A. W. WINBERG.

ENGINE.

APPLICATION FILED JUNE 20, 1910.

991,680.

Patented May 9, 1911.

3 SHEETS—SHEET 1.

Fig. 1.

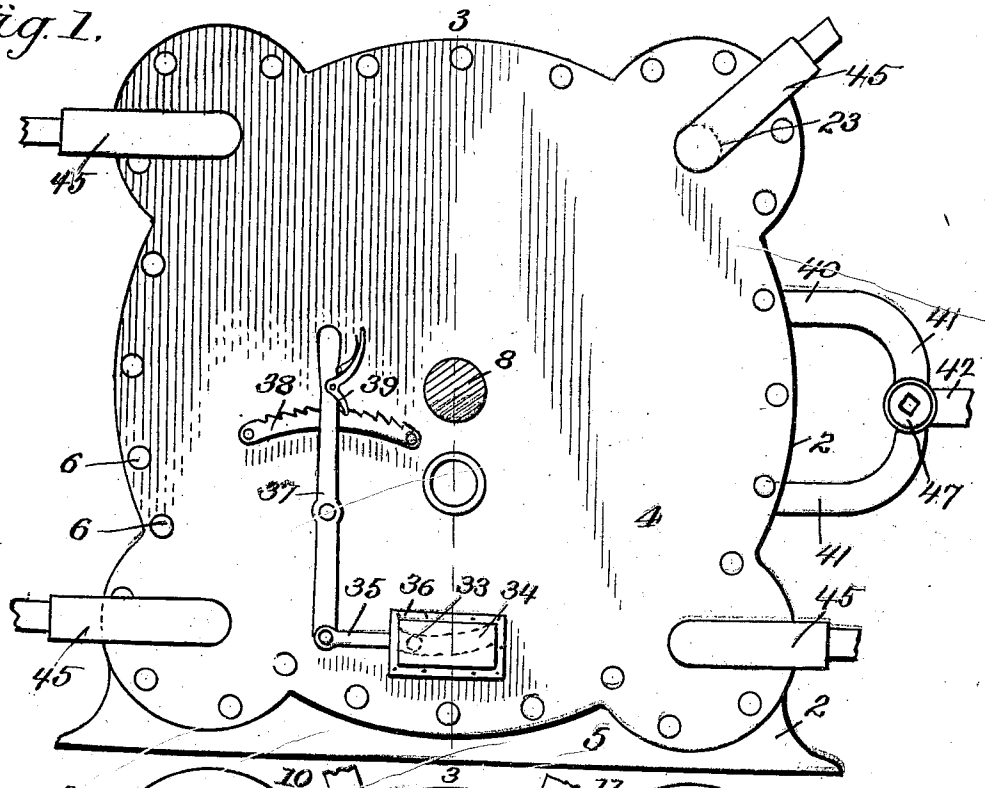
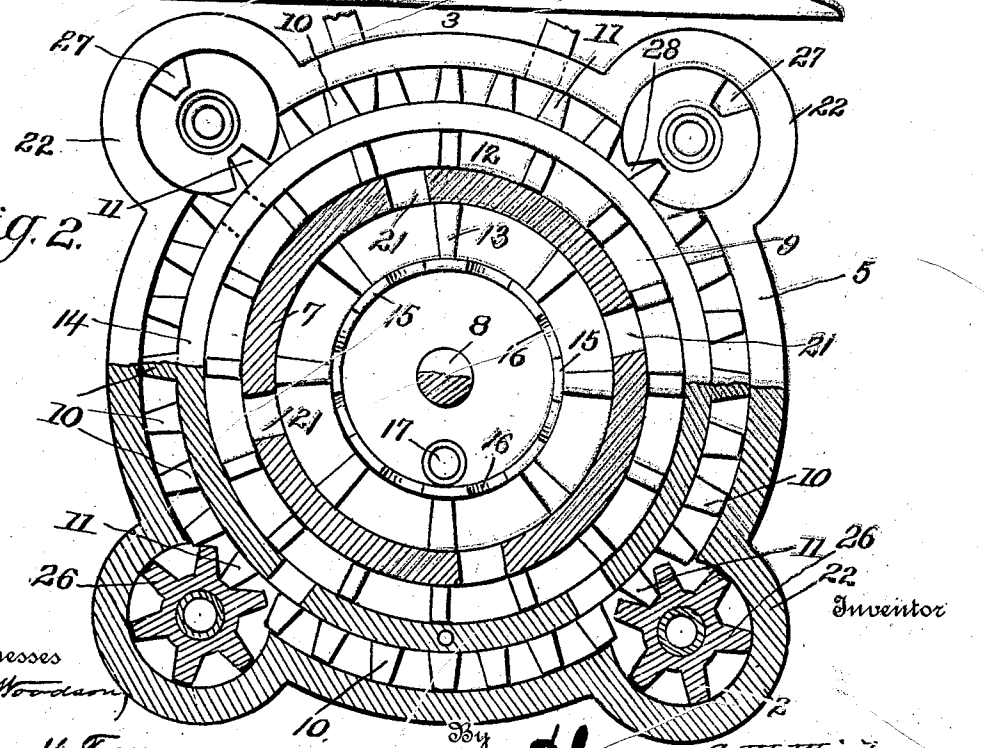


Fig. 2.



Witnesses

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3 SHEETS—SHEET 2.

Fig. 3

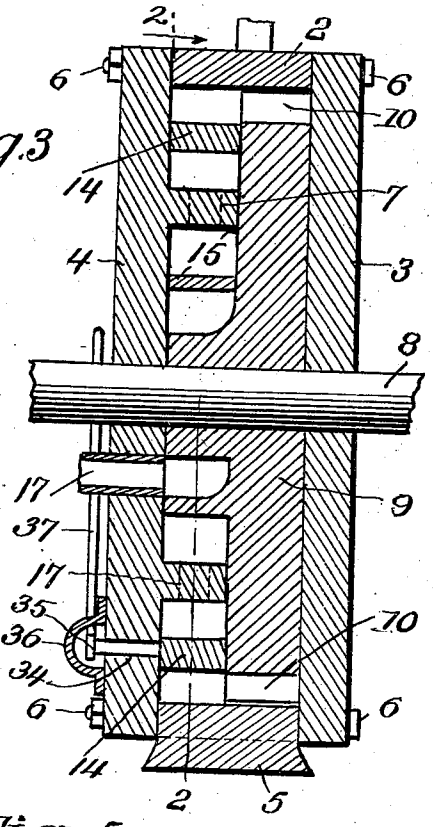


Fig. 4.

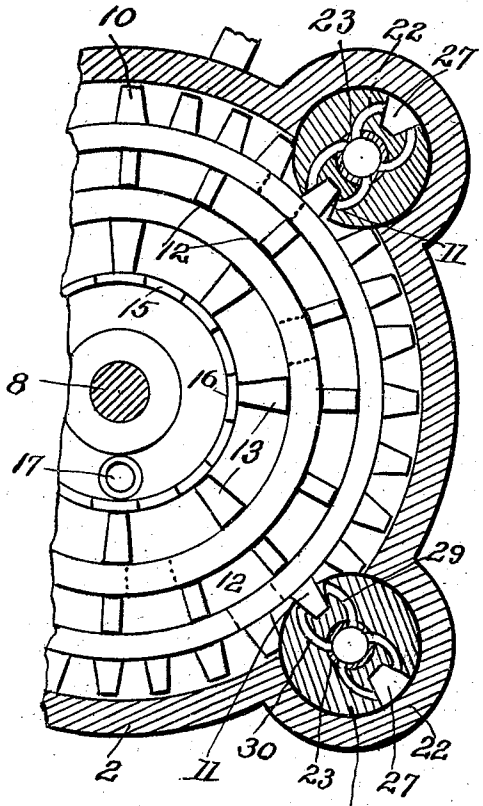


Fig. 5

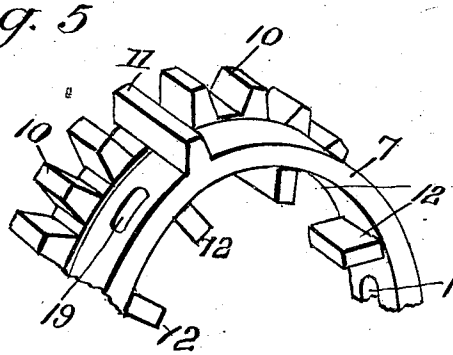


Fig. 6.

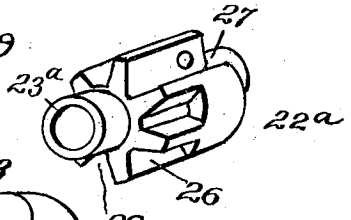
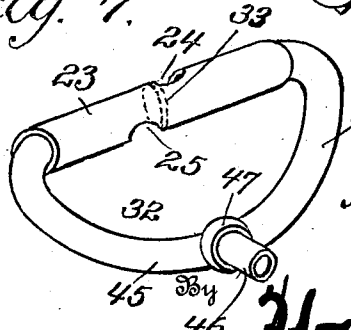


Fig. 7.



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3 SHEETS—SHEET 3.

Fig. 8.

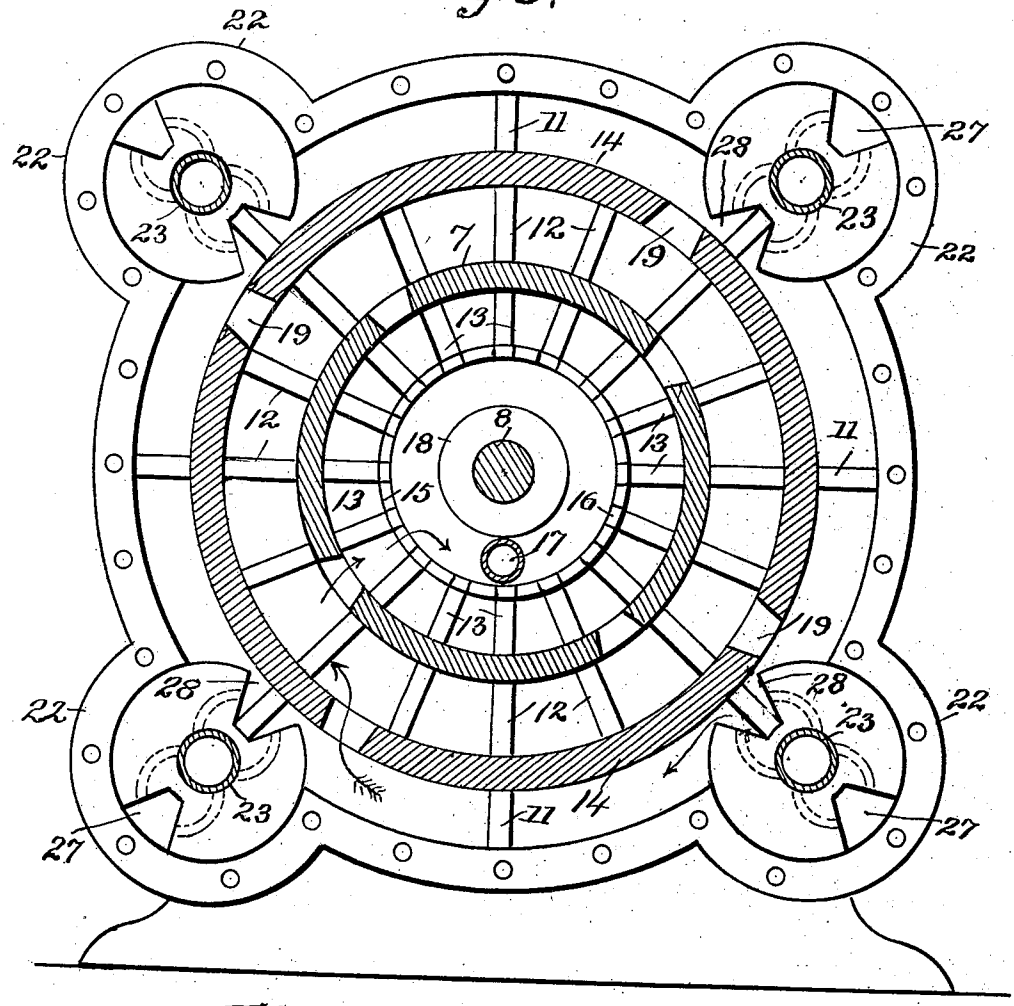
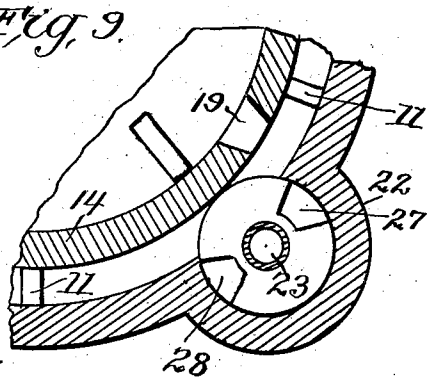


Fig. 9.



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UNITED STATES PATENT OFFICE.

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ENGINE.

991,680. Specification of Letters Patent. Patented May 9, 1911.

Application filed June 20, 1910. Serial No. 568,041.

To all whom it may concern:

Be it known that I, ANDERS W. WINBERG, citizen of the United States, residing at Redding, in the county of Shasta and State of California, have invented certain new and useful Improvements in Turbine-Engines, of which the following is a specification.

My invention relates to steam engines, and particularly to engines of the rotary type in which a rotor is mounted within an outer casing, this rotor being provided with outwardly extending blades, and in which the steam is admitted against said blades to drive the rotor.

The primary object of my invention is to provide a very simple form of rotary engine in which the steam reacts against a comparatively large number of blades, and in the course of its travel passes from the exterior of the rotor to the interior thereof, through a number of chambers in its passage and eventually exhausting from the central portion of the rotor.

Another object is to provide an engine of this type with very simple means whereby the engine may be reversed whenever desired without the necessity of using complicated valve gears for this purpose.

The invention contemplates in its general features a rotor provided with a plurality of radiating blades in conjunction with a plurality of steam inlet valves actuated by the rotation of the rotor, which valves while acting to prevent the entrance of steam behind each of the outer blades of the rotor also act as abutments against which the steam reacts in forcing the rotor around.

The invention is shown in the accompanying drawings wherein:

Figure 1 is a side elevation of an engine constructed in accordance with my invention. Fig. 2 is a vertical section thereof on the line 2—2 of Fig. 3. Fig. 3 is a vertical section, transverse to Fig. 2 and taken on the line 3—3 of Fig. 1. Fig. 4 is a fragmentary section on the line 4—4 of Fig. 3. Fig. 5 is a fragmentary perspective view of the rotor and one of the rings dividing the outer set of blades from the inner set of blades. Fig. 6 is a perspective view of one of the valves. Fig. 7 is a perspective view of the tubular axis on which the valve turns. Fig. 8 is a diagrammatic view to show the action of the steam as it passes from the inlet valves and exhausts from the outer piston space into the next succeeding piston space, acts on the blades therein and passes out through the exhaust space. Fig. 9 is a fragmentary section of a portion of the casing and the rotor as shown in Fig. 8, showing the position of the valve after a blade has passed the same.

Referring to these drawings 2 designates a circumferential casing closed at its ends by the side plates 3 and 4, these plates being bolted to the casing 2 by means of the bolts 6. The lower portion of the casing 2 may be shaped to provide any suitable base 5 upon which the engine may be supported. Projecting from the side plate 4 is the fixed annulus 7.

Passing through the centers of the plates 3 and 4 is the shaft 8 upon which the rotor is mounted, this rotor being designated 9. The circumference of the rotor is provided for one-half of the width of the rotor with gear teeth 10, for a purpose to be later described, while the face of the rotor is provided with a plurality of sets of radially extending piston blades 11, 12 and 13, as most clearly shown in Fig. 8 wherein the gear teeth 10 are omitted for the sake of clearness. While I do not wish to limit myself to any specific number of blades, I have shown eight outer blades 11, and double that number of blades 12 and 13. The inner ends of the blades 11 are spaced from the outer ends of the blades 12 sufficiently to accommodate a relatively fixed annulus or ring 14 which I shall hereinafter term the reversing ring, and the inner ends of the blades 12 and the outer ends of the blades 13 are spaced from each other a distance equal to the thickness of the fixed ring 7, previously referred to. It will thus be seen that the blades 11, 12 and 13 project out from the face of the rotor and into the spaces between the outer wall or casing 2 and the ring 14, and between the ring 14 and the fixed ring 7, and between the ring 7 and the shaft 8, upon which the rotor turns.

The central portion of the rotor is provided with an annular wall 15 which is cut away between each of the blades 13 so as to form ports 16, through which the exhaust steam passes. An exhaust pipe 17 passes through the plate 4 of the casing, as shown in Fig. 3 and registers with the annular recess or chamber formed between the wall 15 and the hub 18 of the rotor. Thus the exhaust port will always be in connection with the spaces betwen the blades 13, and no exhaust valves are used for controlling

the passage of the exhaust steam through said exhaust pipe.

In order to provide for the passage of steam from the exterior set of blades to the chambers or spaces between the intermediate set of blades, and from thence to the chambers or spaces between the inner set of blades, I form the exterior annulus 14 with a plurality of inlet ports 19 and provide the interior ring or annulus 7 with a like number of ports 21. It will be understood that the inner ring or annulus 7 is fixed with relation to the casing and hence that its ports have a fixed relation, but the reversing ring or outer annulus 14 is shiftable through the arc of a circle and hence the ports 19 are shiftable into position, as will be later claimed.

In order to provide for the inlet of steam to the outermost set of blades, I form the casing 2 and the side plates 3 and 4 with a plurality of cylindrical valve casings 22. These casings are shown as four in number but I wish it understood that any number of inlet valves may be used. Passing through each of the valve chambers and extending out on each side of the engine, is the valve axis 23 which is tubular and is provided with ports 24 and 25. These ports are diametrically opposite to each other but are longitudinally spaced so as to aline with certain longitudinally spaced ports in the rotatable valves, one of the valves being shown in Fig. 6. Each valve comprises a central tubular core which surrounds and rotates upon the inlet pipe or tube 23, and a cylindrical body which fits the valve chamber 22 and rotates therein. The side wall of the valve chamber opens into the interior of the casing so that the valve projects therethrough and into contact with the exterior face of the rotor. One-half of the face of the valve is provided preferably with teeth 26 which are adapted to be engaged by and mesh with the teeth 10 on the rotor. The other portion of the valve is cylindrical and has a smooth outer face so as to engage with the face of the rotor, as previously stated. The body of the valve is formed with the longitudinally extending, oppositely disposed V-shaped recesses 27 and 28 which are provided to permit the blades 11 to pass the valve. As seen in Fig. 4 each valve is formed with passages 29 and 30 which extend from the hollow interior of the valve to the opposite faces of the V-shaped recesses 27 and 28. One of these passages 29 opens upon the interior of the valve at such a point that it will intermittently register with the port 25, while the other passage 30 is so arranged as to intermittently register with the port 26. The ports 25 and 26 are separated from each other by a dividing partition 32 so that while the axle 23 of the valve is open at opposite ends to admit steam, steam can not pass from one portion of the valve into the other. When, therefore, steam is admitted through one end of the valve axle 23 it will pass out of the port 24 for instance, and will pass into the passage 29 and be delivered in one direction against the face of the blade 11. When, however, steam is cut off from the first named end of the axle and enters the other end thereof, steam will pass down through the port 25 which will intermittently register with the passage 30, and thus the steam will be delivered in the other direction and against the faces of the blades.

It will be seen that as the valves mesh with the teeth 10 the valves will be given a constant rotation, and that the valves are so arranged that the recesses 27 will mesh with the blades 11, thus permitting the blades to pass the valves, and that as soon as a blade has passed the valve, steam will be directed against the rear face of the blade, the valve in that case acting as an abutment, or practically forming a fixed end to the steam space, the other end of which is formed by the moving blade.

Referring to Fig. 8 it will be seen that the steam will pass out from the inlet valve into a space between the outer casing and the reversing ring 14 and will act against the blade 11, carrying the blade forward until the blade has reached and passed one of the ports 19, which port in the position of the reversing ring shown in Fig. 8, is disposed on one side of the adjacent inlet valve. When the blade has passed the port 19, the steam behind the blade which is exhaust steam will pass through said port and into the next inner steam space, until such time as the blade 12 reaches and passes one of the ports 21 in the inner annulus 7. The steam will then escape through said port, to the chambers or spaces between the inner set of blades 13 and will from thence pass to the exhaust pipe 17, by which the steam is finally carried off. It will thus be seen that I secure a turbine action in my rotor compelling the steam to impinge upon a plurality of blades in the course of its passage from the exterior of the rotor to the interior thereof.

It is for the purpose of reversing the movement of the rotor that I have provided the shiftable reversing ring 14. The direction of rotation of the rotor depends upon the position of the ports 19 with relation to the inlet valves. If the ports 19 are on one side of the inlet valves, the engine will move in one direction, whereas if the reversing ring is shifted to bring the ports to the other side of the inlet valves, the rotor will be moved in the opposite direction. For the purpose of shifting this ring I provide the ring with an outwardly extending pin

33 which extends out through a slot 34 in the plate 4 of the rotor and is connected to a link 35 which extends through a stuffing box or other casing 36 which is packed to prevent the escape of steam. The link 35 is pivotally connected at its end to a lever 37 which moves over a sector 38 and is provided with a latch 39 whereby the lever may be held in any adjusted position. It will thus be seen that by moving the lever to one side or the other that the ring 14 will be shifted to carry its ports to one side or the other of the inlet valves. There are four inlet valves as shown, each formed with two blade recesses 22, and hence the rotor is shown as being formed with eight outer blades 11, and the rings 7 and 14 are shown as being provided with four ports. It will, however, be understood that I may increase or decrease the number of piston blades on the rotor, and change the other parts of the apparatus to correspond.

It will be noted that the engine as shown takes steam at four points, that this steam is almost immediately cut off, and then acts expansively until it passes into the exhaust pipe.

If the engine should stop on a center so that the valves would be so turned as to prevent steam being applied to one side of a blade and not to the other, and therefore preventing the forward movement of the rotor, I direct steam into the casing by means of the inlet ports 40 and 41 which are connected by a pipe 42 with any source of steam supply. The pipe 42 is, of course, provided with a valve 43 whereby the steam may be directed either into the branch 41 or 40, depending upon which way the rotor is to be moved.

The extremities of each of the valve axles 23 are connected by the pipes 44 and 45 to a source of steam supply, these pipes extending to a common supply pipe 46 provided with a valve 47, whereby the steam may be directed into either branch pipe 44 or 45 for the purpose previously described, that is, for rotating the rotor in one direction or the other as desired.

What I claim is:

1. In a fluid pressure turbine, a rotor, a casing surrounding the rotor, a relatively fixed ring mounted on the casing concentric to the axis of the rotor and having a plurality of ports arranged in spaced relation around the ring, a series of blades on the rotor disposed exterior to fixed ring, and means for directing fluid pressure into the casing and against said outer series of blades and permitting the exhaust of the fluid pressure from interior of the rotor.

2. In a fluid pressure turbine, a casing, a rotor inclosed within the casing having a plurality of radially disposed blades extending from the rotor, a fixed ring carried by the casing and located interiorly of said blades, said ring being provided with ports, a rotatable fluid inlet valve mounted on the casing contacting with said ring, said valve having a recess in its face adapted to receive one of the blades and permit the blade to pass, said valve being provided with ports for the admission of fluid pressure behind the blade.

3. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a plurality of radially disposed blades upon its circumference, a fixed ring carried by the casing, against which the ends of said blades abut, said ring being provided with a plurality of exhaust ports, a rotatable fluid inlet valve mounted on the casing and contacting with the outer face of the said ring, said valve being provided with recesses adapted to receive one of the blades of the series of blades and being provided with fluid pressure inlet ports opening upon the faces of said recess, and means whereby said valve may be rotated in correspondence with the rotation of the rotor.

4. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a series of radially disposed blades upon its circumference, a relatively fixed ring carried in the casing, against which the inner ends of said blades abut, said ring being provided with ports, a rotatable fluid inlet valve mounted on the casing to contact with the outer face of the exterior ring, said valve being provided with a recess in its face adapted to receive and permit the passage of one of the exterior blades and with ports opening upon the faces of said recess, gear teeth on the valve, and gear teeth upon the rotor engaging with said first named gear teeth to rotate the valve.

5. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a series of radially disposed blades on its circumference, a ring attached to the casing, against which the inner ends of the blades abut, said ring being relatively fixed with relation to the rotor, but being shiftable in the arc of a circle and being provided with a plurality of exhaust ports, means for admitting steam to the space between the ring and the wall of the casing and for exhausting the steam from the space inclosed by said ring, a rotatable fluid inlet valve mounted on the casing and contacting with the outer face of the exterior ring, said valve being provided with a recess on its face adapted to receive and permit the passage of one of the exterior blades and with ports opening upon the faces of said recess, gear teeth on the valve, and gear teeth upon the rotor engaging with said first named gear teeth to rotate the valve.

6. In a fluid pressure turbine, a casing having a series of radially extended circum-

ferential blades projecting from its face, a shiftable ring mounted upon the side wall of the casing and adapted to be shifted through the arc of a circle, said ring projecting inward in said casing and abutting against the rear ends of the blades, said ring being provided with ports and the casing being provided with an exhaust port disposed immediately over the center of the rotor, a rotatable inlet valve mounted upon the casing and contacting with the face of the exterior ring, said valve being provided with a recess adapted to accommodate a blade of the exterior series of blades and permit the passage of the same and having fluid pressure inlet ports opening upon the faces of said recess, and means for continuously rotating the valve with the rotor.

7. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a plurality of radially disposed blades projecting from its face and concentrically arranged to the axis of the rotor, a ring mounted on the casing and contacting with the face of the rotor, said ring on its outer face abutting against the inner ends of said blades, said ring being shiftable through an arc of a circle and being provided with ports, means for exhausting the fluid pressure from the interior of the rotor interiorly of said ring, a rotatable, cylindrical valve mounted on the casing and contacting with the said ring, said valve being provided with a series of equidistant recesses upon its face, each recess being adapted to accommodate and permit the passage of one of the exterior series of blades, said valve being formed with inlet ports opening upon the opposite faces of each of the recesses, means for preventing the passage of steam through one of said ports but permitting its passage through the other, and means for giving a continuous rotation to the valve in correspondence with the rotation of the rotor.

8. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a plurality of series of radially disposed blades upon one face thereof, each series being concentric to the axis of the rotor, a plurality of relatively fixed rings carried on the side wall of the casing, each ring separating one of said series of blades from the next adjacent series, said rings being provided with ports, the exterior ring being shiftable in an arc of a circle, an exhaust duct leading from the casing opposite to the center of the rotor, a plurality of valve casings formed upon the exterior of the rotor casing and opening to the space between the rotor casing and the exterior face of the outer ring, and cylindrical rotatable valves carried in the valve casings and contacting with the inner face of the outer ring, said valves being formed with oppositely disposed recesses to receive and permit the passage of the exterior blades of the rotor and with steam fluid inlet passages leading into each end of the valve, said passages terminating in ports opening upon the opposite faces of the recesses, and means for preventing the admission of steam to either of said passages and simultaneously permitting the entrance of steam to the other passage.

9. In a fluid pressure turbine, a casing, a rotor inclosed within the casing and having a plurality of series of radially disposed blades, each series being concentric to the axis of the rotor, a plurality of relatively fixed rings carried on the side wall of the casing, each ring separating one series of blades from the next adjacent series, said rings being provided with ports and the exterior ring being shiftable in an arc of a circle to reverse the movement of the rotor, gear teeth formed upon the circumference of the rotor below the outer series of blades, and a plurality of cylindrical rotatable inlet valves disposed around the circumference of the rotor and contacting with the outer face of the outer ring, said valves being provided with recesses to receive and permit the passage of said outer series of blades and with ports connected to a source of fluid pressure, and gear teeth formed on the valve and meshing with the gear teeth on the rotor.

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

ANDERS W. WINBERG. [L. S.]

Witnesses:
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F. X. LA BONTÉ.