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[54] **HYDRAULIC PUMP**

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[51] **Int. Cl.**..... **F04b 49/08,** B66f 5/04

[58] **Field of Search**..... 417/568, 307, 311; 254/93 H, 93 R

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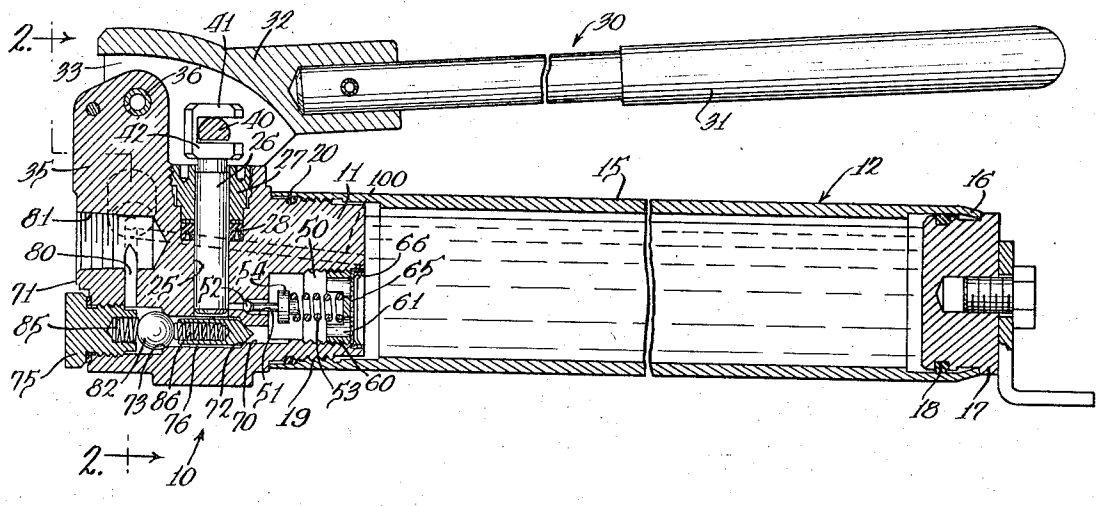
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[57] **ABSTRACT**

A hydraulic hand pump having an integral reservoir associated with a body having a handle assembly for operating the piston member of the pump. The pump has relief valve structure mounted in the body and communicating with the reservoir with use of a part of the same flow path for supplying fluid to the pump piston and with a passage mounting both an intake valve and an outlet check valve. An outlet sure port and a release valve associated therewith has a return passage leading to reservoir.

3 Claims, 2 Drawing Figures



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Fig. 1.

Fig. 2.

HYDRAULIC PUMP

BACKGROUND OF THE INVENTION

This invention pertains primarily to hand pumps and, more particularly, manually operable hand pumps having a self-contained reservoir and with a structural design providing for ease of manufacture and assembly of the required parts in a small package.

Hydraulic hand pumps are known which have a self-contained reservoir and a manually operable handle assembly connected to a pump piston mounted within the body of the pump. Such pumps are commonly used in operating jacks and other hydraulic devices wherein a portable source of hydraulic power is required. As a hand tool, the cost of a hydraulic hand pump is important as well as maintenance and repair.

SUMMARY

A primary objective of the invention disclosed herein is to provide a hydraulic hand pump which is constructed for ease of manufacture, with minimal number of parts and which may be easily disassembled for repair or replacement of parts with simple reassembly.

In the invention disclosed herein, the pump has a body provided with suitable passages and which mounts an intake valve, an outlet check valve, and a release valve and with a relation of flow passages whereby both the relief valve and intake valve can use a flow path which, in part, is common and leads to a reservoir which is self-contained with the pump. Additionally, a passage which supplies hydraulic fluid to a bore in which the pump piston is mounted and which communicates with the reservoir extends to an end of the body and has a multi-step diameter to provide valve seats for both the intake valve and an outlet check valve. The latter valves are positioned within the body passage and held in position by a closing member fitted into the passage and with springs positioned between the parts to yieldably hold the intake valve and the outlet check valve in closed position.

The pump body has a pressure port with an outlet passage leading thereto for receiving fluid pumped by the piston of the pump and with the outlet passage extending beyond the pressure port and terminating in a seat which opens to a release valve chamber and a release valve mounted therein. A return passage extends along a generally straight line between the release valve chamber to an end of the body communicating with the reservoir whereby the return passage and other passages may be accessible for machining from either a face of the pump body which extends into the reservoir or from an opposite face of the pump body.

The hydraulic pump has a relief valve with a settable spring and an adjustable perforate member for setting the spring force and with said adjustable perforate member also functioning as a positioning element for a filter to provide filtering of the hydraulic fluid which flows to the bore mounting the pump piston and past the intake valve.

In view of the foregoing, an object of the invention is to provide a new and improved hydraulic pump and, more particularly, a hydraulic hand pump having parts and flow passages arranged to minimize the number of parts required and the cost of manufacture.

Another object of the invention is to provide a hydraulic hand pump embodying the features and advantages as set forth in this Summary.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a vertical section of the hydraulic hand pump, taken generally along the line 1—1 in FIG. 2; and

FIG. 2 is an end elevational view of the hydraulic hand pump with parts thereof shown in section and taken generally along the line 2—2 in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The hydraulic hand pump has a body, indicated generally at **10**, with an outwardly extending part **11** which connects to a reservoir tube assembly, indicated generally at **12**, and which includes a tubular member **15** having an end **16** swaged onto an end plug **17** with a sealing O-ring **18** interposed therebetween. The opposite end of the tubular member **15** threadably attaches to the exterior of the outwardly extending body part **11**, as indicated at **19**, and with a sealing O-ring **20** interposed therebetween.

The pump body has a bore **25** mounting a movable pump piston **26** with the piston **26** movable in a retainer **27** threaded into an enlarged end of the bore. A seal member **28** surrounds the pump piston **26**.

The pump piston **26** is reciprocated in the bore by a handle assembly, indicated generally at **30**, including a handle **31** extended into an arm **32** pivotally mounted by means of a pair of spaced legs **33** and **34** to a body section **35** by a pivot pin **36**. The handle assembly **30** connects to the pump piston **26** by a pin **40** extending between the spaced legs **33** and **34** and engageable within a slot formed by spaced members **41** and **42** formed at the exposed end of the pump piston.

The outwardly extending part **11** of the pump body has a relief valve chamber **50** with a first passage **51** extending between the relief valve chamber **50** and the bore **25** for the pump piston **26**. The passage **51** has two sections of different diameter to provide a step intermediate its ends on which a relief valve ball **52** may seat, with the ball being urged against the seat by a spring **53** acting on a ball retainer **54** which engages against the ball **52**. The opposite end of the spring **53** seats against an adjustable perforate member **60** threaded into the relief valve chamber and with this member being provided with a series of flow passages **61** whereby fluid may flow therethrough. Rotation of the adjustable member **60** permits the setting of the pressure at which the relief valve will open. The adjustable member **60** also provides a locater for a filter screen **65** which is positioned against the adjustable member and which is held in position by a friction-type snap ring **66**. When a pressure created by the pump exceeds the setting of the relief valve, the relief valve ball **52** moves off its seat whereby fluid can flow through the passage **51** and the relief valve chamber **50** into the reservoir.

A second passage **70** extends from the relief valve chamber **50** to an exposed end **71** of the pump body and has a multi-step diameter in order to provide a valve seat **72** and a valve seat **73**. The end of the passage **70** is closed by a closure plug **75** threaded into an end of the passage. The passage **70** movably mounts an intake valve member **76** formed of hexagonal stock

whereby it is movably guided in the passage **70** while permitting flow therepast. The intake valve member **76** has a conical end coacting with the valve seat **72** whereby on the upstroke of the pump piston **26** fluid can be drawn from the reservoir, past the intake valve member into the bore **25.** On the pump stroke of the pump piston **26** the intake valve **76** closes. Fluid under pressure flows along the passage **70,** past the valve seat **73,** and to an outlet passage **80** leading to a pressure port **81.**

An outlet check valve includes a ball **82** coacting with the valve seat **73,** with the ball moving off its seat during flow of fluid to the pressure port **81** but being seated to prevent reverse flow.

From the foregoing, it will be seen that the first passage **51** providing for relief valve operation and the second passage **70** both communicate with the reservoir through the relief valve chamber **50** and that both the intake valve **76** and the outlet check valve **82** are positionable within the passage **70** through the opening closed by the closure plug **75.**

A spring **85** is seated in an opening in the inner end of the closure plug **75** and engages the outlet check ball **82** to urge the latter towards its seat **73** and a spring **86** is fitted within a recess in the intake valve member **76** and engages against the outlet check ball **82** whereby the intake valve member **76** is yieldably urged against its seat.

As seen particularly in FIG. **2,** the outlet passage **80,** which connects passage **70** with the pressure port **81** extends beyond the pressure port **81** into a release valve chamber **90,** with the end of the outlet passage **80** forming a valve seat **91** for a release valve member **92** having a conical end coacting with the seat. A guide **95** threadably seats in the release valve chamber, with a sealing O-ring **96** positioned to prevent leakage and with a knob **97** having a stem **98** threaded into the guide **95** engaging the release valve member **92** to hold the release valve member **91** on its seat. Backing off of the threaded stem **98** releases the release valve member **92** from its seat whereby fluid can flow from the pressure port **81,** past the valve seat **91** to a return passage **100** extending along a generally straight line from the release valve chamber **90** to the end of the body which opens into the reservoir.

With the construction disclosed herein it is possible to machine a plurality of openings and passages with a minimum number of set ups of the body **10,** with tooling entering from the end faces of the body **10.** The first passage **51** and second passage **70** are arranged to share a common passage to the reservoir, namely the relief valve chamber **50.**

As will be noted in FIG. **2,** the relationship of the components enables the single outlet passage **80,** which extends in line with the axis of the release valve chamber **90** to coact with the passage **70,** the pressure port **81** and the release valve chamber.

The multi-step diameter passage **70** houses a number of valve components built-up, one upon the other, for providing the necessary interaction with easy assembly and disassembly of these components. Access to these components is provided by removal of the closure plug **75.**

I claim:

1. A hydraulic pump comprising, a pump body with an outwardly extending part, a reservoir tube assembly fitted onto said part, means defining a bore in said body and a movable piston therein for pumping hydraulic fluid in response to reciprocation of the piston, a pair of passages communicating with said bore and with a chamber in said body part open to the reservoir, said pair of passages being generally parallel and opening to an end of said chamber, an intake valve in one of said passages, a relief valve in the other passage, said relief valve including a spring and an adjustable seating member for said spring in said chamber, openings in said seating member permitting flow therethrough between the reservoir and said pair of passages, a filter screen spanning said seating member, means for holding the filter screen in position adjacent said seating member, a pump pressure port, and an outlet check valve.

2. A hydraulic pump as defined in claim **1** wherein said one passage extends through said body with a pair of steps providing valve seats, said outlet check valve having a ball engaging one of said seats, said intake valve being formed of hexagonal stock with a recess therein, a first spring in said recess of the intake valve and engaging the ball to urge the intake valve to closed position and a second spring urging the ball against its seat.

3. A hydraulic pump as defined in claim **1,** a release valve chamber in the body, a straight-line outlet passage connecting said pressure port, said one passage terminating in a seat for said release valve chamber, a release valve in the release valve chamber in communication with said pressure port, and a return passage in said body extending along a straight line from said release valve chamber through said outwardly extending body part to communicate with the reservoir.

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