

[54] PUMP HOUSING FOR USE WITH TOP MOUNTED OR REMOTE MOUNTED RESERVOIRS

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[22] Filed: Dec. 17, 1970

[21] Appl. No.: 99,057

[52] U.S. Cl. 418/270, 417/310

[51] Int. Cl. F01c 21/00, F03c 3/00, F04c 15/00

[58] Field of Search 418/70, 149, 270;
417/300, 310

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UNITED STATES PATENTS

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Primary Examiner—Carlton R. Croyle

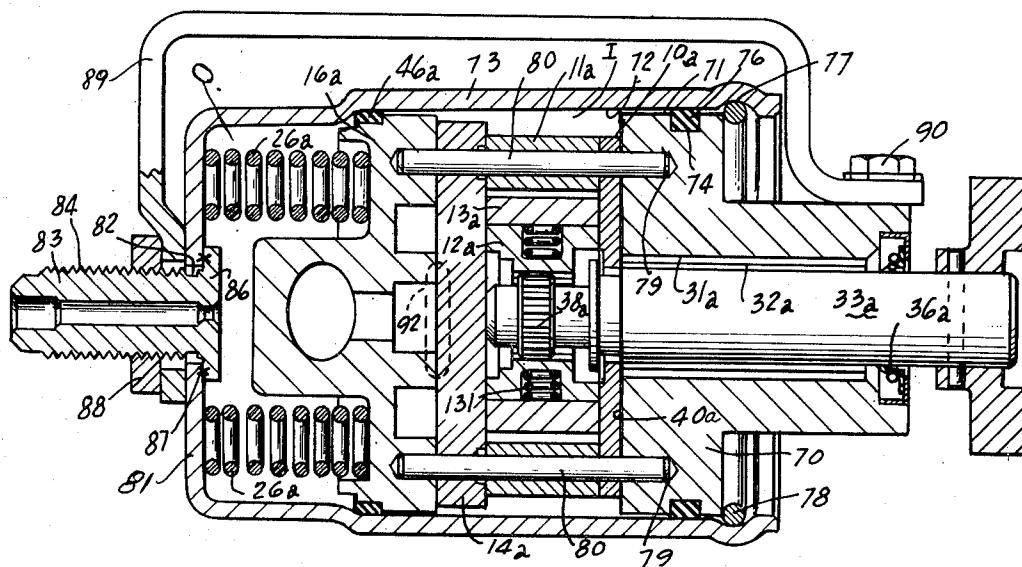
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[57] ABSTRACT

A compact housing construction for a power booster pump of the type having a stack-up of parts forming an operative pump unit wherein first and second axially disposed housing parts together form a cylindrical housing envelope for closing the stack-up of parts, the parts being sized and shaped to form complementary inner and outer diameters with a seal groove and a locking groove formed therein so that one part may be inserted within the other. One of the parts has an inlet opening for connection to a top mounted or remote mounted reservoir.

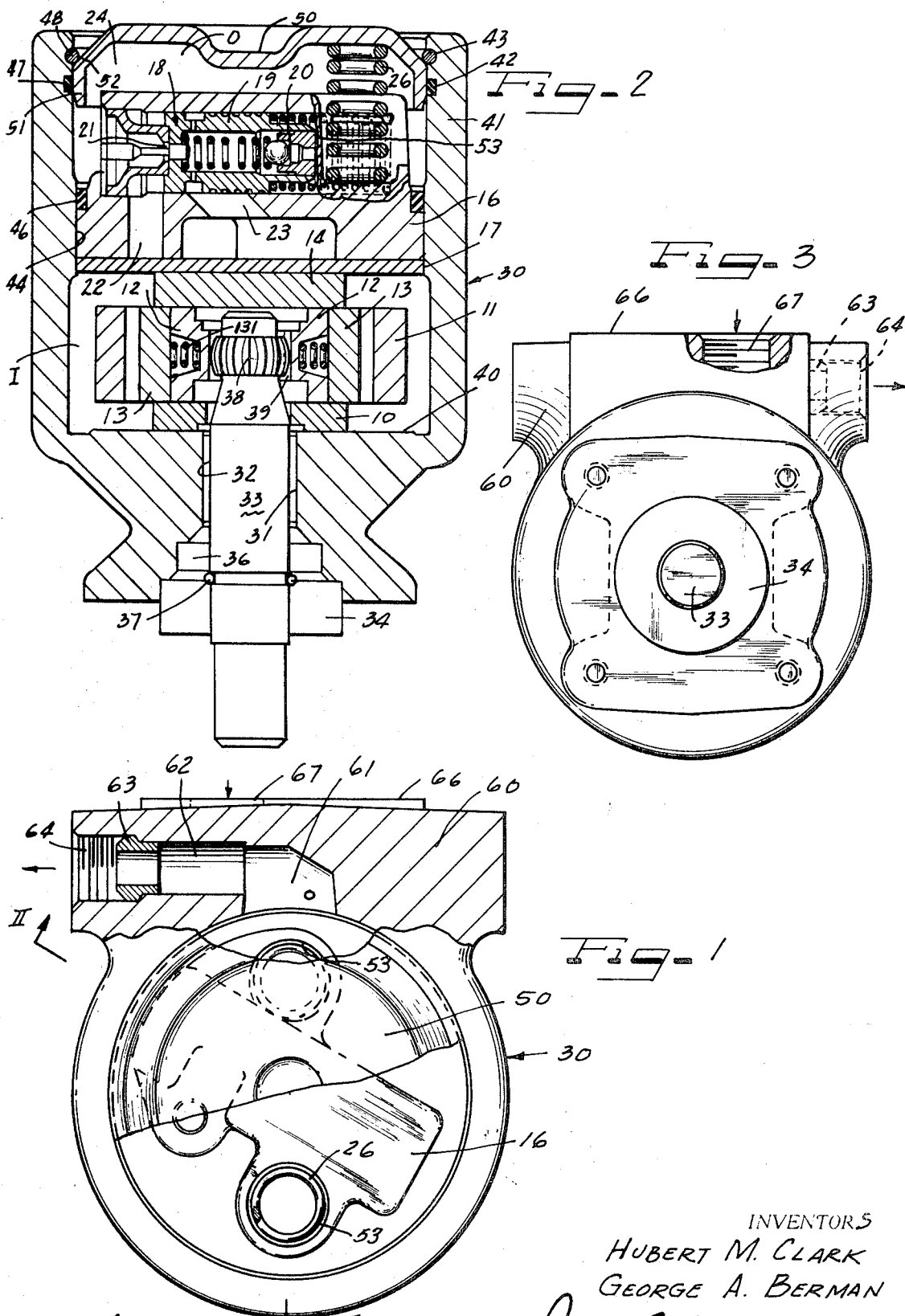
1 Claim, 6 Drawing Figures



PATENTED JUN 12 1973

3,738,784

SHEET 1 OF 2



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Fig. 4

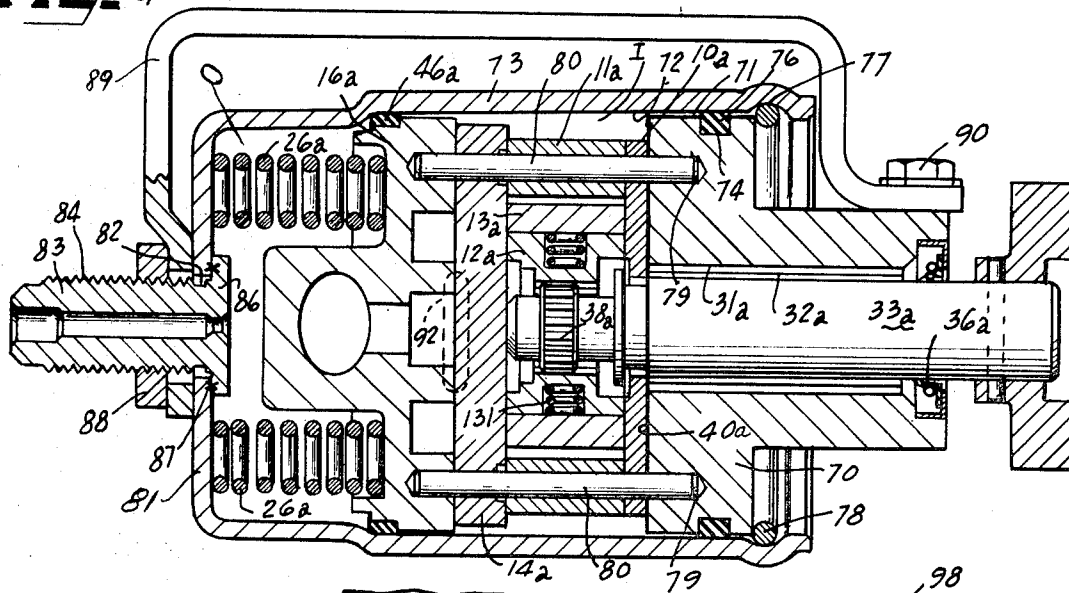


Fig. 5

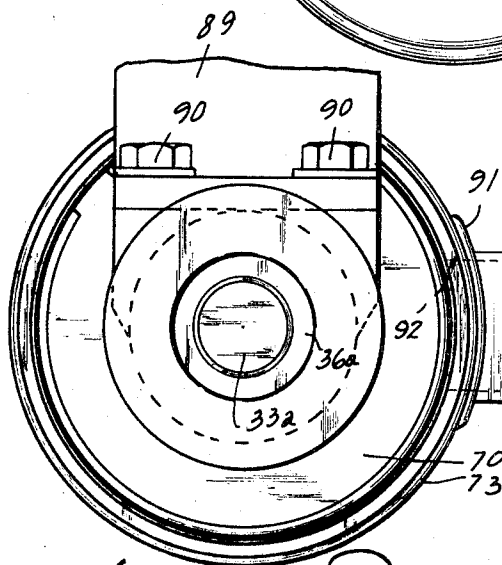
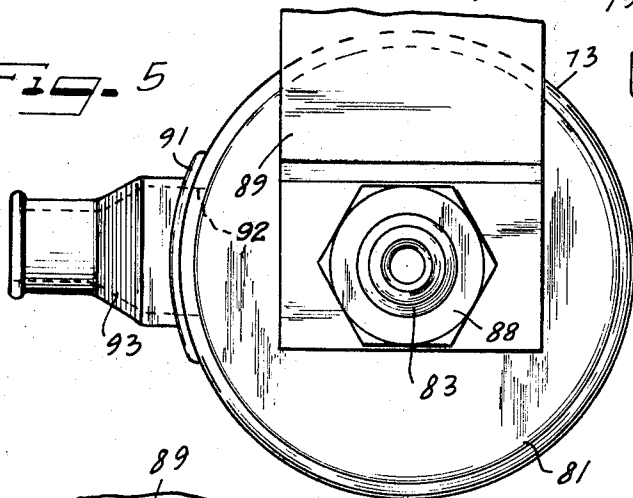
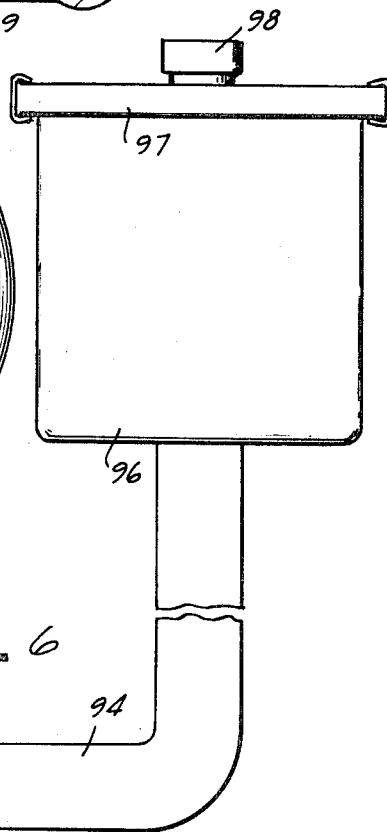


Fig. 6



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PUMP HOUSING FOR USE WITH TOP MOUNTED OR REMOTE MOUNTED RESERVOIRS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates generally to power booster pumps and more particularly to a compact housing construction for a power booster pump adapted to be connected to a top mounted or remote mounted reservoir.

2. The Prior Art

The prior art is exemplified by U.S. Pat. No. 3,200,752 wherein is disclosed a power booster pump which has been widely used in the automotive industry as a power steering pump.

In many vehicle installations, particularly in compact or foreign automobiles, and in trucks and tractors, where pumps may be gear driven from the engine, the power booster pump disclosed in U.S. Pat. No. 3,200,752 is too large in size to assemble in the space available. Further, in many instances, the location of the pump is required to be such that a reservoir mounting remote from the pump is required in order that the reservoir be accessible for easy filling.

SUMMARY OF THE INVENTION

In accordance with the present invention, a compact housing construction is provided which is capable of utilizing a maximum number of the parts and assemblies constituting a stack-up of parts as shown in U.S. Pat. No. 3,200,752 and which form an operative pump unit. The compact housing construction features the utilization of first and second axially disposed housing parts which together form a cylindrical housing envelope for enclosing the stack-up of pump unit parts.

The housing parts are sized and shaped to form complementary inner and outer diameters with a seal groove and a locking groove formed therein. A seal ring is situated in the seal groove and a locking ring in the locking groove, thereby to retain the housing parts in sealed-together assembly when one of the housing parts is inserted within the other of the housing parts.

Further, one of the housing parts has formed thereon means providing an inlet opening for connection to a top mounted or a remote mounted reservoir.

In one form of the invention, the inlet opening intersects a flat mounting surface so that a top mounted reservoir may be situated directly superjacent the pump housing.

In another form of the invention, a boss providing the inlet opening has a nipple connection for coupling to one end of a flexible conduit. The other end of the flexible conduit is connected to a reservoir disposed at a location remote from the pump.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is an end elevational view with parts broken away and with parts shown in cross section showing a compact housing construction for a power booster pump in accordance with the principles of the present invention;

FIG. 2 is a cross sectional view taken on line II—II of FIG. 1;

FIG. 3 is a somewhat reduced view from the opposite end of that shown in FIG. 1 and showing parts broken away to illustrate additional details of the pump construction;

FIG. 4 is a cross sectional view showing an alternative construction in accordance with the principles of the present invention;

FIG. 5 is an end view of the pump shown in FIG. 4; and

FIG. 6 is an end view from the opposite end of FIG. 5 and showing the pump connected to a remote reservoir.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention is directed to a compact housing construction which is adapted to utilize and retain a maximum number of parts and assemblies as used in a power booster pump similar to that disclosed in U.S. Pat. No. 3,200,752. Accordingly, it will be understood that the actual operative portions of the pump unit contained within the compact housing construction of the present invention may correspond generally to such parts as are shown in U.S. Pat. No. 3,200,752. Thus, there is a lower pressure plate 10, a cam ring 11 forming a pumping chamber for a rotor 12 carrying a plurality of slippers 13. An upper pressure plate 14 is provided and a combination pressure plate and valve body is shown at 16. A spacer plate 17 may be interposed between the upper pressure plate 14 and the valve body 16.

A flow control valve is contained within the valve body 16 and is shown generally at 18. Thus, the flow control valve 18 comprises a spool 19 carrying a relief valve assembly shown at 20. The valve contains a flow orifice 21 and flow from a discharge passage 22 in excess of flow requirements is directed to a by-pass 23 back to the pump inlet. Fluid at pump generated outlet pressure is discharged into a discharge zone 24 and pressure loads the combination pressure plate and valve body 16, thereby to load the stack up of parts comprising the operative pump unit. Pressure plate springs are provided one of which is shown at 26.

In accordance with the principles of the present invention, the compact housing construction comprises first and second axially disposed housing parts which together with one another form a cylindrical housing envelope for enclosing the stack-up of parts. In the form of the invention shown in FIG. 2, a cast housing is used to accept the power booster pump components. The housing is shown generally at 30 and constitutes a generally cylindrical member in which is machined a bore 31 adapted to receive a bearing means shown at 32 and at 34 for journalling a shaft 33. A shaft seal is also received at 36, the shaft 33 being located in place by a shaft retainer ring 37.

The inner end of the shaft 33 has formed thereon splines as at 38 thereby to effect a driving connection with corresponding splines 39 formed interiorly of the rotor.

The housing 30 is counterbored thereby to form an end wall 40 forming a bottom face of an enclosure having an inner diameter size to receive the various pump components previously referred to. Thus, there is left an outer circumferentially continuous wall 41 particularly characterized by having formed inwardly adjacent the open end thereof a sealing ring groove 42 and a locking ring groove 43. If desired, a median portion of the inner diameter of the circumferentially continuous wall 41 may have a section 44 in which is received the spacer or separator plate 17 as well as the pressure

plate 14 and valve body 16. An O-ring sealing member 46 may be interposed between the surface 44 and the valve body 16, thereby to separate the interior of the cylindrical enclosure into an inlet area shown at I and an outlet area shown at O.

Received within the groove 42 is an O-ring sealing member 47 and received within the groove 43 is a locking ring 48.

Also received within the inner diameter of the circumferentially continuous wall 41 is a cover member shown generally at 50 and comprising an end wall extending across the open end of the cylindrical enclosure and including an axial wall portion 51 adapted to be engaged by the seal ring 47 and terminating in a circumferentially continuous shoulder 52 adapted to be abuttingly engaged against the locking ring 48.

The end wall of the cover 50 is formed with embossed portion as shown at 53 thereby to bottom the pressure plate springs, one of which is shown at 26 in FIG. 2.

As shown in FIGS. 1 and 3, the housing 30 is formed with a boss 60 having a passage 61 communicating with the outlet area O and through which fluid at pump generated pressure is directed through the passage 61, a passage 62 and a seat member 63 adapted to engage the coupling portion of a conduit leading to a point of utilization. To accommodate the coupling function, an outlet opening is shown at 64 threaded for cooperation with an appropriate coupling member.

The boss also has a flattened surface 66 intersected by an inlet opening 67, thereby to facilitate mounting on the flat surface 66 of a top mounted reservoir.

The form of the invention shown in FIGS. 4, 5 and 6 utilizes an alternate construction wherein a header is shown at 70 and is turned to an outside diameter 71 to fit the bore 72 of a drawn steel shell 73.

In this form of the invention, the header 70 has a groove 74 receiving an O-ring sealing member 76 and a drawn steel shell has an embossed groove 77 adapted to receive a locking ring 78.

The header is machined to provide a bore 31a in which is received a bearing 32a for journalling a shaft 33a. A shaft seal is provided at 36a.

The header 70 is further provided with an end or bottom wall 40a and includes recesses 79 for receiving dowel pins 80. The same general stack-up of parts is provided as previously referred to including lower pressure plate 10a, a cam ring 11a, a rotor 12a carrying a plurality of slippers 13a spring-biased by slipper springs 131 and the rotor being driven off the shaft by a splined connection shown at 38a. A combined upper pressure plate and separator plate is shown at 14a and a valve body is shown at 16a pre-loaded by pressure plate springs designated at 26a. An O-ring sealing member 46a establishes a seal between the valve body 16a and the circumferentially continuous wall 73 of the drawn steel housing, thereby to separate the interior of the housing into an outlet area O and an inlet area I.

The drawn steel shell includes an end wall 81 having a centrally disposed opening 82 in which is mounted a

discharge nipple 83 externally threaded as at 84 and having a flange 86 to facilitate connection by a weldment shown at 87.

A fastening nut 88 engages the threads 84 and locks the end of a bail 89, the other end of the bail being connected to the header 70 by means of studs as at 90. Thus, the bail 89 may be used for connecting the pump to a suitable mounting surface.

In accordance with the present invention, means are provided forming an inlet for the compact housing construction and such an inlet forming means is shown at 91 and may be conveniently welded to the steel shell in register with an inlet opening 92. A nipple coupling is shown at 93 by means of which the inlet may be connected to a flexible conduit 94 leading to a reservoir 96 situated and disposed at a location remote from the pump. The reservoir has a cover 97 and a filling opening 98. It will be appreciated that even though the pump may be relatively inaccessible, the filling opening 98 and the top of the reservoir 96 may be conveniently located in an accessible position for servicing purposes.

By virtue of the compact housing construction thus provided, a trusted and reliable power booster pump unit may be effectively utilized in areas of considerably restricted space. Further, the housing constructions thus provided facilitate utilization of the pump with either a top mounted reservoir or with a reservoir located and disposed in a remote location relative to the actual pumping unit.

Although minor modifications might be suggested by those versed in the art, it should be understood that we wish to embody within the scope of the patent warranted hereon all such modifications as reasonably and properly come within the scope of our contribution to the art.

We claim as our invention:

1. In a power booster pump, a header having an outside diameter forming a cylindrical wall, a cylindrical cup-shaped shell housing having an end wall and a circumferentially continuous side wall receiving said header in inserted assembly and for enclosing an axial stack-up of parts forming an operative pump unit, said header having an axial bore formed therein for journalling a shaft and for receiving and retaining a shaft seal and a shaft bearing means, said end wall of said shell housing having a centrally disposed opening in which is mounted an externally threaded discharge nipple, a bail having one end connected to said discharge nipple and the other end connected to said header, thereby to facilitate connection of the pump to a mounting surface, said side wall having an inlet forming means connected thereto and forming a coupling adapted for connection to a flexible conduit leading to a remotely disposed reservoir.

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