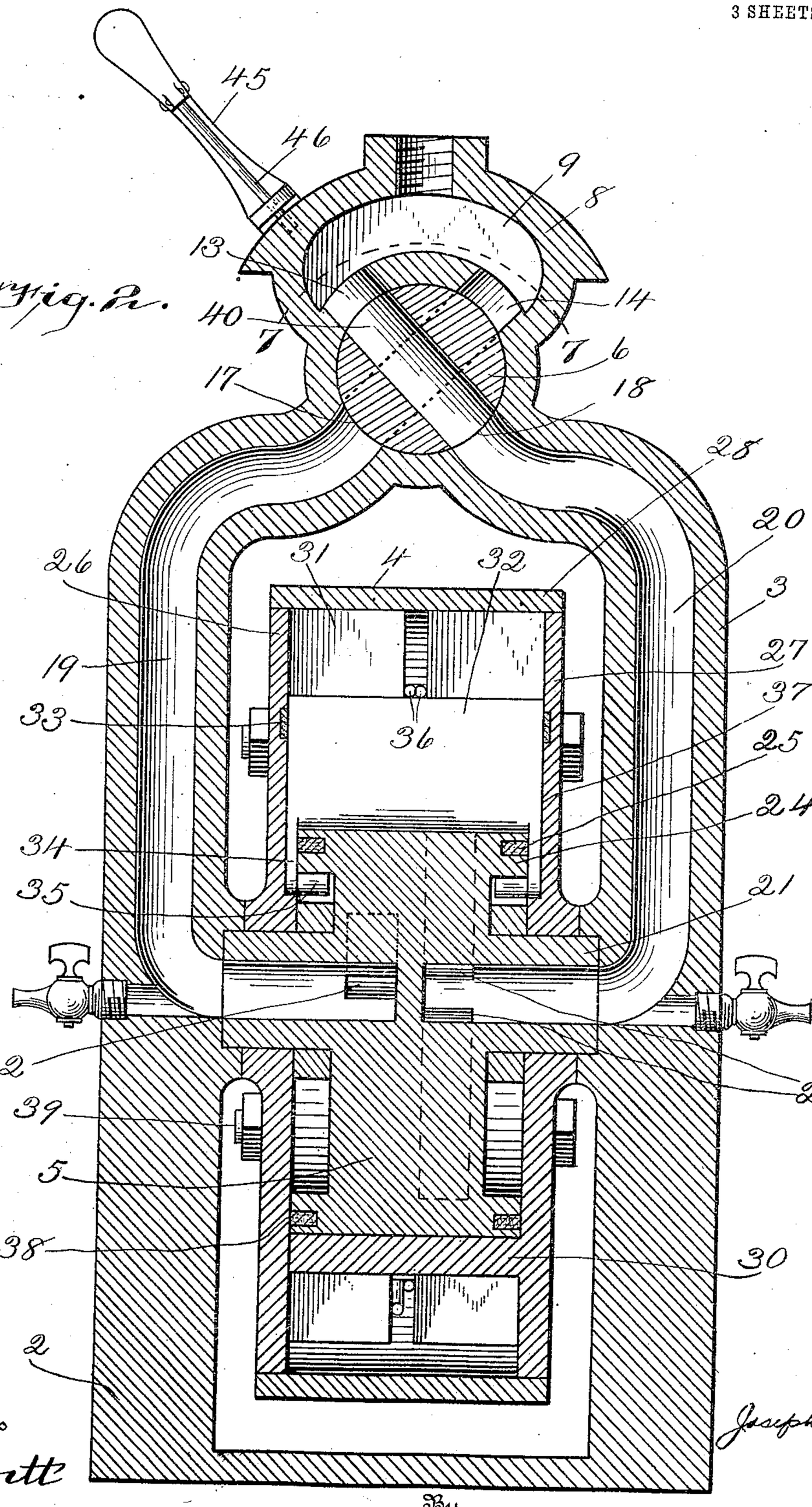
3 SHEETS—SHEET 2.

Fig. 2.



Witnesses

J. F. Brett

E. C. Duffy

Inventor

Joseph Harman

By

C. E. Duffy & Son

Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

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3 SHEETS—SHEET 3.

Fig. 3.

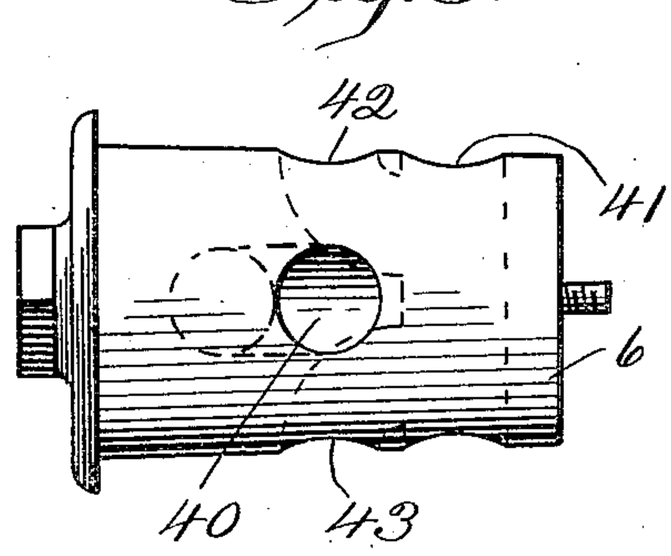


Fig. 4.

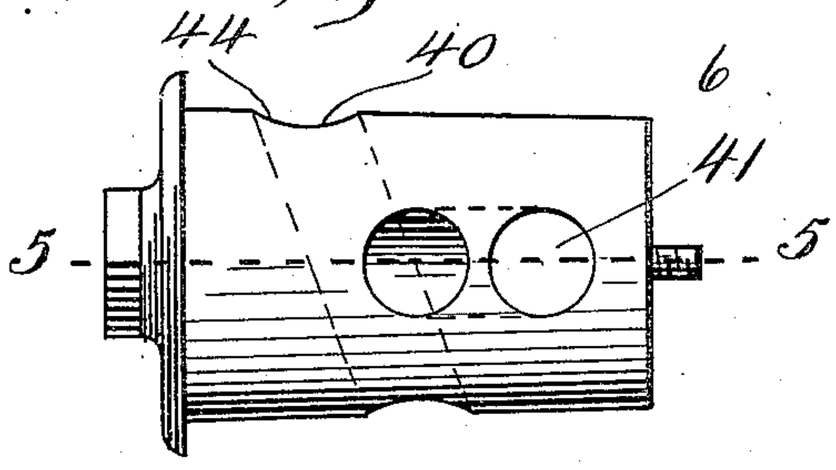


Fig. 5.

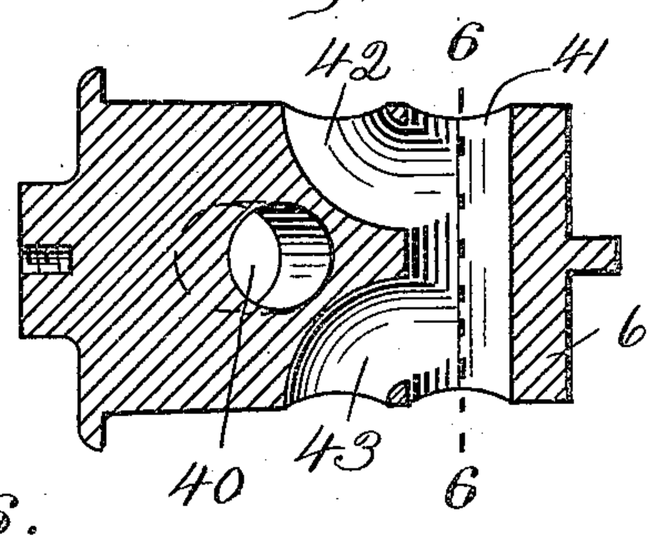


Fig. 6.

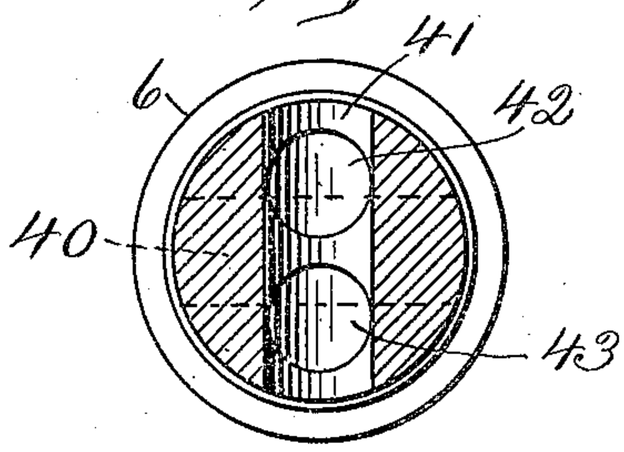
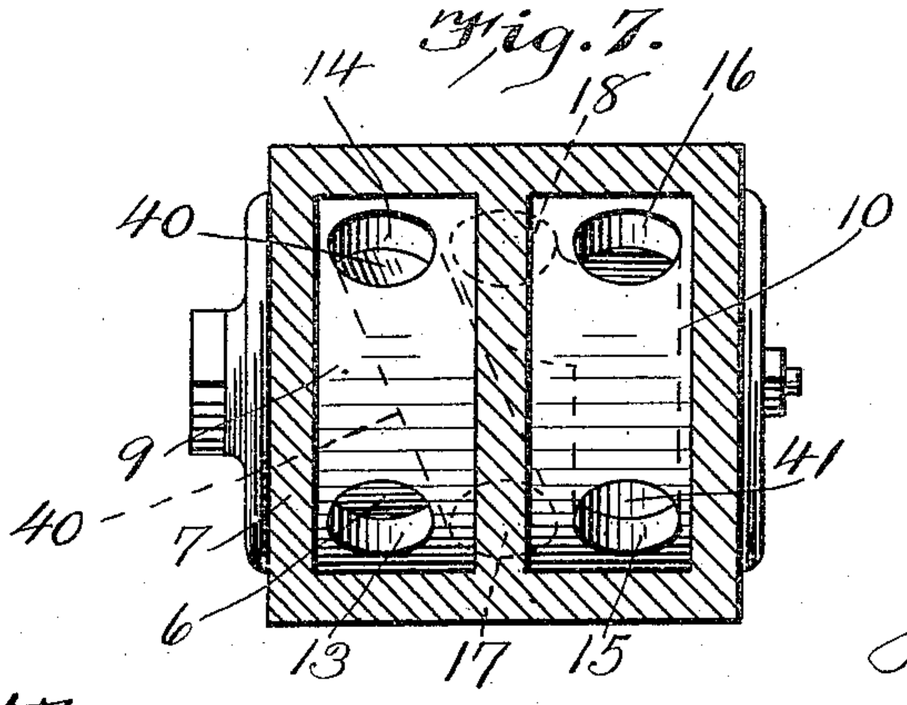


Fig. 7.



Witnesses

T. P. Britt

E. C. Duppa

Inventor

Joseph Harman

By O. E. Duppa

Attorneys

ANDREW. B. GRAHAM CO., PHOTO-LITHOGRAPHERS, WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

JOSEPH HARMAN, OF BRAINERD, MINNESOTA, ASSIGNOR, BY DIRECT AND MESNE ASSIGNMENTS, OF ONE-THIRD TO CHARLES COLEMAN, OF CROW WING COUNTY, MINNESOTA, AND ONE-THIRD TO JOHN H. KOOP, OF BRAINERD, MINNESOTA.

MOTOR-ENGINE.

934,968. Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed January 30, 1909. Serial No. 475,233.

To all whom it may concern:

Be it known that I, JOSEPH HARMAN, a citizen of the United States, residing at Brainerd, in the county of Crow Wing and State of Minnesota, have invented certain new and useful Improvements in Motor-Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to rotary steam engines and has for its object to provide certain new and useful improvements in the construction and arrangements of parts of the engine or motor.

My invention further consists in the novel construction of the valve chest and valve.

My invention further consists in the novel construction of the stationary portion of the motor, and also in the novel construction and arrangement of parts of the pistons and rotating portion of the motor.

My invention also consists in certain other novel details of construction and in combinations of parts, all of which will be first fully described and afterward specifically pointed out in the appended claims.

Referring to the accompanying drawings: Figure 1 is a vertical longitudinal section through a rotary motor constructed in accordance with my invention. Fig. 2 is a transverse sectional view taken on dotted lines 2—2 of Fig. 1. Fig. 3 is an elevation of the steam valve. Fig. 4 is an elevation of the valve in a different position. Fig. 5 is a longitudinal sectional view taken on line 5—5 of Fig. 4. Fig. 6 is a vertical sectional view taken on line 6—6 of Fig. 5, and Fig. 7 is a horizontal sectional view taken on line 7—7 of Fig. 2.

Like numerals of reference indicate the same parts throughout the several figures in which;

1 indicates the motor which comprises a base 2, frame 3, rotating portion 4, stationary portion 5, a valve 6, a valve casing 7 and valve chest 8.

Referring to Fig. 1 it will be seen that the valve chest 8 comprises an intake chamber 9 and an exhaust chamber 10, suitable intake and exhaust ports 11 and 12 being provided in the top of the valve chest as clearly shown.

Referring now to Fig. 7 it will be seen that the intake chamber 9 is provided with two ports 13 and 14, while the exhaust chamber 10 is provided with two similar ports 15 and 16; and referring to Fig. 2 it will be seen that a port 17 is provided at the bottom of the valve casing and a similar port 18 provided as shown, said ports 17 and 18 as will hereinafter fully appear being either exhaust or intake ports according to the position of the valve 6. It will also appear from Fig. 7 that the ports 17 and 18 are arranged central of the valve casing 7 as shown in dotted lines; while the intake ports 13 and 14 and the exhaust ports 15 and 16 are arranged on either side of the ports 17 and 18 and above the same. The ports 17 and 18 communicate with the steam passages 19 and 20 located in the frame 3 and pass downwardly and communicate with the central portion 21 of the stationary member 5. Arranged in the stationary member 5 and communicating with the steam passages 19 and 20 are a series of ports 22 and 23, said ports being either intake or exhaust ports according to the position of the valve 6, the ports 22 communicating with the steam passage 19, while the ports 23 communicate with the steam passage 20.

As will appear from Fig. 1 the stationary member 5 is substantially triangular having the points rounded as shown, and a flange 24 is formed around the edge of both faces of the stationary member 5 as clearly shown in the drawing, suitable packing material 25 being arranged in each of the flanges 24 for a purpose which will be presently described.

Referring now to the rotary portion 4 it will be seen that the same comprises two side plates or walls 26 and 27, said plates or walls being journaled on the central portion 21 of the stationary member 5, and a band 28 is arranged around the peripheries of the plates 26 and 27, said band forming a friction surface to receive a transmission belt.

Referring to Figs. 1 and 2 it will appear that a circular chamber 29 is formed within the rotary portion 26, said chamber 29 being

of a size to conveniently receive the stationary or triangular member 5 and fitted in such manner that each of the rounded points of the stationary member 5 is in close contact with the shell 30 providing a steam tight joint at each of the said rounded points.

Arranged within the rotary member 4 are preferably 5 radially disposed guides 31, each guide 31 carrying a piston 32, each piston being suitably packed at 33. The pistons 31 extend within the chamber 29 and normally engage the surface of the triangular stationary member 5 as clearly shown; while two arms 34 (Fig. 2) on each of the pistons 32 straddle the triangular stationary member 5 and carry on their ends a roller 35 which acts on the under side of the flange 24 as clearly shown. By this construction the pistons 32 are positively connected or tied to the triangular stationary member 5.

As will appear from Fig. 1 suitable springs 36 are provided within the rotary member 4 and act upon the outer end of the pistons 32 in order to normally hold said pistons in engagement with the surface of the triangular stationary member 5.

As will appear from Fig. 2 each piston 32 slides in the groove 37 arranged radially in the side plates 26 and 27, while the packing 25 in the flanges 24 of the triangular stationary member 5 forms a steam tight joint between said flanges 24 and the side plates 26 and 27 as is clearly shown at 38 in Fig. 2, suitable bolts 39 being employed transversely of the rotary part 4 in order to securely tie the side plates 26 and 27 together.

Referring now to the valve 6 it will be seen that the same is tapered and is provided with an obliquely disposed port 40 passing directly through the axis of the valve 6 and from the center of the periphery thereof to one side of the center of the periphery. The valve 6 is also provided with a port 41 which passes directly through the axis of the valve and to one side of the center of its periphery, said port 41 being arranged in the valve transversely to or at right angles with the port 40, and said port 41 communicates with two identical ports 42 and 43, which ports enter the periphery of the valve 6 at the center thereof as clearly shown in Fig. 5.

Referring now to the valve chest 8 and valve casing 7 it will be seen that the end 44 of the port 40 must always be in line with the intake ports 13 and 14 in the valve casing 7 under the intake chamber 9; while it will be seen that the port 41 must always be in line with the ports 15 and 16 in the valve casing 7 and under the exhaust chamber 10, and while the valve 6 may be swung by its operating handle 45 from the position shown in Fig. 2 to the other extreme position the port 40 must in each instance register with and communicate with the intake ports 13 and 14 under the intake chamber 9, and it is at once evident that since the port 41 is at right angles to the port 40 that said port 41 must always register with and communicate with the ports 15 and 16 under the exhaust chamber 10 when the operating lever 45 is in position shown in Fig. 2 or is in the opposite position, it being of course understood that the valve 6 rotates within the casing 7 and is operated by the handle 45 which handle is provided with a pin 46 adapted to enter the perforation 47 (Fig. 1) in the valve chest 8.

Having thus fully described the several parts of my invention its operation is as follows: When the valve 6 is in position shown in Fig. 2 the steam passing from the intake chamber 9 in the valve chest 8 passes through the port 13 in the valve casing and diagonally through the valve 6 by means of the port 44 therein and from said port 44 into the steam passage 20, the steam being led through said passage to the ports 22 in the triangular stationary part 5 the pistons 32 being in engagement with the surface of the triangular stationary part 5, the steam passing into the chamber 29 acts on each of the pistons 32 causing the pistons and rotary part 4 to rotate. As the said pistons 32 move over the surface of the triangular stationary part 4 and uncover the ports 23 the steam actuating the pistons is exhausted through the ports 23 as is of course obvious. When it is desired to reverse the motor the lever 45 is thrown to the other extreme position, this movement of the lever 45 causing the port 44 to effect communication between the intake port 14 in the valve casing and the steam passage 19 in the frame 3, thus causing the steam to flow to the ports 23 in the triangular stationary part 5. The ports 23 then become the intake ports and act upon the pistons 32 on their opposite sides causing the pistons 32 and the rotary part 4 to rotate in the opposite direction. The ports 22 now being the exhaust ports the steam passes therethrough and into the steam passage 20. When the valve is in the position as described the steam passes from the steam passage 20 into the port 43 in the valve 6, thence into the port 41 in the valve 6 and into the exhaust chamber 10 through the port 16 therein.

By reason of the packing 25 arranged in the flanges 24 of the triangular stationary part 5 a steam tight joint is effected between the said stationary part 5 and the side walls 26 and 27 of the rotary part 4, and as the pistons 32 are suitably packed at 33 the steam passing from the triangular stationary part 5 into the chamber 29 is effectually contained therein with great force against the pistons 32.

By reason of the form of the pistons as shown and described the same are caused to absolutely follow the surface of the trian-

gular stationary part 5, thus always insuring a close and perfectly steam tight union between the pistons and the stationary part 5.

Having thus described my invention what I claim as new and desire to secure by Letters Patent of the United States is:

1. A rotary engine comprising a stationary triangular member, a rotatable member encompassing said stationary member, a chamber within said rotatable member said triangular member being arranged within said chamber, the corners of said triangular member being in contact with the wall of said chamber, a series of pistons carried in said rotatable member and extending into said chamber for engagement with the said triangular member, a series of supply and exhaust ports in said triangular member communicating with said chamber and means for reversing the direction of flow of steam to said ports.

2. A rotary engine comprising a stationary triangular part, a rotatable part encompassing said stationary member, a chamber within said rotatable part, said triangular member being arranged in said chamber and in engagement with the wall thereof, a series of pistons carried in said rotatable part and extending into said chamber for engagement with the said triangular member, a series of supply and exhaust ports in said triangular part communicating with said chamber, a steam chest, a valve supply and exhaust passages leading from said valve to said ports in the stationary member, and means for operating said valve to reverse the direction of flow of steam to said ports.

3. A rotary engine comprising a stationary triangular member, a rotatable member encompassing said stationary member, a chamber within said rotatable member, said triangular member being arranged within said chamber and in engagement with the wall thereof, a series of pistons carried in said rotatable member and extending into said chamber for engagement with the said triangular member, a series of supply and exhaust ports in said triangular member communicating with said chamber, said stationary member being provided with a guideway on each side thereof, and means on each of said pistons entering said guideway to securely hold each of said pistons in engagement with said stationary member.

In testimony whereof, I affix my signature, in presence of two witnesses.

JOSEPH HARMAN.

Witnesses:

J. H. Koop,

T. C. Blewitt.