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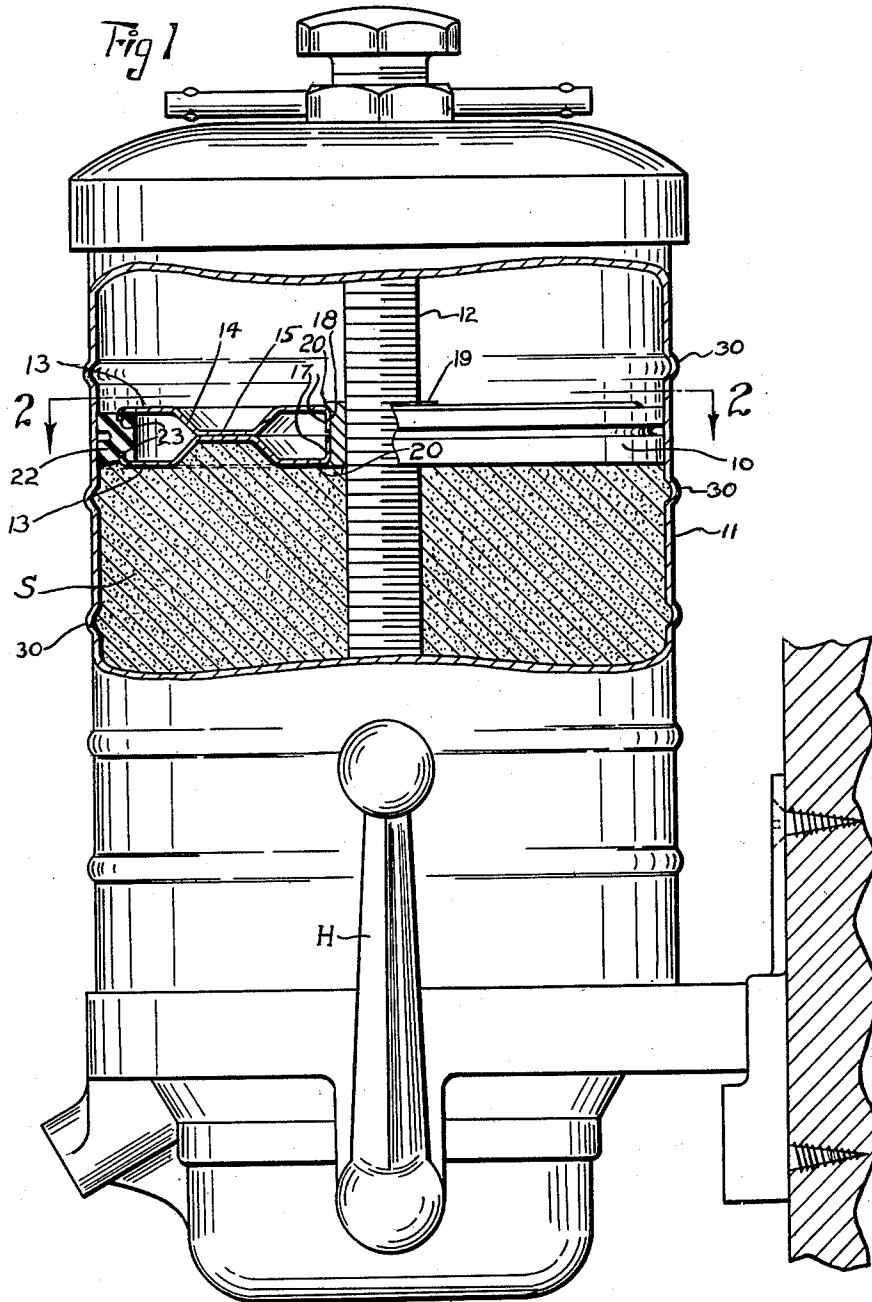
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2,815,994

SELF-ADJUSTING PISTON FOR SOAP DISPENSER

Filed March 7, 1955

2 Sheets-Sheet 1



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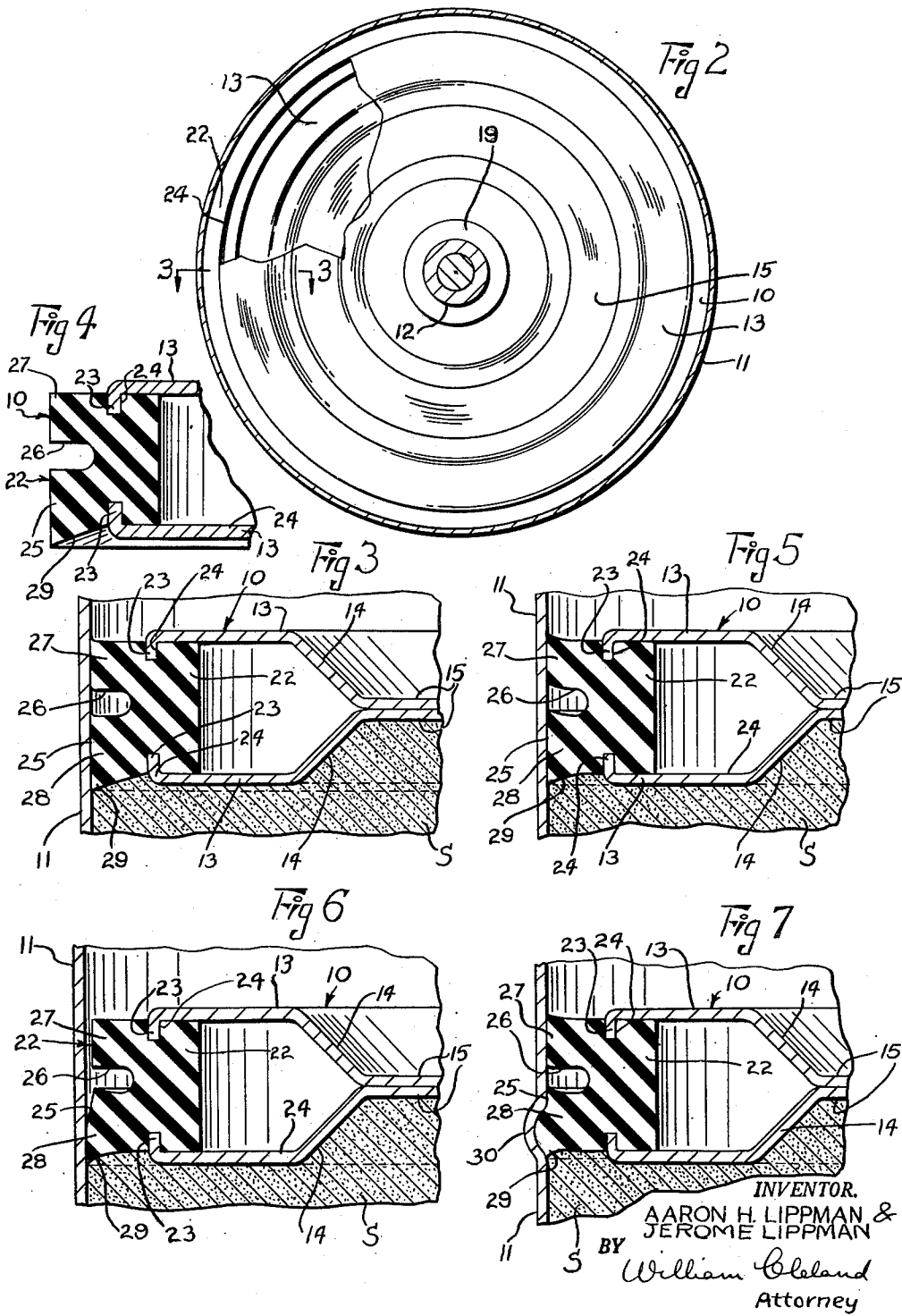
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SELF-ADJUSTING PISTON FOR SOAP DISPENSER

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4 Claims. (Cl. 309—23)

This invention relates to a piston for applying internal pressure to fluid material in a cylindrical container, and in particular, to an improved piston for a soap dispenser of the type shown in United States Letters Patent No. 2,700,490.

Heretofore, pistons for the purposes described have been provided with gaskets of rubber or like elastic material, but these have not been satisfactory for use in soap dispensers which utilized the usual paste-type shipping cans as interchangeable cylinders or containers for the soap dispensers. That is, because of the usual wide divergence in give diameters of these shipping cans, the pistons often fitted so loosely in oversized cans as to allow pressurized soap to leak past the piston gasket, and just as often the cans were undersized and the pistons could not be fitted into them at all.

One object of the present invention is to provide a piston having improved gasket means thereon which will self-adjustingly fit into cylinders, particularly cylindrical soap cans used as such cylinders, the inside diameters of which may vary substantially above and below a given standard dimension, whereby loss of soap due to leakage past the sealing gasket fitted on an oversized can is avoided, and whereby is obviated serious losses of time and money caused by failure of the piston to be insertable in somewhat undersized cans.

Other objects of the invention will be manifest from the following brief description and the accompanying drawings.

Of the accompanying drawings:

Figure 1 is a side elevation of a soap dispenser wherein is incorporated a piston embodying the features of the invention.

Figure 2 is a horizontal cross-section taken substantially on the line 2—2 of Figure 1.

Figure 3 is a fragmentary enlarged cross-section taken substantially on the line 3—3 of Figure 2, illustrating the fit of the piston in a can or cylinder of desired standard inside diameter.

Figure 4 is a view similar to Figure 3, illustrating the piston removed from the can or cylinder, and, therefore, showing a rubber gasket on the piston in normal vulcanized shape or condition.

Figure 5 is a view similar to Figure 3, showing the piston self-adjustingly fitted into an undersized can or cylinder.

Figure 6 is a view similar to Figures 3 and 4, but illustrating the self-adjusting manner in which the piston adapts itself to an oversized can or cylinder by utilizing internal pressure of the soap therein.

Figure 7 is a view similar to Figures 3 and 5 to 7,

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illustrating the manner in which the piston adapts itself to an irregularity in the surface of the can or cylinder.

Referring particularly to Figures 1, 2 and 3 of the drawings, the numeral 10 designates a piston embodying the features of the invention, mounted in a cylinder 11 of a soap dispenser of the type shown and described in said patent. Rotation of the screw shaft or sleeve 12 in dispensing paste-type soap S, in known manner, progressively urges the piston downwardly to maintain the soap under desired pressure in the cylinder.

The piston 10 may include a pair of discs 13, 13, formed of sheet metal to have oppositely disposed annular recesses 14, defining flat annular walls 15 which are welded, riveted, or otherwise secured together in back-to-back relation. At the center portions of the disc the plates 13 are oppositely inturned at 17, 17 to form an aperture 18 in which is suitably retained a bearing 19 through which shaft 12 is threaded (see Figure 1). Bearing 19 may be so retained by being peened over at 20, 20, thereby further to secure the plates 13 together as a unit. At the outer periphery of the disc 10 a rubber or rubber-like elastic gasket 22, of generally square cross-section, is firmly clamped between oppositely inturned annular flanges 23, 23 of the disc plates 13, received in annular grooves 24, 24 in axially-opposite sides of the gasket.

As best shown in Figure 4, the gasket 22 is of substantial thickness to define a generally cylindrical peripheral edge 25 in which is an annular groove 26 of substantial depth, but the inner end of the groove being of greater diameter than said inturned portions 23 of the disc plates 13. Thus, the groove 26 defines axially spaced top and bottom peripheral portions 27 and 28, which are adapted to be flexed relatively of each other against the inherent resiliency of the elastic material of the gasket. The proportions of the depth of the groove 26 with respect to the location of the gripping flanges 23 may be such that said portions 27 and 28 will flex about a relatively short radius approximating the depth of the groove, so that when said portions are flexed in known manner they will tend to swing the cylindrical outer surfaces thereof in an arc extending outwardly through the wall of the cylinder, whereas by comparison larger radii would tend to permit flexure of the cylindrical outer surfaces along the wall of the cylinder with proportionately lesser sealing pressure.

Pressure created against the soap S by urging the disc downwardly tends to flex the lower gasket portion 28 upwardly and outwardly, into effective sealing relationship against the wall of the cylinder. To increase the advantage of this sealing action the lower edge of portion 28 is downwardly and outwardly chamfered to provide a flexible lip 29, which is adapted to be flexed radially outwardly by the soap pressure, into full fluid-sealing engagement with said cylinder wall, and to conform to irregularities in the surface of the same as well as to variations in diameters of various soap cans utilized as the cylinder 11.

In use of the dispenser, as fully shown and described in Lippman et al. Patent No. 2,700,490, dated January 25, 1955, a predetermined quantity of soap S is dispensed as previously described, upon reciprocation of handle H, each reciprocation being effective to turn shaft or sleeve 12 in one direction, and thereby progressively to move the disc 10 downwardly against the soap S to apply pres-

sure thereto. As the cylinder 11 is a can in which the soap S is to be supplied, and is interchangeable with other full cans as the soap is used, there may be a substantial plus and minus variance in the inside diameters of the different cans with respect to a given standard size of the same. Figure 3 shows the case where the piston 10 is fitted in a cylinder or can 11 of correct diameter, the gasket portions 27 and 28 having been flexed only slightly for this purpose, and the sealing pressure of the gasket material plus the internal pressure of the soap applied against the lip 29 being sufficient to seal against upward escape of soap S around the gasket. Figure 5 shows a condition wherein the cylinder is undersized, in which event the resilient portions 27 and 28 of the gasket self-adjustingly flex upwardly to correspondingly reduced diameter, and yet the action is such that the gasket will not bind in the cylinder as the piston is urged downwardly against the soap S.

In the opposite extreme, where the cylinder or can is oversized, as shown in Figure 6, the upper gasket portion 27 in some instances may not engage the cylinder wall at all, but the internal pressure of the soap S will urge the lip 29 of lower gasket portion 28 into effective fluid-sealing relation with the cylinder wall. Figure 7 illustrates the manner in which the gasket lip 29 is similarly urged into conformity with an irregularity, such as a groove formed by a reinforcing rib 30 in the cylinder.

Although the annular gasket portion 28 is free to flex axially outwardly or upwardly of the soap S as described, the annular groove 26 inherently is of such relatively narrow width that the annular portion 27 will serve as a buffer to prevent over-flexing of portion 28 which would otherwise tend to destroy or break the seal thereof with the cylinder 11.

The improved piston 10 is easy to assemble, as it is only necessary to secure the two plates 13 together with the short flanges 24 received in the annular grooves 23 of the gasket, and then to secure the threaded hub 19 in recess 18, as previously described.

Modifications of the invention may be resorted to without departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. A piston as for relatively applying internal pressure to fluid material in a cylinder, comprising a disc having an annular gasket at the outer periphery thereof, said gasket being of resilient material and of substantial thickness defining a generally cylindrical peripheral edge of substantially a predetermined diameter of the inner wall surface of the cylinder, said gasket having an annular groove in said peripheral edge defining spaced flexible peripheral portions one of which on the pressure-applying inner side has an inwardly axially unconfined annular surface adapted to be in contact with fluid material in a said cylinder, said disc having means thereon for gripping said gasket to have said flexible peripheral portions free and unconfined, said unconfined annular surface of the gasket being conical to be presented in angular opposition to the inner wall of a said cylinder, whereby opposing pressure of the fluid material tends to flex said at least one peripheral portion toward firm contact with said inner wall surface of the cylinder, said annular groove being of such shallow depth radially of the disc that said at least one peripheral portion tends to flex in such a relatively short arc as to be urged predominantly radially outwardly toward yielding engagement of at least a portion of said at least one peripheral portion with said inner wall surface to conform to irregularities in the shape and proportions of said inner wall surface of the cylinder within a substantial range of plus or minus tolerances.

2. A piston as for relatively applying internal pressure to fluid material in a cylinder, comprising a disc having an annular gasket at the outer periphery thereof, said gasket being of resilient material and of substantial thickness defining a generally cylindrical peripheral edge of

substantially a predetermined diameter of the inner wall surface of the cylinder, said gasket having an annular groove in said peripheral edge defining spaced flexible peripheral portions one of which on the pressure-applying inner side has an inwardly axially unconfined annular surface adapted to be in contact with fluid material in a said cylinder, said disc having means thereon for gripping said gasket to have said flexible peripheral portions free and unconfined, said gripping means clampingly gripping said gasket at a point radially inwardly of the innermost depth of said annular groove, said unconfined annular surface of the gasket being conical to be presented in angular opposition to the inner wall of a said cylinder, whereby opposing pressure of the fluid material tends to flex said at least one peripheral portion toward firm contact with said inner wall surface of the cylinder, said annular groove being of such shallow depth radially of the disc that said at least one peripheral portion tends to flex in such a relatively short arc as to be urged predominantly radially outwardly toward yielding engagement of at least a portion of said at least one peripheral portion with said inner wall surface to conform to irregularities in the shape and proportions of said inner wall surface of the cylinder within a substantial range of plus or minus tolerances.

3. A piston as for relatively applying internal pressure to fluid material in a cylinder, comprising a disc having an annular gasket at the outer periphery thereof, said gasket being of resilient material and of substantial thickness defining a generally cylindrical peripheral edge of substantially a predetermined diameter of the inner wall surface of the cylinder, said gasket having an annular groove in said peripheral edge defining spaced flexible peripheral portions one of which on the pressure-applying inner side has an inwardly axially unconfined annular surface adapted to be in contact with fluid material in a said cylinder, said gasket having annular recesses in axially opposite sides thereof, said disc comprising superposed plates of thin sheet material secured together, said plates having portions embracing said opposite sides of the gasket, said embracing portions terminating in oppositely inturned annular flanges complementally received in said annular recesses of the gasket firmly to retain the same on the disc, said unconfined annular surface of the gasket being generally conical to be presented in angular opposition to the inner wall of a said cylinder, whereby opposing pressure of the fluid material tends to flex said at least one peripheral portion toward firm contact with said inner wall surface of the cylinder, said groove being of such shallow depth radially of the disc that said at least one peripheral portion tends to flex in such a relatively short arc as to be urged predominantly radially outwardly toward yielding engagement of at least a portion of said at least one peripheral portion with said inner wall surface to conform to irregularities in the shape and proportions of said inner wall surface of the cylinder within a substantial range of plus or minus tolerances.

4. A piston as for relatively applying internal pressure to fluid material in a cylinder, comprising a disc having an annular gasket at the outer periphery thereof, said gasket being of resilient material and of substantial thickness defining a generally cylindrical peripheral edge of substantially a predetermined diameter of the inner wall surface of the cylinder, said gasket having an annular groove in said peripheral edge defining spaced flexible peripheral portions one of which on the pressure-applying inner side has an inwardly axially unconfined annular surface adapted to be in contact with fluid material in a said cylinder, said disc having means thereon for gripping said gasket to have said flexible peripheral portions free and unconfined, said unconfined annular surface of the gasket being generally conical to be presented in angular opposition to the inner wall of a said cylinder, whereby opposing pressure of the fluid material tends to flex said at least one peripheral portion toward firm contact with

said inner wall surface of the cylinder, said annular groove being of such shallow depth radially of the disc that said at least one peripheral portion tends to flex in such a relatively short arc as to be urged predominantly radially outwardly toward yielding engagement of at least a portion of said at least one peripheral portion with said inner wall surface to conform to irregularities in the shape and proportions of said inner wall surface of the cylinder within a substantial range of plus or minus tolerances, said annular groove being of relatively narrow width by which the outer said flexible peripheral portion serves to prevent said flexing of said inner flexible portion

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outwardly in axial direction beyond a predetermined extent.

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