Feb. 23, 1926. 1,574,429

W. H. LEGGETT

FLUID MOTOR

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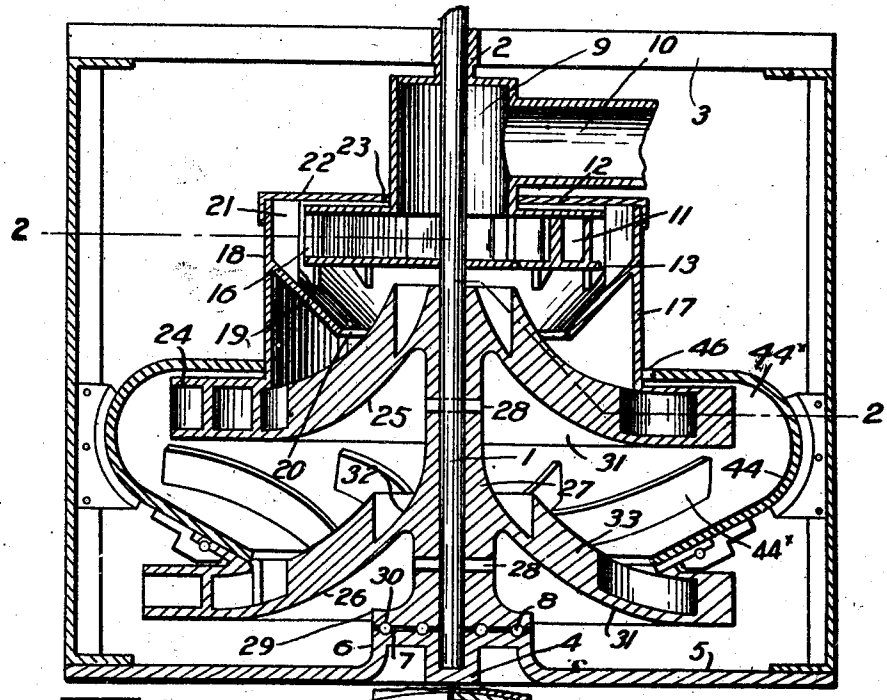

Fig. 1.

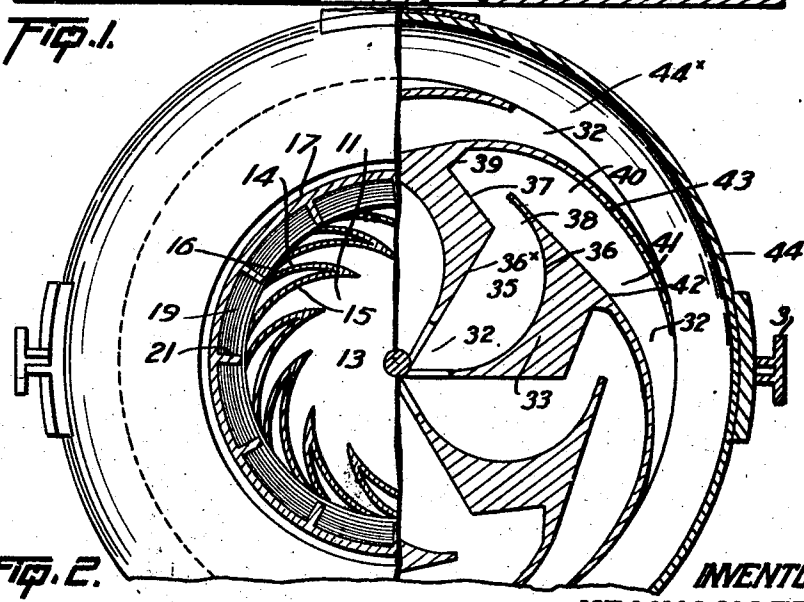

Fig. 2.

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UNITED STATES PATENT OFFICE.

WILLIAM HARRISON LEGGETT, OF ZION, ILLINOIS.

FLUID MOTOR.

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To all whom it may concern:

Be it known that I, WILLIAM HARRISON LEGGETT, a subject of the King of Great Britain, and a resident of the town of Zion, in the county of Lake, in the State of Illinois, United States of America, have invented certain new and useful Improvements in Fluid Motors, of which the following is the specification.

My invention relates to improvements in fluid motors, and the object of the invention is to devise a motor of water wheel or turbine type, in which the efficiency will be increased, the resulting speed by which the rotor is driven by a given fluid pressure being increased over that produced by similar devices hitherto employed, and it consists essentially of the arrangement and construction of parts hereinafter more particularly described.

Fig. 1 is a sectional view through my fluid motor.

Fig. 2 is a plan view partially in full and partially in section, taken on line 2—2, Fig. 1.

In the drawings like characters of reference indicate corresponding parts in each figure.

1 indicates a main vertical shaft which is held at its upper end in a bearing member 2 located in the supporting frame 3, and at its lower end in the step bearing 4 forming part of a base frame 5. Around the step bearing 4 is formed a circular table 6 having annular ball races 7 located therein provided with ball bearings 8.

9 is a cylindrical casing through which the upper end of the shaft 1 extends in proximity to the bearing 2. 10 is a fluid or water supply pipe by which the water is fed into the cylindrical casing 9 so as to pass downward through the open lower end thereof and form a pressure head.

11 is a circular discharge member comprising an upper end wall 12 formed integral with the annular lower edge of the casing 9 and a lower wall 13 spaced apart from the wall 12. Interposed between the walls 12 and 13 are a series of curved walls 14 and 15, forming outwardly curved discharge peripheral nozzles 16. It will be understood that the discharge member is stationary so that as the water is fed from the pipe 10 into the cylindrical casing 9, it passes downward into the stationary discharge member 11 and is ejected outward through the nozzles 16 under pressure of the head of water within the cylindrical casing 9.

17 is a revolving member, the upper portion 18 of which is cylindrical and provided intermediately of the height of the cylindrical portion with a conical internal downwardly tapering flange 19 forming a central opening 20 concentric with the shaft 1.

Between the upper portion of the conical face 19 and the upper end of the cylindrical portion 18 are arranged round its internal periphery a series of spaced apart radial blades 21, arranged to receive the impact of water ejected through the nozzle 16 hereinbefore described, and by which the cylindrical portion 18 of the revolving member 17 is revolved.

22 is a cover for the upper end of the portion 18, such cover being provided with a central orifice 23, through which the cylindrical casing 9 extends.

The lower end of the portion 18 is provided with an annular outwardly extending flange 24.

25 and 26 are a pair of water wheels provided with a hub 27 secured to the shaft 1. either by means of pins 28 or by any other suitable means desired. The lower end of the hub 27 is provided with an annular flange 29 opposing the table 6 and provided with ball races 30 coacting with the balls 8 and races 7 hereinbefore described, to revolubly mount the hub 27 and the water wheels 25 and 26 carried thereby.

It will be noted that the lower wall 31 forming the body of each water wheel 25 and 26 is formed centrally into a conical upwardly extending portion 32 adapted to deflect the water as it passes downward in an outward radial direction.

Each water wheel 25 and 26 is provided with a series of radial portions 33. At the outer edge of each water wheel 25 and 26 is provided a series of discharge openings 32 directed in a direction opposite to the direction of rotation of the water, as indicated by arrow in Fig. 2.

The portions 33 above described form interposed water ducts 35, the rear wall of which curves gradually forward as indicated at 36, in relation to the direction of rotation of the water wheel towards its outer end or adjacent to the periphery of the water wheel. The forward wall of the duct 35 extends from the centre of the wheel

radially, as indicated at 36× and then extends forward at an obtuse angle to the radii of the wheel, as indicated at 37, thereby forming a discharge nozzle 38 at the outer end of the duct 35.

At right angles to the wall portion 37 extends a wall portion 39 directly opposite to the nozzle 38 to receive the impact of water ejected therefrom.

Between the outer end of the portion 33 and the outer end of the wall portion 39 is formed a discharge opening 40, and a discharge duct 41 leading therefrom to the discharge opening 32.

The inner wall 42 of the duct 41 extends in a tangential direction to the circular line upon which the discharge openings of the nozzles 38 are located. The outer wall 43 is concaved inward as indicated, so as to receive a certain amount of the water pressure as it flows from the wall 39 after its impact thereagainst, such water flowing through the discharge duct 41 and being finally discharged through the opening 34 at the periphery of the wheel.

44 is a conical casing into which the outer peripheral portion of the wheel 25 extends, having a circular opening 45 at its lower end through which the conical upwardly extending portion of the water wheel 26 extends. The upper edge of the conical portion of the casing 44 is curved inward so as to form an annular channel 44× which is semi-circular in cross section and in which the outer peripheral portion of the upper water wheel 25 travels.

The upper portion of the casing 44 is provided with a central opening 46 through which the cylindrical portion 18 of the revolving member 17 extends.

From this description it will be seen that as the water passes through the inlet pipe 10 and through the cylindrical casing 9 to form a pressure head, and is discharged through the nozzles 16, the revolving member 17 is rotated by means of the impact of water against the blades 21, such water passing downward from the blades and being directed by the conical portion 19 against the radial blades 33 of the upper water wheel 25, which thereby directs the water outward through the ducts 35 so as to have impact against the wall portion 39.

It will be seen that by the water being carried outward and operating adjacent to the outer periphery of the water wheel 25, greater torque is exerted upon the wheel. Water, after operating against the wheel portion 39, passes rearward in relation to the direction of rotation of the wheel 25, and is discharged through the discharge openings 34 into the conical casing 44, against the blade 44× which then directs the water into the water wheel 26.

Although I have only shown two water wheels mounted upon the shaft 1, it will of course be understood that any number may be employed coupled in vertical series upon the shaft 1.

What I claim as my invention is:

1. A fluid motor comprising a stationary member having an annular series of tangentially discharging fluid outlets, means for feeding the fluid centrally into the member to pass outward through the outlets, a shaft mounted to extend centrally through the annular member, a rotor carried by the shaft, an inner annular series of fluid impact members carried by the rotor, a plurality of annular series of outer fluid impact members also carried by the rotor on different planes, the inner series of fluid impact members being adapted to receive the fluid directly from the discharge outlets of the stationary member, and means for directing the fluid from such inner series successively to each of the plurality of outer series, and means for finally discharging the fluid from the last of the outer series.

2. In a fluid motor, the combination with the main supporting frame, of a stationary member comprising a cylindrical body, a water inlet leading in to the body, an annular flange extending outward from the lower edge of the cylindrical member, a circular wall located beneath and spaced apart from such flange and an annular series of forwardly curved vanes arranged between the flange and the wall and forming tangentially directing fluid discharges, a shaft mounted to extend centrally through the cylindrical member, a rotor mounted upon the shaft, an inner series of fluid impact members carried by the rotor against which the fluid discharge from the stationary member has direct impact and an outer series of fluid impact members arranged on a different plane to the aforesaid members and from which the fluid is discharged, and means for directing fluid from the inner series in a tangential direction against the outer series.

3. In a fluid motor, the combination with the main frame, of a stationary inlet member mounted upon the frame provided with an annular series of tangential fluid discharges, a main shaft mounted to extend centrally through the stationary member, a rotor mounted upon the shaft and comprising a cylindrical portion in the upper portion of which the stationary member is located, an annular series of fluid impact receiving members formed by vanes carried by the cylindrical portion of the rotor and arranged round the stationary member to receive the fluid discharge therefrom, an outer series of fluid impact members carried by the lower portion of the rotor cylinder, a conical flange mounted intermediately of the height of the rotor cylinder for directing the water discharge from

the inner impact members towards the centre of the rotor, and means for tangentially directing the water as it passes centrally from the conical flange against the outer series of impact members.

4. In a fluid motor, the combination with the main frame, of a shaft journalled in the main frame, a stationary fluid inlet member mounted concentrically with the shaft and provided with an annular series of tangentially directing fluid discharges, means for feeding fluid into the centre of the member, a rotor comprising a cylindrical body in the upper portion of which the inlet member is located, an annular series of fluid impact receiving members formed by vertically set vanes extending from the inner periphery of the cylindrical body opposite to the discharges of the stationary member, a conical flange depending downward intermediately of the height of the cylindrical body to form a central opening, a fluid receiving wheel carried by the lower end of the body and extending outward therefrom and provided with an annular series of peripheral discharges, a fluid impact member located in proximity to each water wheel discharge at a greater radial distance from the centre of the shaft than the inner series of impact members, a conical portion located centrally of the water wheel and extending upward through the opening of the aforesaid conical flange, and ducts formed on such conical portion adapted to direct the fluid received from the flange in a tangential direction against the outer fluid impact members.

5. In a device of the class described, a fluid receiving wheel comprising an annular upper wall, a circular lower wall spaced apart and beneath the annular wall, vanes carried by the lower wall and extending in a substantially radial direction from the centre of the wheel to between the upper and lower wall thereof and having one vertical face concaved and its opposite vertical face straight to form a constricted discharge opening at the outer end of the vane directed tangentially, a wall extending from the outer end of each vane opposing the aforesaid tangential outlet and adapted to receive the fluid impact from such outlet, and a wall curving rearwardly and in a tangential direction from the aforesaid impact wheel to the periphery of the wheel to form a rearwardly directed fluid discharge.

6. A fluid motor comprising a stationary member having an annular series of tangentially discharging fluid outlets, means for feeding the fluid centrally into the member to pass outward through the outlets, a shaft mounted to extend centrally through the annular member, a rotor carried by the shaft, an inner annular series of fluid impact members carried by the rotor, a plurality of annular series of outer fluid impact members also carried by the rotor on different planes, the inner series of fluid impact members being adapted to receive the fluid directly from the discharge outlets of the stationary member, a conical fluid directing member located between each pair of outer series of fluid impact receiving members, the upper portion of the fluid directing member being curved inward over the uppermost outer series of fluid impact members to form a channel in which such members revolve, the lower portion of the conical fluid directing member having a central orifice located intermediately between the next adjacent outer series of fluid impact members and the centre of the shaft upon which such impact members are carried.

7. In a device of the class described, a rotary member comprising a cylindrical upper portion having a closed upper end and a lower open end, a series of radial vanes extending inward from the internal periphery, a conical depending flange located beneath such vanes on the inner periphery of the aforesaid cylindrical portion, an outwardly extending annular flange extending from the lower end of the cylindrical portion, a horizontal circular wall located beneath and spaced apart from such flange, and ducts located between the flange and the wall for directing fluid tangentially as it passes outward from the centre of the rotor.

8. In a device of the class described, a rotary member comprising a cylindrical upper portion having a closed upper end and a lower open end, a series of radial vanes extending inward from the internal periphery, a conical depending flange located beneath such vanes on the inner periphery of the aforesaid cylindrical portion, an outwardly extending annular flange extending from the lower end of the cylindrical portion, a horizontal circular wall located beneath and spaced apart from such flange and having a central portion extending upward in conical form through the opening formed by the conical flange, ducts extending from the top of such conical portion to between the circular wall and the annular flange to form peripheral tangentially directed outlets.

WILLIAM HARRISON LEGGETT.