July 4, 1950 F. A. TALBOT 2,513,758

MECHANICAL MOVEMENT

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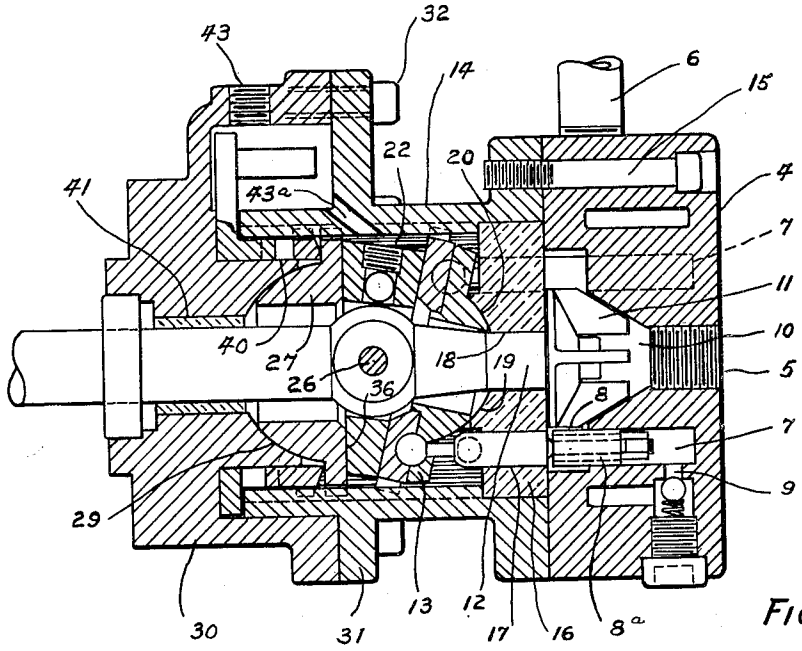

FIG 1

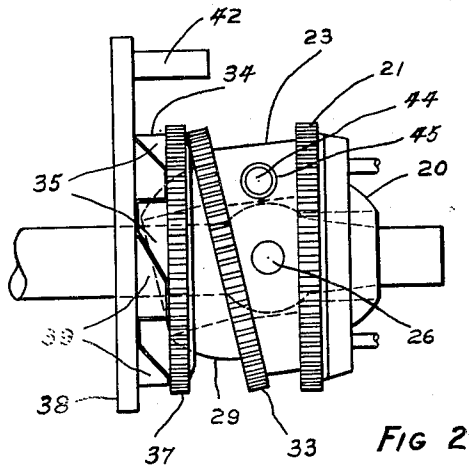

FIG 2

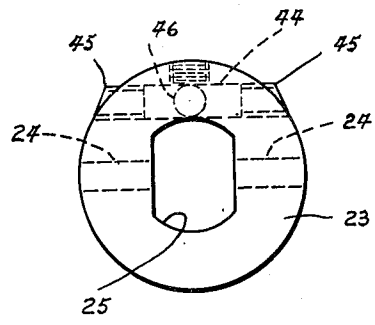

FIG 3

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MECHANICAL MOVEMENT

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11 Claims. (Cl. 74—60)

1

This invention relates to improvements in mechanical movements, and more particularly to means for converting rotary motion into reciprocating motion.

The primary object of the invention is to provide improved means for reciprocating the pistons of a pump from a rotary shaft without imparting end-thrust from the pistons to the shaft.

Another object is to supply a mechanical movement for converting rotary motion into reciprocating motion and including means for varying the stroke of the part or parts reciprocated.

Another object is to supply a high pressure pump of the type disclosed in my Patent No. 2,365,309 with readily controlled means for varying the stroke of the pistons or reversing the sequence of movement thereof.

A still further object is to provide a mechanical movement for converting rotary motion to reciprocating motion and including novel motion varying and reversing means.

A further object is to provide novel means for lubricating the mechanism.

Withe the foregoing objects outlined and with other objects in view which will appear as the description proceeds, the invention consists in the novel features hereinafter described in detail, illustrated in the accompanying drawing, and more particularly pointed out in the appended claims:

In the drawing:

Fig. 1 is a longitudinal sectional view of a high pressure pump of the type disclosed in my above-mentioned patent and showing my improved mechanical movement, and with parts of the mechanical movement set for maximum discharge by the pump.

Fig. 2 is a side elevation of parts of the mechanical movement with the piston thrust ring set in neutral or "no discharge" position.

Fig. 3 is a side elevation of the wedge ring forming part of the mechanical movement.

Referring to the drawing, 4 designates the high pressure pump casing having a fluid inlet 5 and a fluid discharge conduit 6. The pump has a series of parallel cylinders 7 in which valved pistons 8a reciprocate, and one end of each cylinder is provided with an inlet port 8, and the opposite end is provided with a valve controlled discharge port 9. Between the inlet 5 and the ports 8, there is a chamber 10 in which an impeller wheel 11 is arranged, for forcing fluid from the inlet 5 into the inlet ports 8 of the

2

cylinders 7. The impeller is driven by a rotary shaft 12 which is employed to rock a thrust member or ring 13, to which the pistons are operatively connected. All of these parts are substantially in accordance with the pump illustrated in Patent 2,365,309, and with the same I employ my novel mechanical movement. In accordance with the present invention, a housing sleeve 14 is connected to one face of the pump casing 4 by any suitable means, such as screws 15, and the sleeve is employed to clamp a bearing plate 16 to the casing. Said plate has parallel guide apertures 17 for the pistons, and a journal 18 for the shaft. Said plate is also provided with a spheroidal seat 19 to receive a complementary projection or dome 20 of the thrust ring 13, which ring, in accordance with the present invention, is provided with peripheral gear teeth 21 meshing with internal gear teeth 22 of the housing sleeve 14.

In keeping with the present invention, a wedge-shaped ring 23 is provided with diametrical apertures 24, and a central orifice 25. The shaft 12 passes through the hole 25, and a pin 26 extends through the shaft and into the apertures 24 to pivotally connect the wedge ring to the shaft. One face of the wedge ring slidably engages the thrust member 13 so that the latter is rocked to reciprocate the pistons.

A second rockable ring or member 27 surrounds the shaft 12 and engages the opposite face of the wedge ring 23, and the ring 27 has a spheroidal projection 28 at one side thereof to rockably engage a complementary seat 29 of the housing end plate 30, secured to a flange 31 of the sleeve 14 by screws 32, or the like.

The ring 27 is also provided with peripheral gear teeth 33 meshing with the internal teeth 22 of the sleeve.

A cam ring 34 having cams 35 bears against the rim portion of the rockable ring 27 for the purpose of adjusting the latter, that is, to vary the angularity of the face 36 of the rockable member 27 so as to change the angularity of the wedge ring 23 with reference to the axis of the shaft. The cam ring 34 is also provided with peripheral teeth 37 meshing with the teeth 22 of the sleeve 14, and at this point it may be stated that all of the teeth 21, 33 and 37 are preferably ellipsoidal to facilitate rocking of the members 13 and 27 and to prevent rotation of these members and of the cam ring 34. The cam ring 34 is moved axially of the shaft by means of an oscillatable cam ring 38 having cam surfaces 39 cooperating with the cams 35. Both cam rings

bear upon the cylindrical surface 40 of the end plate 30 which is provided with a central bearing 41 for the shaft.

Cam ring 38 has an actuating member 42 controlled in any suitable way to vary the position of the parts so that the pistons during the rotation of the impeller shaft may be moved from neutral to maximum stroke or have their stroke varied anywhere between these two points.

For lubricating purposes, the housing end plate 30 is preferably provided with a plug-receiving hole 43 to permit the introduction of lubricant into the housing through aperture 43*a*, and the wedge ring 23 is provided with an aperture or passageway 44 preferably arranged parallel to the hole 24. Ferrules 45 extend into the ends of the aperture 44 and project beyond the periphery of the wedge ring to function as scoops to move lubricating oil from the interior of the sleeve into the interior of the parts 13, 23, 27, etc., and a ball valve 46 is arranged to roll in the passageway 44 and cooperate with the inner end of either of the ferrules to close communication through that ferrule, depending on the direction of rotation of the wedge ring. At this point, it will be noted that the impeller shaft 12 can be rotated in either direction, but regardless of the direction of rotation, the impeller 11 will always force the fluid uni-directional through the pump, that is from intake 5, through ports 8, past valved pistons 8*a*, through discharge ports 9, and the discharge conduit 6. Regardless of the direction of rotation of the impeller shaft, the stroke of the pistons may be varied from minimum to maximum by adjusting or turning the cam ring 38. When that ring is turned, its cam surfaces will cause the cams 35 of the cam ring 34 to move the latter axially of the shaft, and as the ring 34 cannot turn and it bears against the rim of ring 27, the latter is caused to rock. Hence, the wedge ring is also caused to rock about the pivot pin 26 with the result that the ring 13 partakes of the rocking movement to vary the stroke of the pistons 8*a*.

As the spheroidal projection 28 of the ring 27 engages the spheroidal seat 29, it is obvious that any end thrust of the pistons will be borne by the plate 30 and will not be imparted to the impeller shaft. Consequently, the impeller will always remain in an operative position and the impeller will not tend to rub against the surfaces of the chamber in which it rotates.

From the foregoing, it is believed that the construction of the mechanical movement, the operation and advantages thereof may be readily understood, and it is evident that changes may be made in the details disclosed without departing from the spirit of the invention, as expressed in the following claims:

What I claim and desire to secure by Letters Patent is:

1. In mechanism of the character described, a stationary housing, a pair of rockable thrust rings arranged in the housing, means operatively connecting the rings and housing to prevent the rings from rotating, one of said rings having a spheroidal surface at one side thereof, said housing having a spheroidal seat against which the spheroidal surface of the ring bears, a rotatable wedge ring arranged between and operatively engaging said thrust rings, a rotatable shaft extending through one of said thrust rings and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto, and a reciprocating member operatively connected to one of the thrust rings and actuated thereby.

2. In mechanism of the character described, a stationary housing, a pair of thrust rings rockably arranged in the housing, means operatively connecting the rings and housing to prevent the rings from rotating, each of said rings having a spheroidal surface at one side thereof, said housing having spheroidal seats against which the spheroidal surfaces of the rings bear, a rotatable wedge ring positioned between the thrust rings and operatively engaging the opposite sides thereof, a rotatable shaft extending through one of said thrust rings and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto, and a reciprocating member driven by one of said thrust rings.

3. In mechanism of the character described, a housing, a pair of rockable thrust members arranged in the housing, one of said members being of ring shape, means operatively connecting the thrust members and housing to prevent said members from rotating relatively to said housing, one of said members having a spheroidal surface at one side thereof, said housing having a spheroidal surface at one side thereof, said housing having a spheroidal seat against which the spheroidal surface bears, a rotatable wedge ring arranged between and slidably engaging said thrust members, a rotatable driving shaft for the wedge ring extending through the ring-shaped thrust member and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto, and at least one reciprocating member driven by one of said thrust members.

4. In mechanism of the character described, a housing provided with internal gear teeth, a pair of rockable thrust members arranged in the housing and having peripheral teeth engaging the teeth of the housing to prevent the thrust members from rotating relatively to the housing, one of said members having a spheroidal surface at one side thereof, said housing having a spheroidal seat against which the spheroidal surface bears, a reciprocating element driven by the other member, a rotatable wedge ring arranged between and operatively engaging the thrust members, and a rotatable shaft extending through one of said thrust members and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto.

5. A mechanism as claimed in claim 1, including control means operatively connected to one of the thrust rings for rocking the same with reference to the pivotal axis of the wedge ring.

6. A mechanism as claimed in claim 3, including control means operatively connected to one of the thrust members for moving a peripheral portion thereof toward the wedge ring.

7. In mechanism of the character described, a housing provided with internal gear teeth, a pair of rockable thrust members arranged in the housing and having peripheral teeth engaging the teeth of the housing to prevent the thrust members from rotating relatively to the housing, one of said members having a spheroidal surface at one side thereof, said housing having a spheroidal seat against which the spheroidal surface bears, a reciprocating element driven by the other

member, a rotatable wedge ring arranged between and operatively engaging the thrust member, a rotatable shaft extending through one of said thrust members and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto, a cam ring having peripheral teeth meshing with the teeth of the housing to prevent the cam ring from rotating relatively to the housing, and a second cam ring operatively connected to the first-mentioned cam ring for moving the latter axially of said shaft, the first-mentioned cam ring being operatively connected to one of the thrust members for moving a peripheral portion of the same toward the wedge ring.

8. In mechanism of the character described, a housing, a pair of thrust members arranged in the housing, means operatively connecting the thrust members and housing to prevent said members from rotating relatively to the housing, one of said members having a spheroidal surface at one side thereof, said housing having a spheroidal seat against which said spheroidal surface bears, a plurality of reciprocating members operatively connected to and operated by the other one of said members, a rotatable wedge ring arranged between and operatively engaging said thrust members, and a rotatable driving shaft for the wedge ring extending through the ring and thrust members and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto.

9. A mechanism as claimed in claim 8, including control means for rocking the thrust member with the spheroidal surface about the pivotal axis of the wedge ring.

10. A mechanism as claimed in claim 8, in which the wedge ring has a passageway extending therethrough and provided with scoops at the ends thereof, said passageway communicating with the interior of the ring, and valve means arranged in said passageway for closing either end thereof depending on the direction of rotation of the wedge ring.

11. A mechanism of the character described, comprising a housing, a pair of rockable thrust members arranged in the housing, means operatively connecting the members and housing to prevent the members from rotating relatively to the housing, said members having spheroidal surfaces at opposite sides thereof, said housing having spheroidal seats against which the spheroidal surfaces bear, a rotatable wedge ring positioned between the opposite sides of said members and operatively engaging the latter, a rotatable drive shaft for the wedge ring, extending through one of said thrust members and pivotally connected to the wedge ring to permit the latter to turn about an axis intersecting the axis of the shaft and positioned perpendicularly thereto, a series of reciprocating members operatively connected to one of the thrust members and actuated thereby, and control means operatively connected to the other one of the thrust members for moving a peripheral portion there of toward the wedge ring.

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