

L. W. ZAAR.

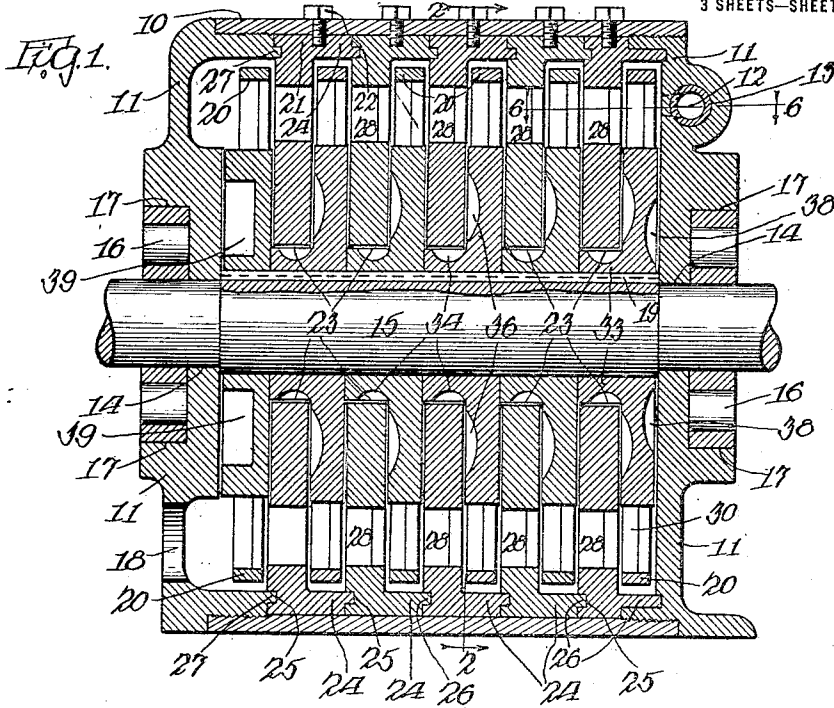
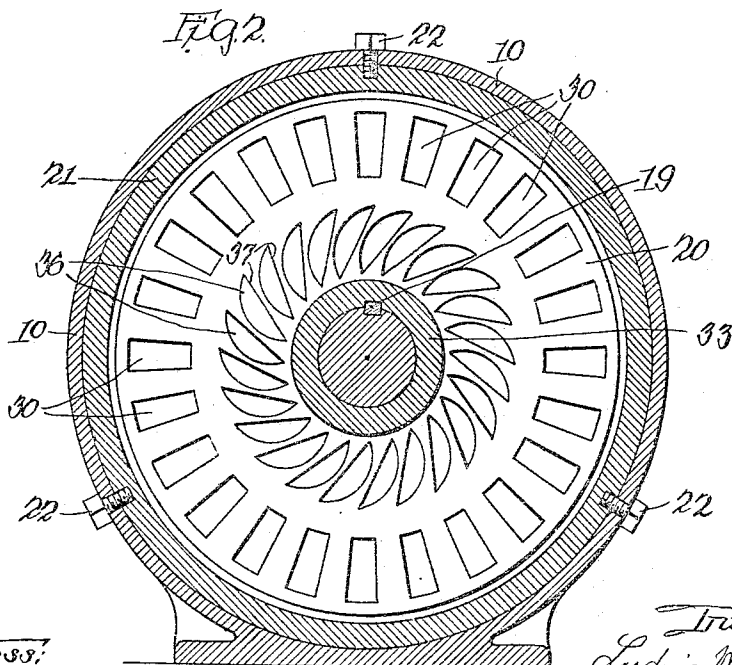
TURBINE.

APPLICATION FILED NOV. 6, 1916.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 1.

1,288,360.



Witness:
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3 SHEETS—SHEET 2.

Fig. 3.

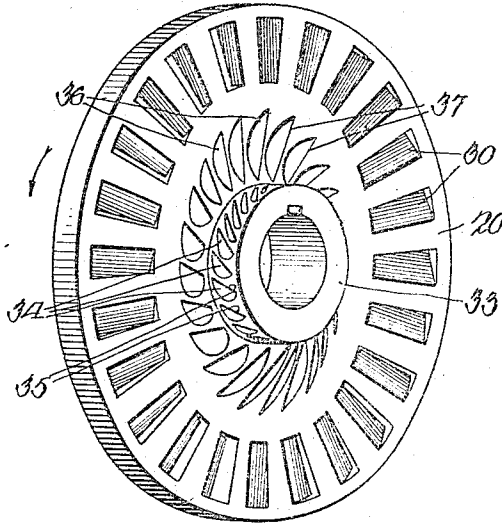
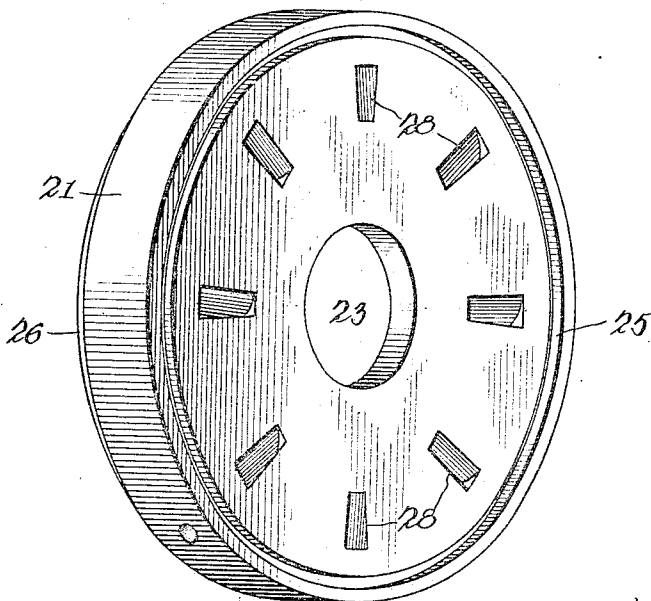


Fig. 4.



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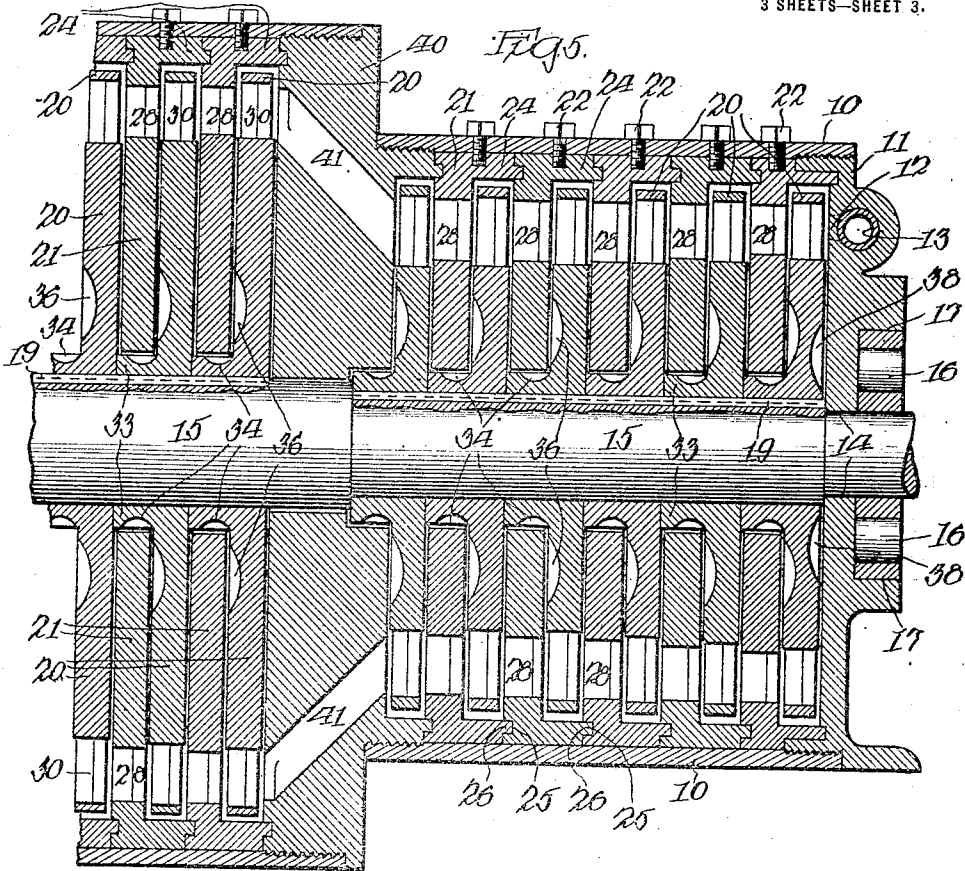
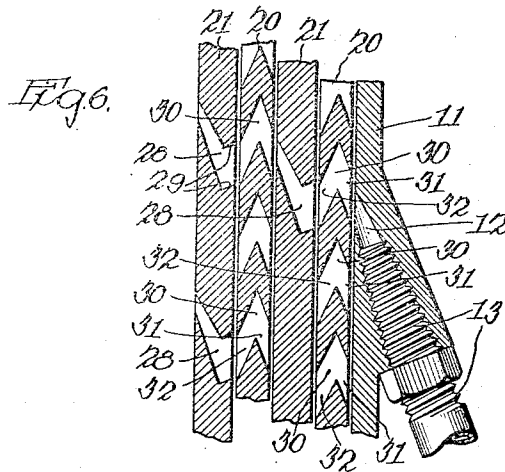
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TURBINE.

APPLICATION FILED NOV. 6, 1916.

Patented Dec. 17, 1918.

3 SHEETS—SHEET 3.

1,288,360.



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UNITED STATES PATENT OFFICE.

LUDWIG W. ZAAR, OF CHICAGO, ILLINOIS.

TURBINE.

1,288,360.

Specification of Letters Patent.

Patented Dec. 17, 1918.

Application filed November 6, 1916. Serial No. 129,752.

To all whom it may concern:

Be it known that I, LUDWIG W. ZAAR, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Turbines, of which the following is a specification.

This invention relates to turbine motors, and it consists in certain peculiarities of the construction, novel arrangement and operation of the various parts thereof, as will be hereinafter more fully set forth and specifically claimed.

The principal object of this invention is to provide a turbine motor which shall be compact in form, strong, and durable, simple and inexpensive in construction, having a maximum of efficiency with a minimum of friction, capable of generating high speed and great power, and which is adapted to be operated either by the intermittent explosion of gases or by the constant flow of other motive fluids or agents, such as air, steam or water under pressure.

Other objects of my invention or improvements will appear from the description and explanation hereinafter contained and the features of novelty will be pointed out in the appended claims.

In the accompanying drawings which serve to illustrate an embodiment of the invention,

Figure 1, is a central longitudinal sectional view of a motor embodying one form of the invention.

Fig. 2, is a cross-sectional view taken on line 2—2 of Fig. 1, looking in the direction indicated by the arrows.

Fig. 3, is a detached perspective view of one of the rotors or movable disks or members of the motor.

Fig. 4, is a similar view of one of the stators or stationary members of the motor.

Fig. 5, is a central longitudinal sectional view of the motor showing a modification in the construction thereof, and

Fig. 6, is an enlarged plan sectional view taken on line 6—6 of Fig. 1, as indicated by the arrows showing means for supplying motive fluid or agents to the interior of the engine cylinder or casing.

Like numerals of reference, refer to corresponding parts throughout the different views of the drawings.

Referring now to Figs. 1 to 4 inclusive, and to Fig. 6, the reference numeral 10

designates the cylinder of the engine or motor, which cylinder by preference has each of its ends internally screw-threaded to engage the heads 11 one of which is located at each end of the cylinder, as is clearly shown in Fig. 1 of the drawings. One of the heads 11 is provided near its periphery with one or more inlets 12 for the admission of the motive agent or fluid to the interior of the cylinder or casing, and as shown in Figs. 1 and 6 of the drawings, said inlet or inlets is or are located obliquely with respect to the head of the cylinder, and said inlet or inlets may be provided with a nozzle or pipe 13 leading to a supply of motive fluid or agent under pressure, not shown. Each of the cylinder heads 11 is provided centrally with an opening 14 in which is located a power shaft 15 which has its portions outwardly of the heads 11 journaled in suitable anti-friction bearings 16 which bearings are mounted in suitable races or recesses 17 with which each of the heads 11 is provided in its outer surface around the opening 14 therein. The head 11 opposite the head having the inlets is provided with an outlet or exhaust port 18, which is by preference located near the bottom of the motor or engine. Rigidly fixed to the shaft 15 by means of a spline 19 or otherwise, are a plurality of rotors or disk like members 20, which are of considerably less diameter than the cylinder 10 and also of less diameter than the stators or fixed members 21 which are located alternately with respect to the rotors or members 20 and are of such diameter as to fit closely within the cylinder 10, to which they may be firmly secured by means of screw-bolts 22 which are extended through suitable openings in the cylinder 10 and are seated in the stators or fixed members or disks 21 at their peripheries.

By referring to Figs. 1 and 4 of the drawings, it will be seen that each of the members 21 is provided with a centrally located circular opening 23, and that each of said members has at its periphery an annular flange 24 which overhangs and are clearly spaced from the peripheries of the rotors 20 or disk like movable members. It will also be observed by reference to said figures, that each of the members 21 has in its face opposite the inlet end of the cylinder, an annular groove 25 which are located near the peripheries of said members and are for the

reception of annular extensions 26 on the adjacent faces of the members 21 as well as for the reception of an annular extension 27 on the inner portion of the head 11 which is provided with an outlet or exhaust port. By this arrangement it will be seen and understood that the members 21 will be rigidly and securely connected to the cylinder as well as to its heads in such a way as to surround with their flanges 24, the peripheries of the rotors or members 20, which as before stated, are fixed to the shaft 15, so as to rotate therewith.

Each of the stators or members 21 is provided between its central opening 23 and its periphery with a number of conduits or openings 28, which are by preference arranged radially in a circle concentric with the central opening and periphery of each of said members, as is clearly shown in Fig. 4 of the drawings. These openings or conduits 28, are by preference of substantially the form shown in Fig. 6 of the drawings, that is to say, they are located diagonally with respect to the disks 21, that is they extend through said disks from the faces thereof adjacent to the inlet end of said cylinder to and through the opposite faces in the direction of the rotation of the rotors or movable members 20, and have their discharging ends tapered while their ends adjacent to the inlet head of the cylinder are enlarged and provided with angular walls 29, (see Fig. 6) which enlarged portions are adapted to register momentarily with the chambers or pockets 30 of the rotors or members 20, which chambers or pockets 30 are by preference substantially V-shaped with their points or apexes presented in the direction of the rotation of the members 20 or rotors. By reference to Fig. 6 it will be clearly seen and readily understood that the chambers or pockets 30 extend through each of the members 20 from one of the faces thereof to and through the other faces, thus presenting an inlet portion 31 and an outlet portion 32 for each of said openings, the inlet portion 31 of each of the openings 30 in the members 20 adjacent to the inlet head 11 are adapted for communication with the inlet port or ports 12, while the outlet portion 32 of each of said members is adapted to communicate momentarily with the enlarged portions of the conduits 28 in the members 21 in the operation of the motor. The outlet or tapered ends of the conduits 28 in the members 21 will communicate with the pockets or chambers 30 in the rotors or members 20 interposed between the members 21 or stators as is obvious.

By preference, the stator 21 adjacent to the inlet head 11 is provided with about four (4) of the conduits 28 while the stator adjacent thereto is provided with about six (6) of said conduits, and the remainder of said sta-

tors have a corresponding increase in the number of conduits. Each of the disks or rotors 20 is provided with a large number of the pockets or chambers 30, of the construction shown in Figs. 3 and 6 of the drawings, which chambers or pockets are arranged radially near the periphery of each of the disks 20 and in a circle concentric with the periphery and central opening of the disks. I do not desire to limit myself to the number of pockets 30 with which each of the disks or members 20 is provided, nor do I desire to be limited to the number of conduits 28 with which the members 21 are provided, but it is essential that the disks 20 shall have a greater number of pockets or chambers 30 than there are conduits in the stators 21 or fixed members.

By reference to Figs. 1, 2, and 3, of the drawings, it will be clearly seen and understood, that each of the disks or members 20 is provided on its face adjacent to the exhaust head of the cylinder of the motor with a hub 33, each of which is provided on its outer surface with a series of diagonally disposed recesses 34, each of which has an abrupt wall 35 thus affording what may be termed a rotary fan on the periphery of the hub of each of the rotors. The face of each of the rotors 20 adjacent to the hub 33 thereof, is also provided with a series of depressions or recesses 36 each of which has an abrupt wall 37, which walls have substantially the same inclination with respect to the hub 33 of the disk as do the walls 35 of the depressions or recesses 34 thereon. Thus it will be understood that as the rotors are turned by the action of the motive fluid, the recesses 34 on the hubs 33 of the rotors, will force the air, gases, or motive fluid toward the adjacent faces of the rotors and that then the depressions or recesses 36 in the faces of the rotors will force the air, gases or motive fluid outwardly or toward the chambers 30 in the rotors and the conduits 28 in the stators or members 21. It will be seen and understood by reference to Figs. 1 and 5, that the rotors and stators are spaced from each other and also that said parts are spaced from the heads of the cylinder so that there will be no metallic friction in the operation of the motor. The rotor 20 adjacent to the inlet head of the motor cylinder is provided on its face adjacent thereto with a series of depressions 38 similar to the depressions 36 above referred to, and are for the purpose of forcing the air, or motive fluid outwardly from the bearing of the shaft 15. The rotor 20 adjacent to the head 11 having the exhaust port, is provided with a series of recesses or depressions 39 for a like purpose.

In Fig. 5 of the drawings, I have shown a modification in the construction of the motor, which consists in making the cylinder in

a plurality of sections, but in the present instance a single section and a part of another one only is shown. In this modified construction the section of the cylinder at the right-hand side of the figure of the drawing, is of substantially the same construction as that shown in Fig. 1 and above described except, that the head of the cylinder opposite the inlet head is enlarged and is designated by the reference numeral 40 and as being provided with a number of conduits 41 which extend diagonally through said head from the smaller portion of the cylinder to the larger portion 42, in which larger portion the same construction and arrangement of the rotors and stators are employed, except that their dimensions are amplified.

From the foregoing and by reference to the drawings, it will be seen and understood that by supplying motive fluid under pressure to the cylinder through the inlet or inlets 12, it will pass into the pockets or chambers 30 of the rotor 20 adjacent to the inlet head 11, and in so doing it will be discharged against the inner walls of the V-shaped pockets or chambers and into the apexes of said chambers, thus concentrating its force and effect, and that as said rotor revolves the portions 32 of the chambers 30 will momentarily communicate with the enlarged ends of the conduits 28, thus permitting the motive fluid to pass through said conduits, and as they are tapered toward their discharging ends, to be compressed as they enter the chambers or pockets of the rotor adjacent to the discharging ends of said conduit. As the motive fluid expands as it advances through the cylinder, the stators or members 21 are provided with an increasing number of openings therein toward the opposite end of the cylinder.

While I have herein described in some detail, and illustrated a particular embodiment of the invention that I have found in practice to be advantageous and desirable, in many of its details or features and certain details of which I may claim, it will be understood that, in the broader aspects of my invention many changes may be made in the specific construction without departure from the spirit of my invention, and within the scope of the appended claims. In using the term "motive fluid" I desire to be understood as meaning the agent or means employed to give movement to the parts of the motor.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent is—

1. In a turbine motor, the combination with a cylinder or casing having an exhaust outlet, of means for introducing motive fluid under pressure into the cylinder, a plurality of rotors, and a plurality of stators alternately arranged side by side within the cylinder, said rotors and stators having cham-

bers or pockets and conduits, respectively, formed therethrough at spaced distances therearound, and means to remove the motive fluid outwardly from their axes.

2. In a turbine motor, the combination with a cylinder, of a plurality of rotors and a plurality of stators alternately arranged side by side within the cylinder and spaced from each other, said rotors and said stators having chambers or pockets and conduits, respectively, formed therethrough at spaced distances therearound, means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, means for exhausting the cylinder, and means to force the motive fluid outwardly from their axes.

3. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a plurality of rotors and a plurality of stators alternately arranged side by side within the cylinder and spaced from each other, said rotors and said stators having chambers or pockets and conduits, respectively, formed therethrough at spaced distances therearound, means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means carried by the rotors to force the motive fluid outwardly from their axes.

4. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a shaft centrally journaled in said cylinder, a plurality of disk-like rotors fixed on said shaft within the cylinder, a plurality of stators secured to the inner surface of the cylinder and interposed alternately between the rotors but spaced therefrom, said rotors and said stators having inwardly of their peripheries chambers or pockets and conduits, respectively, formed therethrough at spaced distances therearound, means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means to force the motive fluid outwardly from their axes.

5. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a plurality of rotors and a plurality of stators alternately arranged side by side within the cylinder and spaced from each other, said rotors having inwardly of their peripheries chambers or pockets formed therethrough at spaced distances therearound, each of the said chambers or pockets being in the form of an acute angle with its apex presented in the direction of the rotation of the rotors, said stators having conduits formed therethrough at spaced distances therearound, said conduits being located diagonally across the stators and tapered toward their discharging ends, means for introduc-

ing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means to force the motive fluid outwardly from their axes.

6. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a plurality of rotors and a plurality of stators alternately arranged side by side within the cylinder and spaced from each other, said rotors having chambers or pockets formed therethrough at spaced distances therearound, each of the said chambers or pockets being in the form of an acute angle with its apex presented in the direction of the rotation of the rotors, said stators having conduits formed therethrough at spaced distances therearound, said conduits being located diagonally across the stators and tapered toward their discharging ends, means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means carried by the rotors to force the motive fluid outwardly from their axes.

7. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a plurality of rotors and a plurality of stators alternately arranged side by side within the cylinder and spaced from each other, each of said rotors having chambers or pockets formed therethrough at spaced distances therearound, each of which chambers being in the form of an acute angle with its apex presented in the direction of the movement of the rotor, each of said stators having conduits formed therethrough at spaced distances therearound, each of said conduits being diagonally located in the stators and tapered toward its discharging end, the inlet end of each of said conduits being enlarged with its walls arranged at an angle to the conduit, means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means carried by the rotors to force the motive fluid outwardly from their axes.

8. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a shaft centrally journaled in said cylinder, a plurality of disk-like rotors fixed on said shaft and within the cylinder, a plurality of stators secured to the inner surfaces of the cylinder and interposed alternately between the rotors but spaced therefrom, said rotors having chambers or pockets formed therethrough at spaced distances therearound, each of said chambers having an acute angle presented in the direction of the movement of the rotor, said stators having conduits formed therethrough at spaced distances therearound, each of said conduits being located diagonally across the stators and re-

duced toward its discharging end means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof, and means carried by the rotors to force the motive fluid outwardly from their axes.

9. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a shaft centrally journaled in said cylinder, a plurality of disk-like rotors fixed on said shaft within the cylinder and each having a hub extended therefrom and surrounding said shaft, the said hub having depressions in its periphery, each of which has its rear wall inclined rearwardly with respect to the travel of the rotor, a plurality of stators secured to the inner surface of the cylinder and interposed alternately between the rotors but spaced therefrom, said stators having conduits formed therethrough at spaced distances therearound and means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof.

10. In a turbine motor, the combination with a cylinder having an exhaust outlet, of a shaft centrally journaled in said cylinder, a plurality of disk-like rotors fixed on said shaft within the cylinder and each having a hub extended therefrom and surrounding said shaft the said hub having depressions in its periphery, each of which has its rear wall inclined rearwardly with respect to the travel of the rotors, the face of each disk adjacent to its hub having depressions therein each of which has its rear wall inclined rearwardly with respect to the travel of the rotor, a plurality of stators secured to the inner surface of the cylinder and interposed between the rotors but spaced therefrom, said stators having conduits formed therethrough at spaced distances therearound, and means for introducing motive fluid under pressure into the cylinder and directly into the pockets of one of said rotors in the direction of the movement thereof.

11. In a turbine motor, the combination with a cylinder or casing having an exhaust outlet, of means for introducing motive fluid under pressure into the cylinder, a rotor and a stator arranged side by side within the cylinder, said rotor and stator having chambers or pockets and conduits, respectively, formed therethrough at spaced distances therearound, and means to remove the motive fluid outwardly from their axes.

12. In a turbine motor, the combination with a cylinder or casing having an exhaust outlet, of means for introducing motive fluid under pressure into the cylinder, a rotor and a stator arranged side by side within the cylinder said rotor and stator having chambers or pockets and conduits, respectively,

formed therethrough at spaced distances therearound, and means carried by the rotor to force the motive fluid outwardly from its axis.

- 5 13. In a turbine motor, the combination with a cylinder or casing having an exhaust outlet, of means for introducing motive fluid under pressure into the cylinder, a rotor and a stator arranged side by side within the
10 cylinder, said rotor and stator having chambers or pockets and conduits, respectively,

formed therethrough at spaced distances therearound, the said rotor having a greater number of pockets or chambers than the stator has conduits, and means carried by the 15 rotor to force the motive fluid outwardly from its axis.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents,
Washington, D. C."