Dec. 19, 1944. F. A. TALBOT 2,365,309

HIGH PRESSURE PUMP

Filed July 12, 1943 2 Sheets-Sheet 1

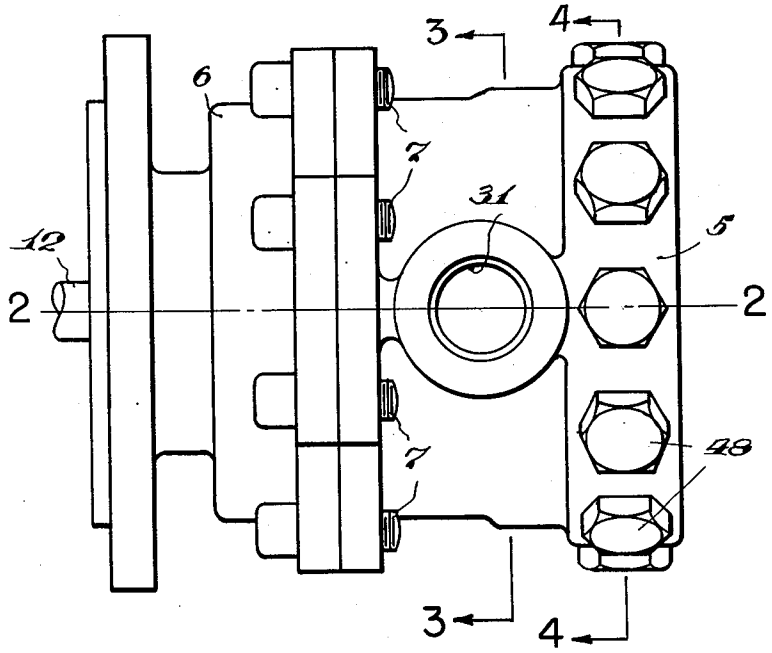

FIG. 1

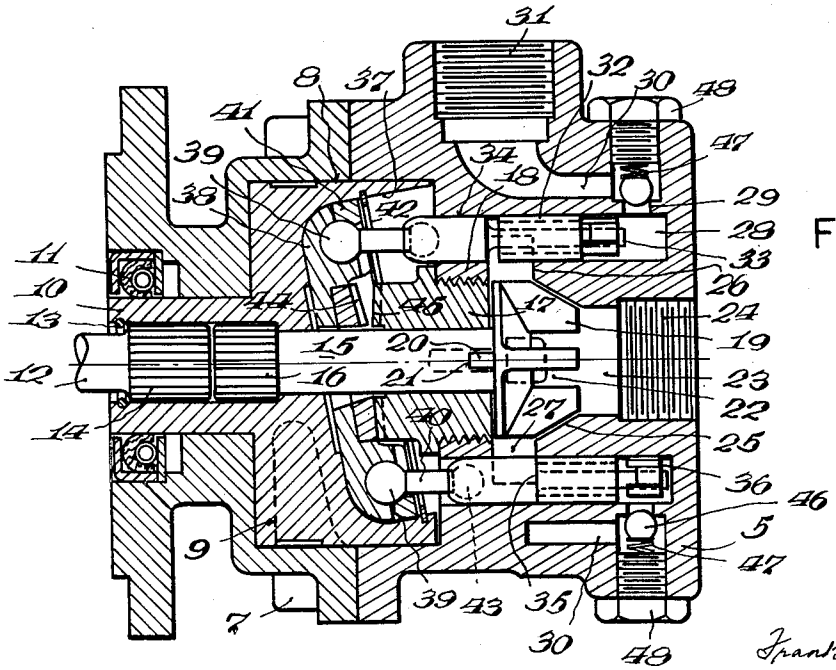

FIG. 2

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HIGH PRESSURE PUMP

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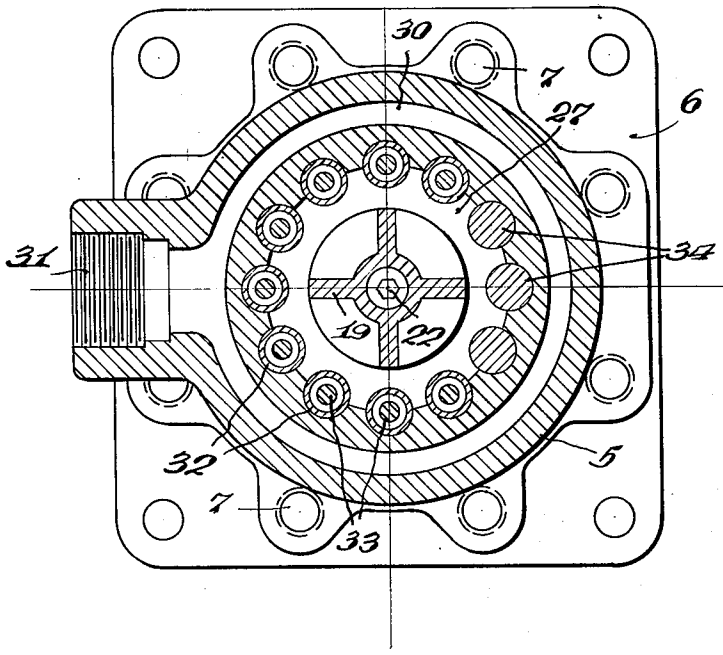

FIG. 3

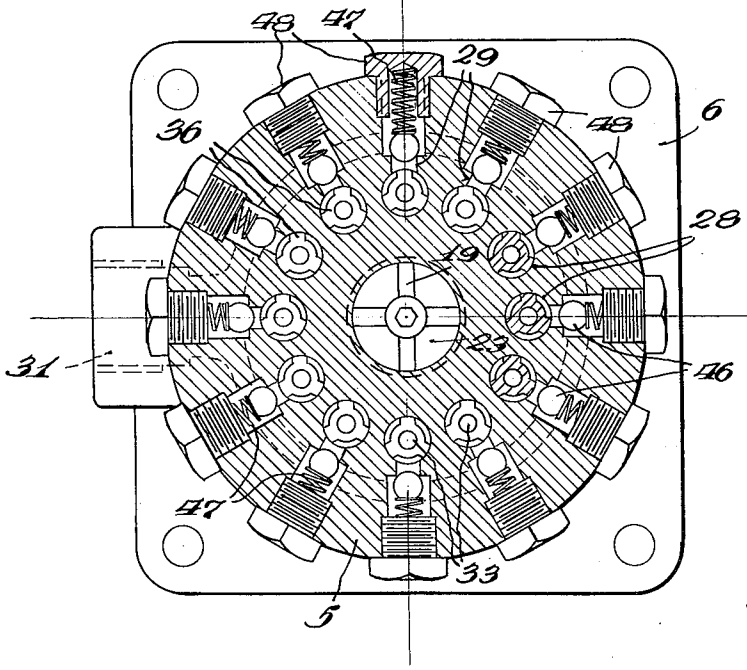

FIG. 4

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UNITED STATES PATENT OFFICE

2,365,309

HIGH-PRESSURE PUMP

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Application July 12, 1943, Serial No. 494,381

8 Claims. (Cl. 103—5)

This invention relates to improvements in high-pressure pumps and more particularly to a novel pump of the super-charger type.

One of the objects of the invention is to provide a compact high-pressure pump which may fit in a relatively small space on an airplane, for example.

Another object is to supply a high-pressure pump not liable to leakage of the pumped fluid.

A still further object is to furnish a pump of this character which may be readily dismantled for the changing of any part thereof.

A still further object is to provide a pump of this type which may be readily manufactured in mass production, as the parts are relatively few in number and extremely simple in contour.

With 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 and illustrated in the accompanying drawings, in which:

Fig. 1 is an elevation of my improved pump.

Fig. 2 is a longitudinal sectional view of the same taken on the line 2—2 of Fig. 1.

Figs. 3 and 4 are transverse sectional views taken respectively on the lines 3—3 and 4—4 of Fig. 1.

Referring to the drawings, 5 designates a main housing or casing, closed at one end by a cap 6, secured in place by screws 7 or the like, which extend through flanges of the cap and casing.

Within the cap and casing there is a circular chamber 8 in which is rotatably mounted, a rotor 9 having a hub 10 journaled in the cap and provided with a sealing ring 11 to prevent discharge of fluid between the contacting surfaces of the rotor and cap.

A drive shaft 12 is secured in the hub of the rotor by any suitable means such as a split ring 13 and is provided with a splined end portion 14 that is interlocked with the hub, for driving the rotor from the driving shaft.

A driven shaft 15 is splined to the rotor as indicated at 16 and it extends through and is journaled in a collar 17, fixed in the housing and having a threaded connection therewith, as indicated at 18.

A bladed impeller wheel 19 is provided with a fixed key 20, interlocked with a recess 21 in the driven shaft, and the impeller is removably secured to the shaft by a screw 22 or the like. The impeller wheel functions to draw fluid into the inlet port 23 of the housing which port may be threaded, as indicated at 24, so that the incoming fluid may be conducted through a pipe or the like (not shown).

From the intake port, a flared surface 25 within the housing (conforming to edges of the impeller blades) merges into a wall 26 of a circular chamber 27, communicating with the intake ends of a multiplicity of cylinders 28 bored in the housing, in parallel relation in a circular row about the axis of the driven shaft, and each communicating at its opposite end with a discharge port 29 leading to an annular chamber 30 which in turn communicates with the common discharge port 31 of the pump.

Arranged in each cylinder is a reciprocating sleeve 32 that has a sliding fit in the cylinder and loosely surrounds a piston rod 33 rigidly united with a piston 34, slidably mounted within the housing. An abutment 35 of the piston is adapted to engage one end of the sleeve during the compression stroke and a winged nut 36 secured to the piston rod is adapted to engage the opposite end of the sleeve on the suction stroke. As each nut is winged, it will allow passage of fluid through the sleeve at all times, so that when a piston is on its suction stroke, the impeller will force fluid through the sleeve and into the cylinder 28 so as to build up a pressure in the latter before the piston commences its compression stroke.

Reciprocation of the pistons is caused by the rotor in the following way. The rotor is dished as indicated at 37 to provide a wobbler surface for a wobbler plate 38. Ball ends 39 of connecting rods 40 are connected to this plate in a universal manner by means of a ring 41 that is secured to the rotor by a retaining ring 42. The other end of each connecting rod is connected to one of the pistons by a ball and socket joint as indicated at 43.

To assist in preventing rotation of the wobbler plate 38, it is provided with a gear 44 meshing with a stationary gear 45 preferably forming part of the fixed collar 17. As the rotor revolves the teeth of the gear 44 will successively engage the teeth of the gear 45 so as to insure alignment of the pistons 34 with the cylinders 28.

Each of the discharge ports 29 is preferably controlled by a ball valve 46, pressed towards its seat by a spring 47, adjustably held in position by screw plug 48. From Fig. 4 it will be observed that these plugs fit in radial holes in the housing so that they may be readily removed or adjusted.

Operation

Rotation of the shaft 12 will cause turning of

the rotor 9 and the impeller wheel 19. The latter will act to draw in fluid through the port 23 and force it into the circular chamber 27 communicating with the intake ends of the cylinders 28. At the same time the wobbler plate 38 will cause reciprocation of the pistons, and as each piston is on its suction stroke the fluid forced by the impeller will pass through the sleeve of the piston and past the winged nut of that piston into the end of cylinder 28. On the compression stroke, the abutment 35 of the piston will engage and close an end of the sleeve so that the trapped fluid will be further compressed in the cylinder 28 and will be forced past the check valve 46 into the exhaust chamber 30 of the housing from which it may be discharged through the port 31 to any suitable point of utilization.

On each suction stroke of a piston, it will be understood that the abutment surface 35 will move away from an end of the sleeve and the latter will remain stationary until it is contacted by the winged nut of that piston which when it contacts the sleeve will force it to travel with the piston.

The pars are so constructed and arranged that no packing is required for the cylinders since all of the pumped fluid passes through passageways surrounded by solid metal until entering the discharge port 31. Furthermore as there are large surfaces in contact between the rotor and the housing and its cap there will be no likelihood of leakage into the chamber in which the wobbler is arranged and as there will be no leakage, there will be no loss of pressure.

From the drawings it may be seen that the mechanism may be readily assembled or dismantled. The removal of the closure plate 6 makes the rotor and the parts to which it is connected, accessible, and after the closure plate is removed, if the rotor is shifted toward the left, the retaining ring 42 will act to cause the pistons and their sleeves to move out of the cylinders, providing of course the screw 22 is removed so as to allow the shaft 15 to move with the rotor. The removal of the collar 17 which closes the hole through which the impeller wheel 19 passes, will allow the impeller to be removed from the chamber which it occupies.

While I have disclosed what I now consider to be a preferred embodiment of the invention in such manner that the same may be readily understood by those skilled in the art, I am aware that changes may be made in the details disclosed without departing from the spirit of the invention as expressed in the claims.

I claim:

1. A pump comprising a housing having a series of cylinders arranged therein in parallel relation and in circular formation, a chamber communicating with one end of each of said cylinders, an intake port in said housing, an impeller wheel arranged in said chamber and positioned to draw fluid through the intake port and to force the same into said cylinders through the last mentioned ends thereof, piston rods arranged to reciprocate in the cylinders, sleeves surrounding the piston rods and slidably mounted in the cylinders and through which fluid pumped by the impeller wheel can enter the opposite ends of said cylinders, discharge ports in the housing communicating with the last mentioned ends of the cylinders, valve means controlling said discharge ports, and means for simultaneously rotating the impeller wheel and reciprocating said piston rods.

2. A pump comprising a housing, shafting rotatably mounted in the housing, a series of cylinders arranged in the housing in parallel relation to said shafting and in circular formation, each cylinder being spaced an equal distance from the axis of said shafting, a chamber communicating with one end of each of said cylinders, an intake port at one end of said housing, an impeller wheel arranged in said chamber, substantially surrounded by the cylinders and positioned to draw fluid through the intake port and to force the same into said cylinders through the last mentioned ends thereof, piston rods arranged to reciprocate in the cylinders, sleeves surrounding the piston rods and slidably mounted in the cylinders and through which fluid pumped by the impeller wheel can enter the opposite ends of said cylinders, discharge ports in the housing communicating with the last mentioned ends of the cylinders, valve means controlling said discharge ports, and means for simultaneously rotating the impeller wheel and reciprocating said piston rods from said shafting.

3. A pump comprising a housing having a series of cylinders constituted thereby and arranged in parallel relation and in circular formation, a chamber communicating with one end of each of said cylinders, an intake port in said housing, an impeller wheel arranged in said chamber and positioned to draw fluid from the intake port and to force the same into said cylinders through the last mentioned ends thereof, piston rods arranged to reciprocate in the cylinders, sleeves surrounding the piston rods and slidably mounted in the cylinders and through which fluid pumped by the impeller wheel can enter the opposite ends of said cylinders, discharge ports in the housing communicating with the last mentioned ends of the cylinders, check valves controlling said discharge ports, and means for simultaneously rotating the impeller wheel and reciprocating said piston rods.

4. In a pump of the character described, a casing provided with a circular chamber, a dish-shaped rotor arranged in said chamber and having an elongated step-shaped surface slidably engaging internal surface of the casing, the rotor having a cavity provided with a surface arranged obliquely to the axis of the rotor, a non-rotatable wobbler plate arranged in the rotor and having a surface complemental to said oblique surface and engaging the latter, pistons arranged in a circular series in the casing about the axis of the rotor and slidably mounted in the casing, means having ball and socket joints connecting the pistons to the wobbler plate, a gear fixed to the wobbler plate and a stationary gear arranged in the casing and meshing with the last mentioned gear.

5. In a pump of the character described, a housing provided with a central chamber, a circular series of parallel cylinder bores substantially surrounding said chamber, each bore having an inlet directly communicating with the chamber, fluid intake means communicating with the chamber, driving means, a rotatable shaft driven by said driving means and having its axis passing through the center from which the circle of the circular series of bores is struck, an impeller wheel secured to the shaft and positioned in said chamber, said wheel being constructed and arranged to draw fluid through the intake means into the central portion of the wheel and to force it from its periphery directly into the inlets of the bores, reciprocating valved pistons

slidably mounted in the bores and operatively connected with the driving means for reciprocation by the latter, and valve means spaced lengthwise of the bores from the fluid inlets for controlling the discharge of fluid from the bores.

6. In a pump of the character described, a housing provided with a circular series of parallel cylinder bores, a chamber arranged within the circle defined by said bores and directly communicating with each bore, an impeller wheel positioned in the chamber for forcing fluid away from the axis of the wheel and directly into said bores, means for conveying fluid to the central portion of the wheel, valved pistons arranged to reciprocate in the bores, means for simultaneously rotating the wheel and reciprocating the pistons, and valve means for controlling the discharge of fluid from the bores.

7. In a pump of the character described, a housing provided with a series of parallel cylinder bores having fluid inlets, each bore having a fluid outlet spaced longitudinally of the bore from its inlet, a chamber directly communicating with said inlets, an impeller wheel positioned in the chamber for forcing fluid away from the axis of the wheel and directly into said inlets, means for conveying fluid to the central portion of the wheel, valved pistons arranged to reciprocate in the bores and past which fluid flows from the inlets of the bores to the outlets thereof, means for simultaneously rotating the wheel and reciprocating the pistons, and valve means for controlling the outlets of the bores.

8. In a pump of the type having a substantially circular series of parallel cylinder bores arranged in a housing and each provided with an inlet and outlet, pistons arranged to reciprocate in the cylinders, a chamber in the housing communicating with the inlets of the bores, a fluid admission means communicating with the chamber, a rotatable impeller wheel arranged in the chamber and adapted to draw fluid through the admission means and force it through said inlets into the bores, and means for simultaneously rotating the impeller wheel and reciprocating said pistons, the improvement in which said chamber is substantially surrounded by said series of bores and directly communicates with the inlets of the bores, and the pistons are valved so that the fluid will travel from the chamber directly through the bore inlets, pistons and bore outlets, in the order named.

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