March 7, 1950 D. T. HARBISON 2,499,952

PACKING OR PLUNGER RING

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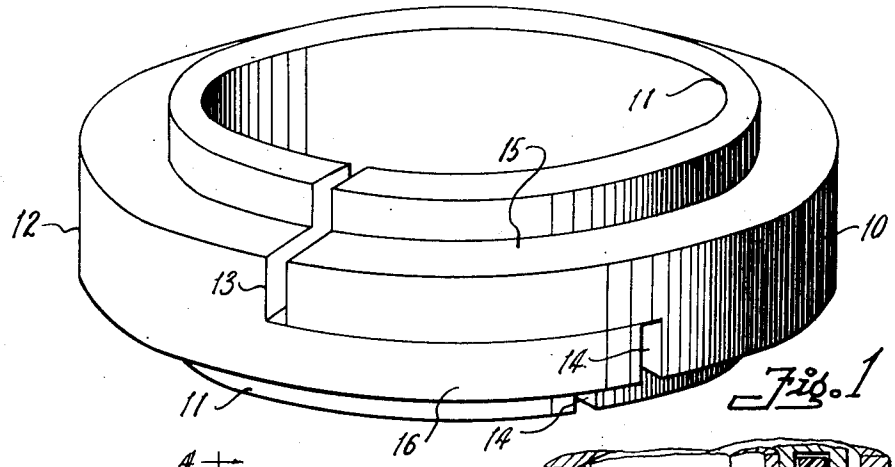


Fig. 1

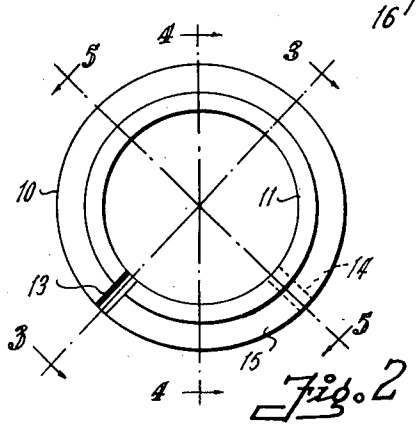


Fig. 2

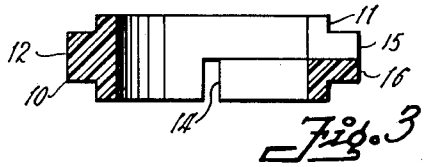


Fig. 3

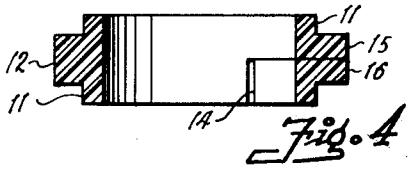


Fig. 4

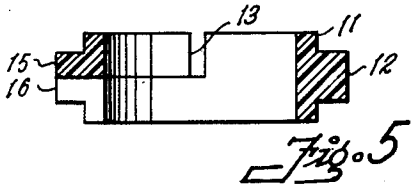


Fig. 5

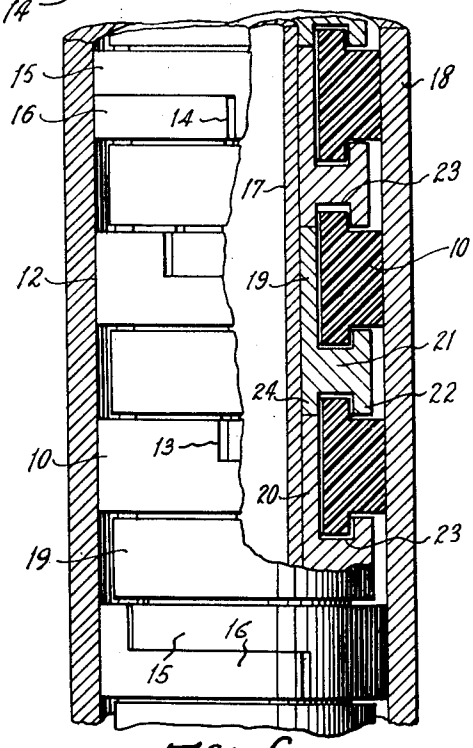


Fig. 6

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PACKING OR PLUNGER RING

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Original application March 13, 1947, Serial No. 734,374. Divided and this application May 1, 1948, Serial No. 24,649

2 Claims. (Cl. 309—23)

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This invention relates to new and useful improvements in packing or plunger rings.

This application is a division of my co-pending application filed March 13, 1947, Serial No. 734,374.

One object of the invention is to provide an improved plunger ring formed of laminated plastic materials and possessing certain inherent resiliency, whereby its periphery is urged into intimate contact with a working surface, such as the inner surface of the working barrel of an oil well pump.

Another object of the invention is to provide a plunger ring of the character described which, while split to adjust itself to variations in pump-barrel diameters, has means whereby a predetermined quantity of pressure fluid is by-passed and acts to expand the ring into sealing engagement with the wall of the pump barrel, thus preventing collapsing of the ring.

A further object of the invention is to provide an improved plastic plunger ring of uniform radius which is under a constant tension when in place in a pump barrel, whereby it is self-sealing and self-seating.

A construction designed to carry out the invention will be hereinafter described together with other features of the invention.

The invention will be more readily understood from a reading of the following specification and by reference to the accompanying drawing wherein an example of the invention is shown, and wherein;

Fig. 1 is a perspective view of a plunger ring constructed in accordance with the invention,

Fig. 2 is a reduced plan view of the ring,

Figs. 3, 4 and 5 are transverse, sectional views, taken on the respective lines 3—3, 4—4 and 5—5 of Fig. 2, and

Fig. 6 is a view, partly in elevation and partly in section, of a portion of a pump barrel and plunger equipped with the plunger rings.

In the drawing, the numeral 10 designates a plastic plunger ring constructed in accordance with the invention and having an annular body or annulus. This annulus is cut or stamped from a flat sheet of plastic material(not shown) which is laminated so as to increase its strength and wearing qualities. The ring is formed by the method set forth in my co-pending application, whereby certain expanding qualities are inculcated in the annulus to the end that said ring is inherently self-expanding and self-seating when in operating position in a working barrel.

Co-axial flanges or shoulders 11 are formed at

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the inner peripheral edge portions of the annulus by circumferentially recessing or cutting away the outer peripheral edge portions thereof and these flanges are relatively thin. Thus, a peripheral surface 12 of reduced width is provided and the annulus is substantially T-shaped in cross-section.

In order to form a joint in the annulus having a controlled or predetermined fluid passage of restricted area, the same is preferably split in the following manner. As shown a radial notch or gap 13 is cut through one edge portion of the annulus and its flange 11 to a depth of substantially one-half its axial thickness. A complementary notch or recess 14 is cut through the opposite flange and edge portion of the annulus at a point offset or spaced from the notch 13. Although the spacing of the notches is subject to variation, it has been found that an offset of approximately seventy-five (75°) degrees is most satisfactory. It is pointed out that a predetermined amount of material is removed by the forming of the notches.

A pair of coacting, sealing tongues or bridging elements 15 and 16 are provided by slitting or splitting the annulus circumferentially between the inner end or base portions of the notches 13 and 14, as shown in Figs. 1, 3, 4 and 5. The slitting or splitting is accomplished by a knife-cut so as to remove substantially no material between the tongues 15 and 16, whereby the contacting or contiguous internal surfaces of said tongues coact throughout their coincidental or overlapping lengths to seal the step joint against leakage between the notches. Due to the removal of material in forming the notches, fluid is permitted to pass radially through and behind or within the annulus when in operation so as to assist in expanding the same into sealing position.

In Fig. 6 the plunger or packing rings 10 are shown mounted on a pump plunger 17 within a well-pump barrel or cylinder 18. The plunger rings are spaced and seated in spacer collars 19. Each of these collars is substantially L-shaped in cross-section and comprises an inner vertical annulus 20 which embraces the plunger 17, a radially extending base shank 21 and an annular flange 22 at the outer portion of said shank; which flange projects above and below the shank. The annulus 20, shank 21 and flange 22 combine to form annular grooves 23 above and below the shank.

When a plunger ring is mounted on the plunger, its lower annular flange 11 is engaged in the upper groove 23 of the underlying collar 19. It will

be observed that the major portion of the collar annulus 20 extends above the base shank 21 and only a minor portion 24 extends below the shank. Thus the major portion of the annulus 20 extends vertically within the plunger ring and the minor portion 24 of the superposed collar 19 abuts and rests upon the underlying annulus. The upper flange 11 of the ring engages in the under groove 23 of the superposed collar.

Since abutting of the annuli of the collars determines the spacing of the shanks 21, the plunger rings may have a free engagement between collars. It will be seen that the external diameters of the collars are considerably less than the external diameters of the rings whereby said collars are spaced from the inner wall of the barrel 18. When a ring is in place in the barrel, it is under tension because it has been compressed to its true circular form. Thus, the ring exerts its inherent expansive force, so as to seat its outer periphery 12 against the inner cylindrical wall of the barrel and provide a self-sealing contact.

While the ring is compressed, the radial gaps 13 and 14 at the ends of the tongues are not closed and provide channels whereby pressure fluid may be by-passed to the grooves 23. Such fluid will flow from the recesses to the spaces between the annuli 20 of the collars and the inner peripheries of the rings, thus forcing said rings outwardly whereby their peripheries 12 will more intimately engage the wall of the barrel 18. This prevents collapsing of the rings and leakage thereby.

Since the width of the gaps may be controlled, the quantity of pressure fluid which flows through a gap may be controlled and the outward expansive force thus regulated. Owing to the structure of the overlapping tongues 15 and 16 and the location of the gap 13 above the split between said tongues and the gap 14 below said split, the tendency of the pressure fluid to flow directly from

one gap to the other gap is defeated. While there is no flow past all of the rings during any one stroke of the plunger, pressure fluid may flow from one ring to another ring.

The foregoing description of the invention is explanatory thereof and various changes in the size, shape and materials, as well as in the details of the illustrated construction may be made, within the scope of the appended claims, without departing from the spirit of the invention.

What I claim and desire to secure by Letters Patent is:

1. As an article of manufacture, a pump plunger ring including, an annular body formed of a hardened thermo-setting synthetic resin having reinforcing laminations extending transversely to the axis of said body, the body having a step joint forming overlapping oppositely-directed sealing tongues, the adjacent surfaces of said tongues being in sliding engagement when the ring is in its undistorted position.

2. A pump plunger ring as set forth in claim 1, wherein the outer free ends of the tongues are spaced from the circumferentially opposed portions of the body when the ring is in working position.

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