No. 836,768. PATENTED NOV. 27, 1906.

E. G. KESLING.

ROTARY ENGINE.

APPLICATION FILED JUNE 29, 1905.

2 SHEETS—SHEET 1.

Fig. 1.

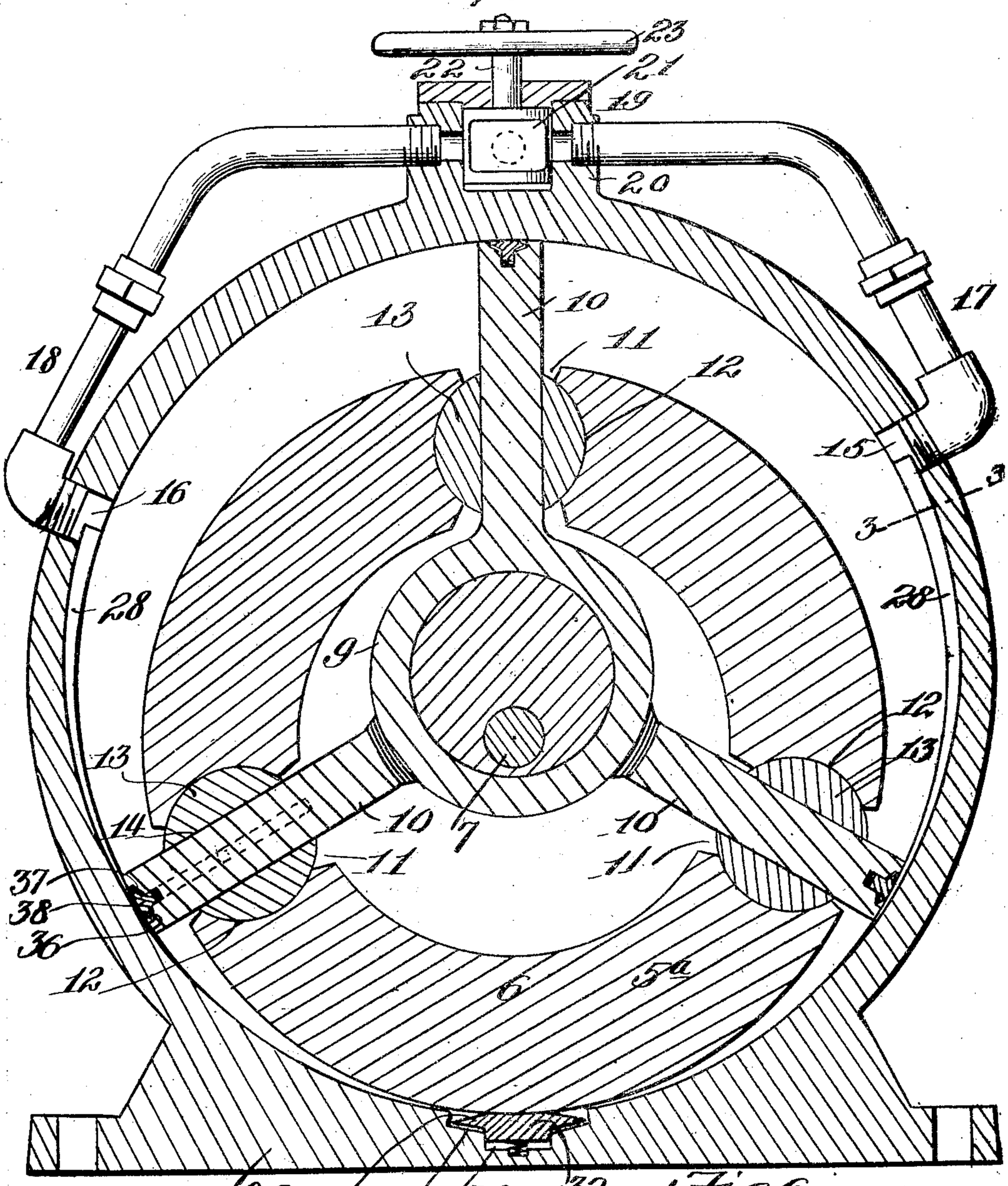



Fig. 6.

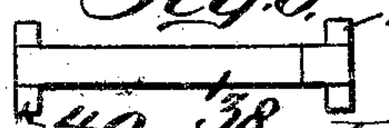
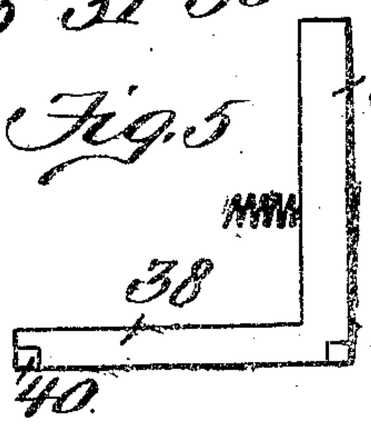



Fig. 5




Witnesses,
C. L. Kesler
T. O. Parker

Inventor
Elmer G. Kesling
By James L. Norris.
Atty.

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2 SHEETS—SHEET 2.

Fig. 2.

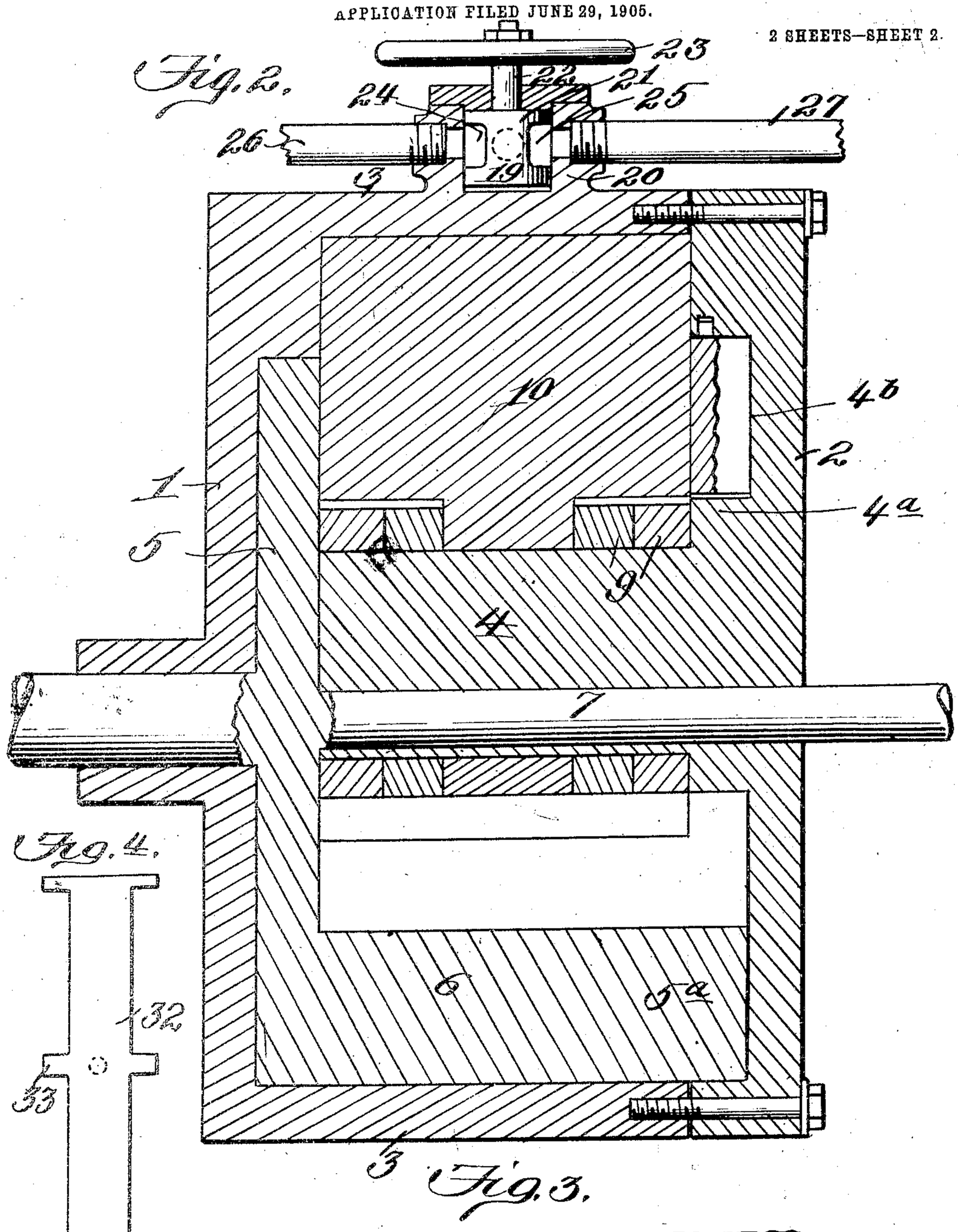


Fig. 4.

Fig. 3.

Witnesses
C. A. Keller
A. O. Parker

Inventor
Elmer G. Kesling
By James L. Norris
Atty.

# UNITED STATES PATENT OFFICE.

ELMER G. KESLING, OF ONWARD, INDIANA.

## ROTARY ENGINE.

No. 836,768. Specification of Letters Patent. Patented Nov. 27, 1906.

Application filed June 29, 1906. Serial No. 267,567.

*To all whom it may concern:*

Be it known that I, ELMER G. KESLING, a citizen of the United States, residing at Onward, in the county of Cass and State of Indiana, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to rotary engines of that type having a rotary piston therein eccentrically disposed within a casing or inclosing means and having blades or arms projectable therethrough at regular intervals and against which the propulsive medium has impact to regularly actuate the piston and a shaft connected thereto.

The primary object of the invention is to simplify the construction of engines of this class and minimize the frictional resistance without detracting in the least from effectiveness in power generation proportionate to the dimensions of the several coöperating parts.

A further object of the invention is to wholly overcome the retarding effect of back pressure on the members of the engine receiving the direct impact of the propulsive medium and controlling the rotation of the piston and to utilize the full pressure of the propulsive medium by permitting the latter to inlet into a chamber of such extent or area that the period of engagement of the propulsive medium with the members against which it strikes or impacts will be materially prolonged with advantages in regularity of rotation of the piston and obliteration of any tendency to the establishment of dead-center.

A still further object of the invention is to increase the driving power of a rotary engine with reduced proportions and dimensions of the general organization of contributing elements.

The invention essentially consists of a casing or inclosing means having a piston eccentrically disposed therein and touching a portion of the wall of the casing to provide an elongated crescent-shaped chamber or space which is increased in area by materially diminishing the diameter of the piston with respect to the inner diameter of the casing or inclosing means, the piston being connected to a shaft extending through the opposite extremities of the casing and on which are eccentrically supported a plurality of rigid arms or blades projectable through the piston at intervals and radially disposed with relation to the latter.

The invention still further consists in the details of construction and arrangement of parts, which will be more fully hereinafter set forth.

In the drawings, Figure 1 is a longitudinal vertical section of a rotary engine embodying the features of the invention. Fig. 2 is a section through the engine, taken in planes at right angles to that shown by Fig. 1. Fig. 3 is a detail section on the line 3 3, Fig. 1. Fig. 4 is a detail plan view of a packing-strip used in connection with the piston. Figs. 5 and 6 are detail views, respectively, in elevation and plan of packing-strips for application to the piston-blades.

Similar numerals of reference are employed to indicate corresponding parts in the several views.

The casing or inclosing means consists of opposite members 1 and 2, the member 1 having extended rims 3, which abut against corresponding portions of the member 2 and connected to the latter by suitable screw-bolts or other preferred means. The members 1 and 2 are suitably shaped interiorly to receive the operating parts, which will be presently set forth, and will also have at such points as may be found necessary packings and joint-sealing means applied thereto for obvious reasons. These members of the casing will also be provided with suitable shaft-bearing means or other devices ordinarily used in rotary-engine equipment. The member 2 has a hub projecting inwardly therefrom through a greater portion of the center of the engine and terminates or abuts against the inner side of a supporting-web 5 of the rotary piston 6, which is connected to or integrally formed with a shaft 7, the part of the shaft projecting outwardly from the web 5, as shown by Fig. 2, having a greater diameter than the remaining portion of said shaft, which extends through the hub 4 and the member 2. The part of the shaft 7 having an increased diameter is adapted to receive a power-transmitting wheel of any desired form, and to the opposite reduced portion of the shaft exteriorly of the casing or inclosing means governor or other analogous mechanism may be connected. The reduced portion of the shaft 7 extends eccentrically and loosely through the hub 4, so that the said shaft may be rotated without affecting

the motion of the said hub. The piston 6 has a rim $5^a$ projecting from the inner portion of the outer extremity or periphery of the web 5, the said rim being considerably thicker than the web, and thus producing a piston which is substantially hollow, it being preferred that the piston and the shaft be formed by turning from a suitable metal and made integral, as clearly shown by Fig. 2.

The hub 4 is turned with a shoulder $4^a$ where it continues into the member 2, the shoulder having the same center as the hub, and by this means the upper part of the member 2 is formed with a groove $4^b$, through which the terminal of the rim $5^a$ has movement. This structural provision is to accommodate the greater length of the rim $5^a$ with respect to other parts, which will be hereinafter specified, and also to provide for a close fitting of the several parts to obtain a full impact of the propulsive medium against the operating elements movable about the hub and through the piston 6.

On the hub 4 are a plurality of independent sleeves 9, each having an arm or blade 10 projecting therefrom, the arms or blades in the present instance being shown as three in number. The arms or blades have a radial direction and are long enough to snugly contact with the inner wall of the casing or inclosing means or extend across the propulsive-medium-receiving space and are projected through openings 11 in the rim $5^a$ of the piston, the said openings 11 communicating with seats 12, in which cylindrical bearings 13 are loosely disposed, and provided with diametrical openings 14, one in each, through which the arms or blades 10 project. The cylindrical bearings 13 automatically compensate for the movement of the arms or blades 10 inwardly and outwardly with respect to the piston and also form tight joints to prevent the propulsive medium from passing into the interior opening 8 of the said piston. The arms or blades 10, carried by the independent sleeves, are permitted to have individual movement around the hub 4, and one arm is not dependent on either of the others for its operation, the sleeves being so divided or arranged that they will all be in alinement on the hub to avoid impracticable projection thereof. The arms or blades 10 have their opposite ends coincident with the opposite sides of the piston, and the bearings 13 are coincident with the ends of the blades and piston and move in the groove $4^b$ with the rim of the piston. This groove $4^b$ is of such dimensions with respect to the rim $5^a$ of the piston and the projecting extremities of the bearings 13 that the inner wall thereof will not contact with the inner walls of the projecting extremities of the cylindrical bearings 13 and also permit easy movement of the free extremity of the rim $5^a$ therethrough. The openings or slots 14 in the bearings 13 do not extend throughout the full length of said bearings, as shown by Fig. 2. This formation of the bearings 13 is advantageous in assembling the same with the remaining parts of the engine and also from a standpoint of strength and durability.

At opposite points in the upper part of the casing or inclosing means are inlet and outlet openings 15 and 16, respectively communicating with pipes 17 and 18, running to a valve mechanism 19. This mechanism controls the operation of the piston in opposite directions and consists of an inclosing shell 20, suitably secured on the upper or top portion of the engine and having a horizontally-disposed valve 21 therein with a stem 22 rising therefrom through the top of the shell 20 and operative either by a hand-wheel 23, as shown, or by any other suitable means, such as a lever, if desired. The valve 21 has opposite passages 24 and 25 therein to establish communication between the pipes 17 and 18, which are attached to diametrically opposite points of the shell 20, and a feed-pipe 26 and exhaust-pipe 27 are attached to the casing in planes at right angles to the point of attachment of the pipes 17 and 18. The feed-pipe may be a steam-conveying means communicating with any suitable steam-generator or if water be used the said pipe may connect with a suitable water-main. By shifting the position of the valve 21 the operation of the piston may be quickly reversed.

Extending downwardly from the inlet and outlet openings 15 and 16 are tapering or converging grooves 28, which are of less width than the chamber for receiving the propulsive medium, as shown by Fig. 3, and the function of these grooves is to prevent any back pressure on the arms before they have passed the inlet-opening 15 and after movement over the outlet-opening 16. These grooves 28 at their lower extremities merge into the inner side of the wall of the chamber defined by the casing for the reception of the piston 6 and the propulsive medium, as clearly shown by Fig. 1, the length of the grooves being such as to effectively accomplish the object sought.

The member 1 having the rim or flange 3 integrally formed therewith, as shown, is also advantageous in that the number of joints is reduced and the possibility of leakage correspondingly minimized. Furthermore, the inlet and outlet openings 15 and 16 are at such distances apart that before one arm or blade 10 has ceased to be affected by the propulsive medium a succeeding arm will have come up into position to receive the impact of the propulsive medium, and thereby overcome any tendency to lost motion or the establishment of dead-center and set up a continuous rotation of the piston by the direct influence of the propulsive medium on the

arms independent of momentum of the piston, which is relied upon in some rotary-engine structures.

The base 29 of the casing or inclosing means has at the center a transversely-extending groove 30, intersected at intervals by smaller auxiliary grooves 31 of angular contour, and therein is fitted a packing-strip 32, having side projections 33, which engage the grooves 31, and a spring 34, bearing against the under side and disposed in a socket 35, also formed in the base 29. This packing-strip 32 is shown in detail by Fig. 4, and the purpose of the same is to keep the steam or other propulsive medium from passing under the piston, and the angular side projections 33 are used to prevent the packing devices carried by the arms or blades from catching against the opposite edges of the said packing-strip 32, or if packing-strips are not applied to the arms or blades the projections 33 will serve in a similar manner to prevent the ends of the said arms or blades themselves from contacting with the opposite edges of the said packing-strip 32. It will be seen that the upper edges of the projections 33 are inclined, and the ends of the arms or blades or the packing-strips carried by the latter will readily ride over the packing-strip 32. It is preferred that packing-strips of the form shown in detail by Figs. 5 and 6 be used in connection with the arms or blades, the outer ends of the arms being grooved, as at 36, each of the latter grooves being similar in contour to the groove 30 in the base and also having auxiliary angular grooves 37 leading thereinto.

In the grooves 36 and 37 is fitted a packing-strip 38, having the contour particularly shown by Fig. 6 and provided with an arm 39 at one end, thus giving the strip as an entirety an L shape, the arm 39 being applied against the end of the blade and bearing against the adjacent part of the casing, as shown by Fig. 2. The strip 38 has angular projections 40 at opposite ends, which are seated in the auxiliary grooves 36, the said projections having inner and outer inclined edges to permit the blades to freely ride over the packing-strip 32 and its projections 33 and also form a tight joint with the wall of the inclosing casing, with obvious advantages.

In the operation of the engine the arms 10 are regularly projected and withdrawn with respect to the piston 6 by reason of the eccentric position of the piston and the eccentric relation of the hub 4 and shaft 7, and as the hub is stationary or fixed the projection of the arms will be regular, owing to the fact that the said hub, in effect, operates as an eccentric around which the sleeve 9 has movement. The rotation of the sleeve 9 is caused by the rotation of the piston, and motion is imparted to the latter by the propulsive medium impacting against the succeeding arms or blades 10. The arms or blades 10, having a rigid connection to the sleeve 9 and a radial position with respect to the inclosing casing, will always be in proper position when moved around to the inlet-opening 15 to receive the impact of the propulsive medium to the greatest advantage. Moreover, when the arms coincide with the vertical diameter of the engine they have their greatest projection, and at such time the propulsive medium will be exerting its greatest expansive effort, and at such time the piston will be in a position of greatest resistance by reason of the fact that the preponderance of weight will be in the lower portion thereof and overcome or equalized by the most forceful action of the propulsive medium against the then-projected arm 10.

The dimensions of the chamber or space for receiving the propulsive medium are always constant in view of the fixed rotative position of the piston 6. The association or disassociation of the several parts of the engine may be readily accomplished through the medium of the member 2 of the casing, which is easily removable from and applicable to the member 1. When the member 2 is withdrawn, it carries therewith the hub 4 and clears one side of the casing for the withdrawal of the piston 6, shaft 7, and the arms 10 without requiring a separation of the said arms from the piston.

It will also be understood that the engine structure will be provided at such points as may be found necessary with oiling devices.

Having thus described the invention, what is claimed is—

1. In a rotary engine, the combination of an inclosing casing having a circular chamber therein and provided with opposite inlet and outlet openings, a rotary piston eccentrically disposed in said chamber, a stationary hub also projected eccentrically through the piston, a shaft fast to the piston and rotatably extending through the hub, the shaft being eccentrically arranged in the hub, and an element rotatable on the hub and having rigid arms radially projecting through and movable in the piston.

2. In a rotary engine, the combination of a casing having a circular chamber therein with upper oppositely-disposed inlet and outlet openings and converging grooves extending downwardly from said openings, the inlet and outlet openings communicating directly with the upper terminals of the grooves or at the maximum dimensions of the latter, a circular rotary piston eccentrically disposed in said chamber, and a plurality of arms radially projectible and withdrawable through the piston and terminally engaging the inner surface of the wall of the chamber.

3. In a rotary engine, the combination of a

casing composed of two members, one member having a rim integrally formed therewith terminally secured to the outer portion of the opposite member, and the latter member having a hub extending centrally toward the first-named member, a circular hollow piston eccentrically disposed in the casing and having a shaft connected thereto, a part of the shaft movably extending through the hub, and a plurality of rigidly-supported arms radially movable through the piston and held in central relation to the casing, the arms operating around the hub.

4. In a rotary engine, the combination of a casing having a circular chamber therein and oppositely-disposed inlet and outlet openings communicating with said chamber and arranged in the upper portion of the said casing, a centrally-disposed piston arranged in said casing and having a shaft integrally projecting from the center thereof and connected thereto, a fixed hub extending eccentrically through the piston and also having the shaft projecting eccentrically therethrough, a series of arms arranged in eccentric relation to the shaft and movable around the latter and the hub, the said arms being radially movable inwardly and outwardly through the piston, a valve mechanism disposed on the upper portion of the inclosing casing for controlling the movement in opposite directions of the piston, and pipes leading from the valve mechanism to the inlet and outlet openings, said valve mechanism also having supply and exhaust connections.

5. In a rotary engine, the combination of a casing having a base, a piston mounted in the said casing and carrying a series of projectable arms, packing-strips held by the arms and in part having side projections with inwardly-inclined faces, and a packing-strip extending transversely across the base for contact with the piston, the packing-strips in the arms having springs engaging the inner portions thereof and forcing the same outwardly, and the packing-strip in the base having a spring engaging the central outer part thereof and forcing the same inwardly toward the piston.

6. In a rotary engine, the combination of a casing having a base, a piston mounted in the said casing and carrying a series of projectable arms, packing-strips held by the arms and in part having side projections with inwardly-inclined faces, and a packing-strip extending transversely across the base for contact with the piston, the latter packing-strip also having side projections with upper inclined faces.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ELMER G. KESLING.

Witnesses:
D. R. CORBIN,
F. W. WILLIAMS.