No. 697,693. Patented Apr. 15, 1902.

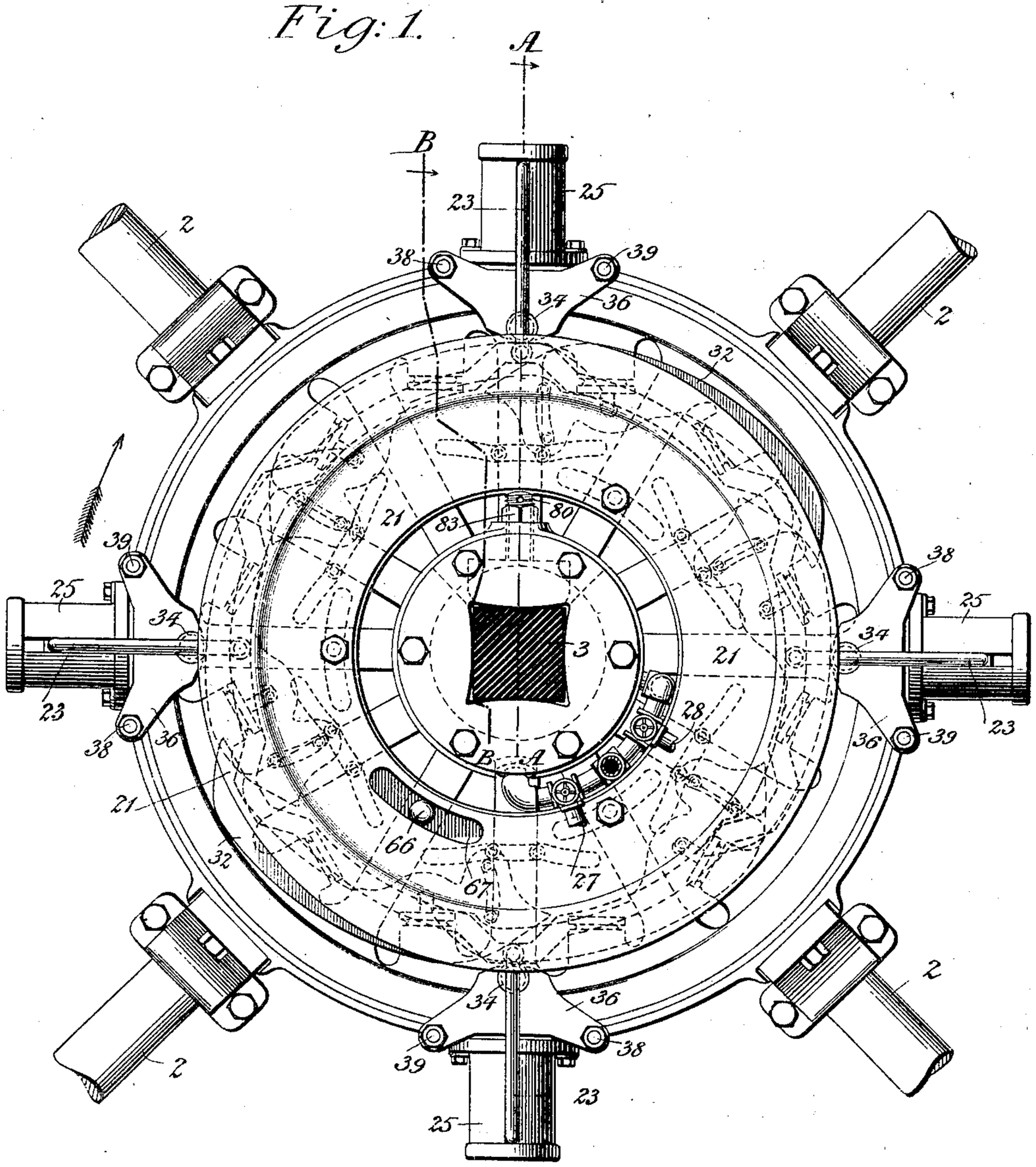
J. THEEMLING.

ROTARY ENGINE.

(Application filed May 24, 1901.)

(No Model.) 4 Sheets—Sheet 1.

Fig: 1.



Witnesses:
John A. Kenne.
George Barry Jr.

Inventor:
Jakob Theemling
by attorneys
Brownell & Ward

No. 697,693.

Patented Apr. 15, 1902.

J. THEEMLING.

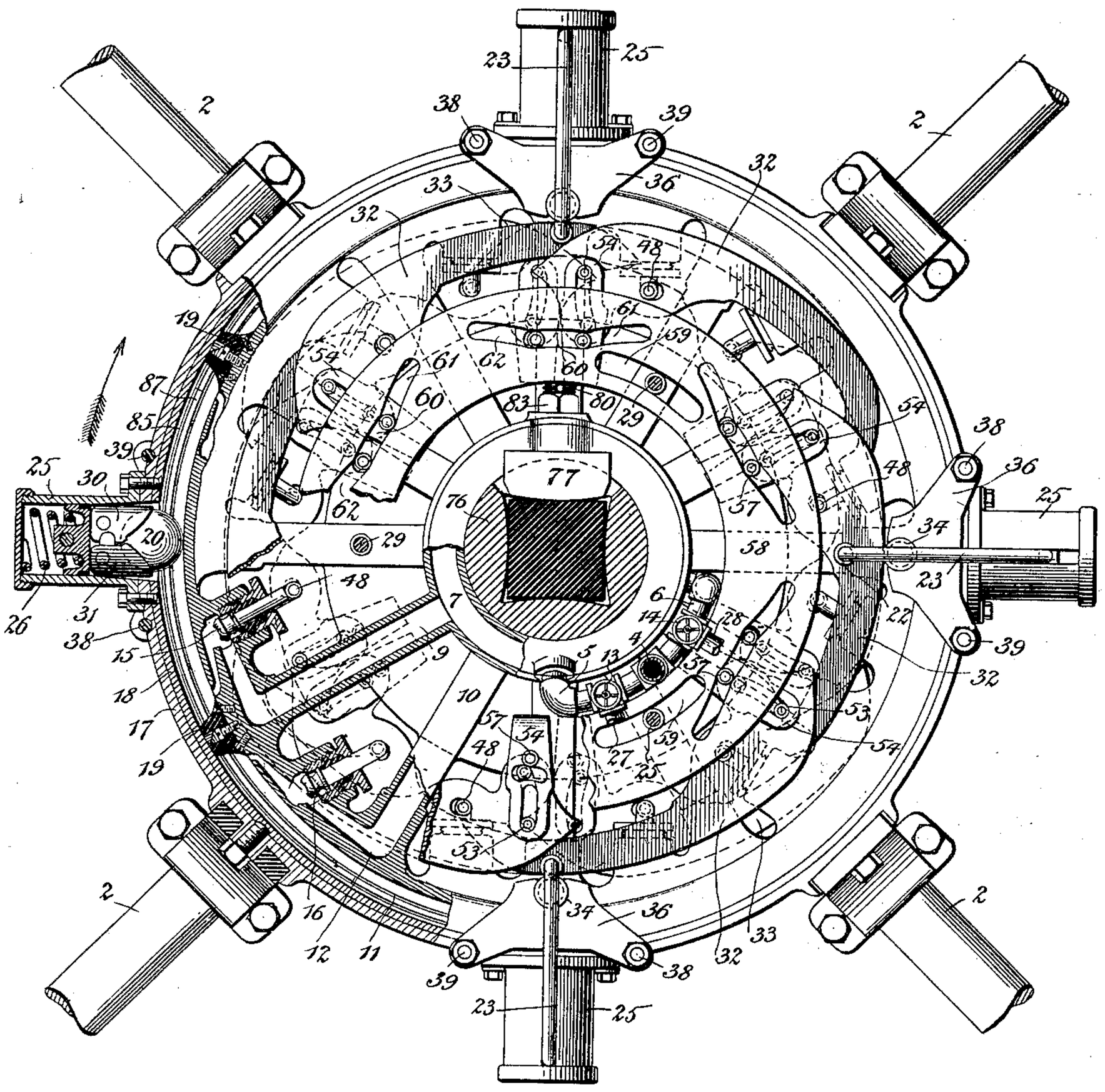
ROTARY ENGINE.

(Application filed May 24, 1901.)

(No Model.)

4 Sheets—Sheet 2.

Fig. 2.



Witnesses:
John A. Rennie.
George Barry Jr

Inventor:
Jakob Theemling
by attorneys
Brown & Seward

No. 697,693. Patented Apr. 15, 1902.

J. THEEMLING.

ROTARY ENGINE.

Application filed May 24, 1901.)

(No Model.) 4 Sheets—Sheet 3.

Fig: 3.

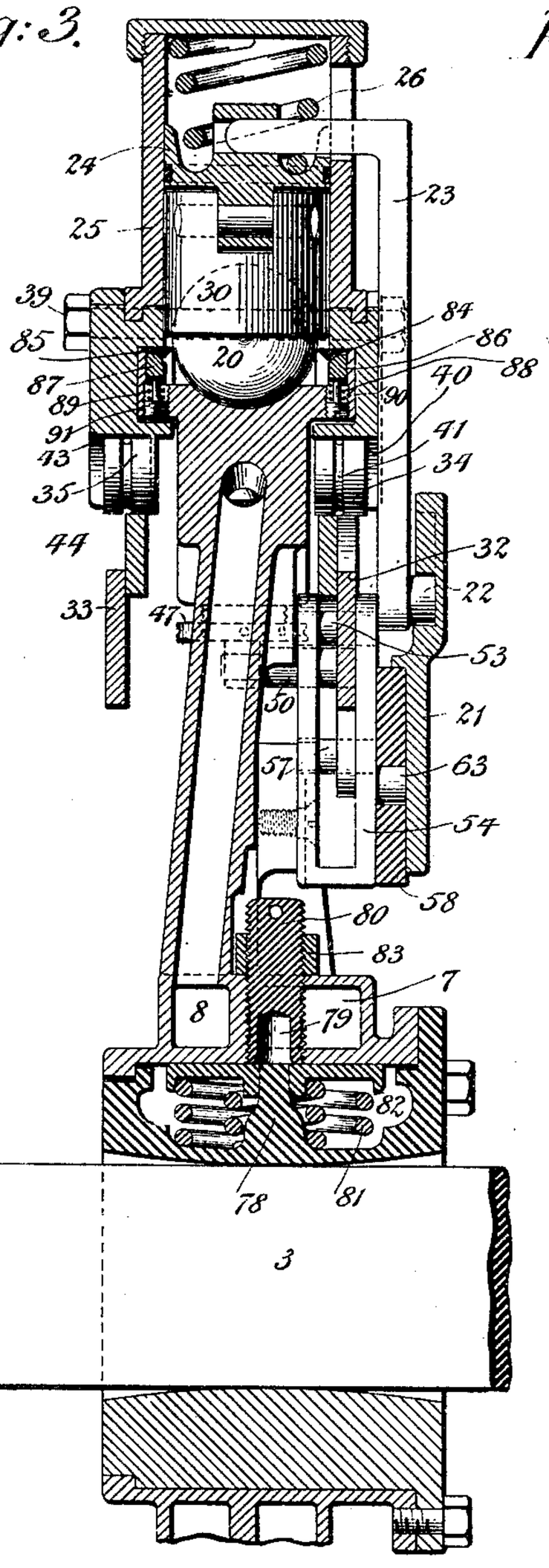
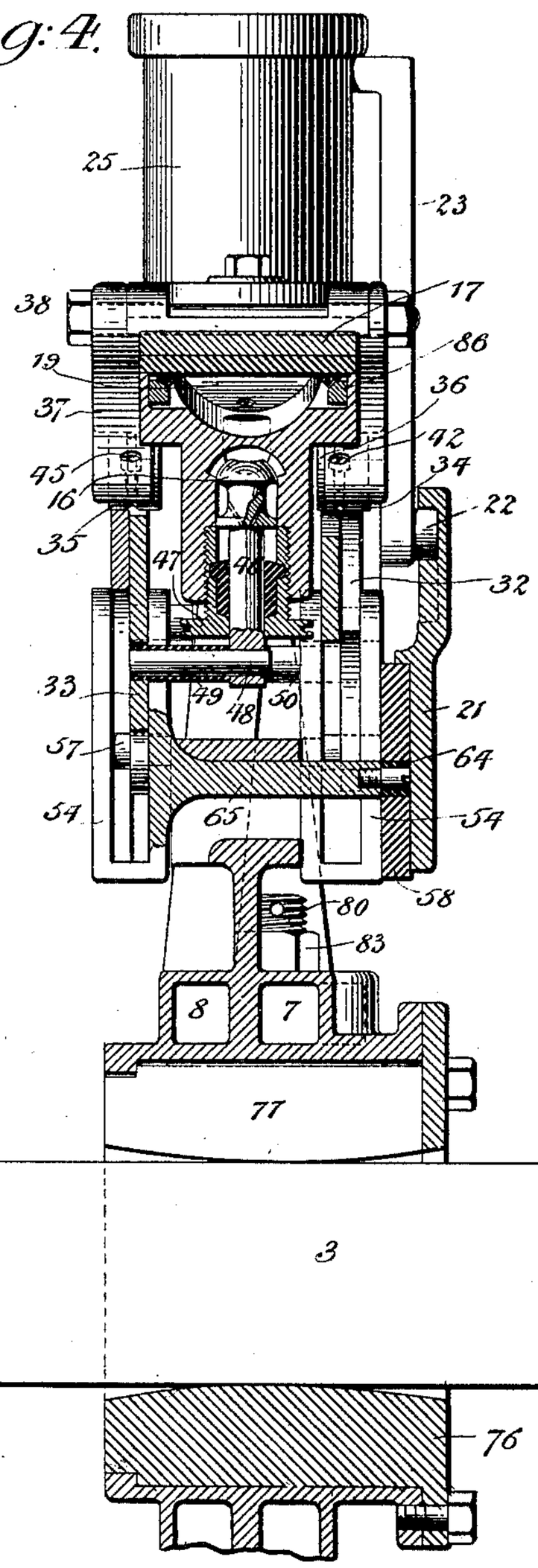


Fig: 4.



Witnesses:
John A Rennie.
George Barry Jr

Inventor:
Jakot Theemling
by attorneys
Brownell & Ward

No. 697,693. Patented Apr. 15, 1902.

J. THEEMLING.

ROTARY ENGINE.

Application filed May 24, 1901.

(No Model.) 4 Sheets—Sheet 4.

Fig: 5.

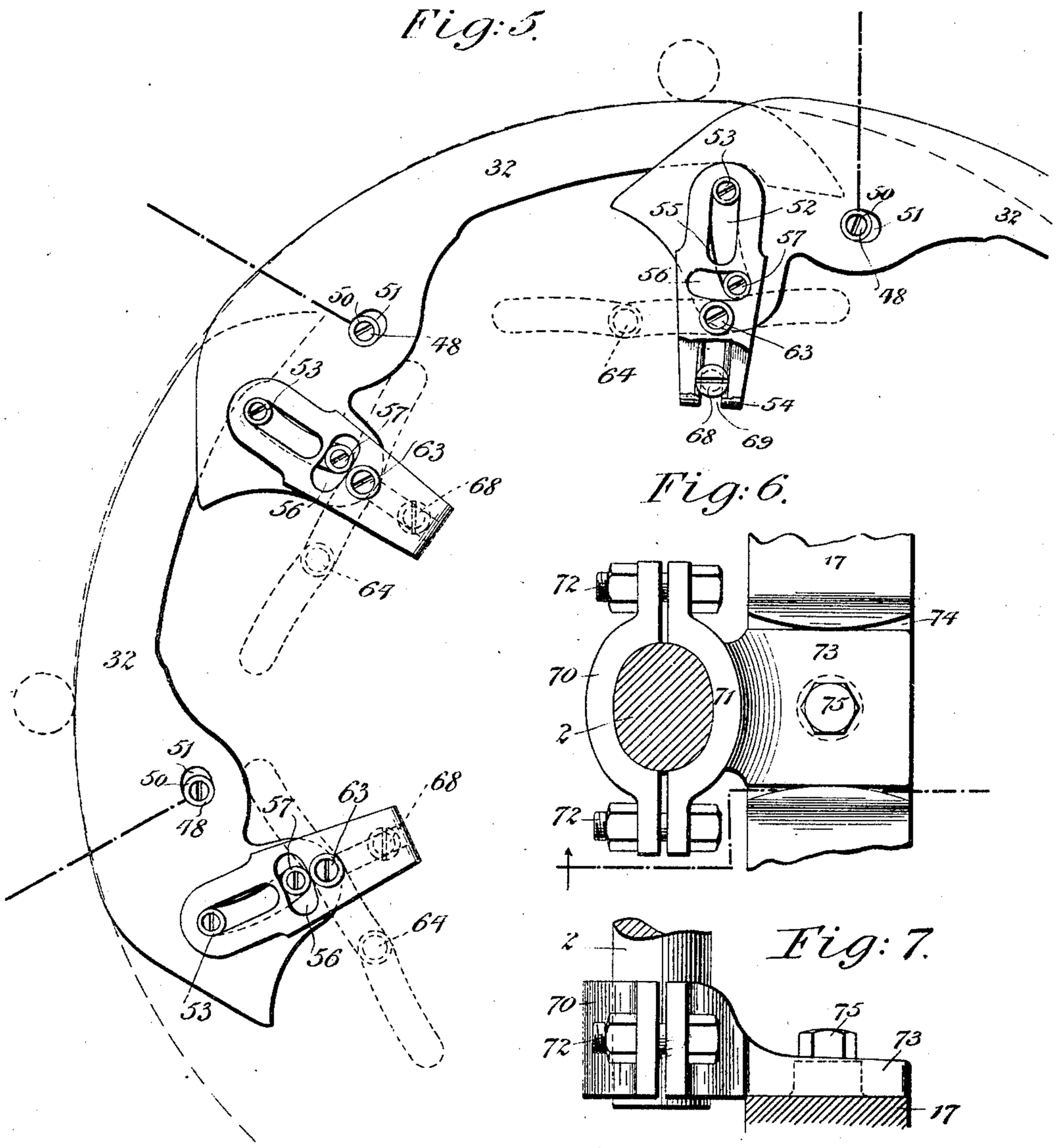


Fig: 6.

Fig: 7.

Witnesses:
John A Rennie.
George Barry Jr.

Inventor:
Jakob Theemling
by attorneys
Brown & Seward

UNITED STATES PATENT OFFICE.

JAKOB THEEMLING, OF UNION HILL, NEW JERSEY.

ROTARY ENGINE.

SPECIFICATION forming part of Letters Patent No. 697,693, dated April 15, 1902.

Application filed May 24, 1901. Serial No. 61,707. (No model.)

To all whom it may concern:

Be it known that I, JAKOB THEEMLING, a citizen of the United States, and a resident of Union Hill, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in Rotary Engines, of which the following is a specification.

This invention relates to improvements in rotary engines, and relates more particularly to certain improvements in the construction, form, and arrangements of the several parts of the engine, so as to render the same comparatively simple in construction, positive in action, and which will run with a small amount of friction.

A further object is to provide a rotary engine in which the stationary part is yieldingly mounted upon a stationary support and the movable part is secured to the spokes of a driving-wheel which is to be driven by the engine.

A still further object is to provide a rotary engine which is well adapted for use in connection with any fluid power—such, for instance, as steam or gas—the said engine being so constructed and arranged that its movement may be instantly and readily reversed.

A practical embodiment of my invention is represented in the accompanying drawings, in which—

Figure 1 is a face view of the engine and a portion of the wheel to which the movable part is attached and the stationary support on which the stationary part is mounted. Fig. 2 is a similar view with certain of the parts broken away to show more clearly the interior construction of the engine. Fig. 3 is an enlarged partial section taken in the plane of the line A A of Fig. 1, the yielding abutment and its controlling parts being shown at the limit of their inward movement. Fig. 4 is an enlarged detail section taken in the plane of the line B B of Fig. 1. Fig. 5 is an enlarged detail view of several of the valve-controlling devices. Fig. 6 is a detail plan of the means for securing the movable part of the engine to the wheel which it is intended to drive, and Fig. 7 is a side view of the same.

The spokes of the driving-wheel, to which the movable member of the engine is secured, are denoted by 2, and the support upon which the stationary member of the engine is mounted is denoted by 3. The stationary member of the engine is yieldingly supported on the support 3, and the movable member of the engine is clamped to certain of the spokes 2 of the wheel.

Proceeding to describe the stationary member of the engine, a main inlet-pipe 4 is provided with two branches 5 and 6, leading, respectively, to two annular chambers 7 and 8 at the central portion of the stationary member of the engine. Two series of alternating conduits 9 and 10 lead, respectively, from the annular chambers 7 and 8 to a common annular piston-chamber 11 in the periphery of the rim 12 of the stationary member. The branch pipes 5 and 6, leading from the main inlet-pipe 4 to the annular chambers 7 and 8, are provided with suitable two-way cocks 13 and 14 for directing the flow of the motive fluid to the one or the other of the annular chambers 7 and 8 and at the same time connecting one or the other of the chambers 7 and 8 with one or the other of the exhaust outlet-pipes 27 28. The alternating conduits 9 and 10 are provided with self-seating positively operated valves 15 and 16, the valves 15 serving as inlet-valves and the valves 16 serving as outlet-valves when the motive fluid is permitted to enter the annular chamber 7, and the valves 16 serving as inlet-valves and the valves 15 serving as outlet-valves when the motive fluid is permitted to enter the annular chamber 8 for reversing the movement of the engine.

The outer rotary member of the engine comprises an annular ring 17, having a lining-ring 18, of antifriction metal, which engages the periphery of the rim 12 of the stationary member with an easy sliding fit.

In the accompanying drawings I have represented six conduits with their respective valves 15 and six conduits 10 with their respective valves 16, and have provided the annular piston-chamber with six stationary abutments 19, each one interposed between the mouths of two adjacent conduits 9 and 10, which abutments conform to the concave cross-section of the piston-chamber and bear against the antifriction-lining 18 of the rotary member 17 of the engine.

I provide the rotary member with a plurality of ball-pistons 20, (in the present instance four are shown,) which fit the concave walls of the annular piston-chamber 11 and are arranged to travel along within the same. These ball-pistons are controlled by a stationary cam-plate 21, fixed to the stationary member by a series of bolts 29, which cam-plate is provided in its inner face with an irregular annular cam-groove, along which travel studs or rollers 22 at the inner ends of radially-reciprocating bars 23, the outer ends of which are engaged with spring-actuated followers 24, fitted to slide within the piston-casings 25. Springs 26 are interposed between the outer ends of the casings and the backs of the followers for holding the pistons snugly against the concave walls of the annular piston-chamber. Ball socket-pieces 30 31 are interposed between each of the balls 20 and its spring-actuated follower 24, which socket-pieces are so hinged to the follower that they will force the ball into its position in the piston-chamber, will permit the ball to rotate freely, and will automatically take up all wear. The inner walls of the casing are made flaring opposite the hinged socket-pieces to permit them to spread slightly, and thus adjust themselves to the ball. The cam-groove in the plate 21 is so formed that the spring-actuated followers and socket-pieces will be forced outwardly and the balls released as they arrive at the several stationary abutments 19.

The several valves 15 and 16 are opened at predetermined intervals by means of two annular series of plates 32 33, the annular series of plates 32 for controlling the movements of the valves 15 being located upon one face of the engine and the annular series of plates 33 for controlling the movements of the valves 16 being located upon the other face of the engine.

The valves 15 and 16 are of the self-seating type in which the pressure of the motive fluid normally holds the valves seated. The valves therefore will also normally hold the plates 32 and 33 at the limits of their outward movements.

The plates 32 are successively operated upon by a plurality of rollers 34, carried by the movable member 17 of the engine, and the plates 33 are successively operated upon by a plurality of rollers 35, also carried by the movable member. There are six of these plates in each of the series, one for each of the valves, and there are four of the rollers 34 and four of the rollers 35, one pair for each of the ball-pistons 20. Each roller 34 is mounted in a bracket 36, and each roller 35 is mounted in a bracket 37, the two brackets being securely fastened to the outer member 17 by means of cross-bolts 38 39. The roller 34 is mounted to rotate in a curved recess 40 in the bracket 36 by providing the roller with an annular groove 41, which is engaged by the end of the screw 42. The roller 35 is similarly mounted in a recess 43 in the bracket 37 and is provided with an annular peripheral groove 44, which is engaged by the inner end of a screw 45. The brackets 36 and 37 overlap the sides of the ring 17 of the rotary outer member and the sides of the rim 12 of the stationary inner member for holding the outer member in its position on the inner member.

Each of the valve-controlling plates is connected to its valve in the following manner: The valve is provided with an inwardly-extended stem 46, which passes through a suitable packing-box 47, and is provided on its inner end with a laterally-extended pin 48, having antifriction-rollers 49 50 thereon, the said pin and rollers being sufficiently long to enter corresponding elongated recesses 51 in two plates 32 33 upon the opposite faces of the engine. Each of the plates is provided with a curved elongated slot 52, struck from a radius having the pin 48 as a center, through which elongated slot extends a stationary fulcrum-stud 53, screwed or otherwise rigidly secured in one face of the rim 12 of the stationary member of the engine. The yoke 54 has its opposite branches provided with longitudinally-elongated slots 55, which engage the stud 53 upon opposite sides of the plate. The branches of the yoke 54 are further provided with transverse elongated slots 56, arranged to intercept the slot 52 in the plate. A loose stud 57 is located in the two transverse slots 56 of the yoke 54 and the slot 52 in the plate.

As the valve-controlling roller 34 or 35, carried by the outer or rotary member of the engine, travels along the outer edges of the series of plates 32 or 33 the roller will successively depress the plates and open the valve 15 or 16 in the following manner: The roller will first depress its plate to take up this lost motion until the stud 53 engages the outer end of the elongated slot in the plate. The further inward pressure of the plate by the roller will cause the laterally-extended pin 48, carried by the valve-stem, to be forced inwardly, thus opening the valve. This movement will cause the loose stud 57 to travel along in the two transverse slots 56 of the yoke 54 and the slot 52 in the said plate.

I provide the following mechanism for adjusting the plates with respect to the valve-controlling rollers, so that the valves may be held open a greater or lesser length of time. An annular cam-plate 58 is located between the piston-controlling cam-plate 21 and the yokes 54. This cam-plate 58 has a limited rotary movement by providing elongated grooves 59, concentric with the axis of the engine, which are engaged by the bolts 29, which secure the piston-controlling cam-plate 21 to the stationary member of the engine. This cam-plate 58 is provided with six irregular elongated slots each comprising a concentric central portion 60 and diagonally outward oppositely extended wings 61 62. Each one of these cam-slots is fitted to receive a stud 63, carried by the yoke 54 upon one face of the engine, and the stud 64, carried by the

end of a transversely-extended pin 65, carried by the corresponding yoke 54 upon the opposite face of the engine. Supposing the yokes to be in the normal position shown in the drawings and it be required to lessen the time which the inlet-valves are open without lessening the time which the outlet-valves are open, the cam-plate 58 is rotated a short distance in one direction by means of its operating-handle 66, which projects through a curved slot 67 in the stationary piston-controlling cam-plate 21. This movement will force one of the studs 63 64 outwardly, thus also moving its yoke 54 outwardly. This will move the loose stud 57 upwardly along the elongated slot 52 in the plate, thus permitting the forward end of the plate to swing outwardly and the rear end of the plate to swing inwardly, so that when the valve-controlling roll carried by the movable member of the engine passes over the plate it will hold the plate depressed for a shorter time. To guide the yoke in its inward and outward movements, I provide a screw 68, which travels in a groove 69 in the inner branch of the yoke, which screw is secured to the stationary member of the engine.

The means which I have shown for connecting the movable member of the engine to the driving-wheel and spoke, so as to permit a slight yielding movement between the said member and spoke for adjusting the two relative to each other, is constructed and arranged as follows: A two-part clip comprising an outer part 70 and an inner part 71 is clamped to the spoke by means of bolts 72. The inner part 71 is provided with a laterally-extended rectangular plate 73, which enters an open-ended recess 74, the sides of which are convex, so that they permit a slight yielding movement between the outer member 17 and the spoke 2 for adjusting the parts relatively to each other. The plate 73 is secured to the outer member by means of a central bolt 75. The stationary member of the engine is mounted on the stationary support 3, so as to yield slightly by the following means: A box 76 embraces three sides of the support 3 and is bolted in its position within the central portion of the stationary member. A spring-actuated bearing-plate 77 is interposed between the central portion of the stationary member and the other side of the support, which spring-actuated bearing-plate has a very slight yielding movement, so that it yieldingly supports the said stationary member. This bearing-plate 77 is hollow and is provided with a central stud 78, which may enter a hole 79 in the lower end of an adjustable screw 80, carried by the stationary member. The supporting-spring 81 surrounds the central stud 78 within the bearing-plate 77 and is interposed between the bearing-plate and an adjustable retaining-plate 82. This retaining-plate 82 may be adjusted to just the strength of the spring by means of the adjusting-screw 80, which bears against the back of the said plate. A lock-nut 83 serves to lock the adjusting-screw 80 in its different adjustments. Two sectional packing-rings 84 85 are located around the periphery of the stationary member of the engine upon opposite sides of the piston-chamber. These packing-rings 84 85 have their outer faces engaged with the antifriction-lining of the movable member. These antifriction packing-rings are fed outwardly and laterally toward each other by means of sectional follower-rings 86 87, which are held under pressure by means of a plurality of springs 88 89, interposed between the inner faces of the follower-rings, and adjusting-screws 90 91, carried by the rim of the stationary member at intervals along the same. By this means I am enabled to take up the wear upon the packing-rings 84 85 in a convenient manner.

The operation of my engine is as follows: Presupposing that the movable member of the engine, and thereby the wheel, is to be driven in the direction indicated by the arrows, Figs. 1 and 2, the two-way cock 13 is turned to close the outlet 27 and open communication from the inlet 4 to the annular chamber 7. The two-way cock 14 is turned to close communication from the interior of the annular chamber 8 to the outlet 28. The motive fluid will be caused to flow outwardly through the conduits 9, ready to be admitted to the annular piston-chamber through the valves 15 when the valves are opened. The valves 16 when opened will permit the escape of the motive fluid through the conduits 10 into the annular chamber 8 and from thence out through the outlet 28. The times of admitting the motive fluid to the piston-chamber and the length of time which the inlet-valves may remain open are regulated by the means hereinabove fully set forth. As the ball-pistons reach the several stationary abutments they are released to permit them to pass over the abutments in the manner also hereinabove fully set forth. When it is desired to reverse the action of the engine, the two-way cock 13 is turned in a direction to open communication from the interior of the annular chamber 7 to the outlet 27 and close communication to the inlet 4, while the two-way cock 14 is turned in a direction to open communication from the inlet 4 to the annular chamber 8 and close communication through the outlet 28.

It is evident that changes might be resorted to in the form, construction, and arrangement of the several parts without departing from the spirit and scope of my invention. Hence I do not wish to limit myself strictly to the structure herein shown and described; but

What I claim is—

1. In combination, a stationary support, a driving-wheel and a rotary engine comprising a stationary member mounted on the support and a rotary member adjustably connected to the spokes of the wheel for adjusting the

rotary member with respect to the said spokes, substantially as set forth.

2. In combination, a stationary support, a driving-wheel and a rotary engine comprising a stationary member yieldingly mounted on the support and a rotary member secured to the spokes of the wheel, substantially as set forth.

3. In combination, a stationary support, a driving-wheel and a rotary engine comprising a stationary member yieldingly mounted on the support and a rotary member adjustably connected to the spokes of the wheel for adjusting the rotary member with respect to the said spokes, substantially as set forth.

4. In combination, a stationary support, a driving-wheel, a rotary engine comprising a stationary member mounted on the support and a rotary member and clips for securing the rotary member to the driving-wheel, substantially as set forth.

5. A rotary engine comprising a stationary member having an annular piston-chamber, stationary abutments in the chamber, a rotary member, ball-pistons carried thereby and fitted to travel along within the said piston-chamber and over the abutments, means for controlling the inward and outward movements of the ball-pistons and means for controlling the admission and the escape of the motive fluid to and from the piston-chamber, substantially as set forth.

6. A rotary engine comprising a stationary member having an annular piston-chamber in its periphery, motive-fluid inlet and outlet ports, stationary abutments located between each pair of inlet and outlet ports, a rotary member, and spring-actuated ball-pistons fitted to travel along within said piston-chamber and over the abutments and means for controlling the admission and escape of the motive fluid to and from the piston-chamber, substantially as set forth.

7. A rotary engine comprising a stationary member having an annular piston-chamber in its periphery and two inner annular chambers, alternating inlet and outlet conduits connecting the inner annular chambers with the piston-chamber, valves for opening and closing the conduits, stationary abutments between the two conduits of each alternating pair, a rotary member, spring-actuated ball-pistons carried thereby and fitted to travel along within the said piston-chamber and over the abutments and means carried by the rotary member for controlling the operation of the valves in the conduits in the stationary member, substantially as set forth.

8. A rotary engine comprising a stationary member having an annular piston-chamber with abutments therein, motive-fluid inlet and outlet conduits arranged in pairs, valves therefor, an annular series of valve-operating plates for operating the inlet-valves and a second series of valve-operating plates for operating the outlet-valves, a rotary member, ball-pistons carried thereby and fitted to travel along within said piston-chamber and over the abutments and rollers carried by the rotary member in position to successively engage the two annular series of valve-controlling plates for opening the valves at predetermined intervals, substantially as set forth.

9. In a rotary engine, a stationary member, a piston-chamber therein, a motive-fluid conduit leading to the piston-chamber, a valve for opening and closing said conduit, a valve-operating plate pivoted to the stationary member, and connected with the valve-stem, a rotary member, a piston carried thereby and a roller carried by the rotary member in position to force the plate inwardly to open the valve, substantially as set forth.

10. In a rotary engine, a stationary member having a piston-chamber therein, a motive-fluid conduit communicating with the piston-chamber, a valve for opening and closing said conduit, a valve-operating plate fulcrumed on the stationary member and connected to the valve-stem, a movable cam-plate for adjusting the valve-operating plate, a rotary member, a piston carried thereby and a roller carried by the rotary member in position to depress the valve-operating plate for opening the valve, substantially as set forth.

11. In a rotary engine, a stationary member having an annular piston-chamber therein, fluid inlet and outlet conduits communicating with the piston-chamber, valves for opening and closing the said conduits, a series of valve-operating plates upon each face of the engine for operating the inlet and outlet valves, respectively, the said plates being fulcrumed on the stationary member, a cam-plate having a limited rotary movement in opposite directions for adjusting the two series of cam-plates for controlling the length of time that the valves shall remain open, a rotary member, pistons carried thereby and rollers carried by the rotary member in position to engage the two series of valve-operating plates for successively operating the valves, substantially as set forth.

12. In a rotary engine, a stationary member having an annular piston-chamber therein, a rotary member having spring-actuated ball-pistons fitted to travel along within said piston-chamber and a stationary cam-plate connected with the ball-piston for controlling the inward and outward movement of the same, substantially as set forth.

13. In a rotary engine, a rotary member, a ball-piston, a casing, a spring-actuated follower within the casing and hinged socket-pieces interposed between the ball-piston and the follower and hinged to the follower, substantially as set forth.

14. In combination, a valve, a valve-operating plate connected with the valve-stem and having an elongated groove therein, a support having a stationary fulcrum within the said groove, a yoke having an elongated groove embracing the fulcrum and a transverse groove therein, a loose stud located in the said trans-

verse groove and the elongated groove in the plate and means for raising and lowering the yoke for adjusting the position of the loose pin with respect to the fulcrum for adjusting the movement of the plate, substantially as set forth.

15. In combination, two valves, a valve-operating plate for each valve connected thereto and having an elongated slot therein, stationary fulcrums for each plate located in the said elongated groove, a yoke for each plate having an elongated groove embracing the fulcrum and a transverse groove therein, a loose stud located in the said transverse groove and the elongated groove in the plate, a rotary cam-plate having an irregular cam-slot therein comprising a concentric central portion and two outwardly-extended wing portions, the said yokes being provided with studs engaging said slot, whereby, when the cam-plate is moved in one direction or the other, the movement of the one or the other of the valve-operating plates is adjusted, substantially as set forth.

16. A rotary engine comprising a circular stationary member, a rotary ring-shaped member mounted on the periphery of the stationary member and confining-brackets secured to the movable member and overlapping the opposite faces of the stationary member for holding the rotary member in position thereon, substantially as set forth.

17. A rotary engine comprising a circular stationary section having an annular peripheral piston-chamber therein, a rotary member mounted on the periphery of the stationary member, ball-pistons carried by the rotary member and fitted to travel along the said piston-chamber, packing-rings, triangular in cross-section, located along the periphery of the stationary section upon the opposite sides of the piston-chamber and spring-actuated adjustable follower-rings for forcing the packing-rings snugly against the face of the rotary member and against the walls of the ball-pistons for taking up wear, substantially as set forth.

18. In combination, a wheel, a rotary engine comprising a stationary member and a rotary member, and means for adjustably connecting the rotary member with the spokes of the wheel comprising a plurality of split clips embracing the spokes and having laterally-extended rectangular plates and open-ended recesses on the periphery of the rotary member having convex sides which recesses are adapted to receive the clip-plates and bolts for securing the centers of the clip-plates to the rotary members, substantially as set forth.

19. In combination, a stationary support, a rotary engine and means for yieldingly mounting the engine on the support comprising a box embracing three sides of the support and a spring-actuated bearing-plate interposed between the engine and the other side of the support, substantially as set forth.

20. In combination, a stationary support, a rotary engine comprising a stationary member and a rotary member mounted thereon and means for yieldingly mounting the stationary member on the support comprising a box embracing three sides of the support, a spring-actuated follower-plate interposed between the other side of the support and the stationary member and means for adjusting the spring tension thereof, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 18th day of May, 1901.

JAKOB THEEMLING.

Witnesses:
FREDK. HAYNES,
C. S. SUNDGREN.