T. J. LOFTUS.

TURBINE MOTOR.

APPLICATION FILED FEB. 9, 1910.

977,107.

Patented Nov. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.

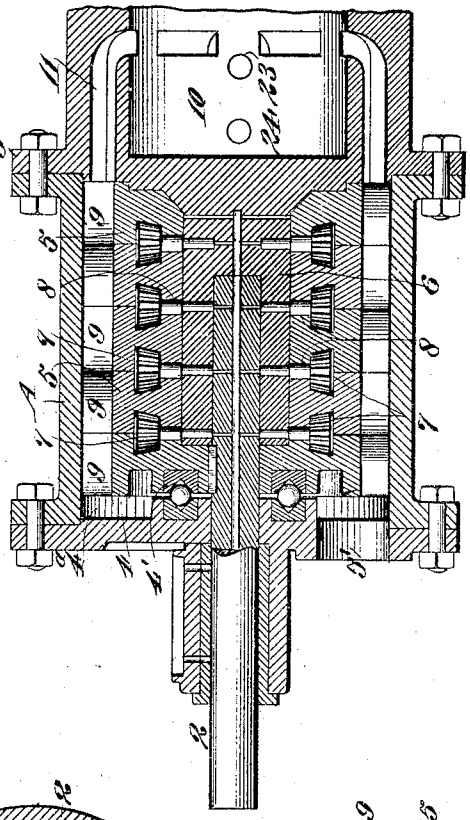


Fig. 2.

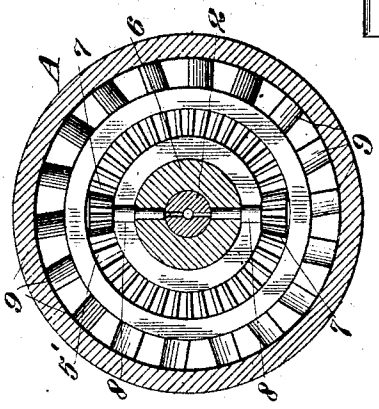
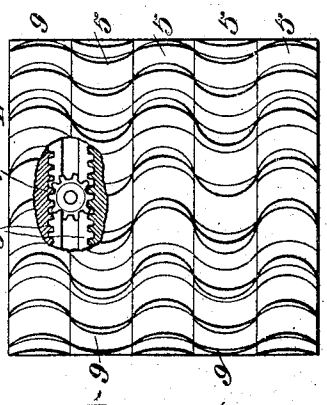


Fig. 3.



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2 SHEETS—SHEET 2.

Fig. 4.

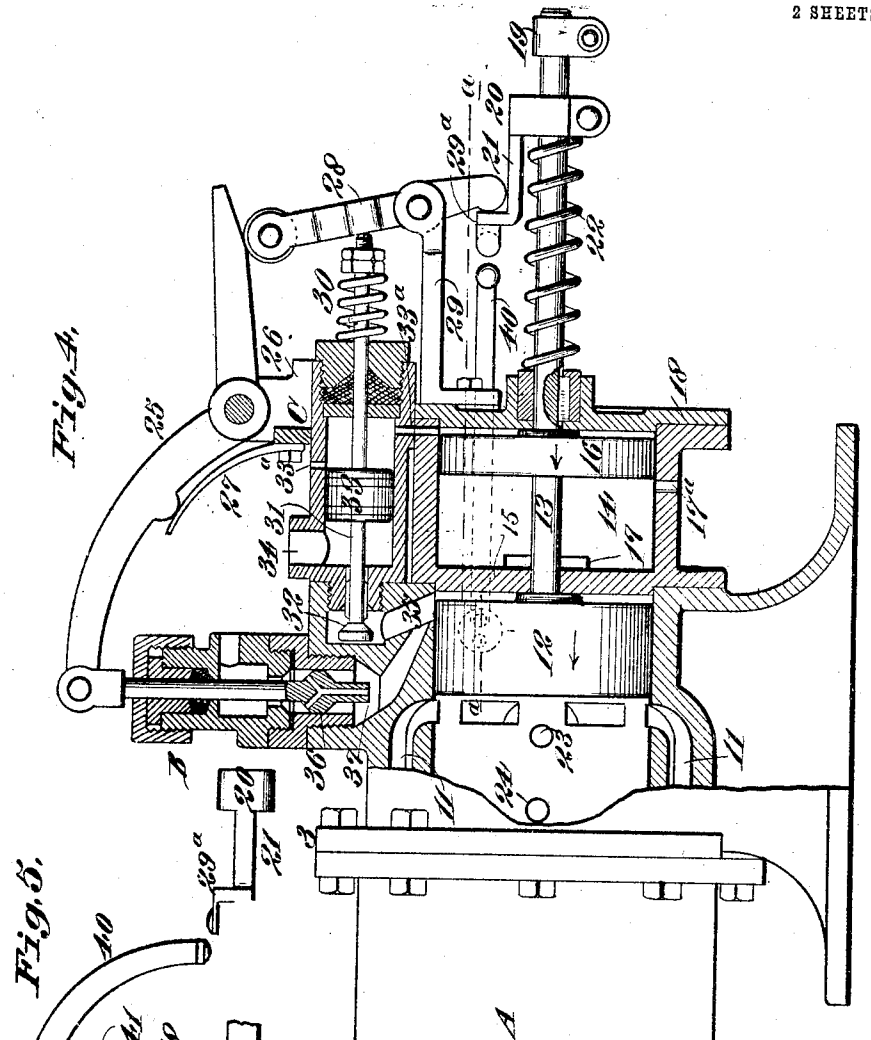
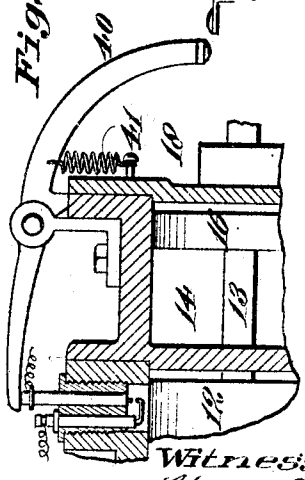


Fig. 5.



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UNITED STATES PATENT OFFICE.

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TURBINE-MOTOR.

977,107. Specification of Letters Patent. Patented Nov. 29, 1910.

Application filed February 9, 1910. Serial No. 542,867.

To all whom it may concern:

Be it known that I, THOMAS J. LOFTUS, a citizen of the United States, residing at Castella, in the county of Shasta and State of California, have invented new and useful Improvements in Turbine-Motors, of which the following is a specification.

This device relates to that class of motors whereby a plurality of disks provided with wings or blades, or other form of impact surfaces are caused to rotate by fluid under pressure, whether the same be constant or intermittent, and relates more particularly to the means whereby the flow of motive fluid is controlled and directed to the power-imparting mechanism.

The primary object of this invention is to produce a rotary action in opposite directions of a series of wing-carrying disks, by means of fluid pressure, whether the same is constant or intermittent, and may be of either a solid or expansive nature.

The second object relates to a means whereby motive force may be produced by the ignition and explosion of gas under pressure, whether the same is generated exterior of the controlling mechanism, or generated within the limits of the same.

The third object is to so combine the impact receiving mechanism in connection with the fluid pressure controlling or generating mechanism whereby the same will form an operative rotary or turbine motor from which power may be taken for either stationary or portable use.

In the accompanying drawings, Figure 1 is a longitudinal section on line of the main shaft. Fig. 2 is a front elevation of one of the disks. Fig. 3 is a plan view of a series of the same. Fig. 4 is a longitudinal section of the gas and fluid pressure-controlling device, with the disk cylinder in elevation. Fig. 5 is a detail longitudinal section on line *a*—*a* of Fig. 4, showing the ignition device and means for operating same.

Referring to Fig. 1, A is a housing or cylinder, having closure caps at each end, the cap 1 serving as a journal-bearing for the shaft 2, to the outer end of which may be attached pulleys or other power-distributing mechanism. The inner end of said shaft is journaled in the extension on cap 3, said shaft being provided with a longitudinal passage therethrough, and lateral ports connecting therewith for oil distribution.

Mounted upon the shaft 2, and secured thereto by means of a key, or other suitable device, is a disk 4 through which rotary motion is imparted to said shaft, as later described. Secured to the disk 4 is a suitable raceway 4′; a like raceway is provided on the head 1, and between these raceways are interposed balls, the same forming an antifriction thrust bearing. The disk 4 is located relative to the head 1 of the cylinder A in such manner as to form an annular chamber 4^a for the reception of spent fluid, which passes therethrough, and out through the exhaust port 5′ in the head 1.

The device as here illustrated is provided with five disks, numbered respectively 4—5. The disks 5 are loosely mounted upon the extension 6 on the cap 3, and are adapted to be revolved freely upon the latter extension in opposite directions, through an arrangement of gears which are interposed between the adjacent faces of the disks 4 and 5; the said disks having circular tracks upon the face thereof, into which pinions 7 are adapted to mesh. The pinions 7 rotate upon studs 8 revolubly mounted in the extension 6. By this construction the adjacent disks will rotate in opposite directions, as later described. Secured to the periphery of the disks 4—5 are wings or blades 9. These blades may be arranged at an angle to the face of the disks 4—5, or may be concavo-convex as shown. The blades upon the adjacent disks revolve in close proximity to each other, and fluid pressure passing between the periphery of the disks and the annular chamber within the housing or cylinder A will be directed in a line parallel with the shaft 2 from the point of entry to the point of exit, and in so doing will act against the blades 9 on adjacent disks, and rotate the disks with equal force in opposite directions. A positive and uniform rotation of each and every disk is maintained through the gear connection between the said disks.

The closure head 3 is provided with a chamber 10, into which fluid is received, and from which the same is distributed to the annular space between the disks and the cylinder, and in the path of the wings or blades 4—5 through suitable distributing

ports or passages 11. Suitable means are provided for the admission and distribution of gas or other explosive mixture into the combustion chamber 10, as shown in Fig. 4, whereby effective force is generated to revolve the disks located within the cylinder A. The said controlling device is secured to the head 3 in which the distributing chamber 10 is situated. Operating within the chamber 10 is a piston-head or valve 12 secured to the piston-rod 13, extending through the compression chamber 14; the chambers 10 and 14 being separated by a wall or partition 15. Secured to the rod 13, and adapted to operate within the chamber 14 is a second piston-head 16, the purpose of said head being to compress air, and discharge same through the port 17, into a suitable receptacle. Port 17^a serves as a relief and charging port for chamber 14. The chamber 14 has a closure or head 18 through which the piston-rod 13 reciprocates. The outer end of the rod 13 is provided with a tappet or collar 19, which is adjustable thereon. The ignition mechanism is operated by means of a collar 20 secured to the rod 13, and has a longitudinal arm 21. Interposed between the collar 20 and the head 18, is the spring 22. Chamber 10 is provided with a port 23 for the ingress or egress of atmosphere or spent gases. A restricted port 24 communicates with the atmosphere, the purpose of the latter being to trap the air and form a cushion for the piston-head 12 in its forward or active stroke.

B and C are valve housings, one for the admission of air and the other for gas, the combining of which in their proper proportions forms the explosive charge. The valves which operate within the said housings, are operated by means of the lever 25 fulcrumed upon the standard 26, and operated in one direction by means of the spring 27, and in the other by means of the lever 28, the latter being fulcrumed upon a bracket 29 secured to the head 18, the lever 28 being operated in one direction by the upturned portion 29^a in the extension of the collar 20, and in the opposite direction by means of a spring 30 surrounding the stem 31 of valve 32. Secured to the stem 31 is a piston 33 operating within the housing C. The housing C is provided with two ports 33^a, one of which communicates with the atmosphere, and the other with the interior of the chamber 14, behind the piston-head. Gas, air, or other mixture is introduced into the housing C through port 34, thence around the valve 32, and through passage 35 into chamber 10, to the rear side of the piston 12. The valve housing B is arranged at a right angle to the housing C, and contains a valve 36, with passages through same, adapted to be closed when the valve is seated, and opened when operated by means of the lever 24, to which the valve stem is connected. When the said valve is off the seat fluid is free to pass through the same, thence through passage 37, and terminating in passage 35, thence to the chamber 10.

In Fig. 5, the operating means for the ignition of the charge is shown, and consists of a lever 40 pivoted in a bracket secured upon the outside of the compression cylinder; the same being operated to a stop in one direction by means of the spring 41, and in the other by means of the extension on collar 20. By this operation any well known make-and-break device is applicable, one terminal of which is insulated from the cylinder and immovable, while the opposite terminal may have electric connection to the same, and adapted to be advanced by means of the lever 40, by which means the circuit is closed, a spark being produced when the contact points are separated.

The operation of this device is as follows: Starting with atmospheric pressure in the cylinders and in the air receiver, and with the electric circuit either open or closed, but assume the same to be open, in which case there would be no ignition of either a burning or explosive mixture. Sufficient air pressure in the receiver may be attained by operating the piston 16 in the compression cylinder 14 by any means that may be advantageous to produce a reciprocating movement of same, by means of the piston rod 13 extending exterior of the compression cylinder. All parts connected to, and operated by the movement of the piston rod 13 will operate through their predetermined cycle of operation. During the said piston operation, a charge of air under pressure is delivered into the chamber 10 behind the piston head 12 through the port 35. Around the valve 32, in the housing C, a gas or liquid may be received through the valve 36, and is combined with the atmosphere entering under pressure. During such admission behind the piston 12, the latter will move as indicated by the arrows, Fig. 4, until the collar 19 contacts with the collar 20; and during such movement there will be only frictional resistance. The further movement of the pistons will meet with the resistance of the spring 22, compressing the same, and relieving the lever 28 from contact with the arm on collar 20, permitting the spring on valve stem 31 to act and close valve 32, at the same time the lever 35, by means of spring 27 will operate valve 36, thus closing all communication between the source of motive fluid supply and the explosion chamber at the rear of the piston 12. The explosion chamber 10 now being charged with explosive mixture, and the piston 12 having moved a sufficient distance to expose the

igniter to the said chamber, the extension on collar 20 will contact with and operate the lever 40, thus closing the circuit between the terminals of the igniter. The further travel of the piston 12, due to the expansion of the fluid under pressure, the lever will be released from contact with its operating means before described, when the circuit will be broken, and a spark caused to jump across between the terminals of the igniter, thus igniting the charge within the explosion chamber and generating a fluid under high pressure so as to drive the piston forward and uncover the passages 11; whereupon the said fluid will escape through the passages 11, and impact against the wings on the disks 5 causing the same to revolve. The power thus attained on the first disk 5 is imparted to the next disk 5 through the medium of the intermediate pinions 7. The final disk 4 of the series being secured to the shaft 2 will rotate the latter with the power imparted through the effective force of each and every disk 4—5. The fluid medium will then escape through the discharge opening 5′ to the atmosphere.

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

1. In a fluid pressure motor, the combination with a drive shaft and a turbine disk fixed thereto, of a plurality of loosely mounted disks having impact wings upon the periphery thereof, and means interposed between the adjacent loose disks and between one of the loose disks and said fixed disk whereby the disks will be rotated in opposite directions.

2. In a fluid pressure motor, the combination of a drive shaft and a series of disks arranged side by side parallel with the shaft, one of said disks being fixed to said shaft and the remaining disks being loosely mounted relatively to each other and to the shaft, and interengaging connections between the loose disks and between one of said loose disks and the fixed disk whereby the disks will be rotated in opposite directions.

3. In a fluid pressure motor, a plurality of independent freely revoluble disks, a drive shaft, a disk fixed to the drive shaft, said fixed and revoluble disks having fluid pressure impact surfaces and each of said disks having an annular rack surface, and pinions between the revoluble disks and between one of said revoluble disks and the fixed disk whereby the disks are revolved in opposite directions and the drive shaft operated, and a housing for the disks.

4. In a fluid pressure motor, a drive shaft, a disk keyed on said shaft, impact blades on the periphery of said disk, a series of revoluble turbine disks mounted independent of said shaft, means for rotating said disks, means whereby adjacent disks will be caused to rotate in opposite directions, and means for transmitting the motion of said disks to said drive shaft.

5. In a fluid pressure motor, a plurality of revoluble disks, means whereby the motion of each disk is transmitted to its adjacent disk in an opposite direction, means for transmitting the combined motion of said disks to a drive shaft so as to revolve said shaft, and means for rotating said disks, each of said disks having peripheral wings which revolve in close proximity to each other, and combined wings forming passages through which the fluid pressure is directed in a line parallel with the shaft.

6. In a fluid pressure motor, a plurality of turbine disks, means for driving adjacent disks in opposite directions, means interposed between adjacent disks whereby the power of each disk is transmitted to the adjoining disk, a drive shaft, and means whereby said drive shaft will be revolved by said disks, each of said disks having peripheral wings which revolve in close proximity to each other, and combined wings forming passages through which the fluid pressure is directed in a line parallel with the shaft.

7. In a fluid pressure motor, a plurality of loosely mounted disks, means whereby said disks may be revolved in opposite directions, a drive shaft, a turbine disk fixedly mounted thereon, and means for transmitting the motion of said loosely mounted disks to said rotatable disk and drive shaft.

8. In a fluid pressure motor, a plurality of loosely mounted turbine disks adapted to be impelled in opposite directions, means for impelling said disks, toothed annular racks on said disks, gears interposed between said disks and meshing with said racks, a drive shaft, a turbine disk fixed on said shaft, a toothed rack on said fixed turbine disk, gears meshing with said rack on said fixed disk and with a rack on one of said loose disks, so that the motion of said loose disks will be transmitted to said fixed disk to rotate said shaft.

9. A fluid pressure turbine comprising a drive shaft, a turbine disk fixed thereto, a plurality of loosely mounted turbine disks, toothed circular racks on said turbine disks, gears interposed between said disks and meshing with said racks, revoluble stud upon which said gears are mounted, a housing for said disks, and means for admitting expansive gases to said housing to rotate said turbine disks.

10. A fluid pressure turbine comprising a drive shaft, a turbine disk mounted thereon, a plurality of loosely mounted turbine disks, toothed circular racks on said turbine disks, gears interposed between said disks and meshing with said racks, revoluble studs upon which said gears are mounted, a hous-

ing for said turbine disks, a combustion chamber on said housing, means for admitting explosive gases to said chamber, means for exploding said gases, and means for directing said gases to said housing to rotate said turbine disks.

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

THOMAS J. LOFTUS.

Witnesses:
JAS. G. ESTEP,
ETHEL M. RICHARDSON.