A. E. SHINER.

ROTARY PUMP.

APPLICATION FILED SEPT. 14, 1920.

1,390,932.

Patented Sept. 13, 1921.

3 SHEETS—SHEET 1.

FIG. 1.

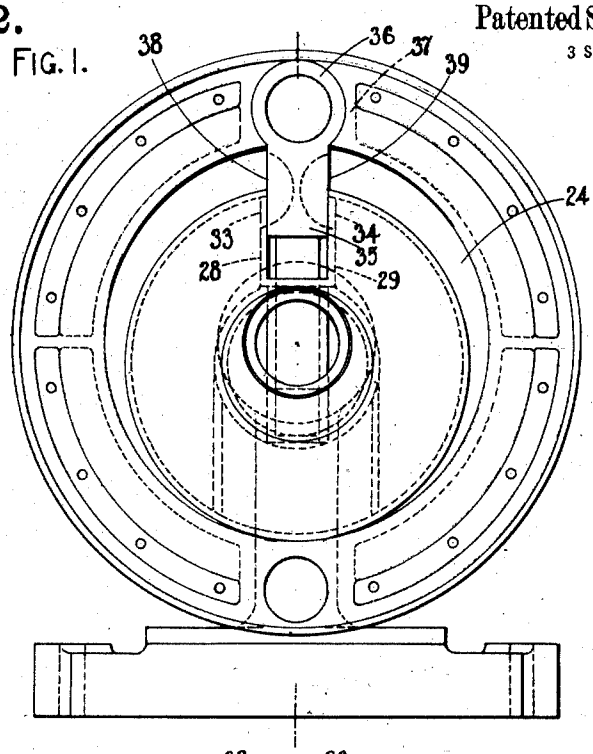
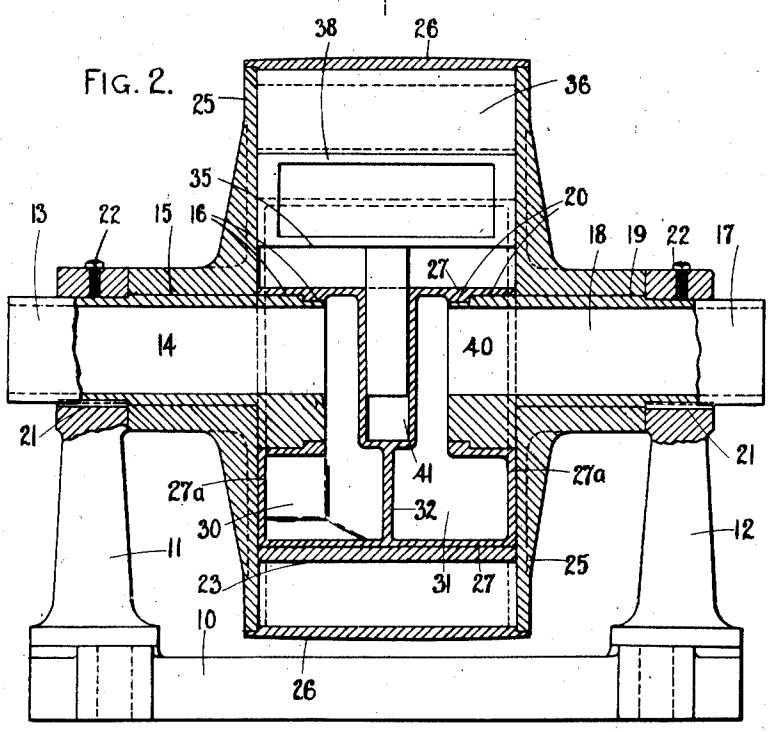


FIG. 2.



INVENTOR

Albert E. Shiner

By James L. Norris

Attorney.

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3 SHEETS—SHEET 2.

FIG. 3.

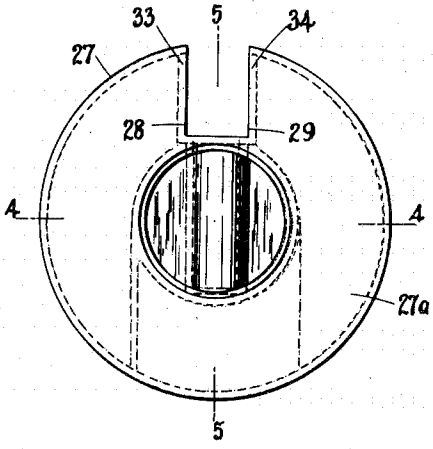


FIG. 5.

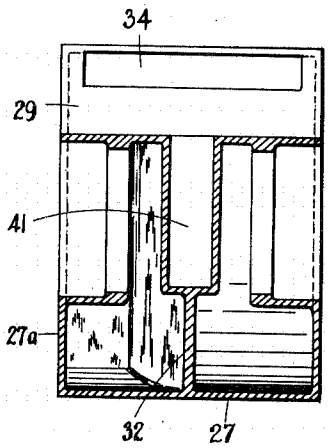


FIG. 4.

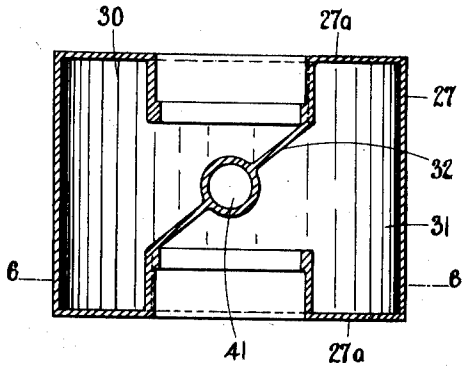
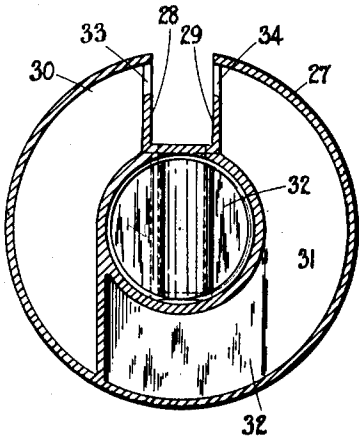


FIG. 6.



INVENTOR

Albert E. Shiner

By James L. Norris,

Attorney.

A. E. SHINER.

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3 SHEETS—SHEET 3.

FIG. 7.

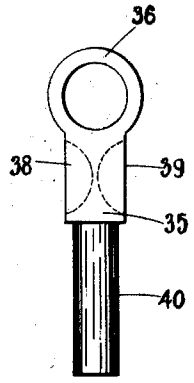


FIG. 8.

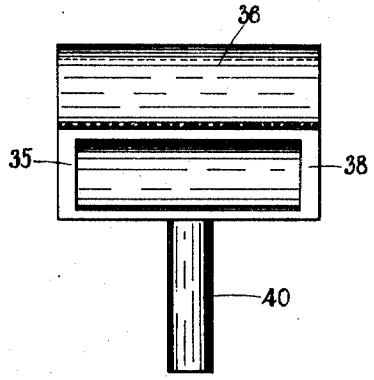


FIG. 9.

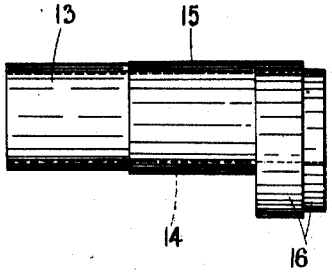
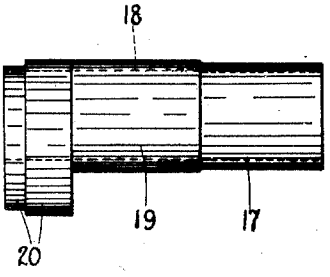


FIG. 10.



INVENTOR

Albert E. Shiner

By Davis L. Norris

Attorney

UNITED STATES PATENT OFFICE.

ALBERT EDWARD SHINER, OF LONDON, ENGLAND.

ROTARY PUMP.

1,390,932. Specification of Letters Patent. Patented Sept. 13, 1921.

Application filed September 14, 1920. Serial No. 410,251.

To all whom it may concern:

Be it known that I, ALBERT EDWARD SHINER, a subject of the King of Great Britain, residing at London, England, have invented a new and useful Improved Rotary Pump, of which the following is a specification.

This invention relates to an improved rotary pump of the type comprising a cylindrical pump chamber and a cylindrical piston of smaller diameter mounted therein, with its axis parallel to the axis of the pump chamber, in such a manner that the exterior cylindrical wall of the piston is in contact with the interior wall of the pump chamber along a line parallel to the axes of both these members. This piston is moved by an eccentric so that the said line of contact moves progressively around the cylindrical walls of the piston and pump chamber, and a radially sliding partition plate, opposite edges of which extend into grooves in the piston and the pump chamber, respectively, is provided between inlet and outlet orifices respectively leading into and out from the said pump chamber.

Now, according to this invention, the radially sliding plate is constructed as a cut off or slide valve, and the walls of the groove in which it slides form valve faces having inlet and discharge ports respectively opening therethrough, so that these ports, under the control of the cut off valve, can be put into communication with the pump chamber on opposite sides of the said cut off valve respectively.

In the accompanying drawings:—

Figure 1 is an end view of the improved rotary pump with an end plate and one supporting standard removed.

Fig. 2 shows a vertical axial section of the same.

Fig. 3 is an end view of the piston of this pump.

Fig. 4 shows a section on the line 4—4, Fig. 3.

Fig. 5 shows a section on the line 5—5, Fig. 3.

Fig. 6 shows a section on the line 6—6, Fig. 4.

Figs. 7 and 8 are respectively an end and a side view of the cut off valve of the improved pump.

Figs. 9 and 10 are detail views of the trunnions supporting the rotary parts of the pump.

Referring to these drawings, 10 is a base plate supporting uprights or standards 11, 12. In the standard 11 is mounted a tubular trunnion 13 the bore of which acts as an inlet conduit 14, and this trunnion is formed with an exterior concentric bearing surface 15 and an exterior eccentric bearing surface 16. In the standard 12 is mounted a similar tubular trunnion 17 the bore of which acts as a discharge conduit 18, and this trunnion is formed with concentric and eccentric bearing surfaces 19, 20 respectively in axial alinement with the bearing surfaces 15, 16. These inlet and outlet trunnions 13, 17 are held against rotation in the standards 11, 12 by keys 21 or set screws 22.

The pump body 23 is formed with an interior cylindrical chamber 24 closed by end plates 25 rotatably mounted on the concentric bearing surfaces 15, 19 of the inlet and discharge trunnions. Exteriorly to the pump body and integral therewith or fixed thereto, there is provided a belt pulley 26 or other means whereby the pump body can be rotated about the bearing surfaces 15, 19 on which the end plates 25 are mounted.

Within the pump chamber 24 is arranged a hollow piston 27 formed with an outer cylindrical wall and end plates 27^a in which central concentric apertures are formed which are mounted on the eccentric bearing surfaces 19, 20 on the inlet and outlet trunnions above described. The said piston is moreover formed with an exterior groove or slideway bounded by lateral walls 28, 29. The hollow interior of the piston 27 is divided into two compartments 30, 31 separated by a curved or angular partition wall 32, the inlet conduit 14 opening into one compartment 30 and the outlet conduit leading from the other compartment 31. Communication between each of these compartments and the pump chamber 24 can be established, under control as hereinafter described, through ports 33, 34 formed in the said lateral walls 28, 29.

A double cut-off valve 35 is formed with a cylindrical enlargement 36 along one edge thereof and this enlargement 36 is accomodated in a cylindrical pocket provided in an enlargement 37 of the wall of the pump body. The opposite faces 38, 39 of the valve reciprocate on the faces of the lateral walls 28, 29 within the said groove. The valve 35 is provided with a tail rod 40 working in a guide pocket 41 as this is found to be ad-

vantageous in preventing the slide valve from getting out of alinement with the groove.

This pump will work equally well when rotated in either direction but assuming that, considering Fig. 1, rotation is in the clockwise direction, then liquid is drawn into the pump chamber through the conduit 14, the compartment 30 of the hollow piston, through the port 33 in the wall 28 and past the valve 35 into the pump chamber. In the rotation of the pump body 23 the hollow piston 27 moves with it, the double cut off valve 35 acting as a driving dog between these parts, and owing to the piston being mounted eccentrically to the pump chamber the line of contact between these parts moves round the interior wall of the pump chamber in a relatively opposite direction. Owing to the manner in which motion is communicated from the pump body to the piston, that is to say through the valve, the latter is caused to oscillate slightly in the pocket 36 about the axis of the pocket but this has no effect on the operation of the pump and is only an incident of construction. At the same time the valve 35 is reciprocated in the groove in a direction radial to the piston so that at the instant the line of contact passes across the break in the pump chamber wall through which the valve projects, both faces of the valve 35 are entirely closed on their seats on the walls 28, 29 of the groove and the pump chamber is during this period cut off from both the inlet and outlet chambers in the hollow piston and there can be no regurgitation of the fluid passing through the pump. This is not the case in constructions in which the inlet and outlet ports open through either the cylindrical walls or end walls of the pump chamber or piston so that, at times, as the line of contact passes between the inlet and outlet orifices, these orifices are in direct communication through the pump chamber.

In my improved pump the fluid moved along in advance of the line of contact, when the valve 35 opens, is expelled through the port 34 in the wall 29 into the compartment 31 within the piston and thence to the discharge conduit 18.

The invention has been hereinbefore described more particularly with regard to its use in a hydraulic pump but the improved construction is also applicable to air or other pumps, moreover by reason of the special arrangement of the cut off valve the principle of the invention can be used in the construction of a motor, actuated by steam, water, air or other fluid under pressure.

I claim:—

1. A rotary pump comprising a cylindrical pump chamber, a cylindrical piston of smaller diameter mounted therein, one of said parts provided with oppositely arranged valve faces having ports opening therethrough and forming a slideway and one of said parts being provided with a guideway, a cut off valve slidable between said valve faces and having an oscillatory support in the other of the said parts, a tail rod on said cut-off valve working in said guideway, and means for moving the piston within the pump chamber.

2. A rotary pump comprising a cylindrical pump chamber, a cylindrical piston of smaller diameter mounted therein, one of said parts provided with oppositely arranged valve faces having ports opening therethrough and forming a slideway and also provided with a guideway, a cut off valve slidable between said valve faces and having an oscillatory support in the other of the said parts, said cut-off valve having similar faces on its opposite sides to coöperate with the ported valve faces in order simultaneously to alternately cut off and open in equal degrees communication between the said ports and the interior of the pump chamber, a tail rod on said cut-off valve and means for moving the piston within the pump chamber.

3. A rotary pump comprising a cylindrical pump chamber, a hollow cylindrical piston of smaller diameter mounted therein, said piston having oppositely arranged valve faces each having a port opening therethrough, said valve faces forming a slideway, said piston also having a guideway, a wall within the said piston dividing its interior space into separate compartments with which said ports respectively communicate, a cut off valve slidable between said valve faces and provided with a rail rod working in said guideway and having an oscillatory support in the wall of the pump chamber, and means for moving the piston within the pump chamber.

4. A rotary pump comprising a cylindrical pump chamber, a hollow cylindrical piston of smaller diameter mounted therein, said piston having oppositely disposed valve faces each having a port opening therethrough and provided with a guideway, said valve faces forming a slideway, a wall within the said piston dividing its interior space into separate compartments with which said ports respectively communicate, separate conduits respectively in open communication with the said compartments, a cut off valve slidable between said valve faces provided with a tail rod working in said guideway and having an oscillatory support in the wall of the pump chamber, and means for moving the piston within the pump chamber.

5. A rotary pump comprising a cylindrical pump chamber, a hollow cylindrical piston of smaller diameter mounted therein, said piston having oppositely disposed valve faces having ports opening therethrough

and provided with a guideway, said valve faces forming a slideway, a wall within the said piston dividing its interior space into separate compartments with which said ports respectively communicate, a cut off valve slidably mounted in the said slideway and having faces on its opposite sides thereof to coöperate with the said ported valve faces respectively and provided with a tail rod working in said guideway, an oscillatory support for the said cut off valve arranged in the wall of the pump chamber, and means for moving the piston progressively along a circular path within the pump chamber so as to cause the cut off valve to be reciprocated in the said slideway.

6. A rotary pump comprising a cylindrical pump chamber, a hollow cylindrical piston of smaller diameter mounted therein, one of said parts having a guideway, and said piston having oppositely disposed valve faces each having a port opening therethrough, said valve faces forming a slideway, a wall within the said piston dividing its interior space into separate compartments with which said ports respectively communicate, trunnions having conduits formed therethrough in open communication respectively, with the separate compartments within the piston, said trunnions being provided with axially alined bearing surfaces on which the pump chamber is rotatably mounted and with other axially alined bearing surfaces arranged eccentrically to said first-named bearing surfaces and on which the piston is rotatably mounted, and a cut off valve slidably mounted between the said valve faces and having an oscillatory support in the wall of the pump chamber and provided with a tail rod working in said guideway.

7. A rotary pump comprising a cylindrical pump chamber, a hollow cylindrical piston of smaller diameter mounted therein, said piston being provided with a guideway and with oppositely disposed valve faces, each of said valve faces having a port opening therethrough and said valve faces together forming a slideway, a wall within the said piston dividing its interior space into separate compartments with which said ports respectively communicate, a cut off valve slidable between said valve faces and having an oscillatory support in the wall of the pump chamber, a tail rod on the said cut off valve extending into the guideway in the piston, and means for moving the piston within the pump chamber.

ALBERT EDWARD SHINER.

Witnesses:
HERBERT ARTHUR BEESTON,
FREDERICK ARTHUR WILLIAMS.