PUMP SHAFT SEAL FOR HAND OILERS

Roy H. Richmond, Jr., Wellsburg, W. Va., assignor to Eagle Manufacturing Company, Wellsburg, W. Va., a corporation of West Virginia

Application August 6, 1953, Serial No. 372,747
4 Claims. (Cl. 222—341)

This invention is directed to improvements in seals for the pump shafts of hand oilers. In a manner to be described, the improved pump shaft seal of this invention is in the nature of a rubber grommet of a particular configuration which facilitates assembly of the pumping apparatus and which provides both a seal and a guiding support for the oiler pump shaft.

The hand oilers for which the seal of this invention is provided are the type in which a closure cap for an oil container mounts an oil delivery spout and a pumping apparatus for pumping oil from the container to the spout. The pumping apparatus includes a manually operable trigger which effects a reciprocating movement of a pump shaft extending through an opening in the top or closure for the container. To prevent leakage of oil from the container through the pump shaft opening, it is necessary to provide a seal about the periphery of the pump shaft and the seal must allow limited lateral movement of the pump shaft since its reciprocating motion is not truly rectilinear.

Conventional seals for the pump shafts of hand oilers have heretofore been comprised of felt washers secured to the container top about the opening through which the pump shaft extends. This form of seal has not proved entirely satisfactory since wear incident to reciprocation of the pump shaft and compression of the sealing material by the lateral movement of the pump shaft during reciprocation have resulted in a deterioration of its sealing function.

A further disadvantage of this type of seal is encountered in assembly of the seal and pump shaft with respect to the container top.

One of the principal objects of this invention is to provide an improved seal for hand oiler pump shafts which will both facilitate assembly of the shaft and seal with respect to the container top and provide an improved sealing action. To this end, the seal comprises a rubber grommet which may be mounted on the pump shaft prior to insertion of the pump shaft through the opening in the container top and which may thereafter be readily assembled with respect to the container top by forcing it through the container top pump. When mounted in position, the grommet is effectively secured against movement relative to the container top and has sealing engagement with the surface of the oiler pump shaft.

Other objects and advantages of the invention will become apparent from the following description.

In the drawings there is shown a preferred embodiment of the invention. In this showing:

Fig. 1 is a vertical sectional view of a hand oiler showing the pumping apparatus and the seal of this invention in side elevation;

Fig. 2 is a top plan view of the apparatus shown in Fig. 1;

Fig. 3 is an enlarged elevational view of the grommet seal shown in Fig. 1;

Fig. 4 is a plan view of the seal shown in Fig. 3; and

Fig. 5 is a sectional view taken vertically of Fig. 3; and

Fig. 6 is a fragmentary detail sectional view illustrating the relative positions of the seal and pump shaft with respect to the container top.

In the drawings, the numeral 1 designates a container having a cap or closure member 2 detachably secured to its upper end. A pumping unit designated as a whole by the numeral 3 is mounted on the cap 2 and comprises a spout 4 secured to and extending through an opening in the cap 2 and connected with a pumping unit 5 arranged interiorly of the container 1. The pumping unit 5 is operated by a pump shaft 6 which is actuated by a trigger 7 and extends through an opening in the cap 2.

The container 1 is of a size such that it may be encircled by the fingers of the operator and with the operator's trigger finger engaged with the trigger 7. When the trigger 7 is pulled inwardly toward the container 1 by a squeezing action, it rocks about its fulcrum 7a engaged with the top to elevate its inner end 7b and the pump shaft 6. Upward movement of the shaft 6 raises the pump unit 5 in a conventional manner to deliver a charge of oil to the spout 7, and the pump vent has a spring biased movement in a downward direction which pulls the shaft 6 downwardly when the trigger is released.

Due to the fact that the trigger end 7b moves in an arcuate path about its fulcrum 7a, the shaft tends to move laterally a limited distance during its reciprocating movement, and this lateral movement must be compensated or permitted by the seal about the shaft in the cap opening. The parts thus far referred to are conventional and form no part per se of this invention.

As indicated above, this invention is directed to an improved construction of a seal 8 which seals the shaft 6 in the cap opening through which it extends. The seal 8 is in the form of a grommet fabricated from rubber, either natural or synthetic, or any other material having similar compressible and resilient characteristics. As best shown in Figs. 3, 4 and 5, the seal 8 comprises a rubber body 9 having an axially extending and tapered opening 10, the maximum diameter of which is located being slightly less than the diameter of the shaft 6 so that its surface has a sliding liquid sealing engagement with the surface of the shaft 6. The diameter of the upper end of the opening 10 is slightly larger than the diameter of its lower end whereby the surface 11 defining such opening has a taper which converges in a downward direction to its lower end.

The outer surface of the body 9 is provided with an annular groove 12 spaced downwardly from its upper end 13. The portion 14 of the outer surface of the body 9 below the groove 12 has a taper which converges in a downward direction to its lower end.

As best shown in Fig. 6, the opening in the cap 2 through which the shaft 6 extends has an intumescing or depending lip 15 the lower edge 16 of which is normal to the plane of the cap 2 and substantially parallel to the shaft 6. The diameter of the lip 15 at its lower edge 16 is approximately the same as the external diameter of the grommet 8 at its lower end 17 to facilitate entry of the grommet in a manner to be described, and is slightly smaller than the external diameter of the body 9 at the inner surface of the groove 12 so that the lip 15 will have sealing engagement with such inner surface when positioned in the cap as shown in Fig. 6. The diameter of the body 9 at the inner surface of the groove 12 is slightly larger than the diameter of the lip 15, the body of the rubber grommet 8 will be compressed to provide a liquid seal by engagement of the lip 15 with the inner surface of the groove 12 when the grommet is in its assembled position. In addition, the axial depth of the lip 15 is slightly greater than the axial depth of the groove 12 so that the upper and lower surfaces of
the groove 12 have sealing engagement respectively with the upper surface of the cap 2 and the lip edge 16.

In the assembly of the cap and pumping apparatus as shown in Fig. 1, the lower end of the shaft 6 is first inserted through the opening 10 in the grommet and the grommet is then forced downwardly through the cap opening defined by the lip 15. The tapered surface 14 of the grommet facilitates its downward movement through this opening, and when the groove 12 is moved to an axial position opposite the lip 15, the rubber in the body 9 which will have been compressed during its downward movement will expand so that the lip 15 will have sealing engagement in the groove 12 as explained above. In the mounting of the grommet 8 in this manner, it will be noted that the depending and curved shape of the lip 15 cooperates with the sloping exterior surface 14 to facilitate movement of the grommet to its mounted position. Attention is also directed to the fact that the depending arrangement of the lip 15 presents a flat surface to the inner surface of the groove 12 and thus protects the grommet against cutting by the material of the cap.

Attention is also directed to the fact that the downwardly converging surface 11 of the opening 10 provides an improved sealing action against the surface of the shaft 6. The lower end of the opening 10 by reason of its relatively smaller diameter has tighter engagement with the surface of the shaft 6 and thus wipes oil from the surface of the shaft during upward movement, and, during downward movement of the shaft 6, any oil which may have penetrated into the opening 10 will tend to move downwardly with the shaft 6. By reason of the taper of the opening 10 together with the snug engagement of the lip 15 with the surfaces of the groove 12, upward movement of the shaft 6 through the opening 10 will tend to compress and wedge the body 9 in the opening 10 and increase its sealing engagement with the shaft 6, while downward movement of the shaft 6 will stretch the rubber of the body 9 and relieve such sealing engagement. The engagement of the lip 15 in the groove 12 provides an effective seal for the grommet and shaft with respect to the cap 2 which prevents leakage of the contents of the container through the opening defined by the lip 15. The lip 15 not only has tight engagement with the inner surface of the groove 12 but has tight engagement with the upper and lower surfaces of such groove since the axial depth of the lip 15 is slightly larger than the axial depth of the groove 12.

While I have illustrated and described a preferred embodiment of my invention, it will be understood that this is merely by way of illustration and that various changes and modifications may be made therein within the contemplation of the invention and under the scope of the following claims.

1. The combination with a cap closure of a hand oiler having an opening therein provided with an in-turned lip and a pump shaft reciprocable through said opening, of a seal comprising a rubber body having an annular groove in its outer surface for reception of the in-turned lip of the cap opening, the inner diameter of said groove being slightly larger than the diameter of said cap closure lip opening, the outer surface of said body having a downwardly converging taper from a maximum diameter at the lower edge of said groove to a minimum diameter at the bottom of said body and with said minimum diameter being substantially the same as the diameter of said lip opening to facilitate axial movement of said body to a mounted position in said opening, said cap closure having its lippered periphery defining the opening therein of greater axial depth than that of said groove and positioned in said body groove to provide a tensioned lip sealing engagement with said body when in its mounted position with respect thereto, said body having an axially extending opening the surface of which has a taper converging axially downwardly from a maximum diameter at the upper end of said body to a minimum diameter at the lower end of said body with said maximum diameter being slightly less than the diameter of said shaft, said shaft extending through said body opening and having sliding engagement with the surface of said body opening.

2. In a hand oiler having a container, a delivery spout, a pump in said container, and a reciprocable pump shaft for operating said pump to deliver oil from said container to said spout, the combination comprising a cap closure for said container, said closure having an opening therein through which said shaft extends and an integral inwardly projecting and depending lip about said opening, said lip having a lower portion providing an inwardly facing flat annular surface concentric to the axis of said opening, a seat comprising a rubber body having an annular groove in its outer surface, said lip being positioned in said groove with its flat annular surface in sealing engagement with the surface of said body at the inner boundary of said groove, said lip having an axial depth greater than the axial depth of said groove whereby its lower edge has sealing engagement with the body surface defining the lower edge of said groove and the upper surface of said closure member has sealing engagement with the body surface defining the upper edge of said groove, said body having an axially extending opening the surface of which has sliding liquid sealing engagement with the surface of said shaft.

3. The invention defined in claim 2 characterized by said body having an outer surface portion below said groove which has a taper converging axially downwardly to facilitate mounting of said body in said closure opening, said surface tapering from a maximum diameter at the lower edge of said groove to a minimum diameter at the lower edge of said body and with said minimum diameter being substantially the same size as the smallest diameter of said opening.

4. The invention defined in claim 2 characterized by the axially extending opening in said body having a taper which converges downwardly from a maximum diameter at the upper end of said body to a minimum diameter at the lower end of said body and with the maximum diameter of said opening being slightly less than the diameter of said shaft, said shaft extending through said body opening and having sliding engagement with the surface of said body opening.

References Cited in the file of this patent

UNITED STATES PATENTS

2,277,637 Eby -------------- Mar. 24, 1942
2,290,928 Del Mar et al. -------------- Dec. 11, 1945
2,529,486 Clarkson et al. -------------- Nov. 14, 1950
2,592,949 Phillipson -------------- Apr. 15, 1952
2,647,774 Newberry -------------- Aug. 4, 1953
2,693,899 Trout -------------- Nov. 9, 1954