Aug. 13, 1929. A. WINTON 1,724,156

PUMP STRUCTURE

Filed Oct. 8, 1927

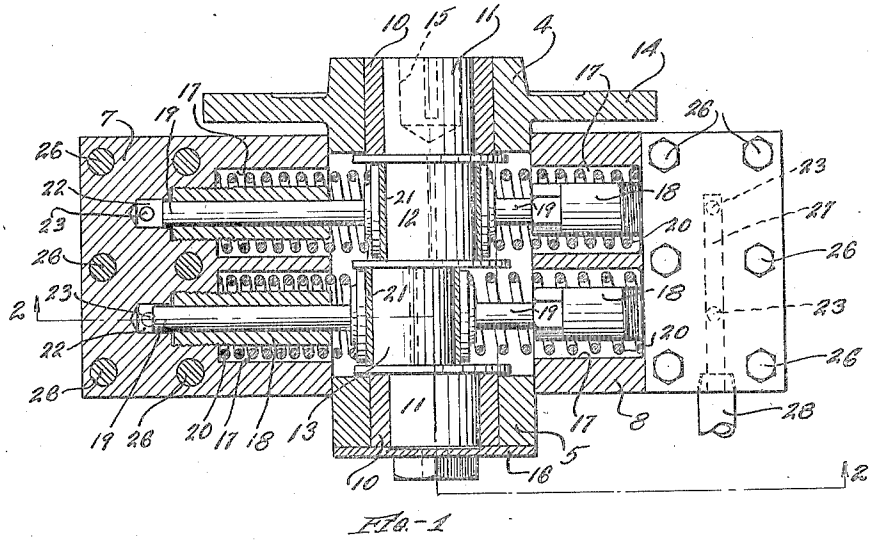

FIG. 1

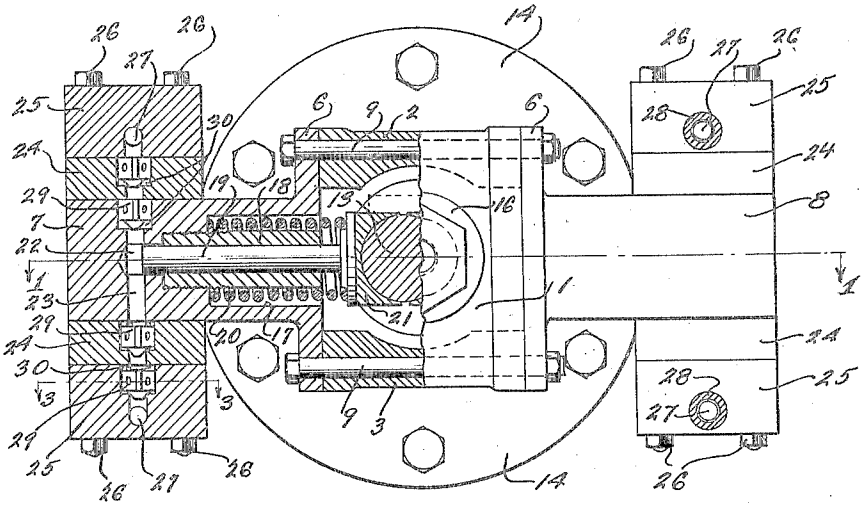

FIG. 2

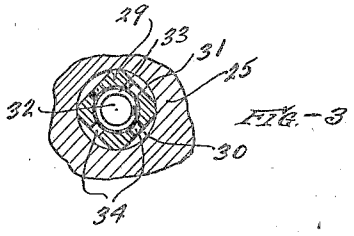

FIG. 3

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UNITED STATES PATENT OFFICE.

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PUMP STRUCTURE.

Application filed October 8, 1927. Serial No. 224,915.

This invention relates to pumps and more particularly to pumps of single acting reciprocating type adapted for delivering relatively small quantities of liquids at very high pressures.

The objects of the invention are to provide such a pump of the simplest and cheapest possible construction and one which will function with high efficiency throughout a long life of service, and in which ready accessibility may be had to all of the working parts.

The example chosen for purposes of illustration of my invention is a four cylinder pump designed for fuel feed employment in connection with an internal combustion engine of the solid fuel injection type, and is shown in the accompanying drawings in which Fig. 1 represents generally a longitudinal section through the pump as in the plane of line 1—1, Fig. 2; Fig. 2 is a combined end view and transverse section of the same pump as in the plane of line 2—2, Fig. 1; Fig. 3 is a detail of one of the check valves which forms a part of the pump, as taken along the line 3—3, of Fig. 2.

In the example chosen for illustration a generally rectangular open-sided base casting 1 is provided having longitudinally and transversely extending upper and lower members 2 and 3 and end members 4 and 5. The sides of the base casting are closed by a pair of head blocks 7 and 8, the flanges 6 thereof being secured in abutting relation with the upper and lower portions of the base by bolts 9. The ends of the base 1 are bored out to receive bushings 10 in which is mounted a crank shaft 11 having a pair of cranks 12, 13 arranged at 90°. The end 4 of the base is flanged as at 14, whereby the same may be conveniently mounted in its operating position with suitable driving connection in the socket 15 of the shaft 11; the opposite end of the base being closed as by a cap 16. Each head block is step-bored out to three diameters as at 17 in the plane of each of the cranks as indicated in the drawings, and the intermediate portion of each bore is threaded to receive gland 18. Very accurately fitted in each gland is a plunger 19. The outer end of each plunger fits loosely in the smallest or dead end portion of its bore in the head block. The opposite end of each plunger carries a mushroom type of head. Surrounding each gland 18 is a helical spring 20 maintained in compression between the adjacent shoulder in the head block and the head of its plunger. Each plunger head is finished to present the flat face which bears against the saddle block 21 seating with a bearing of somewhat less than 180° upon the adjacent crank.

The arrangement is obviously such that upon rotation of the crank shaft reciprocal motion will be imparted to the plungers 19 by the saddle blocks bearing with sliding movement against the plunger head faces, outward strokes of the plungers being effected by positive power and return strokes of the plungers by the springs 20. The smaller or end portions of the bores in the head blocks comprise cavities 22 in which the plunger ends move to form expansion chambers.

Making connection with each expansion chamber is a transverse well 23 extending entirely through the head block, and the opposite faces of each head block in which the wells 23 terminate are finished off to receive each a valve chamber block 24. The outer surface of each block 24 is similarly finished to receive a cap block 25. The blocks 24 and 25 are maintained in the described assembly with the head blocks by bolts 26 which pass entirely through the parts named. Each cap block 25 has a longitudinal manifold bore 27 in communication through leads 28 extending from the bores 27, and through the blocks 24, with the wells 23 in the adjacent head blocks.

The upper faces, (Fig. 2) of the blocks 24, head blocks 7 and lower cap blocks 25 are counter-bored as at 30 in alignment with the wells 23 and communicating passages to receive valves 29. Each valve 29 has cylindrical transverse extremities fitting for sliding movement in one of the counter-bores 30, and is laterally faced off to form faces 31 clearing the adjacent walls of its bore 30. The lower surface of the valve is tapered to seat in the shoulder formed by the counter-bore 30 and the valve is provided with a counter-bored depression 32 in which may be seated a compression spring 33 by which the valve is yieldingly maintained in seated position. In each face 31 is a drilled opening 34 leading to the depression 32, through which, when the valve is unseated, fluid may pass inwards through the holes and by the valve.

The operation of the pump will be apparent. The valves are all arranged to pass fluid upwards, (Fig. 2), but prevent any back flow, two valves being in series on each side of each expansion chamber to insure prevention of leakage. As the plungers 19 are reciprocated by rotation of the crankshaft as already described, fluid will be pumped through each head block upwards, (Fig. 2), past the valves, the lower pair of manifolds 27 having suitable connection with a fluid supply, the upper of the manifolds delivering the fluid against pressure.

What I claim is:

1. In a pump, a base having a lateral opening, a head block secured with said base to close said opening, and having a bore terminating in a cavity, a gland secured in said bore, a plunger slidable in said gland and having a head, a crank shaft mounted for rotation in the ends of said base and having a crank in the plane of said plunger, a saddle block fitting over said crank, a spring arranged in said bore about said gland and bearing against said plunger head to maintain the same against said saddle block and said saddle block against said crank, and valves arranged to control communication with said cavity.

2. In a pump, a base having a lateral opening, a head block secured with said base to close said opening and having a bore terminating in a cavity and opening into said base, a gland secured in said bore adjacent said cavity, a plunger slidable in said gland and having a head, a crank shaft mounted for rotation in the ends of said base and having a crank in the plane of said plunger and having flanges adjacent said crank, a saddle block fitting over said crank between said flanges, said port being counterbored adjacent said gland, a spring arranged in said counter-bore about said gland and bearing between said plunger head and the base of said counter-bore, said plunger head having a face adapted to bear against said saddle block, and valves arranged to control communication with said cavity.

3. In a pump, a base having a lateral opening, a head block secured with said base to close said opening and having a bore terminating in a cavity, a gland secured in said bore, a plunger slidable in the gland and having a head, a crank shaft mounted for rotation in the ends of said base and having a crank in the plane of said plunger, a saddle block fitting over said crank, a spring arranged in said bore about said gland and bearing against said plunger head to maintain said head against said saddle block and said saddle block against said crank, said head block having a passage communicating with said cavity and being counter-bored to form a chamber, a valve in said chamber and seating against the shoulder formed thereby, a valve chamber block secured with said head block to secure said valve in said counter bore and having a passage communicating therewith, the passage in said valve chamber block being counter-bored similarly to the passage in said head block, to form a second chamber, a valve in said second chamber, and a cap block having a passage communicating with said second chamber.

In testimony whereof I hereby affix my signature.

ALEXANDER WINTON.