Nov. 26, 1940. C. C. ENGLISH 2,222,706

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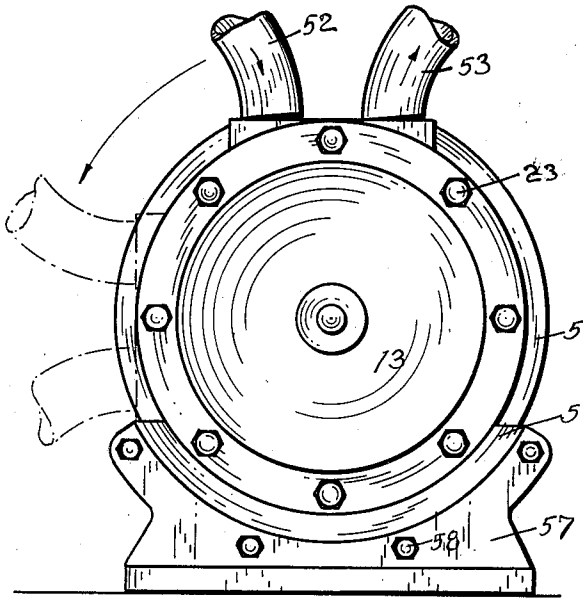


FIG - 1.

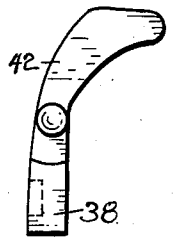


FIG - 3.

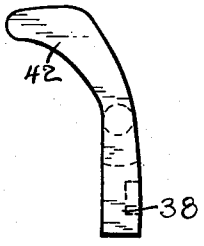


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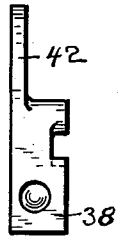


FIG - 5.

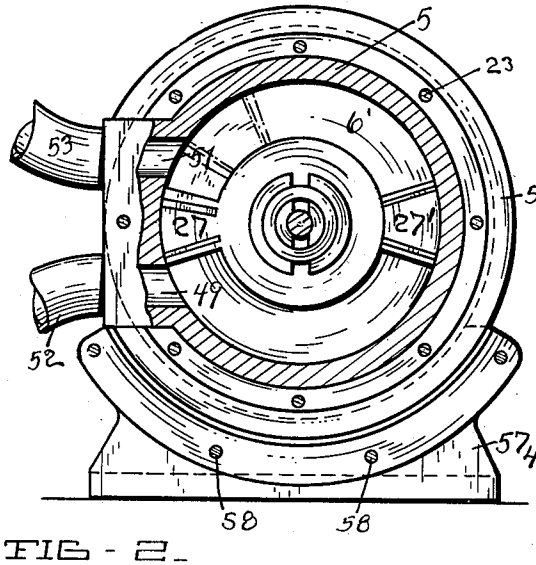


FIG - 2.



FIG - 6.

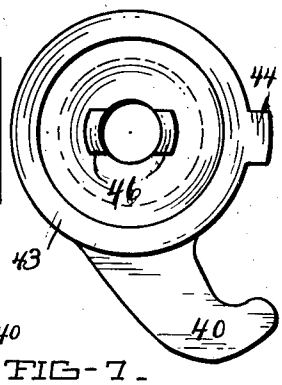


FIG - 7.

INVENTOR

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BY

ATTORNEY

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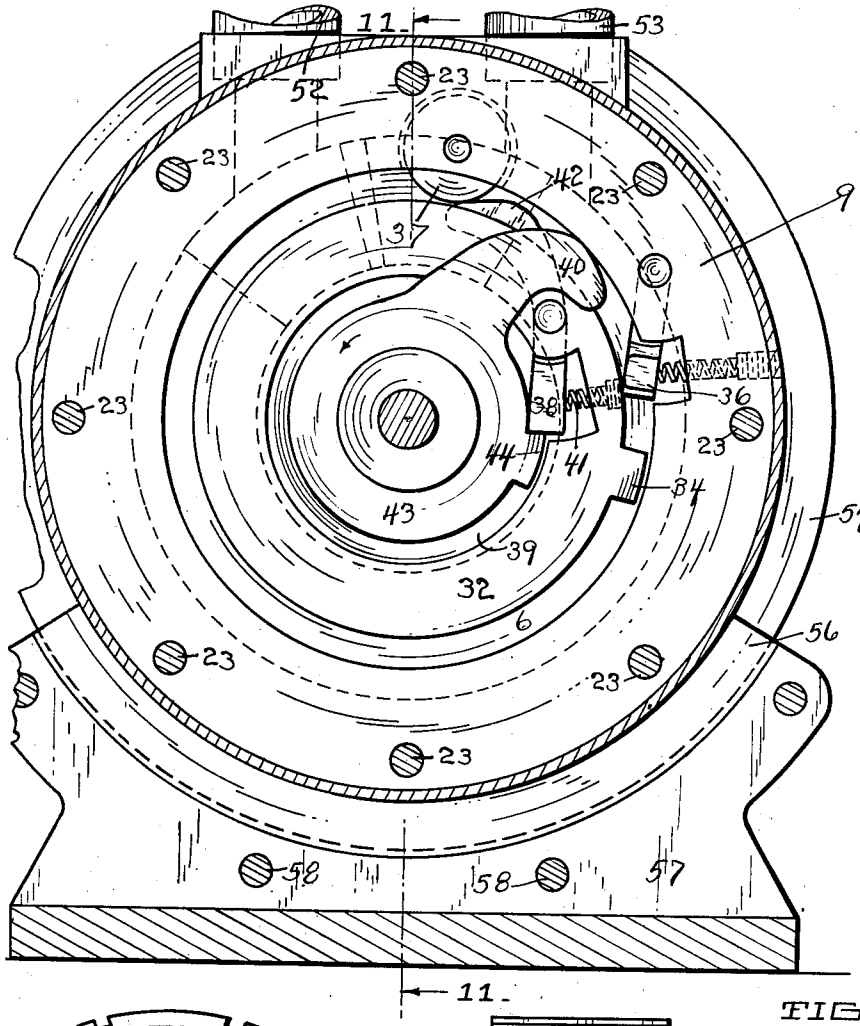


FIG- 8.

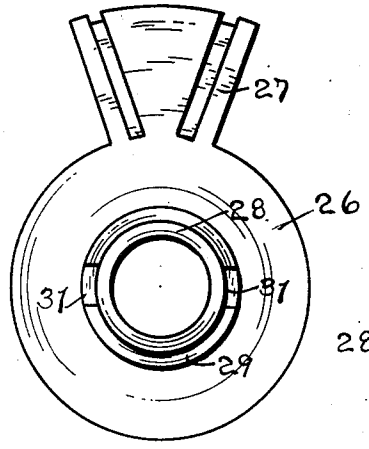


FIG - 9.

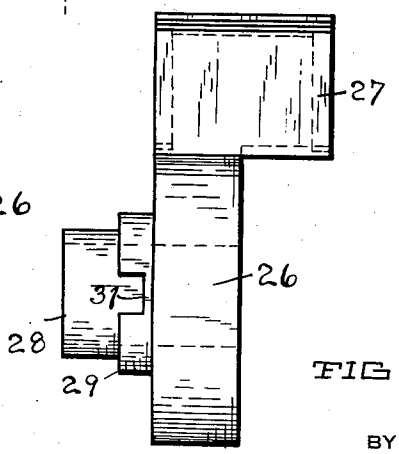


FIG-10.

INVENTOR

C. C. ENGLISH.

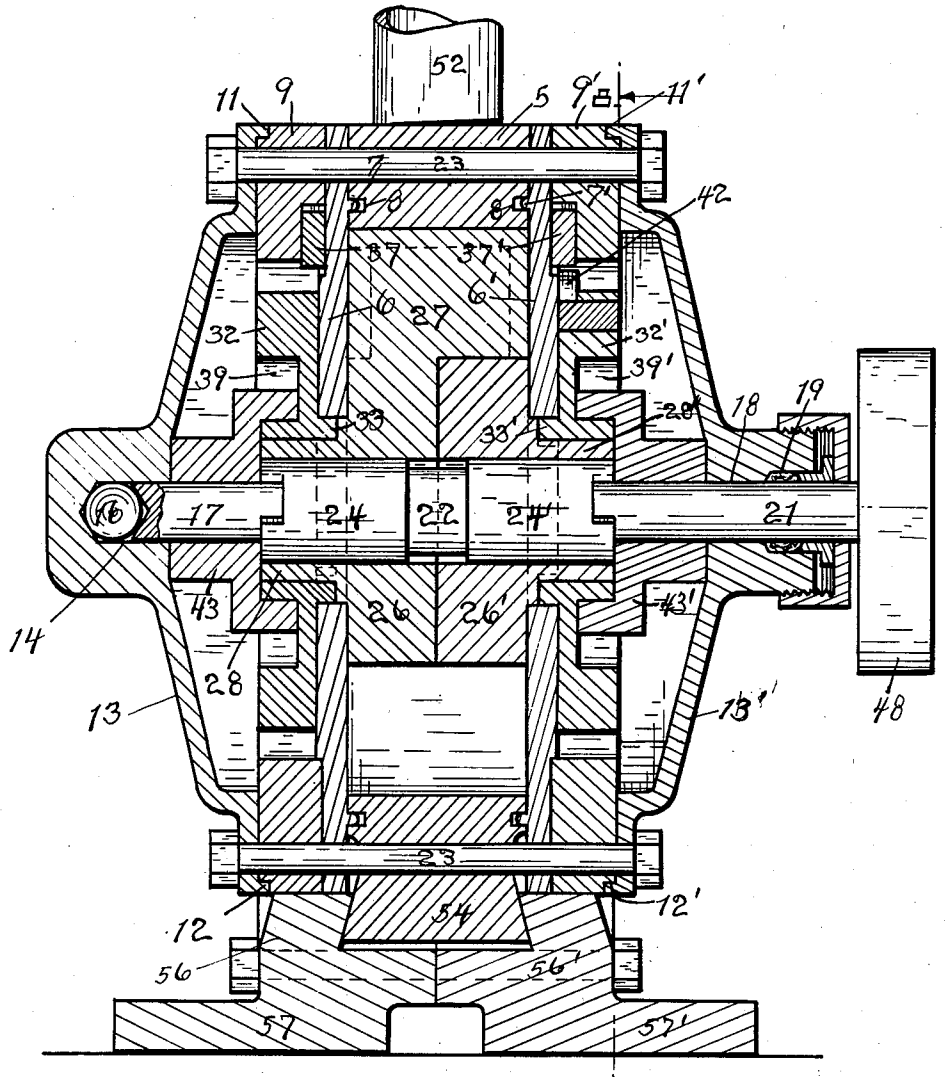
BY

ATTORNEY

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8 ← FIG-11

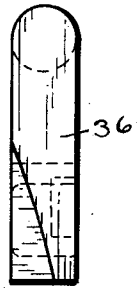


FIG-12

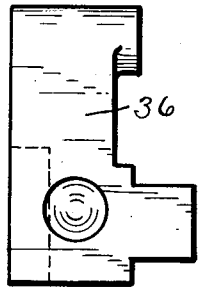


FIG-13

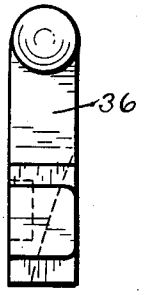


FIG-14

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Nov. 26, 1940. C. C. ENGLISH 2,222,706

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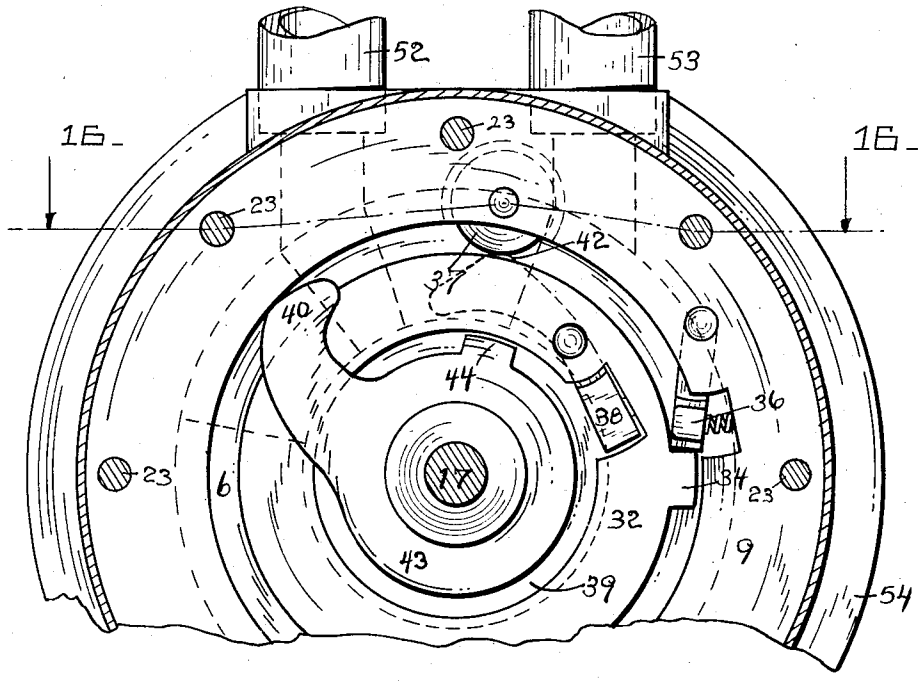


FIG-15.

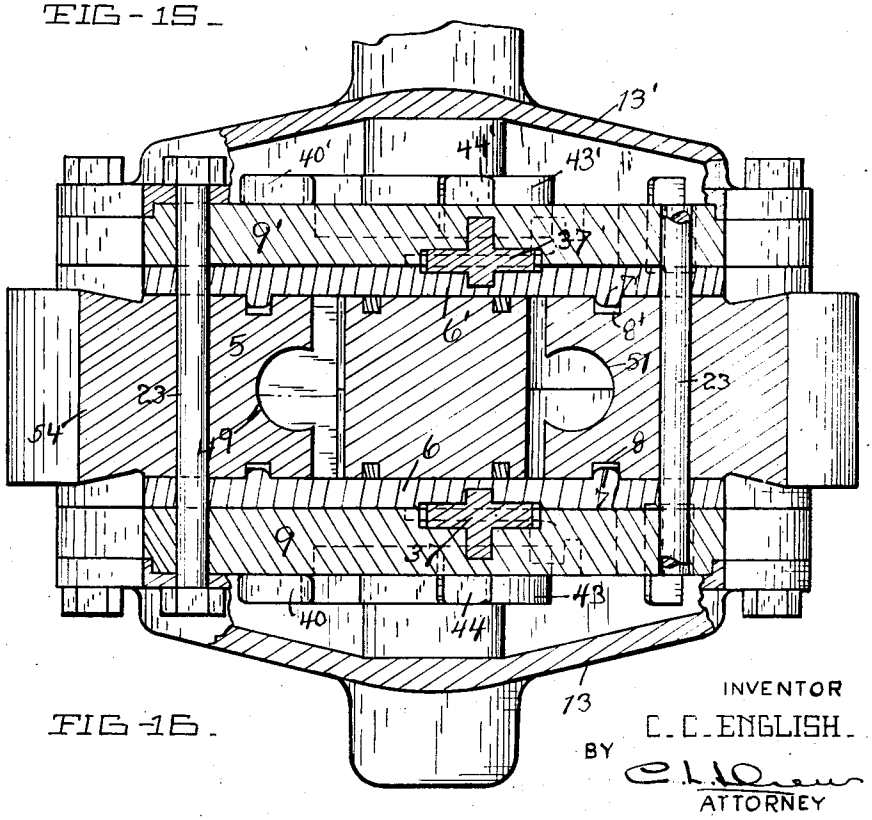


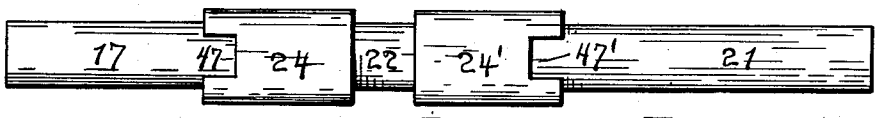
FIG-16.

INVENTOR
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Nov. 26, 1940. C. C. ENGLISH 2,222,706

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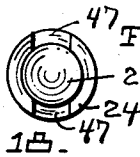
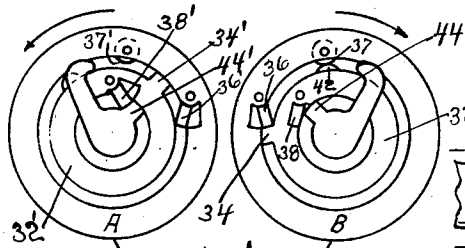
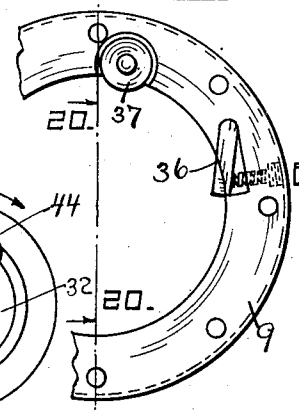


FIG-17.

FIG-18.







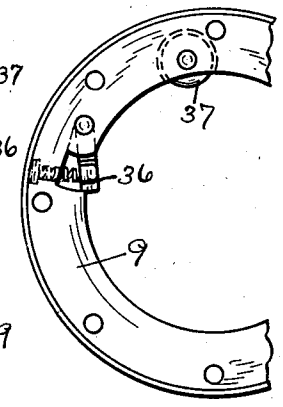


FIG-19. FIG-20. FIG-21.

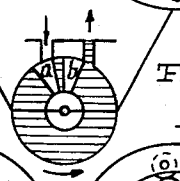
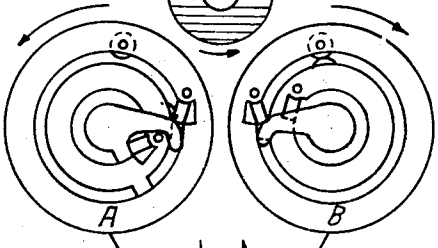


FIG-28.



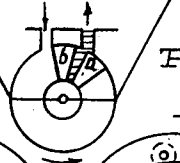


FIG-29.

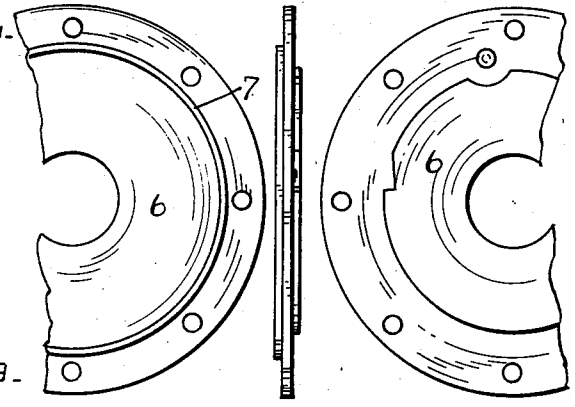
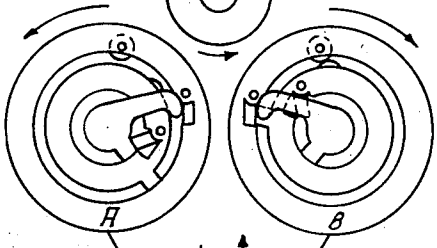


FIG-22. FIG-23. FIG-24.



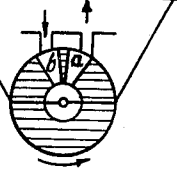


FIG-30.

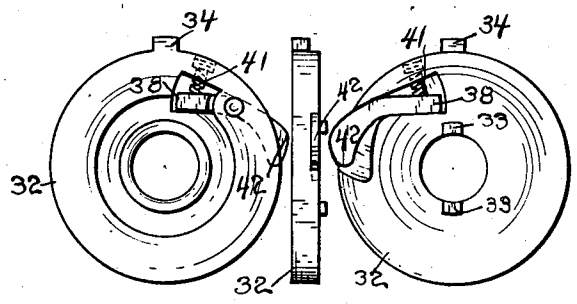


FIG-25. FIG-26. FIG-27.

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BY C. C. English

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Patented Nov. 26, 1940 2,222,706

UNITED STATES PATENT OFFICE

2,222,706

PUMP

Clarence C. English, San Francisco, Calif.

Application April 29, 1939, Serial No. 270,863

1 Claim. (Cl. 103—129)

This invention relates to improvements in pumps and has particular reference to a rotary pump—that is, a pump wherein the pistons move in an annular channel and in one continous direction.

The principal object of the invention is to produce a pump which is economical to manufacture, one which may be run at low speeds, one which will maintain a definite pumping pressure at a given speed, and one having a maximum capacity with a minimum of power.

A further object of the invention is to produce a pump wherein the assembly is such that all parts will automatically line up and will be locked in position, whereby production and assembly may be easily accomplished.

A still further object is to provide means for rotating the pump assembly in order that the inlet and outlet may be positioned where desired.

A still further object is to provide for the elimination of leakage with the provision of but a single packing gland.

Other objects and advantages will be apparent during the course of the following description.

In the accompanying drawings forming a part of this specification and in which like numerals are employed to designate like parts throughout the same,

Fig. 1 is a side elevation of my pump;

Fig. 2 is a side elevation, partly in cross section;

Fig. 3 is an enlarged side elevation of one of the driving dogs;

Fig. 4 is a view of the opposite side of Fig. 3;

Fig. 5 is an edge elevation of Fig. 4;

Fig. 6 is an enlarged edge view of one of the cam members;

Fig. 7 is a side elevation of Fig. 6, looking in the direction of the arrow of Fig. 6;

Fig. 8 is a side elevation of the pump on an enlarged scale taken on the line 8—8 of Fig. 11 and showing portions thereof in elevation;

Fig. 9 is an enlarged side view of one of the hub blocks and its attached piston;

Fig. 10 is an edge elevation of Fig. 9;

Fig. 11 is a cross sectional view taken on the line 11—11 of Fig. 8;

Fig. 12 is an enlarged edge elevation of one of the piston locking dogs;

Fig. 13 is a front elevation of Fig. 12;

Fig. 14 is an edge elevation of Fig. 13 taken from the right;

Fig. 15 is a fragmentary view similar to Fig. 8, showing the piston driving ring in locked position;

Fig. 16 is a cross sectional view taken on the line 16—16 of Fig. 15;

Fig. 17 is a side view of the driving shaft;

Fig. 18 is an end view of Fig. 17;

Fig. 19 is a fragmentary side view of one of the locking rings;

Fig. 20 is a cross section of Fig. 19 taken on the line 20—20;

Fig. 21 is a side elevation of the opposite side of Fig. 19;

Fig. 22 is a fragmentary side elevation of one of the side plates;

Fig. 23 is an edge elevation of Fig. 22;

Fig. 24 is the opposite side of Fig. 22;

Fig. 25 is a side elevation of one of the piston driving rings;

Fig. 26 is an edge elevation of Fig. 25;

Fig. 27 is the opposite side of Fig. 25;

Fig. 28 is a schematic diagram of the opposite sides of the pump at the beginning of the discharge cycle;

Fig. 29 is a similar view at substantially the end of the discharge and intake cycle; and

Fig. 30 is a similar view at the period between the intake and discharge cycles.

Applicant has produced a pump which will deliver a positive pressure in a constantly flowing stream without pulsations by employing an annular chamber in which a pair of pistons intermittently follow each other through a circular path. These pistons are intermittently locked, the locked one serving as an abutment between the intake and the exhaust ports. Applicant has also so arranged the parts of the pump so that when positioned about a center axis, all the parts may be assembled with the assurance that they will be in proper alignment and properly timed to perform their respective functions. Applicant has also provided means whereby the entire pump may be rotated upon its base so that the discharge and intake ports may be moved to a point where the most convenient connection may be made.

As both sides of the pump are identical, with the exception that the parts are left and right, and to simplify the specification, but one side will be described, using ordinary numerals for one side and the same numerals primed for the opposite side.

In the accompanying drawings wherein for the purpose of illustration is shown a preferred embodiment of my invention, it will be noted that the pump consists essentially of an annular ring 5, the inner periphery of which forms the outer periphery of the annular piston chamber. To

this ring are attached side plates 6 and 6', each having a projection 7 which enters a packing groove 8 formed in the ring 5. Attached to the plate 6 is a stationary locking ring 9, which is recessed as at 11, to receive the flange 12 of the cover plate 13, which also serves to center the cover plate with respect to the ring 9.

The cover plate 13 is provided with a bearing 14, in which is positioned a thrust ball 16, against which the reduced end 17 of the shaft 22 abuts. The cover plate 13' is provided with a bearing 18 and is sealed through the medium of an ordinary gland 19, within which rotates the reduced end 21 of the shaft 22.

Tie bolts 23 serve to hold the parts thus far described in proper alignment and all centered with respect to the axis of the shaft 22. Formed upon the shaft 22 is an enlargement 24, positioned to one side of the medial line of the pump, and upon this enlarged portion 24 is positioned a freely rotatable piston block 26 having a piston 27 secured thereto. This piston block is further provided with a tubular extension 28 having a collar 29 and recesses 31.

By viewing Fig. 11 it will be noted that the tubular extension 28 and its collar 29 extend through the plate 6 and form a bearing upon which the piston driving ring 32 is positioned.

By referring to Figs. 25, 26, and 27 it will be noted that this driving ring 32 has projections or keys 33 which engage the recesses 31 formed in the collar 29, thus locking the driving ring to the piston block. Therefore, the piston 27 and its ring 32 will always move in unison. This ring is also provided with a groove 39, the purpose of which will be later seen. This driving ring has a peripheral extension or lug 34 which extends toward the inner periphery of the locking ring 9 so as to be engaged by a spring-pressed locking dog 36, pivotally mounted in the ring 9 (see Figs. 19, 20, and 21). This ring 9 has recessed therein a roller 37, which roller lies between the ring 9 and the plate 6 (see Fig. 16), the purpose of which will be later seen. Recessed in the surface of the driving ring 32 is a driving dog 38 extending into the annular recess 39 and normally held in the positions of Figs. 25, 26, and 27 by a spring 41. This driving dog has a lever 42 which extends beyond the periphery of the ring 32 and is adapted to engage the roller 37.

Mounted upon the small end of the shaft 22 is a cup-shaped disc 43, the annular rim of which extends into the groove 39 and has a projection 44 radially extending therefrom, and a cam 40 is also radially arranged thereon. Lugs or keys 46, formed within the cup-shaped disc, engage the recesses 47 formed in the enlarged portion 24 of the shaft 22, thus locking the cam member 40 to the shaft, whereby the member 43 and its cam 40 always rotate with the shaft.

A driving pulley is shown at 48, and intake and exhaust ports are shown at 49 and 51 respectively. These ports connect to intake and exhaust pipes 52 and 53 respectively.

The ring 5 is provided with a dovetail extension 54 extending around the outer surface of the ring, whereby the same may be engaged by annular dovetail flanges 56 of the base 57. As this base is constructed in two sections, it is obvious that by tightening the bolts 58, the two sections of the base may be clamped together to hold the flange 54 in any adjusted position.

The cycle of operation is as follows:

Assuming that the piston 27 is in the position *b* of Fig. 29, then all parts to which this piston is connected will be at rest—that is, in locked position, due to the fact that this piston 27 is attached to the block 26, which is connected to the driving ring 32, the lug 34 of which is bearing against the locking dog 36, as indicated in section B of Fig. 29. Therefore, as the piston 27', which is being driven, approaches the piston 27, fluid between the approaching sides of the pistons will be discharged through the port 51, and fluid will be drawn into the pump space between the receding faces of the pistons. The piston 27' is moving in a counterclockwise direction due to the fact that the pulley 48 is delivering power to the shaft 22, to which is connected the cup-shaped member 43' having a peripheral lug or projection 44' and a cam 40'. This lug 44' is in engagement with the driving dog 38' of the driving ring 32', which is connected to the piston block 26' carrying the piston 27'. As the piston 27' reaches the position *a* of Fig. 29, the cams 40 and 40' will engage the locking dogs 36 and 36' respectively, lifting them simultaneously, with the result that the lifting of the dog 36 out of the path of the lug 34 will release the driving ring 32 and its attached piston. Lifting of the dog 36' will accomplish nothing at this time, and the dog 36' will again drop back into position ready to be engaged by the advancing lug 34'. (It is here to be noted that the lugs 34 and 34' are radially offset from each other to provide the timing of the piston movement. See the position of the lugs 34 and 34' in Fig. 28.)

A small amount of fluid trapped between the approaching pistons now acts to move the unlocked piston 27 from the position *b* of Fig. 29 through the position shown in Fig. 30 to that of position *a* shown in Fig. 28, and the piston 27' will then be in the position *b* of Fig. 28, locked and ready to function as an abutment, the same as the piston 27 has been doing.

Just before the lug 34' engages its locking dog 36' to stop movement of the piston 27', it becomes necessary to unlock this piston from its driving connection, which is accomplished by having the lever 42' engage the roller 37', thus lifting the driving dog 38' out of its engagement with the lug 44', thereby freeing the driving shaft 22 from the piston 27'. In order to now drive the piston 27, the lug 44 engages its driving dog 38, carried on the driving ring 32, which is connected to the piston 27.

It is also to be noted that my pump can be run backwards without any damage to the parts thereof, which might occur should the driving motor be reversed for some reason. When the shaft 22 revolves in a clockwise direction, it will be free to rotate without moving any of the parts other than the cup-like members 43 and their cams 40.

Thus, it will be seen that there is a constantly rotating driven shaft upon which is mounted freely rotatable pistons. It will further be seen that I have provided means for locking one of the pistons in a stationary position, driving the other of said pistons toward the locked piston in an annular chamber to then release the locked piston and the driven piston at a predetermined time and to then lock the previously driven piston against movement and to establish a driving connection with the free piston.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same and that various changes relative to the material, size, shape and arrangement of parts may be re-

sorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described my invention, I claim:

In a fluid pump, an annular ring having a fluid inlet and outlet port formed therein, side plates secured to said ring to form a piston chamber, a rotatable shaft extending through said plates, freely rotatable piston blocks mounted in axial alignment on said shaft and each provided with an extension, a single piston carried by each of said blocks, each piston overlapping its adjacent block, a driving ring secured to each of said piston block extensions, a radially disposed lug carried by each of said driving rings, locking rings mounted on opposite sides of said annular ring and having their inner peripheries spaced from the outer periphery of their adjacent driving rings, a spring-pressed locking dog mounted in each of said locking rings and adapted for movement to engage the radially disposed lug of their adjacent driving rings, a driving dog carried by each of said driving rings, a cup-shaped member freely rotatably mounted on each of said driving rings and rigidly secured to said shaft to rotate therewith, each cup-shaped member having a radially arranged projection adapted to be engaged by its respective driving dog, said driving dogs being movable into and out of engagement with its adjacent projection, a cam carried by each of said cup-shaped members, each of said cams being in radial alignment and adapted to simultaneously engage said locking dogs whereby said locking dogs will be moved out of the path of movement of said radially disposed lugs, a lever connected to each of said driving dogs, means arranged to engage said levers at certain times in the rotation thereof, whereby said driving dogs may be moved out of the path of movement of said radially arranged projections, both of said cup-shaped members being secured to said shaft, said last-named means and said cams being so arranged to time the unlocking of both pistons from the shaft as one of the pistons reaches the outlet port and to lock said last-mentioned piston between the outlet and inlet ports.

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