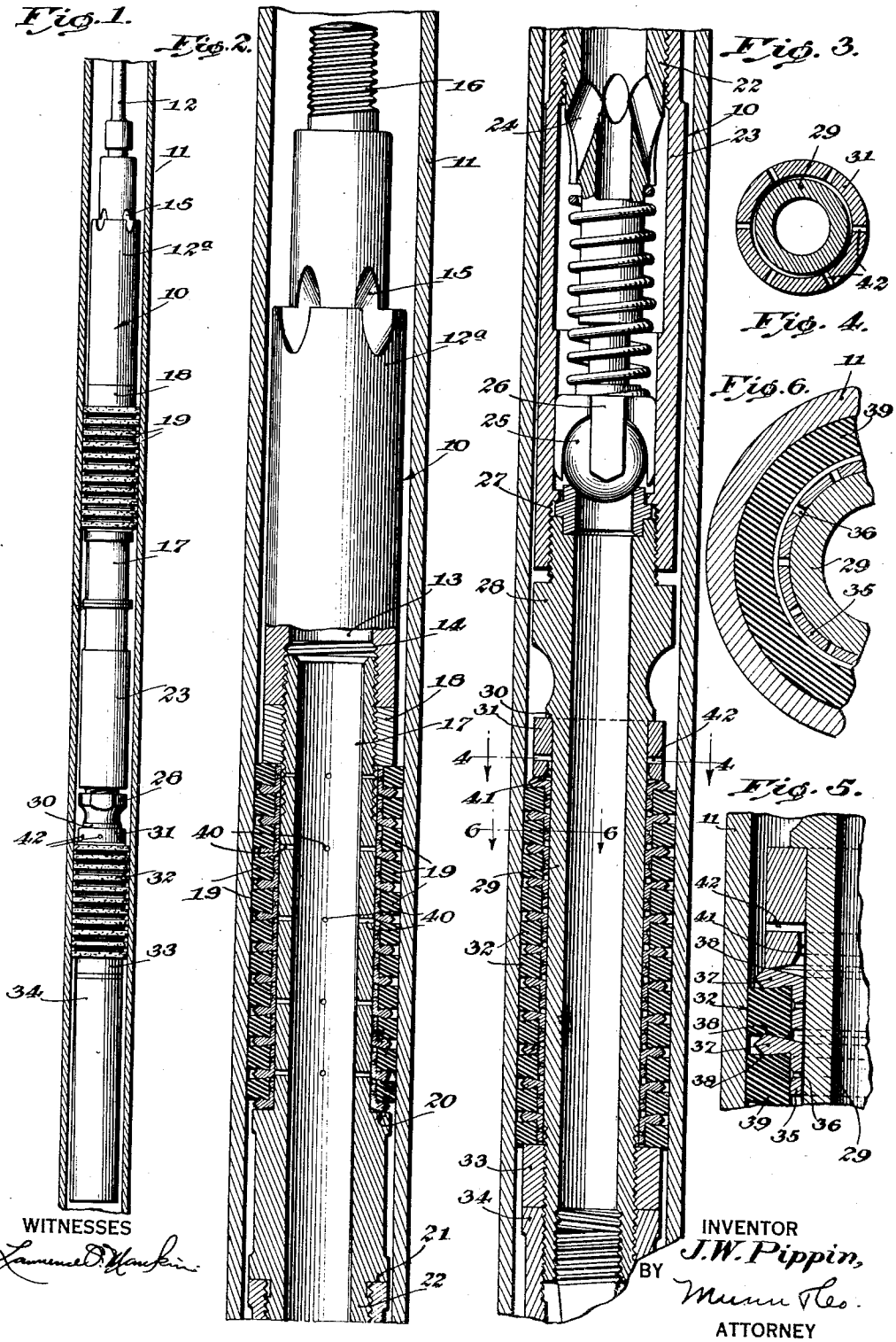
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WELL PUMP PLUNGER

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WELL PUMP PLUNGER

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2 Claims. (Cl. 309—31)

My invention relates to well pump plungers and in particular to a new form of packing therefor.

It is a primary object of the invention to provide a pump plunger with a plurality of sets of pumping elements and with means for successively bringing said sets of packing rings into operative relation with the well tubing upon the failure of a next adjacent set.

Another object of the invention is to provide a well pump plunger with a plurality of spaced sets of packing rings and with means for introducing pressure behind each of said sets of rings in succession so that as one set of rings wears out or fails to properly perform the sealing function, a next adjacent set of rings is brought into operation.

Another object of the invention is to provide an improved form of packing rings which will automatically be held in alinement even after being severely worn so as not to assume an inclined position with respect to the vertical axis of the pump and thereby result in impairment of the operation thereof.

Another object of the invention is to provide carrier rings which will support the packing rings in correctly spaced relation upon the pump plunger and which will effectually prevent any disalinement thereof even after the packing rings have become badly worn in service.

Other objects and advantages of the invention not specifically set forth will become apparent during the course of the following detailed description when read in conjunction with the accompanying drawing which forms a part of this specification and in which:

Figure 1 is a side elevation of my improved pump plunger, the same being shown in a well tubing;

Fig. 2 is a vertical sectional view of the upper portion of the pump plunger, the head thereof being shown in elevation;

Fig. 3 is a vertical sectional view of the lower portion of the pump plunger;

Fig. 4 is a horizontal sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is a fragmentary enlarged view of a portion of Fig. 3; and

Fig. 6 is a horizontal section taken on the line 6—6 of Fig. 3.

Referring now to the drawing in detail wherein like numerals refer to like parts throughout the same, 10 indicates my improved pump plunger which is reciprocated vertically in a well tubing 11 through the medium of a pump rod 12 in a manner well known to this art. The pump plunger 10 comprises a head 12*a* which is provided with a central bore 13, internally threaded at its lower end as at 14. The head 12*a* is provided at its upper end with a series of oil passages 15 connecting the bore 13 with the exterior of the pump plunger and affording a passage for the oil upwardly of the plunger. The head 12*a* terminates in a threaded shank 16 for attachment to the pump rod 12.

An externally threaded conduit section 17 is threadedly engaged within the lower end of the bore 13, a lock nut 18 being provided to lock the parts against relative rotation. The conduit section 17 is of reduced diameter throughout a major portion of its length and has mounted thereon a series of packing rings 19, the particular structure of which will be presently described. The conduit section 17 is enlarged at its lower end to provide oppositely directed shoulders 20 and 21 and terminates in a downwardly extending exteriorly threaded shank 22. The shank 22 as shown in Fig. 3 is threadedly engaged within the internally threaded bore of the valve cage 23 and is provided with a series of upwardly converging conduits 24 to provide an oil passage from the valve cage 23 into the conduit section 17.

The valve cage 23 houses a spring pressed ball valve 25 provided with a guide and follower 26, the particular structure of the ball valve and follower 26 being the subject matter of my co-pending application Ser. No. 533,514, filed April 28, 1931. The lower end of the bore of the valve cage 23 is internally threaded as at 27 for the reception of the externally threaded head 28 of a lower conduit section 29. The conduit section 29 is reduced in diameter just below the head 28 to produce a downwardly directed shoulder 30 against which a spacing sleeve 31 is seated, the spacing ring being received over the conduit 29. The conduit section 29 carries a series of packing rings 32 of a construction similar to the rings 19.

The lower end of the conduit section 29 is exteriorly threaded and is provided with a locking nut 33 which serves the dual purpose of holding the rings 32 in position on said sections and serving to present a shoulder against which the next adjacent conduit section 34 may abut when the same is threadedly engaged on the lower end of the conduit section 29.

As the packing rings 19 and 32 are identical in construction, a detail description of the rings 32 will suffice for both. Referring to Figs. 5 and 6, it will be seen that the packing rings 32 comprise metallic spacing rings including a sleeve-like portion 35 which has a loose sliding fit on the conduit 29 and is provided with laterally disposed openings or passages 36 which provide a fluid passage between the outer and inner faces of the sleeve portion 35. Each of the sleeves 35 terminate at one end in an annular flange 37 which is tapered from the inner to the outer edge thereof. The outer edge of the flange portion 37 is sharply tapered off so as to provide a sharply defined contacting edge or ridge 38 at opposite sides of

the thickest portion thereof. A composition packing ring 39 is received on the sleeve portion 35 of each of the rings 32. The packing rings 39 are rectangular in cross section and are of such a size as to extend both beyond one edge of the sleeve 35 and the outer edge of the flange portion 37. The particular composition of the rings 39 forms no part of the present invention but it has been found that rings cut from composition belting have proven very satisfactory in service.

In assemblying the rings on a conduit section, they are placed with the sleeve portions thereof all directed in the same direction away from the flange portion so that each of the composition packing rings 39 will be clamped between the flanges 37 on adjacent rings as clearly shown in Figs. 2, 3 and 5. When the rings are so mounted and end pressure is placed upon the same due to assembly of the pump parts, the composition rings 39 will be slightly compressed between adjacent flanges 37 so that their inner edges will expand into the tapered socket which is enlarged inwardly and which is formed by the adjacent flange sections. It will thus be seen that the rings are really in effect clamped between the contact edges 38 which are disposed adjacent the outer edges of the ring.

Referring now to Fig. 2 it will be seen that the conduit section 17 is provided with a plurality of passages 40 which lead from the bore thereof to the space behind the packing rings 19 so that the fluid within the bore of the conduit section 17 may pass through said openings 40 and exert pressure behind said packing rings. The apertures 36 in the sleeve portion of the packing rings provide a means by which the fluid may be introduced directly behind the composition rings 39. In the case of the set of packing rings 19 they are clamped between the lock nut 18 and the shoulder 20 produced by the enlarged portion of the conduit 17. It will of course be understood that during the operation of the pump, the column of fluid above the plunger 10 is of such a height as to exert a very high pressure against the inner face of the packing rings 19 thereby causing them to be tightly urged against the walls of the well tubing 11 and to form an efficient seal.

Referring to Figs. 3 and 5, it will be seen that the set of packing rings 32 is received between the sleeve member 31 and the lock nut 33 and that said sleeve 31 has the bore thereof slightly enlarged at the lower end as at 41. The sleeve 31 is provided with a series of apertures 42 which extend from the enlarged lower portion 41 thereof and open into the well tubing. It will thus be seen that any fluid pressure within the well tubing above the rings 32 will pass through the apertures 42 and into the enlarged lower portion 41 of the sleeve 31. As the sleeve portions 35 of the packing rings are loosely fitted on the conduit sections 29, fluid pressure will work down behind the rings and serve to expand the composition packing rings 39 in the same manner as described for the packing rings 19.

As long as the packing rings 19 maintain their efficiency, the packing rings 32 will not be brought into operation due to the fact that the rings 19 will serve to prevent the pressure of the column of fluid from expanding the rings 32. However, as soon as the rings 19 wear out or become inoperative for any other reason the pressure of the column of fluid will at once pass downwardly to the rings 32 and will work behind said rings through the passage 42 in the sleeve 31 thereby bringing the rings 32 into operation and allowing the pump to continue its service without renewing the packing rings 19. While I have shown but two sets of packing rings 19 and 32, it will be understood that as many sets of packing rings similar to the rings 32 may be provided below the ring section 19 so that as soon as one set wears out, another set may be brought into operation thereby greatly prolonging the length of time that the pump may be left in the well without pulling the same to renew the packing thereof.

While I have shown the pump with the packing rings located above the ball valve cage 23, this arrangement is not inflexible, but it should be noted that the openings 40 placing the conduit section in communication with the space behind the packing rings should be used only with the top set of rings, otherwise the pressure within the conduit would be introduced behind all the rings simultaneously which would defeat one of the features of my pump, that is, the feature of having each succeeding lower set of rings come into service when the next adjacent upper set ceases to be effective.

It will be noted that the sleeves 35 of the packing rings form effective guides which prevents the composition parts of the ring from canting to one side after they become badly worn. It will thus be seen that no matter how badly the composition portions of the rings become worn, the rings will be held in correctly spaced relation by means of the sleeve portions thereof and will thereby be prevented from jamming to one side and thereby affecting the operation of the pump.

Although a preferred embodiment of the invention has been shown and described, it will be understood that various changes in the details of construction may be made without departing from the spirit of the invention as defined by the appended claims.

I claim:

1. In a packing for well plungers, a plurality of superposed elements each comprising a metallic carrier ring comprising a sleeve portion and an annular flange portion formed therewith, said flange portion being substantially wedge shaped in cross section with the thickest portion adjacent the outer edge thereof, and a composition packing ring received on said sleeve portion and bearing at one side against said annular flange portion, and at the other side against the annular flange portion of a next adjacent packing element.

2. In a well pump plunger, comprising a conduit section, a plurality of superposed packing elements carried thereby, each of said elements comprising a metallic carrier ring having a sleeve portion slidably received on said conduit section, an annular flange portion formed with said sleeve portion, said flange portion being substantially wedge-shaped in cross section with the thickest portion adjacent the outer edge thereof, and a composition packing ring received on said sleeve portion and bearing at one side against said annular flange portion and at the other side against the flange portion of a next adjacent packing element, and means for exerting end pressure on said packing elements.

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