A. A. McLAREN.

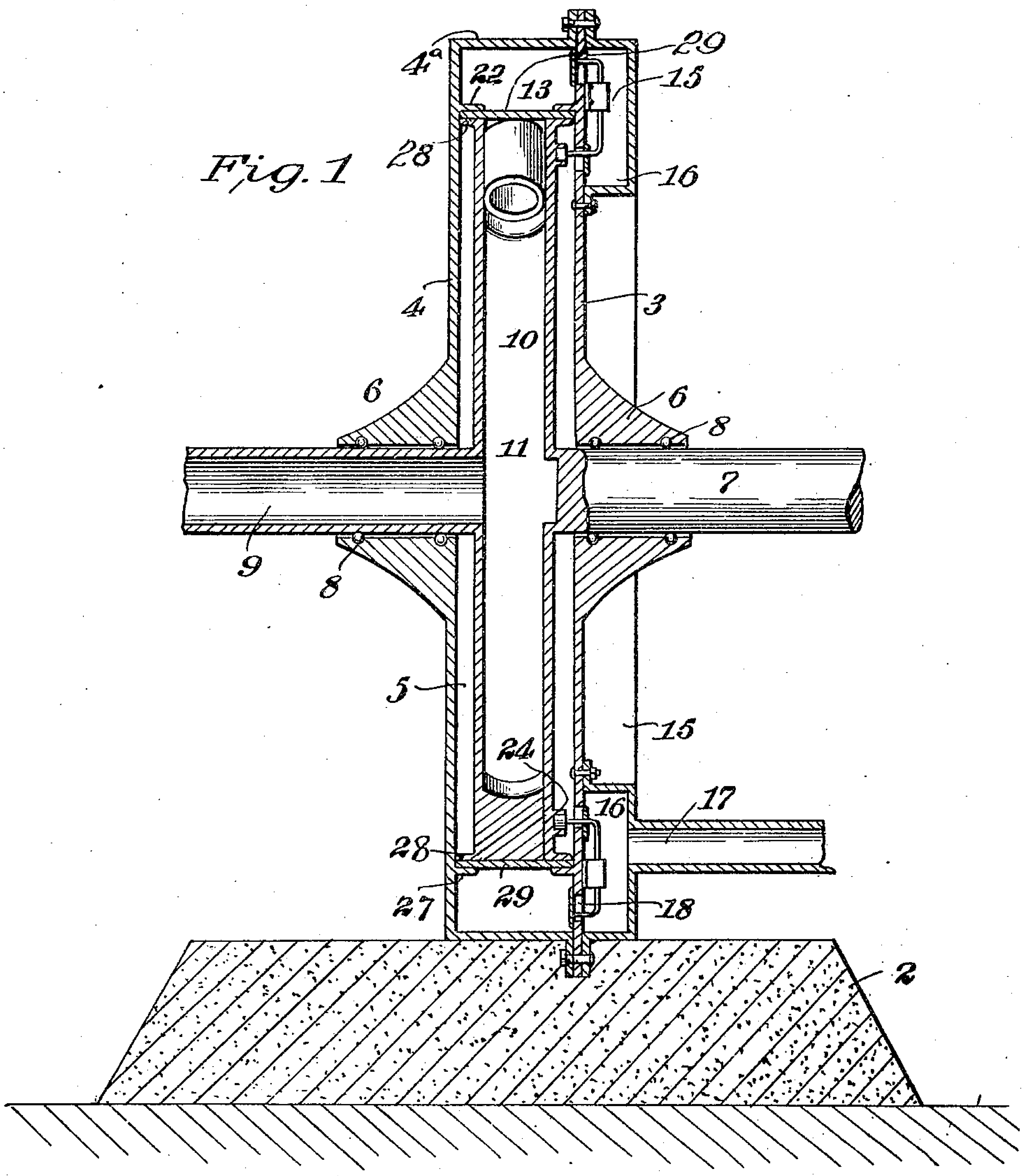
ROTARY ENGINE.

APPLICATION FILED APR. 14, 1909.

935,046. Patented Sept. 28, 1909.

2 SHEETS—SHEET 1.

Fig. 1



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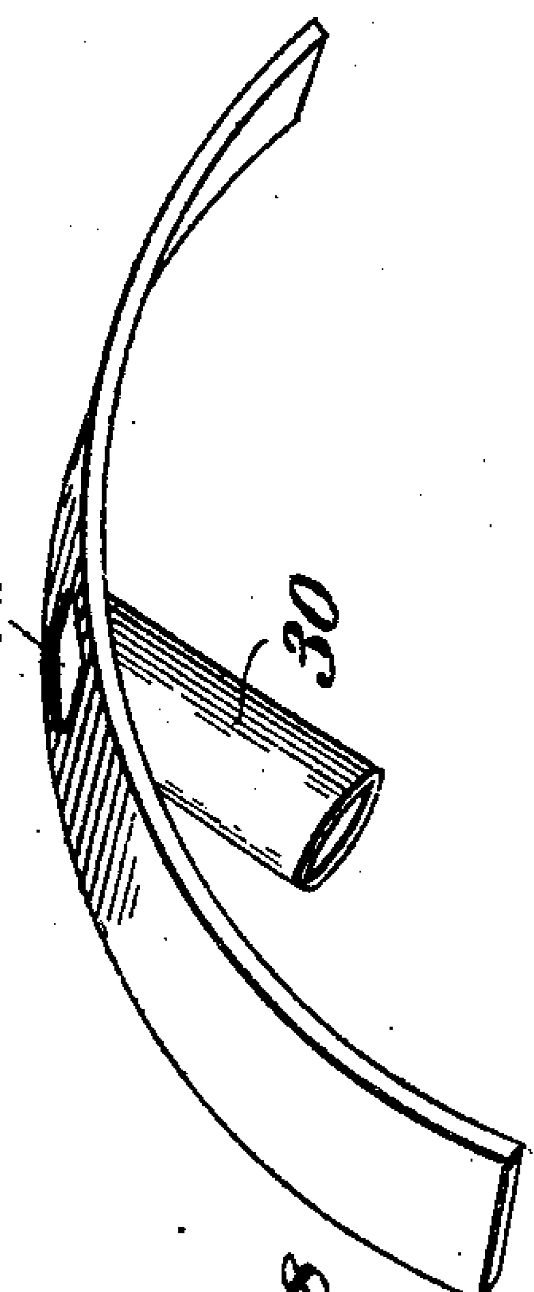

Fig. 3.

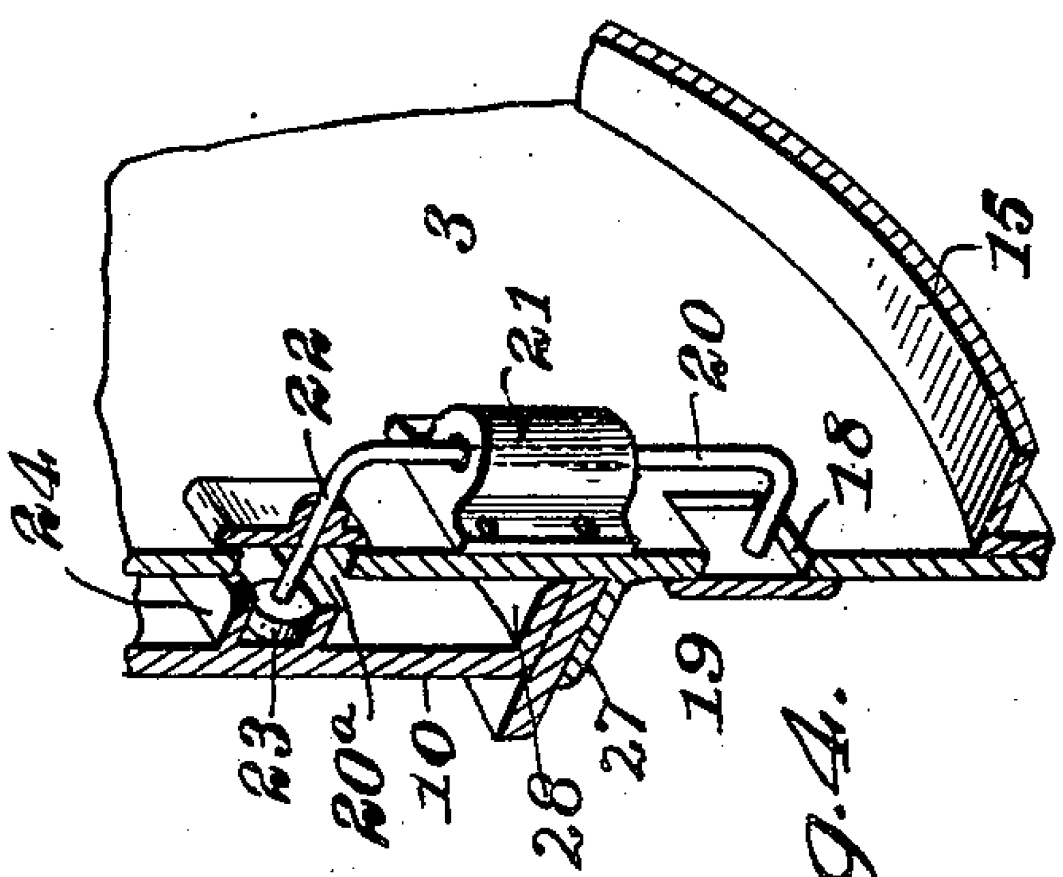

Fig. 4.

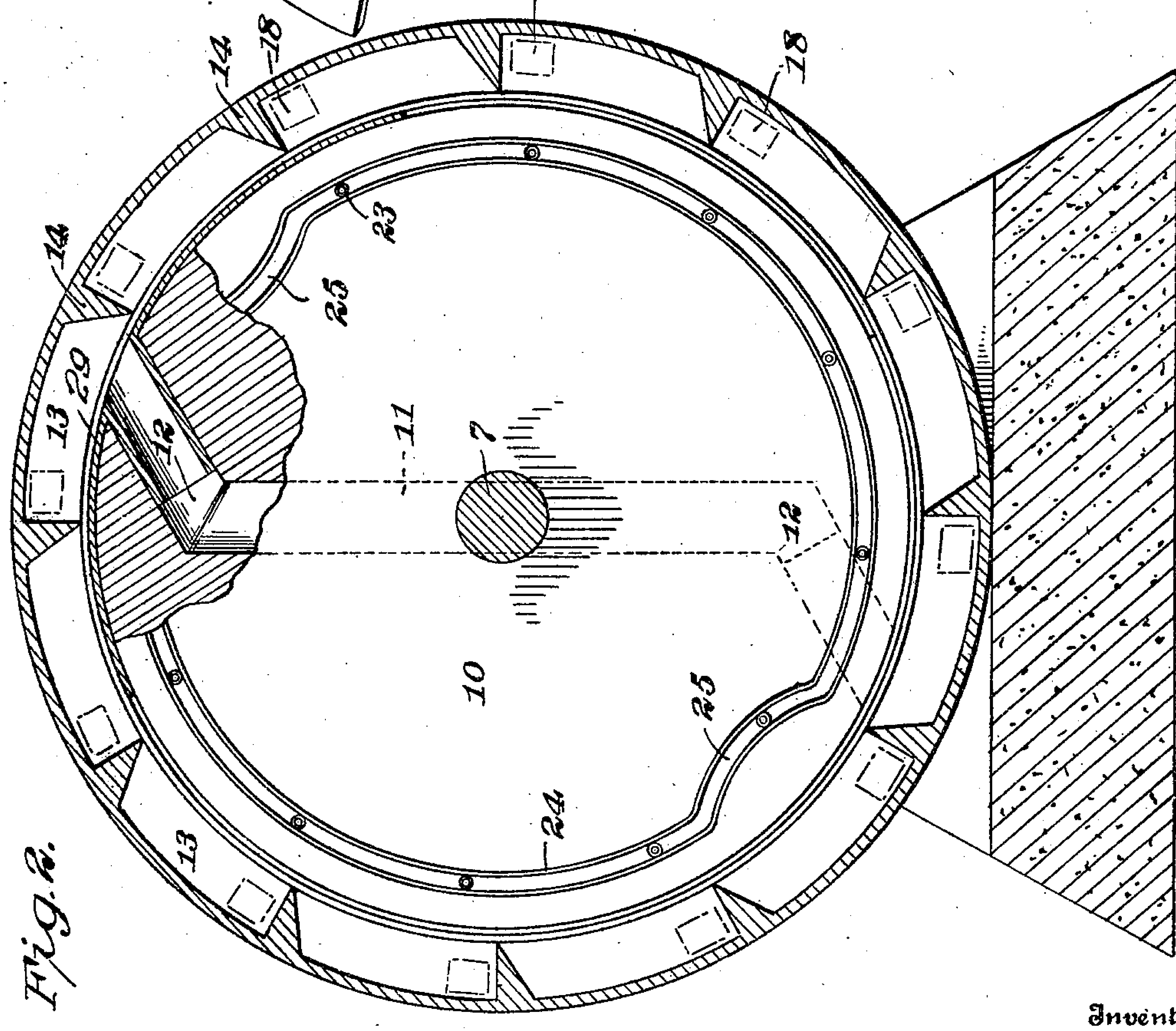

Fig. 2.

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UNITED STATES PATENT OFFICE.

ANDREW A. McLAREN, OF WIARTON, ONTARIO, CANADA.

ROTARY ENGINE.

935,046. Specification of Letters Patent. Patented Sept. 28, 1909.

Application filed April 14, 1909. Serial No. 489,806.

To all whom it may concern:

Be it known that I, ANDREW A. McLAREN, citizen of Canada, residing at Wiarton, in the Province of Ontario and Dominion of Canada, have invented certain new and useful Improvements in Rotary Engines, of which the following is a specification.

My invention relates to rotary engines of the impact type, wherein a jet of steam or other elastic fluid is projected from a rotor against fixed blades, and thereby drives the rotor around with relation to the blades, my invention embodying, generally speaking, a fixed casing, a central rotor of the kind above described, a plurality of blades surrounding the rotor against which the jet impinges, and valve mechanism automatically controlled, whereby the exhaust steam is carried away from the compartments between the blades.

For a full understanding of the invention and the merits thereof, and to acquire a knowledge of the details of construction, reference is to be had to the following description and accompanying drawings, in which:

Figure 1 is a transverse vertical section of the rotor and casing shown in Fig. 2. Fig. 2 is a vertical section transverse to Fig. 1, showing the rotor in elevation, but one portion of it partly broken away. Fig. 3 is a detail perspective of the follower packing plate; and, Fig. 4 is a detail perspective, partly in section, showing a detail construction of my valve mechanism.

Corresponding and like parts are referred to in the following description and indicated in all the views of the drawings by the same reference characters.

Referring to Fig. 1, 2 designates any suitable base upon which is supported in any desired manner, the opposed side plates 3 and 4, the side plate 4 being connected to the side plate 3 by a circumferential flange 4^a so as to form a casing adapted to inclose a rotor chamber 5. The sides 3 and 4 are each provided with the bearings 6 for a transverse rotating shaft 7, the bearings 6 being provided with antifriction balls for this purpose. One portion of the shaft 7 is solid, but the other portion on the opposed side of the rotor is hollow as at 9, and is connected to a source of steam supply, not shown. The rotor 10 is circular in side elevation, and is solid, except for the diametrical steam passage 11 which crosses the rotor transversely, and near its opposite ends is extended at an angle in a direction away from the direction of rotation of the rotor, as shown clearly in Fig. 2. The opposed openings of the angular portions 12 of the passage 11 open into a series of chambers 13 between a series of blades 14 which are mounted to extend inward from the outer wall 4^a of the casing. These blades 14 are preferably triangular in section, with the hypotenuse of the angle extending in a direction reverse to that of the movement of the rotor, so that the blades have an abutting surface almost at right angles to the axis of the bent portions 12, whereby the steam or other fluid issuing from the passage 12 will strike against the inclined face 14^a of the blades, in such direction that the best results may be obtained.

Attached to the wall 3 is the annular casing 15 inclosing an exhaust chamber 16 which, at one portion in its length, is provided with the exhaust pipe 17. As the exhaust casing is attached to the wall 3 and is hence fixed, it will be obvious that means must be provided for carrying away the exhaust steam from between the blades 14, that is, from the chambers 13, and to this end, I provide each of the chambers at a point adjacent to the advanced blade, with an exhaust port 18. There are thus as many exhaust ports as there are chambers 13. Each exhaust port is automatically controlled by a slide valve 19 attached to a valve rod 20 which reciprocates in a guide 21 and has its inner end bent inward and there connected to a roller 23. The inwardly turned inner end 22 of the rod 20 passes through an opening 20^a in the wall 3, this opening being of sufficient width to permit the rod 20 play up and down therein. A shield 24 which bears on its inner face against the outer face of the wall 3, is carried upon the rod 20 and moves with the same. This shield acts to keep the opening 20^a always closed, but permits the rod to be moved therein.

As shown in Figs. 1 and 2, the outer face of the wall 10 of the rotor is formed with a cam track 25 with which the roller 23 of the valve rod engages. This cam track is concentric to the axis of the rotor and is provided at diametrically opposite portions 26 with an inward deflection, this deflected portion of the cam track being for the purpose of drawing inward on the valve rod 20, thereby opening the valve 19 and permitting the exhaust of steam in that particular steam chamber 13. It will be obvious from Fig. 2 that as the rotor rotates, the exhaust ports of each chamber will be successively opened, and as there are two passages 11 and 12, there will be two openings of the valve ports during one revolution of the rotor. While I have shown two passages 11 with their angular portions 12, and two deflections 26 in the cam track, it will be obvious that I might use more passages 11 and increase the number of deflections 26, and thus increase the number of reciprocations of the valves. It will also be seen from Fig. 2 that the exhaust port of the chamber next adjacent to that into which steam is being forced is the exhaust port which is opened. In other words, the deflection 26 is arranged just rearward of the angular portion 15 of each passage.

The walls 3 and 4 are each provided with the inwardly projecting flanges 27, while the rotor 10 is provided with the outwardly projecting flanges 28. The rotor is not, however, of a diameter equal to the diameter of the annular flange 27, but a space is left between the circumference of the rotor and the inner face of the annular flange. This space is to be filled by a follower or packing plate 29, shown in perspective in Fig. 3. This packing plate is curved to conform to the curve of the circumference of the rotor, has a port 30, and has a tubular shank portion 31 which extends inward from the port 30 at an angle to the radius of the curved plate 29, this angle being the same as that of the angular portion 12 and the circumference of the rotor, whereby the tubular shank 31 is adapted to rest in the angular portion 12, the port 30 forming the mouth of the rotor passage through which the jet issues.

It will be obvious that were the rotor made to fit the interior diameter of the annular flange 27, when it became heated it would expand against and so increase the frictional resistance between the rotor and the annular flange 27 that the rotor would not operate. Yet, at the same time, it is necessary that the rotor should have a sufficient contact with the inner open face of the chambers 13 as to prevent the steam passing immediately out of the chambers and losing the full effect of the impact of the steam upon the blades. It is to this end that I have provided the follower 29 whose shank 30 fitting loosely within the portion 12 of the passage 11, permits the follower to be forced outward by the pressure of the steam or by centrifugal action against the inner open face of the chambers 13, and thus closing the same. In my preferable construction, the plate 29 is of sufficient length to entirely close three of these spaces or chambers 13. Thus, there is no chance of the steam escaping until the full force of the steam has acted upon the blades, and until the exhaust valve has opened to permit the exhaust of the steam by its proper conduit, then, and not until then, are the chambers 13 left unpacked. It will be seen that this construction of mine provides for a closing of a few of the chambers 13, but that the rest of the chambers not closed by the plate 29 are not in contact with the rotor, and that thus there is far less frictional resistance than would be otherwise possible.

The operation of my invention is obvious from the drawings and description above given. Steam, as it enters the passage 9 will pass into the rotor, and will not only react as it turns into the angled portion 12, but will be forced in a jet against the inclined faces of the blades 14, the impact driving the rotor in the direction of the arrow in Fig. 2. After the discharge port of the rotor has passed each of the chambers 13, the exhaust port will be opened and the steam exhaust into the pipe 17, and by this time the follower plate 29 has passed, thus leaving the rotor, as before described, out of contact with the blades 14 or the walls of the casing. It will be seen that my invention is extremely simple and positive in its action, and particularly, the friction between the rotor and the exterior casing is reduced to a minimum consistent with a suitable packing of the parts.

While I have described my invention as using steam as a motive fluid, I wish it to be distinctly understood that I might use any other elastic fluid for the purpose, and that I might modify my invention in many ways, particularly as regards the details thereof, without departing from its spirit.

Having thus described the invention, what is claimed as new is:—

1. In a rotary engine, the combination with a rotor having an axial fluid inlet and opposed outlet passages, of a casing surrounding the rotor, a series of circumferential fixed blades on the interior of the casing, said casing having an exhaust port behind each one of the blades, and means actuated by the rotor for controlling said ports.

2. In a rotary engine, the combination with a rotor having an axial fluid inlet and opposed passages, the ends of said passages being turned at an angle reversely to the direction of motion of the rotor, of a casing surrounding the rotor, and a series of circumferential fixed blades, said casing having exhaust openings behind each one of the blades, and valves supported on said casing, one for each of the ports and actuated by the rotor to open the exhaust port after the discharge passage of the rotor has passed.

3. In a rotary engine, the combination with a rotor having an axial inlet and opposed diametrically extending passages, the

ends of said passages being bent at an angle reversely to the direction of motion of the rotor, of a casing surrounding the rotor having on its circumference a series of fixed blades, the wall of said casing having exhaust ports arranged behind each one of said blades, valves supported upon said casing and controlling said exhaust ports, a cam track formed upon the rotor, and mechanism actuated by the said cam track for opening and closing the exhaust ports.

4. In a rotary engine, the combination with a rotor having an axial inlet passage and opposed diametrically arranged discharge passages, the ends of which are turned reversely to the direction of motion of the rotor, of a casing surrounding the rotor and having a series of inwardly projecting fixed blades, said casing being provided with an exhaust port behind each one of said blades, an annular exhaust chamber on the side of the casing into which said ports open, a discharge pipe leading from said casing, and valve mechanism within the chamber and controlling each one of the said valves, said valve mechanism being actuated by the rotor.

5. In a rotary engine, the combination with a rotor having an axial inlet passage and opposed diametrically extending discharge passages, the ends of which are turned in a direction reverse to that of the rotation of the rotor, of a casing supporting and inclosing the rotor having inwardly projecting circumferential fixed blades against which the motive fluid is discharged, said blades having inclined faces, an annular chamber supported on the rotor casing and having an exhaust pipe leading therefrom, said casing having a series of exhaust ports opening behind the blades into said chamber, a series of valve rods mounted within the chamber and carrying sliding valves at their ends controlling the exhaust ports, a cam mounted upon and rotating with the rotor, and means whereby the valve rod shall be moved from said cam.

6. In a rotary engine, the combination with a rotor having an axial inlet passage and diametrically opposed discharge passages, the ends of which are angularly bent in a direction reverse to that of the movement of the rotor, of a casing inclosing and supporting the rotor having a series of circumferential inwardly directed fixed blades having angularly arranged fixed faces, an annular exhaust chamber supported on the casing, the wall of said casing having exhaust ports opening into said chamber, a sliding valve for each one of said ports, a valve rod attached thereto and mounted for radial sliding movement within the exhaust chamber, said valve rod projecting inward through the wall of the casing and having a roller mounted thereon, and a cam mounted on said rotor and engaging with the series of rollers on the valve rods.

7. In a rotary engine, the combination with a rotor having opposed discharge passages and a casing surrounding and inclosing the rotor having a series of inwardly projecting blades, of a follower mounted in each discharge passage of the rotor having a circular plate and adapted to contact with the edges of the blades, and a tubular shank projecting down into the discharge passage of the rotor.

8. In a rotary engine, the combination with a rotor having an axial inlet passage and opposed discharge passages, the ends of which are angularly turned in a direction reverse to the direction of movement of the rotor, and a casing surrounding and inclosing the rotor having inwardly projecting blades, of a follower for said discharge passages, comprising a curved plate adapted to fit the exterior face of the rotor and to contact with the peripheral blades, and an angular tubular shank extending inward from the under side of said plate.

9. In a rotary engine, the combination with a rotor having an axial inlet passage and a radial discharge passage, of a casing surrounding the rotor and having peripheral abutments against which the motive fluid is discharged, a packing plate carried by the rotor and movable radially outwardly therefrom and having an opening through which the discharge from said rotor shall pass, said plate fitting the circumference of the rotor and being adapted to be forced outward into contact with the edges of said blades.

10. In a rotary engine, the combination with a rotor having an axial inlet passage and diametrically opposed discharge passages, the ends of which are turned in a direction reverse to that of the movement of the rotor, said rotor having annular outwardly projecting circumferential flanges, of a casing surrounding and supporting the rotor and having a series of circumferential inwardly projecting blades and opposed annular flanges corresponding to the outwardly turned flanges of the rotor, a follower, one for each of said rotor discharge passages, having a circular plate fitting the exterior of the rotor and projecting over the flanges thereof, and a tubular shank movably fitting into the discharge passage, said plate being adapted to be forced outward against the inwardly projecting flanges on the casing, and to thereby close the spaces between said casing blades.

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

ANDREW A. McLAREN. [L. S.]

Witnesses:
G. S. SINCLAIR,
W. C. BOMESTEEL.