Oct. 16, 1934. D. R. YARNALL 1,977,565

PACKING DEVICE

Filed April 5, 1933

Fig. 1.

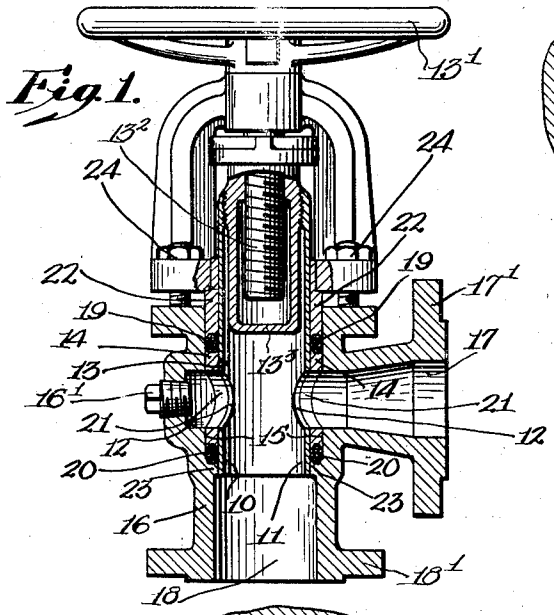


Fig. 2.

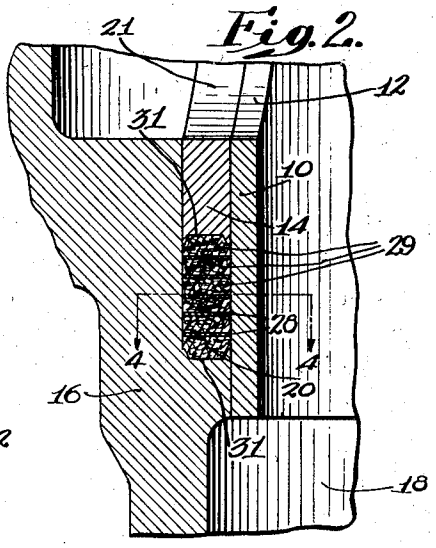


Fig. 3.

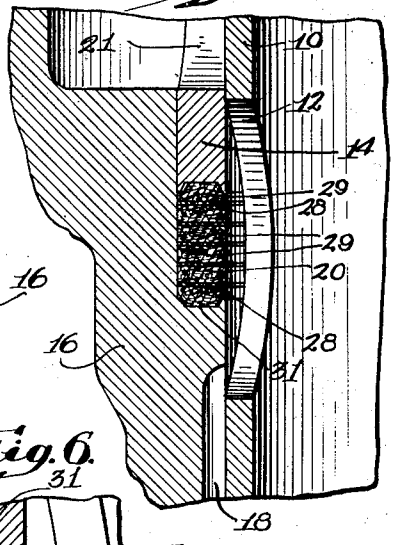


Fig. 4.

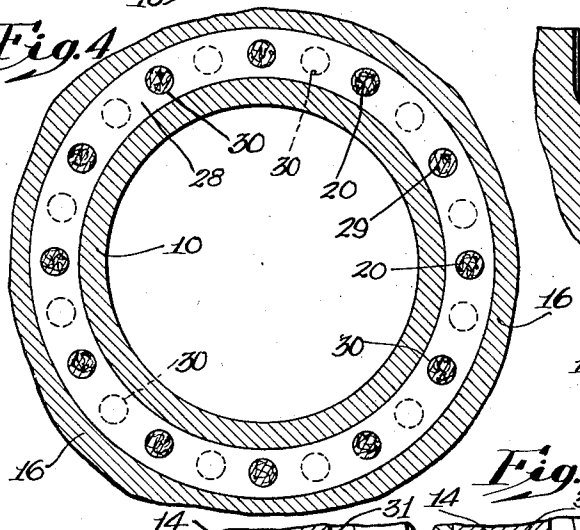


Fig. 5.

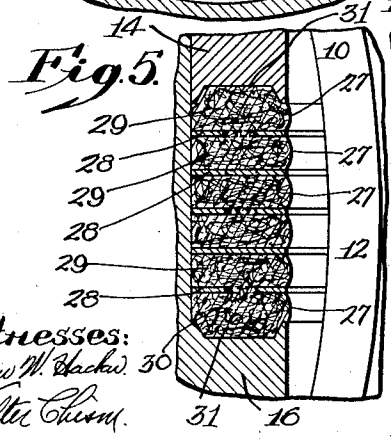
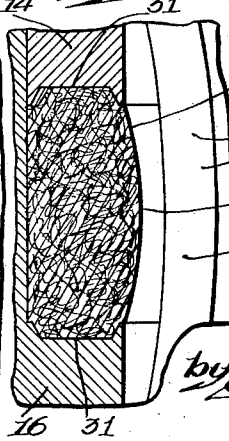


Fig. 6.



Prior Art

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UNITED STATES PATENT OFFICE

1,977,565

PACKING DEVICE

David Robert Yarnall, Philadelphia, Pa., assignor to Yarnall-Waring Company, Philadelphia, Pa., a corporation of Pennsylvania

Application April 5, 1933, Serial No. 664,599

9 Claims. (Cl. 251—80)

My invention relates to packings, with particular reference to plunger valve packings which comprise packing rings surrounding the plunger element of the valve on one or other side of the lateral port of the plunger according as the valve is open or closed, the lateral port of the plunger passing through the ring each time the valve is opened or closed.

A purpose of my invention is to provide a novel device of the character indicated that is easy and inexpensive to manufacture and well suited to the needs of service.

A further purpose is to lessen any inward bulging of a packing ring into the path of travel of a reciprocating member and particularly into the lateral port of a valve plunger packed by the ring when the plunger registers its port with the ring interior.

A further purpose is to divide a column of resilient packing, laterally exposed to a scraping action, into a plurality of shorter resiliently interlocked columns end to end.

A further purpose is to intersperse, throughout a column of resilient packing, suitable supporting plates transverse to the exposed and abraded edge of the packing, allowing the packing to extend continuously through openings in the plates.

Further purposes will appear in the specification and in the claims.

I have elected to show one only of the different forms of my invention, selecting a form however that is practical and efficient in operation and which well illustrates the principles involved.

Figure 1 is a sectional elevation through a seatless blow-off valve having a ported plunger and a packing ring therefor, the valve being shown in open position. The illustrated device embodies a desirable form of my invention.

Figure 2 is an enlarged fragment of Figure 1.

Figure 3 is a view corresponding to Figure 2, except that the parts are in different positions, the port of the plunger valve being spaced from the packing ring in Figure 2 and in registry therewith in Figure 3.

Figure 4 is a section of Figure 2 taken upon the line 4—4 thereof.

Figures 5 and 6 are somewhat diagrammatic fragmentary sectional elevations respectively of a ring that may comprise that of Figures 2 to 4 and of a ring of the prior art, the views showing the rings bulging to exaggerated extents into the ports of plunger valves packed by the rings, and being intended to illustrate the greatly reduced inward bulge of the applicant's ring as compared with the inward bulge of a ring of the prior art.

In all figures like numerals refer to like parts.

Describing in illustration and not in limitation and referring to the drawing.

In Figure 1 a valve plunger 10 having an end outlet at 11, and one or more lateral inlet ports at 12, is adapted to be moved longitudinally at 13 by a hand wheel 13′ through a screw 13^2 protected by a casing 13^3. The valve plunger 10 lies within a laterally ported liner 14, fitting a counterbore 15 that extends inwardly from one end of the valve body 16. A plug 16′ permits ready access into the valve interior.

The valve body has inlet and outlet passages at 17 and 18, which are connected to adjoining piping by flanges 17′ and 18′. The valve plunger is packed, on opposite ends of the liner 14, at 19 and 20, respectively above and below the inlet passage 17 which registers with the lateral port or ports 21 of the liner.

The shell ring 22, packing ring 19, liner 14 and packing 20 are compressed longitudinally together upon an inward flange 23 of the valve body by the pull of yoke bolts 24, and the packing rings normally press outwardly against the longitudinal bore of the body and inwardly against the plunger. Outward and inward bulging of the packings is normally prevented by the sealing engagements of the packings on the outside with the body and on the inside with the plunger.

Each time the valve is opened or closed the plunger carries its port or ports 12 through the lower packing 20 and, during its registry with the port or ports 12, the packing 20 bulges to a greater or lesser extent into the port, being forced back outwardly again as the port is carried beyond the ring.

In practice this has hitherto resulted in relatively excessive wear and gradual deterioration of the packing ring at the part thereof repeatedly passed by the port or ports 12, and an important object of the present invention is to eliminate or very greatly reduce the repeated inward bulging and forced receding of the packing into and out of the port, and thereby to correspondingly eliminate or greatly reduce the wear and deterioration of the ring at the part thereof passed and repassed by the port.

In the prior art the packing has bulged into the port as indicated exaggeratedly in Figure 6, the bulge 25 curving inwardly from opposite walls of the port and normally having its greatest inward extension at 26 at or near the middle of the port.

In my ring any bulging is prevented at spaced intervals along its length, and thereby at spaced intervals across the port 12, as indicated in Figure 5, where the relatively long bulge 25 of Figure 6 has been replaced by a plurality of relatively short bulges 27, each of which has a very small inward extension as compared with that of Figure 6.

The composite ring 20, of Figures 2 to 4, includes lamination rings alternately of molded packing and of metal, the metal laminations 28 having the same inner and outer diameters as the laminations 29 of molded packing and as the liner 14, to fit the outside of the plunger 10 and the inside of the counterbore 15 of the valve body.

The metal laminations 28 are preferably flat and perforated at 30 at circularly spaced intervals, the molded packing filling the perforations and uniting the whole into a unit. The perforations in adjacent laminations 28 preferably are out of line as indicated in Figure 4.

I find it advantageous to make the laminations 28 of a metal non-reactive with the high temperature fluid passing through the valve, this fluid being usually high pressure steam and boiler water contaminated with impurities to be eliminated from the boiler, and frequently also contains dissolved air.

This fluid is deleteriously reactive with many metals, not only directly attacking the metals but also promoting deleterious electrolytic reactions between, for example, the adjacent surfaces of the plunger 10 and the rings 28, and between the rings 28 and the ingredients of the packing. These reactions, while in themselves very small, may readily very seriously increase the friction between the bearing surfaces of the plunger and packing ring, and I have found that the reactions may be substantially eliminated if the ring laminations 28 are made of the metal known commercially as "stainless steel", and preferably comprising 18% of chromium and 8% of nickel.

I prefer to provide the end laminations with annular truncated taper projections 31, correspondingly recessing the liner 14 and flange 23 which respectively fit against the upper and lower ends of the composite ring.

The resilient packing may suitably contain asbestos formed into a ring, and mixed with graphite and with rubber as a binder. The asbestos is a preferable base for the packing, and other ingredients may be added if desired. The asbestos, by extending through the perforations, unites the packing material on one side of a metallic lamination with that on the other side.

The packing ring of my invention is built up by inserting metallic rings 28 between layers of packing 29, staggering the openings or perforations 30 of adjacent rings, and applying pressure to the composite packing. In the compressed packing, the packing material extending through the openings 30 unites various parts of the ring.

While my invention is best applied to a packing ring, it will be evident that it may be used in any case in which a member subjects an exposed packing surface to scraping action or wear across and back along a relatively short unsupported packing surface.

In view of my invention and disclosure variations and modifications to meet individual whim or particular need will doubtless become evident to others skilled in the art, to obtain all or part of the benefits of my invention without copying the structure shown, and I, therefore, claim all such in so far as they fall within the reasonable spirit and scope of my invention.

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

1. In a device of the class described, walls forming a space adapted to hold packing, a member movable back and forth, alternately in contact at a given point with an edge of the packing and out of contact at that point with said edge, and a packing in the space comprising a plurality of metallic laminations generally transverse to the path of movement of the member and packing material between the laminations, whereby bulging of the packing material into the path of movement of the member is reduced by the laminations.

2. In a device of the class described, walls forming a space adapted to hold packing, a member movable back and forth, alternately in contact at a given point with an edge of the packing and out of contact at that point with said edge, and a packing in the space comprising a plurality of perforated metallic laminations generally transverse to the path of movement of the member and packing material between the laminations and in the perforations, whereby bulging of the packing material into the path of movement of the member is reduced by the laminations.

3. In a device of the class described, walls forming a space adapted to hold packing, a member movable back and forth, alternately in contact at a given point with an edge of the packing and out of contact at that point with said edge, and a packing in the space comprising a plurality of metallic laminations generally transverse to the path of movement of the member and packing material between the laminations, having an asbestos base, whereby bulging of the packing material into the path of movement of the member is reduced by the laminations.

4. In a device of the class described, walls forming a space adapted to hold packing, a member movable back and forth, alternately in contact at a given point with an edge of the packing and out of contact at that point with said edge, and a packing in the space comprising a plurality of perforated metallic laminations generally transverse to the path of movement of the member and packing material between the laminations and in the perforations having an asbestos base, whereby bulging of the packing material into the path of movement of the member is reduced by the laminations, and the packing is united by the asbestos extending through the perforations.

5. In a device of the class described, walls forming a space adapted to hold packing, means for compressing packing in the space, a member movable back and forth, alternately in contact at a given point with an edge of the packing and out of contact at that point with said edge, and a packing in the space comprising a plurality of metallic laminations generally transverse to the path of movement of the member and packing material between the laminations.

6. In a device of the class described, a packing ring comprising a plurality of parallel metallic laminations and packing material having an asbestos base between the laminations, means for holding and compressing the packing ring and a member movable in a direction transverse to the laminations and in contact with the exposed annular surface of the ring at least part of the time.

7. In a device of the class described, a packing ring comprising a plurality of perforated parallel

metallic laminations and packing material having an asbestos base between the laminations and in the perforations, means for holding and compressing the packing ring and a member movable in a direction transverse to the laminations and in contact with the exposed annular surface of the ring at least part of the time.

8. In a plunger valve, a valve body having a lateral port, a longitudinally movable liner fitting an intermediate portion of the body interior, a longitudinally movable hollow plunger having a laterally ported intermediate portion fitting inside and extending through the liner, an inward flange on the body longitudinally beyond the liner and surrounding and fitting the outside of the plunger, said plunger having its hollow interior continuously communicating with the body interior at a portion thereof beyond the flange, and means for pressing the liner longitudinally toward the flange in combination with a composite packing ring compressed longitudinally between the liner and flange and radially between the outside of the plunger and inside of the body, said packing ring comprising a longitudinal succession of lamination rings alternately of molded packing and of metal, each approximately fitting the inside of the body and the outside of the plunger, the metal laminations having circularly spaced perforations through which the molded packing laminations unite with one another, and the plunger adapted to present its lateral port on one or the other side of the packing ring according as the valve is in its open or closed position.

9. In a plunger valve, a valve body having a lateral port, a longitudinally movable liner fitting an intermediate portion of the body interior, a longitudinally movable hollow plunger having a laterally ported intermediate portion fitting inside and extending through the liner, an inward flange on the body longitudinally beyond the liner and surrounding and fitting the outside of the plunger, said plunger having its hollow interior continuously communicating with the body interior at a portion thereof beyond the flange, and means for pressing the liner longitudinally toward the flange in combination with a composite packing ring compressed longitudinally between the liner and flange and radially between the outside of the plunger and inside of the body, said packing ring comprising a longitudinal succession of lamination rings alternately of molded packing and of metal, each approximately fitting the inside of the body and the outside of the plunger, and the plunger adapted to present its lateral port on one or the other side of the packing ring according as the valve is in its open or closed position.

DAVID ROBERT YARNALL.