Aug. 30, 1932. J. P. HESS 1,874,010

PUMP

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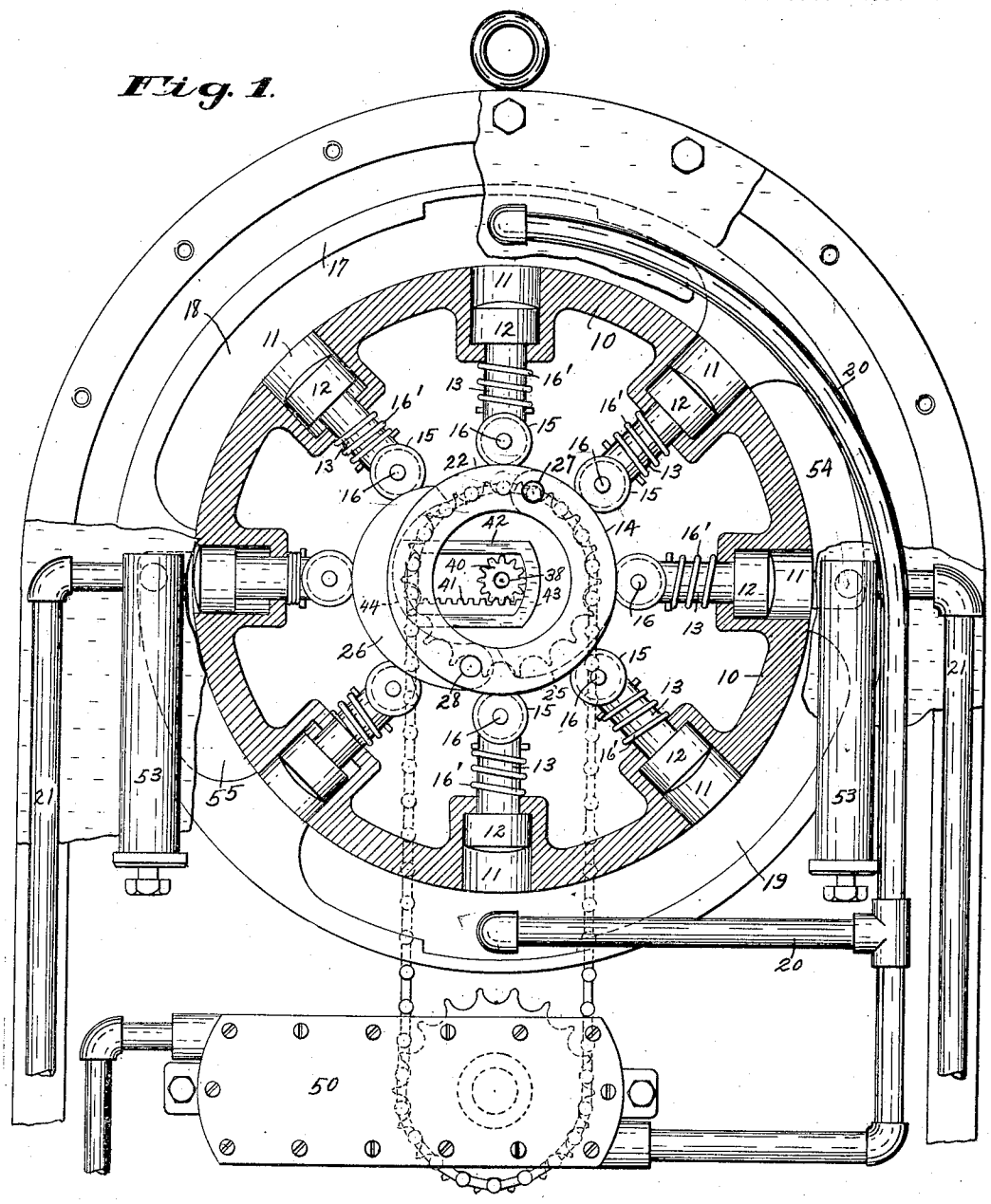
Fig. 1.



INVENTOR.

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Fig. 2.

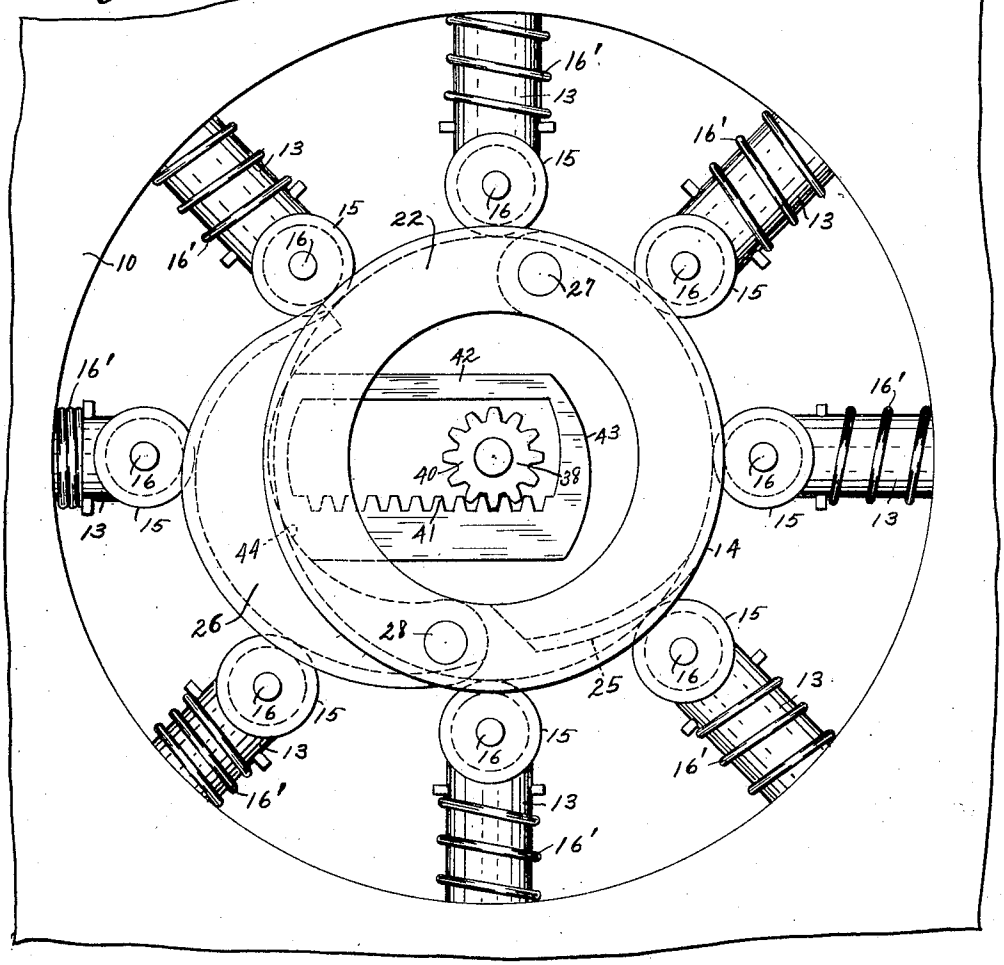

Fig. 3.

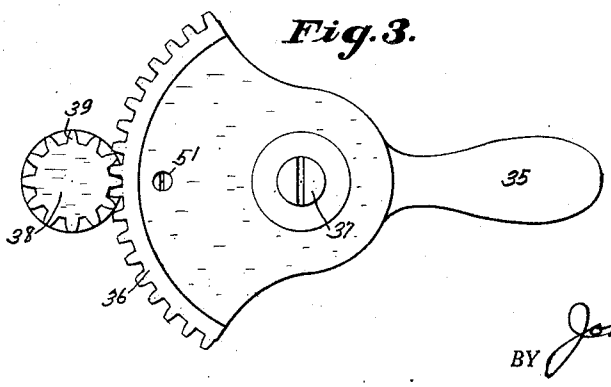

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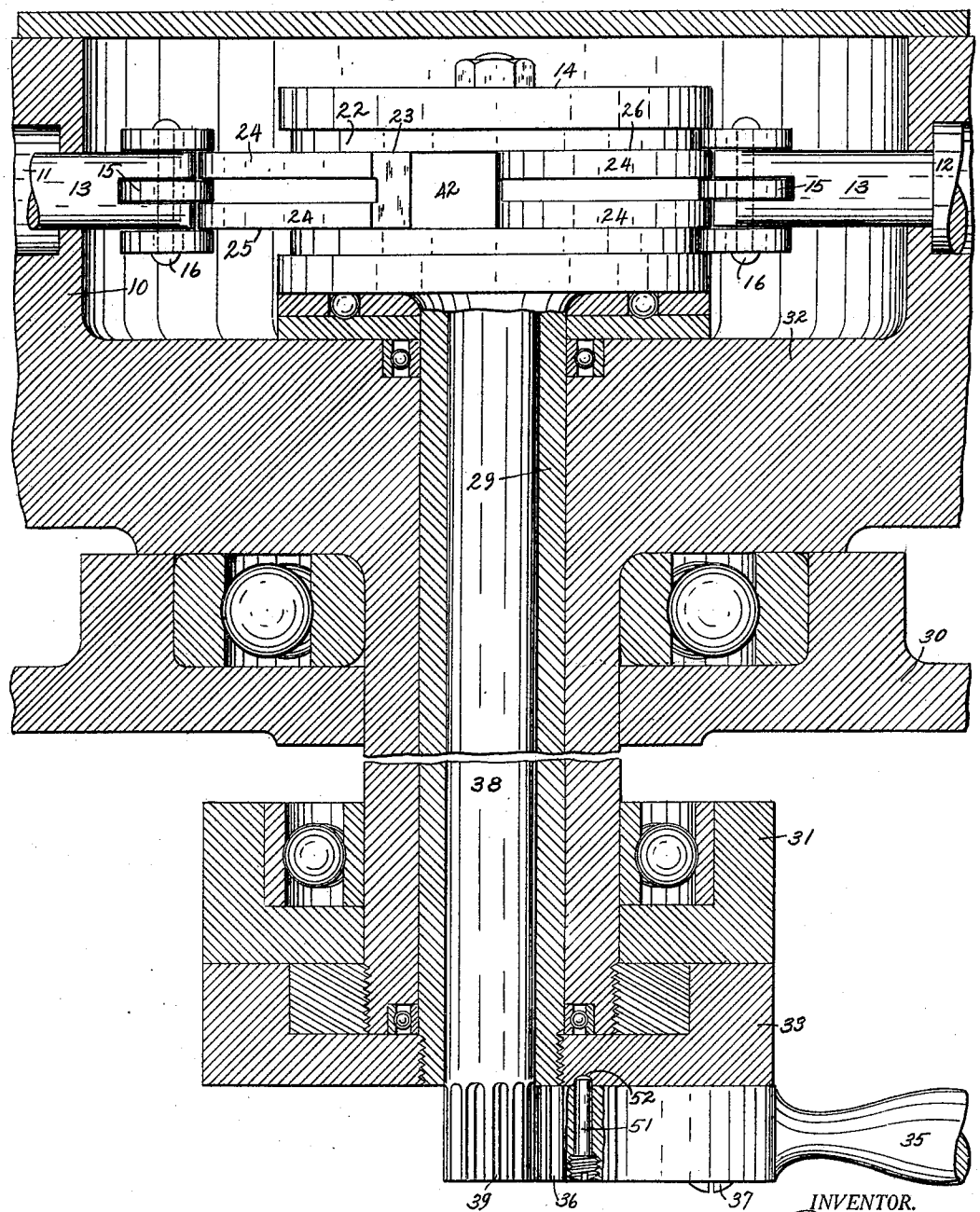
Fig. 4.



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Patented Aug. 30, 1932 1,874,010

UNITED STATES PATENT OFFICE

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PUMP

Application filed November 28, 1927. Serial No. 236,101.

My invention relates to improvements in pumps.

The object of my invention is to provide a pump comprising a plurality of reciprocating elements actuated by a cam of variable pitch.

More particularly stated, it is the object of my invention to provide a cam for the actuation of reciprocating elements wherein portions of the face of the cam may be extended or changed in their configuration so as to vary the throw of the reciprocating elements.

It is a further object of my invention to provide a pump for continuous rotation in either direction in which cam means are provided to enable the operator to change the direction of flow of fluid through the pump or to vary the quantity of flow at will.

In the drawings:—

Figure 1 is a side view of my pump showing portions cut away to exhibit the various elements of my device.

Figure 2 is a side view of the cam upon which the reciprocating elements of my device operate.

Figure 3 is a detail view of my control handle for actuating the cam.

Figure 4 is a vertical section through the central portion of my pump mechanism showing the cam and control therefor.

Like parts are identified by the same reference characters throughout the several views.

Hydraulically operable mechanisms for connection with the usual line shafts or other power supply devices in factories must be supplied with reversing means incorporated within such devices and must be supplied with means for varying their speed of operation and I have, therefore, provided a device which will be capable of easy manual control and which may be easily incorporated into a hydraulic or fluid operating mechanism.

My device comprises a rotary pump mechanism wherein the rotor 10 is provided with a plurality of cylinders 11. Within each of these cylinders is a piston 12 with a connecting rod 13 extending inwardly toward a cam 14, the construction of which constitutes an important feature of my invention. Between the cam 14 and the connecting rods 13 I provide rollers 15 mounted upon pivot pins 16 which guide the rollers upon the face of the cam. Between the rotor 10 and the connecting rods 13, I have provided springs 16. These springs constantly force the connecting rods and the rollers tightly against the face of the cam 14.

Surrounding the rotor 10 is an annular stator 17 which is provided with channels 18 and 19, 54 and 55. Pipe connections into the channels 18 and 19 provide conduits through which fluid may be supplied to the pumping mechanism in my device, supply pipes 20 providing fluid to the channels 18, 19 and pressure pipes 21 receiving fluid under pressure from the channels 54 and 55.

As shown in Figure 1, the cam 14 comprises several elements pivotally secured to one another, the body of the cam as shown at 22 in Figure 4 having splined portions 23 adapted to meet with corresponding portions 24 in two wings 25 and 26 pivotally secured to said body 22 at 27 and 28 respectively, the splined portions of the cam body and said wings being sufficiently extended to enable the wings to respectively collapse into the body of the cam 22 so that the entire cam mechanism in closed position will present to the rollers 15 a continuous circular path upon which to follow. When a wing is extended the cam following rollers present one flange of their periphery to a channel centrally disposed in the wing body, and this one flange guides the cam follower over the extended wing. When the follower reaches the main body of the cam, the other flanges of the follower assume their positions in the cam tracks as indicated

in Fig. 4. This cam and its respective parts are mounted upon a shaft 29 which is carried by bearing supports 30 and 31. A hub 32 is integral with the rotor 10. The other of said supports includes a collar 33 which may be mounted rigidly in the frame of the hydraulic mechanism to be actuated by my pump.

Means for extending and permitting the retraction of the wings 25 and 26 of the cam 14 are shown in Figures 2 and 4 where a control handle 35 with a gear sector 36 pivotally mounted upon a cap screw 37 is operably connected with the shaft 38 which has gear teeth 39 meshed with the teeth of the sector 36. At the inner end of the shaft 38 I have provided a pinion 40 which is adapted to interact with a rack 41 upon the control 42 as shown in Figure 2.

The curved faces 43 and 44 of the control 42 are so constructed as to abut the inner surfaces of the wings 25 and 26.

The operation of my improved pump is as follows:—a supply of fluid through conduits 20 is provided by means of an ordinary gear pump 50 and the fluid so supplied flows into the channels 18, 19 where it may flow into the cylinders 11 in quantities controlled by the position of the pistons 12. The position of the pistons is controlled in turn by the springs 16 and the cam 14 and obviously so long as the cam 14 retains its circular form there will be no movement of the pistons 12 to displace the fluid which may be lodged in the cylinders. However, if fluid is to be forcibly provided to one of the channels 54 or 55, the control handle 35 may be so turned as to project the control 42 against one of the wings of the cam, thereby forcing said wing outwardly to provide an extended surface beyond the normal circular circumference of the cam with the result that when the cam follower or roller 15 of a particular piston 12 rides up upon the said extended wing, the fluid contained in the cylinder 11 will be forced outwardly into the channel 55 upon the side affected by said wing. Each piston in turn as it is brought around to that side of the cam by the rotation of the rotor 10 will in turn be forced outwardly as it reaches the channel 55 and will discharge its fluid into said channel and into the conduit 21 to be conducted under pressure to the portion of the hydraulic mechanism where it is to do its work.

Obviously my pumping mechanism is subject to an infinite number of gradations of hydraulic power supply for the control handle may be moved in either direction from a central neutral position as shown in Figure 3 and a ratchet plunger 51 interacting with sockets 52 at various positions in the arc of its swing may provide any number of indicated speeds of operation through the control of the quantity of fluid to be displaced by the pistons 12 in proportion to the extent of displacement of the wings 25 and 26, since a slight outward extension of one of said wings will obviously displace only a small amount of fluid under pressure in the channels 54, 55 and the conduit 21.

In connection with each of the channels 54, 55 I have provided an extreme limit beyond which the pressure of oil in the channels 54, 55 may not go, for I have incorporated in the pressure pipe 21 a pair of safety valves 53 adjustable to certain predetermined pressures.

In the rotation of the rotor 10, therefore, a constant speed may be maintained in a single direction and quantities of fluid may be pumped in one direction or another in the conduits 21 according to the position of the control 42, for if the control extends the wing 25, fluid pressure will be developed in channel 54 and if the control extends the wing 26, pressure will be induced in channel 55, causing a reversal of flow of fluid and therefore a reversal of the mechanism operated by my fluid pressure pump.

I claim:

1. A pump comprising an annular stator interiorly channeled at spaced points to provide a plurality of supply channels and a plurality of discharge channels, an annular rotor fitted within the stator, and provided with outwardly opening cylinders, pistons in the cylinders, connecting rods secured to the pistons and provided with rollers, and a cam providing variable pitched faces for a track for said rollers whereby selectively alternatively to supply material to said cylinders from either of said supply channels and discharge it into either of the discharge channels.

2. A pump comprising an annular stator interiorly channeled at spaced points to provide a plurality of supply and discharge ducts, an annular rotor fitted within the stator and provided with an outwardly opening cylinder, a piston in the cylinder adapted in its reciprocation to draw material from one of the supply ducts and discharge material into one of said discharge ducts in the revolution of the rotor, a cam provided with controllable wing portions, and connecting rods actuated by said cam to cause reciprocation of the pistons, whereby selectively to utilize one supply and one discharge channel.

3. A pump comprising a stator and a rotor, cylinders in the rotor provided with pistons and connecting rods carried by said rotor said cylinders being so disposed with respect to the rotor that the rotor forms a cylinder head therefor, and a cam substantially centrally located within the stator and rotor said cam being provided with adjustable wings affording cam face portions of variable pitch whereby to provide for reversal of the circulation of the pump.

4. A pump comprising the combination with an annular stator interiorly channeled at spaced points to provide a plurality of supply ducts and a plurality of discharge ducts, of a rotor within said annular stator and provided with outwardly opening cylinders, pistons in said cylinders provided with connecting rods extending inwardly from the stator, an adjustable actuator for said connecting rods substantially centrally located with reference to the stator whereby in the adjustment of said actuator the said pistons through their connecting rods may selectively be actuated to receive a supply of material from either of the supply ducts and discharge said material into either of the discharge ducts.

JOHN P. HESS.