Oct. 16, 1923. 1,470,804

E. BUCKINGHAM.

OIL PUMP

Filed May 11, 1921

FIG. 1

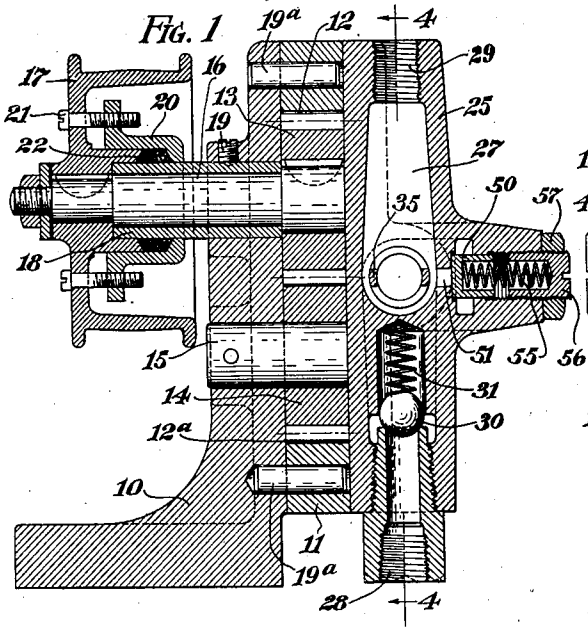


FIG. 2

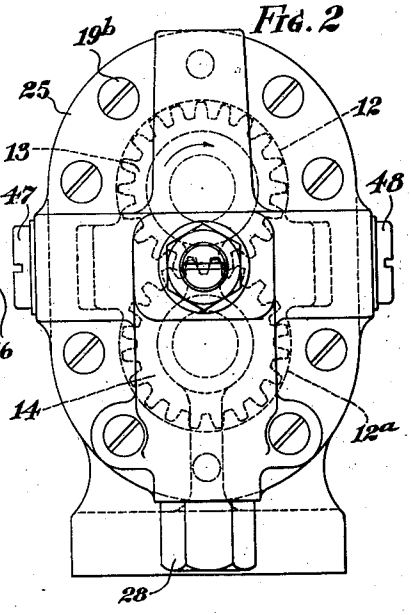


FIG. 3

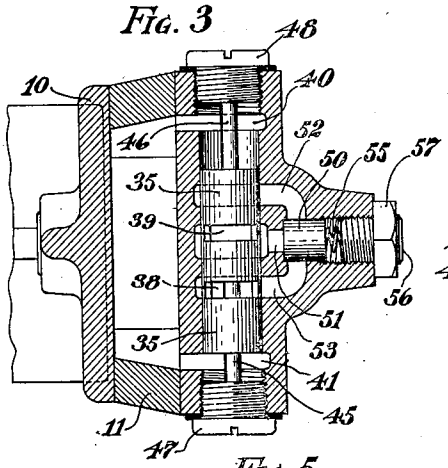


FIG. 4

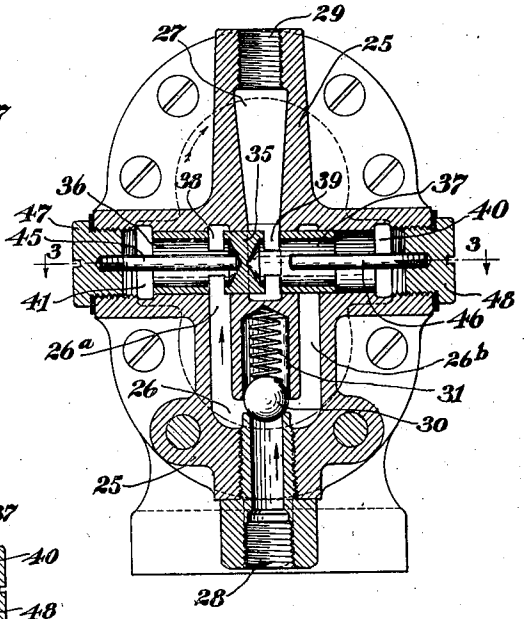
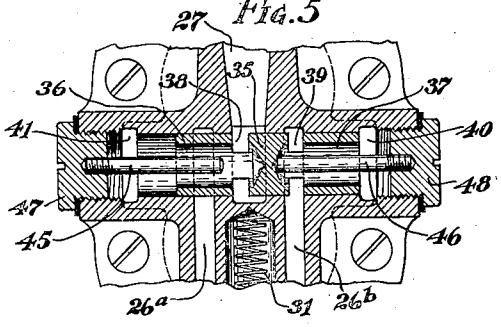


FIG. 5



Inventor
E. Buckingham,
By Joseph N. Schofield
Attorney

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UNITED STATES PATENT OFFICE.

EARLE BUCKINGHAM, OF HARTFORD, CONNECTICUT, ASSIGNOR TO PRATT & WHITNEY COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

OIL PUMP.

Application filed May 11, 1921. Serial No. 468,490.

To all whom it may concern:

Be it known that I, EARLE BUCKINGHAM, a citizen of the United States, residing at Hartford, Connecticut, have invented certain new and useful Improvements in Oil Pumps, of which the following is a specification.

This invention relates to pumps and particularly to a pump adapted to supply lubricating, or other fluid, to a machine tool.

An object of the present invention is to provide an improved pump of the gear type which may be rotated in either direction to supply the continuous flow of fluid from its discharge connection.

One feature which enables me to accomplish the above object is a valve of simple form which is automatically operated by the pressure of the fluid within the discharge side of the pump. Another feature which is advantageous is that the construction is simple and comprises few parts which may readily be assembled. Further, the invention comprises a valve casing in the form of a cover plate within which all of the operating connections of the pump are contained.

With these and other objects in view my invention consists in the features of construction and operation set forth in the following specification and illustrated in the accompanying drawings.

In the accompanying drawings annexed hereto and forming a part of this specification, I have shown my invention embodied in a small rotary pump of the gear type, but it will be understood that the invention can be otherwise embodied and that the drawings are not to be construed as defining or limiting the scope of the invention, the claims appended to this specification being relied upon for that purpose.

In the drawings:

Figure 1 is an elevation in section taken through the central plane of the pump.

Fig. 2 is a front view of the complete pump.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 4.

Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 1.

Fig. 5 is a detail view of the valve and the valve chamber with the valve in its opposite position.

In the above mentioned drawings, I have shown but one embodiment of the invention which is now deemed preferable, but it is to be understood that changes and modifications may be made within the scope of the appended claims without departing from the spirit of the invention.

Briefly, my invention in its broadest aspect comprises the following principal parts; first, a pump casing; second, a pair of gears adapted to rotate together within a suitable chamber provided within the casing; third, rotating means for said gears; fourth, a valve mounted in a cover plate adapted to reverse the connections of the fluid conduits through the pump; and fifth, suction and discharge connections for the pump preferably located within the cover plate.

Referring more in detail to the figures of the drawing, at 10 is shown a base member having a plate 11 fastened thereto provided with an upper and a lower recess or chamber respectively, 12 and 12^a. Within these chambers 12 and 12^a are inserted gears 13 and 14 adapted to intermesh with each other. These are conveniently mounted on a stud 15 and a short shaft 16, a pulley 17 being provided on shaft 16 and fastened thereon in any convenient manner by means of which the gears 13 and 14 may be rotated. As shown in Fig. 1, I provide a sleeve 18 surrounding the shaft 16 and suitably secured in the base 10 by means of set screw 19. To prevent oil or other fluid from passing out between the sleeve 18 and shaft 16, a packing gland 20 is provided surrounding the sleeve 18 and fastened to the pulley 17 by screws 21. Any suitable packing as shown at 22 may be inserted between the hub of the pulley 17 and the gland 20.

Fastened to plate 11 is a cover plate 25 which entirely encloses the gear recesses 12 and 12^a. As shown, this plate 25 is provided with screws 19^b which may pass completely through the plate 11 and be threaded in the base 10 thus holding all of the parts of the pump securely together. To properly align the plate 11 with the base 10 dowel pins 19^a may be provided.

The construction thus far described is common to most geared pumps. The present invention relates to the valve means for reversing the arrangement of conduits within the pump casing to obtain a continuous flow of fluid through the discharge con-

nection when the gears are rotated in either direction.

Within this cover plate 25 are conduits 26 and 27. Conduit 26 is in open connection with a suction connection 28 and conduit 27 is in connection with a discharge connection 29. Preferably, the conduit 26 is divided into two parts as shown, 26^a and 26^b extending to either side of the center line of the cover plate 25.

Within conduit 26 is a suction valve shown in the form of a ball 30 adapted to seat against the inner end of the discharge connection 28 and thus prevent a reverse flow of the fluid being pumped. A spring 31 normally presses against the ball 30 thus holding it against its seat but permitting the ball 30 to lift sufficiently from its seat during operation to permit the free flow of fluid into the pump.

Between conduits 26 and 27 is a valve 35. This, as shown clearly in Figs. 4 and 5, is in the form of a cylinder counterbored from either end to a point near its center thus forming openings 36 and 37. Extending transversely across the valve 35 and intercepting the openings 36 and 37 are openings 38 and 39, preferably formed by suitably milling the valve transversely of its axis. Two of these milled portions or transverse openings are shown on each side of the centre of the valve so that wide openings are provided through the valve from either end to portions of the cylindrical surface near the centre of the valve.

The chamber or cylinder within which the valve 35 may slide may conveniently be formed by boring the cover plate 25 transversely from side to side. This chamber intercepts and connects all of the conduits within the cover plate 25, and, with the valve in operative position within the chamber it opens and closes certain of the conduits thus constraining the fluid to pass through the pump in a predetermined path.

Conduits 40 and 41 are provided extending from the ends of the valve chamber to and opening respectively into opposite sides of the chambers or recesses within which the gears 12 and 12^a operate. To prevent the valve from moving too far toward either side, short rods 45 and 46 are provided which may be threaded into screw plugs 47 and 48 and extend a suitable distance toward the center of the valve chamber taking up against either side of the central portion of the valve 35. These rods are so dimensioned that with the valve in either of its end positions one of the ports of the conduits 26^a, 26^b is fully opened and the other entirely closed.

In operation and with the valve 35 in the position shown in Fig. 4, the fluid being pumped enters the suction connection 28 and passes through the conduit 26^a. From there is passes through the openings 38 and 36 into the conduit 41. From that point it is carried by rotation of the intermeshing gears 13 and 14 which form the pumping members, to the opposite side of these gears and into the conduit 40 from which it passes through opening 37 into openings 39 and thence into the discharge passage 27 from which it passes to discharge connection 29.

This operation of the pump continues so long as the gears are rotated in one direction as indicated by the dotted arrow shown in Fig. 4. As soon as the rotation of the gears 13 and 14 is reversed, the fluid within the pump casing is forced back into the conduit 41 which presses against the central diaphragm of the valve 45 and forces it to its opposite position as shown in Fig. 5. This reverses the arrangement of the conduits with the suction and discharge connections 28 and 29 and the fluid, after passing through conduit 41, enters the opening 36 into openings 38 and thence through discharge conduit 27. While this is taking place, fluid enters the suction connection 28 and passes into conduit 26^b thence through opening 39 into opening 37 and to conduit 40 which is, during this operation of the pump, on the suction side of the intermeshing gears.

In order that the fluid pumped by these gears 13 and 14 may not exceed a convenient or safe pressure, I provide a relief valve within the cover plate 25. This, in the form shown, comprises a valve member 50 which presses against its seat which is connected to a short conduit 51 which is connected with the discharge conduit 27. Branch conduits 52 and 53 are provided, one or the other of which is always open to one of the pairs of openings 38 or 39. In rear of the valve member 50 is a light spring 55 the pressure of which against the valve member 50 may be suitably regulated by a screw 56 firmly held in any adjusted position by lock nut 57. By this arrangement, as soon as the discharge pressure within the discharge conduit 27 reaches a pressure sufficient to force the valve member 50 away from its seat, valve 50 is lifted from its seat and opens a passage between conduit 51 and either conduit 52 or 53 thus permitting fluid to pass directly from the discharge to the suction side of the pump. As soon as the pressure has been reduced to normal, the valve 50 again closes and the pump continues to force the fluid through the pump in the usual way.

It will thus be seen from the above description that I have provided a simple form of gear pump which may be operated by pulley 17, or other means, in either direction and which will force the fluid always in the same direction, that is, the fluid passes out

through the discharge connection at 29 independently of the direction of rotation of the gears 13 and 14. Furthermore, this construction is simple and has but one valve by means of which the conduits controlling the passage of fluid through the pump are reversed.

What I claim is:

1. A continuous flow pump comprising, in combination, a pump casing, a pair of gears within said pump casing in intermeshing relation with each other, means to rotate said gears, conduits within said pump casing connecting the opposite sides of said gears respectively with a suction and discharge connection, and single valve adapted to reverse the arrangement of said conduits with each reversal of rotation of said gears.

2. A continuous flow pump comprising, in combination, a pump casing, a pair of gears within said pump casing in intermeshing relation with each other, means to rotate said gears, conduits within said pump casing connecting the opposite sides of said gears respectively with a suction and discharge connection, and a single valve of sleeve form adapted to reverse the arrangement of said conduits with each reversal of rotation of said gears.

3. A continuous flow pump comprising, in combination, a pump casing, a pair of gears within said pump casing in intermeshing relation with each other, means to rotate said gears, conduits within said pump casing connecting the opposite sides of said gears respectively with a suction and discharge connection, and a single valve having symmetrical openings on either side of its centre adapted to reverse the arrangement of said conduits with each reversal of rotation of said gears.

4. A continuous flow pump comprising, in combination, a pump casing, a pair of gears within said pump casing in intermeshing relation with each other, means to rotate said gears, conduits within said pump casing connecting the opposite sides of said gears respectively with a suction and discharge connection, and a single automatically operated valve adapted to reverse the arrangement of said conduits with each reversal of rotation of said gears.

5. A continuous flow pump comprising, in combination, a pump casing, a pair of gears within said pump casing in intermeshing relation with each other, means to rotate said gears, conduits within said pump casing connecting the opposite sides of said gears respectively with a suction and discharge connection, and a single fluid pressure operated valve adapted to reverse the arrangement of said conduits with each reversal of rotation of said gears.

6. A pump comprising, in combination, a pump casing, gears adapted to be rotated therein in intermeshing relation with each other, conduits within said pump casing extending to both sides of said gears, said pump casing having a valve chamber joining said conduits, and a valve within said chamber adapted when in one position to connect one conduit to a suction connection and the other conduit with a discharge conduit, and in its opposite position to reverse the connections of said conduits.

7. A pump comprising in combination, a pump casing, gears adapted to be rotated therein in intermeshing relation with each other, conduits within said pump casing extending to both sides of said gears, said pump casing having a valve chamber joining said conduits, and a valve within said chamber adapted when in one position to connect one conduit to a suction connection and the other conduit with a discharge conduit, and in its opposite position to reverse the connections of said conduits, and pressure operated means to move said valve from one position to the other at each reversal of rotation of said gears.

8. A pump comprising in combination, a pump casing, gears adapted to be rotated therein in intermeshing relation with each other, conduits within said pump casing extending to both sides of said gears, said pump casing having a valve chamber joining said conduits, a valve within said chamber adapted when in one position to connect one conduit to a suction connection and the other conduit with a discharge conduit, and in its opposite position reverse the connections of said conduits, and a pressure relief valve within said pump casing adapted to connect said discharge conduit with a suction conduit when the fluid within the pump exceeds a predetermined pressure.

9. A pump comprising in combination, a pump casing, gears adapted to be rotated therein in intermeshing relation, conduits within said pump casing extending to both sides of said gears, said pump casing having a valve chamber joining said conduits, a valve within said chamber adapted when in one position to connect one conduit to a suction connection and the other conduit with a discharge conduit, and in its opposite position to reverse the connections of said conduits, said valve having passages through either end permitting the fluid to enter through an end face and pass from the cylindrical portion of said valve.

10. A geared pump comprising in combination, a pump casing, recesses therein, a pair of gears in said recesses adapted to rotate in engagement with each other, a cover plate for said pump casing having a valve chamber therein, a valve slidably mounted within said valve chamber, said valve having openings extending from the ends to portions respectively adjacent the center of said

valve, conduits extending from said valve chamber to opposite sides of said gear recesses, conduits extending from said valve chamber to a suction and a discharge connection, whereby when said valve is in one position a continuous conduit extends from one side of the gears to the suction connection and from the opposite side of the gears to the discharge connection, and when the valve is in its opposite position the disposition of said conduits is reversed.

11. A geared pump comprising in combination, a pump casing, recesses therein, a pair of gears in said recesses adapted to rotate in engagement with each other, a cover plate for said pump casing having a valve chamber therein, a valve slidably mounted within said valve chamber, said valve having openings extending from the ends to portions respectively adjacent the center of said valve, conduits extending from said valve chamber to opposite sides of said recesses, conduits extending from said valve chamber to a suction and a discharge connection, whereby when said valve is in one position a continuous conduit extends from one side of the gears to the suction connection and from the opposite side of the gears to the discharge connection, and when the valve is in its opposite position the disposition of said conduits is reversed, and means for changing the position of said valve when the direction of rotation of said gears is reversed.

In testimony whereof, I hereto affix my signature.

EARLE BUCKINGHAM.