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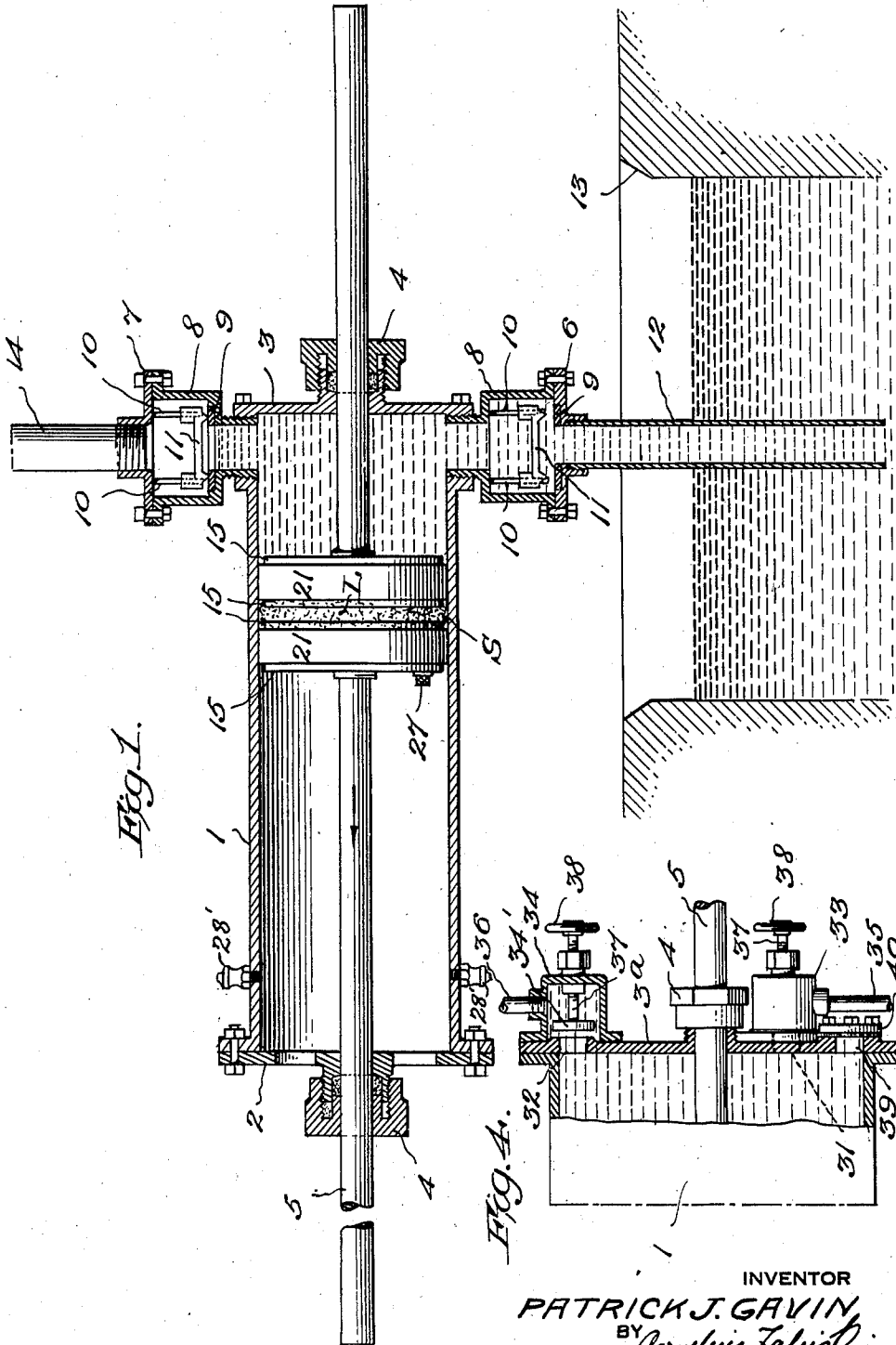
P. J. GAVIN

2,336,240

PUMP

Filed July 29, 1942

2 Sheets-Sheet 1



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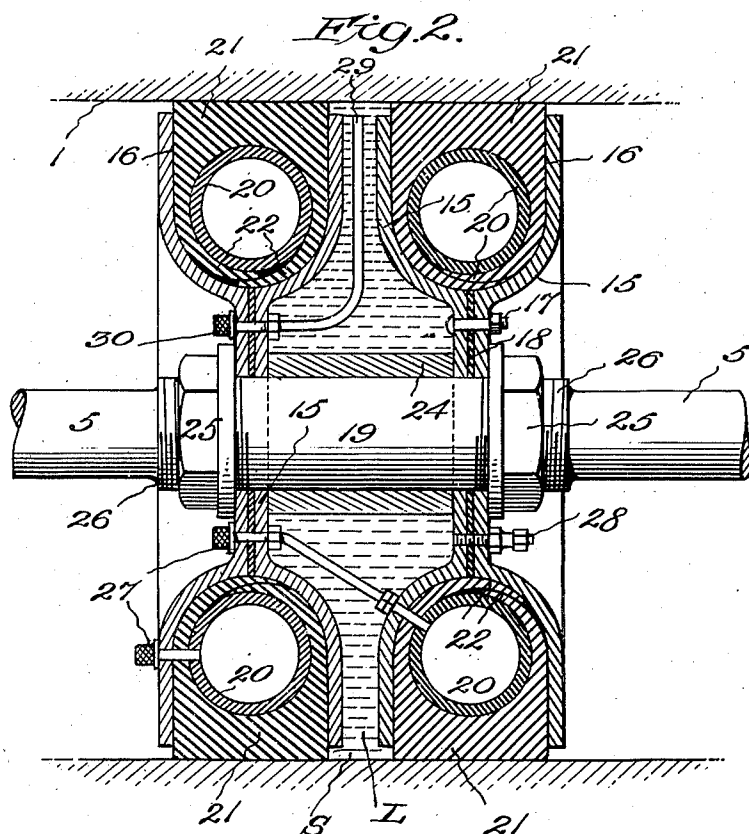
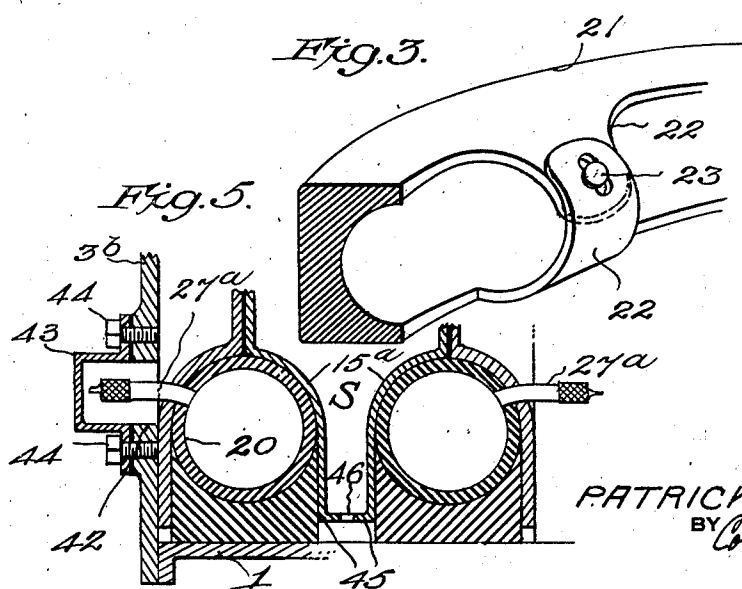
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PUMP

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3 Claims. (Cl. 309—2)

This invention relates to pumps and is directed more particularly to reciprocating piston pumps.

The object of the invention is to provide a novel piston construction with multiple packing which will effectually eliminate leakage and enable the pump to function with maximum efficiency.

Speaking generally, the piston of the present invention is of dual construction in that it provides two packing rings mounted in axially spaced relation on the piston rod and supported on said rod entirely independently of one another, with a pneumatic compression tube back of each ring to yieldably force the rings individually against the cylinder wall. Each ring is so constructed that it may be secured to the pneumatic tube, so as to facilitate the assembly of the parts.

Another feature of the invention consists in mounting piston units in spaced apart relation coaxially of the rod and interposing between such units a liquid or semiliquid lubricating medium, so as to fill the space between them, whereby the piston may be properly lubricated in such manner as to not only eliminate friction but to minimize leakage.

Features of the invention, other than those adverted to, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a longitudinal section through a pump embodying the present invention, illustrating the piston in elevation and showing the pump in the process of withdrawing water from a well or tank.

Figure 2 is a central section through the piston of such pump.

Figure 3 is a fragmental perspective view of one of the packing rings.

Figures 4 and 5 are fragmental sections of modified forms of construction.

Referring to the drawings, 1 indicates a pump cylinder provided at its opposite ends with heads 2 and 3. Each head is provided with a coaxial packing gland 4 for a piston rod 5, which extends axially through the cylinder and beyond the heads thereof. Adjacent the head 3 are inlet and outlet valves, generally designated by the reference characters 6 and 7, respectively. Both valves are of the same construction. Each

embodies a valve casing 8 having a valve seat 9 which is preferably of rubber. From the upper portion of each casing depend guide rods 10 and on these rods the sealing member 11 of the valve is mounted for vertical sliding movement. These sealing members are of the gravity type. They normally tend to gravitate into engagement with their seats 9 and are lifted from their seats by the suction or compression of the liquid, as the case may be.

In Figure 1 the inlet valve 6 is shown as connected to a supply pipe 12 which projects downwardly into a well or tank 13 from which liquid is to be drawn. The outlet valve 7 is connected to an outlet pipe 14 as shown.

On the piston rod 5 is mounted a piston which, through reciprocation of the rod 5, is caused to axially traverse the cylinder. The piston construction is best shown in Fig. 2. It embodies two piston units, both of which are of the same construction. Each piston unit comprises two identical face plates 15 which are so shaped that when assembled in complementary substantially face abutting relation, they form a substantially hour-glass shaped carrier provided with a circumferential channel 16. The face plates of each carrier are secured in assembled relation by bolts 17 with an intermediate gasket 18 and are centrally perforated to fit over an enlarged portion 19 on the piston rod 5. Positioned in the circumferential channel 16 of each carrier is a pneumatic tube 20, similar to the inner tube of an automobile tire and positioned between each tube 20 and the cylinder wall is an annular packing ring 21 which is preferably of rubber, composition or the like.

The packing 21 circumferentially embraces the pneumatic tube 20 and at spaced distances about such packing are formed tongues or ears 22 which are adapted to embrace the tube and overlap one another, so that they may be secured together by a suitable fastener 23, as shown in Fig. 3. These tongues when fastened together in overlapped relation secure the packing rings to the tubes so as to facilitate the assembly of the packing rings and tubes into the carriers, when the rivets or bolts 17 are removed. The two piston units, constructed as described, are assembled in spaced apart relation on the piston rod 5, with an intermediate spacer 24 and they are clamped against this spacer in rigidly assembled relation by means of nuts 25 screwed upon threaded portion 26 at opposite ends of the enlargement 19 of the connecting rod, as clearly shown in Figure 2.

To permit of inflating the tubes 20, they are provided with inflation nipples 27 which extend to the rear end of the piston and are provided with suitable closure caps. When inflated, these tubes 20 expand the packing rings 21 into close conformity with the cylinder wall in a manner to provide for a tight sliding joint between these parts so as to eliminate leakage.

To lubricate the piston, one of the piston units is provided with a filling nipple 28, preferably at the forward end of the piston so that oil, grease, liquid soap or other suitable lubricating material L may be introduced into the space S between the units, to entirely fill this space, or if desired the nipple 28 may be replaced by a check valve, opening in the direction of the space S so that said space will be kept filled by the liquid being pumped. To eliminate the trapping of air during this filling operation, this space is provided with an air vent 29, through which air may escape. A suitable cap 30 screws on to the outer end of the air vent, after said space is filled with the lubricant.

If desired the lubricant may be introduced into the space S through a filling nipple 28' at the top of the cylinder or drawn off through a similar nipple at the bottom of the cylinder, as shown in Fig. 1. During these operations the piston is positioned so that said nipples communicate with the space S.

With the structure described a tight joint is assured between the piston and the cylinder wall and the piston is thoroughly lubricated, with a lubricant appropriate to the particular liquid with which the pump is to be used.

In Figure 4 I have shown a modified form of construction, such as is well adapted for use in conjunction with a container for liquids to put out fires. In this construction I designate the cylinder of a receptacle having therein a piston the same as in the previous figures and which piston is mounted on the piston stem 5. The piston stem may extend through the rear end of the cylinder and have an appropriate handle or other appropriate machinery so that the piston can be operated to suck liquid in the receptacle when drawn toward the rear end of the container and to force out the liquid when the piston is pushed toward the front end of the container. With this type of construction different valve mechanism is desirable and this valve mechanism is preferably purely manually operated. As shown the head 3a of the container, which corresponds to the head 3, is provided with an inlet port 31 and an outlet port 32. With each of these ports is associated a valve, 33 being the inlet valve and 34 being the outlet valve. An inlet tube 35 is connected to the inlet valve and an outlet spout or nozzle 36 with or without hose connection is connected to the outlet valve. Both valves are of the same construction. Each has a sealing member 34' with an associated valve stem 37 operating through a packing gland and adapted to be actuated by a handle 38 or other appropriate machinery.

When liquid is to be drawn into the container, the valve 34 is closed and the valve 33 is opened, and the piston is drawn back to suck in liquid into the container. When the cylinder is thus charged, there will be some air trapped in the cylinder. To discharge this air, the valve 33 is closed and the valve 34 is opened and the piston moved to the right in Figure 4 to discharge the air. As soon as liquid flows from the pipe 36, forward movement of the piston may be discon-

tinued and the valve 34 closed. The valve 33 is then opened again and the piston moved backward to fill up the cylinder with liquid. The inlet valve 33 is then closed and the container is stored full of liquid until ready for use. The valve 34 is then opened and the piston pushed forward to discharge the liquid on to the fire, or for such other uses as may be desired.

When the structure of Figure 4 is to be used as a storage receptacle for liquid only one valve need be used as this single valve may serve as both inlet and outlet for the liquid. If two valves are used as shown both may have attached thereto suitable hoses, both of which may be employed while discharging the liquid.

In Figure 4 I have shown a clean out opening 39 provided at the lower portion of the head 3a and this is normally sealed by a plate 40 bolted or screwed against a suitable gasket. The clean out opening is preferably of oval elongated shape, so that any material which may tend to lodge in the receptacle, such as solids which may be precipitated from the liquid may be drained out when desired.

Both pumps hereinafter described are shown as single acting pumps. That is to say the piston operates only on one side to draw liquid into and discharge it from one end of the cylinder. If desired the arrangement shown at one end of the cylinder may be duplicated at the opposite ends, so that the pump will be a double acting pump.

As shown in Figure 2, the nipples 27 are both accessible from the rear end of the piston assembly. In Fig. 5 a modified form of arrangement is shown wherein each tube 20 has an inflation 27a extending through the exterior plate of its associated carrier and the heads 3b of the cylinder are provided with openings 42 normally covered with caps 43 seated against gaskets and held in place by stud bolts 44, so that when it is desired to inflate the tube 20, the piston is moved to the corresponding end of the cylinder and the caps 43 taken off, so as to render the nipples 27a accessible from the exterior of the cylinder heads. This type of arrangement may be used in both single and double acting pumps.

Also as shown in Figure 5, the adjacent plates 15a of the two piston units are made of somewhat lighter stock and are thinner than the distant plates of said units and said plates 15a have peripheral flanges 45 adapted to bear against one another when the units are assembled, so that said plates reinforce one another. The flanges 45 may be provided therein with holes for the passage of lubricating material therethrough or one of said flanges may have a serrated or castellated edge to provide openings 46 for the passage of such lubricant through all parts of the space S.

The structure of the pump of my invention is relatively simple, but thoroughly efficient in its operations. The pump may be made of any size but is especially useful when made in the very large sizes where the maintenance of tight packing rings is generally a serious operating problem. The use of the pneumatic tubes permits of easy assembly of the parts, for the parts may be assembled while the tubes are deflated and after assembly the tubes are inflated. Their inflation nipples are provided with appropriate check valves to hold such pressure, as may be desirable to maintain tight joints between the packing rings and the cylinder wall.

The foregoing detailed description sets forth

the invention in its preferred practical form, but this invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. A pump piston adapted to operate within a cylinder and having an associated piston rod, said piston comprising a pair of coaxial piston units secured in spaced apart relation to one another on the piston rod to provide a lubricating space between them, each piston unit being formed from complementary face plates arranged in substantially face abutting relation to form a carrier of substantially hour glass cross section provided circumferentially with an annular channel, a pneumatic tube seated in said channel, a packing ring interposed between the pneumatic tube and the cylinder wall, said pneumatic tube having an inflation nipple accessible from one end of the piston to inflate the tube and cause the packing ring to closely fit the cylinder wall, and a nipple for feeding lubricant into the space between the piston units to fill said space.

2. A pump piston adapted to operate within a cylinder and having an associated piston rod, said piston comprising a pair of coaxial piston units secured in spaced apart relation to one another on the piston rod to provide a lubricating space between them, each piston unit being formed from complementary face plates arranged in substantially face abutting relation

to form a carrier of substantially hour glass cross section provided circumferentially with an annular channel, a pneumatic tube seated in said channel, a packing ring interposed between the pneumatic tube and the cylinder wall, said pneumatic tube having an inflation nipple accessible from one end of the piston to inflate the tube and cause the packing ring to closely fit the cylinder wall, a nipple for feeding lubricant into the space between the piston units to fill said space, each packing ring being provided with tongues adapted to embrace the corresponding pneumatic tube and to overlap one another, and means for securing said tongues in overlapping relation to bind the packing ring to the corresponding pneumatic tube.

3. A pump piston adapted to operate within a cylinder and having an associated piston rod, said piston comprising two complementary face plates arranged in substantially face abutting relation for forming a carrier of substantially hour glass shaped cross section with an annular channel about the circumference thereof, a pneumatic tube in said channel and having a valved inflation nipple, and a packing ring interposed between the pneumatic tube and the cylinder wall, said packing ring having tongues embracing the pneumatic tube and secured to one another in overlapped relation to bind the ring to the tube.

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