May 29, 1945. J. B. REILLY 2,377,039

PISTON CONSTRUCTION

Filed Nov. 15, 1943

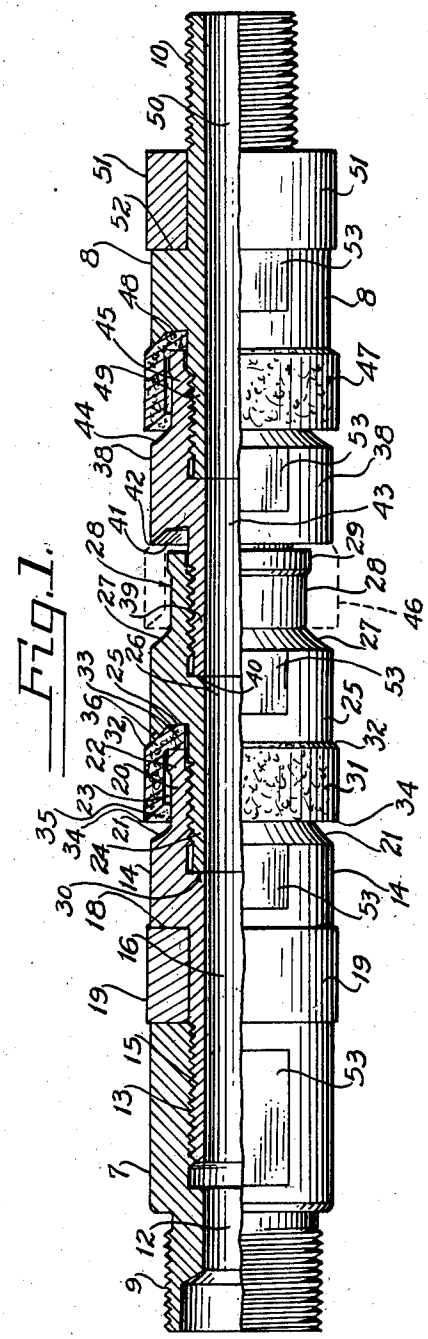


Fig. 1.

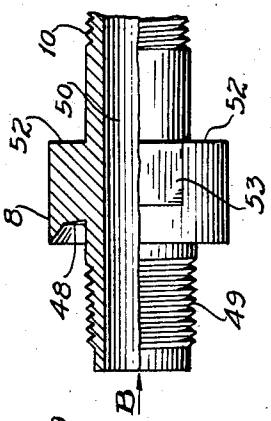


Fig. 5.

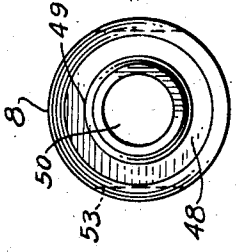


Fig. 4.

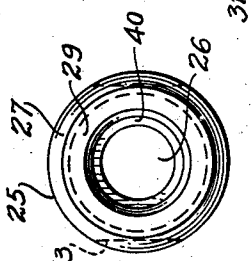


Fig. 3.

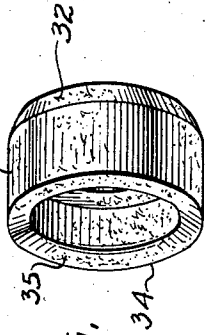


Fig. 6.

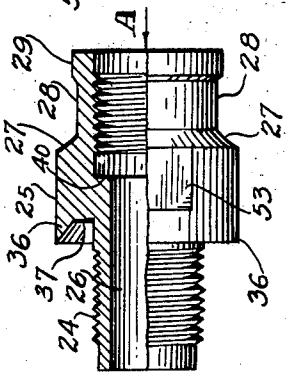


Fig. 2.

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Patented May 29, 1945

2,377,039

UNITED STATES PATENT OFFICE

2,377,039

PISTON CONSTRUCTION

John B. Reilly, Los Nietos, Calif.

Application November 15, 1943, Serial No. 510,283

9 Claims. (Cl. 309—4)

My invention relates to a piston construction for oil well pumps. Heretofore, a mandrel has been employed in such a construction, and cup leathers and followers have been alternately mounted upon the mandrel, with a nut tightening the series in place. The objection to such an arrangement is that the flexible cup members are clamped in place in the series, so that when one of the cup members works loose or becomes lost or worn out, the entire series is longitudinally loose upon the mandrel.

It is an object of the present invention to assemble the cup members and follower members, in an oil well pump construction, in such a manner that the loss or displacement of any of the cup members will not loosen the remaining cup or follower members.

Another object of the invention is to provide means in such a pump construction to hold the cup members independently without relation to the other cup members in the same series.

A further object is to eliminate the use of a mandrel in a pump construction of the character referred to.

Still another object is to provide an arrangement of a series of cup members and follower members, in an oil well pump construction, that will maintain the cup members in position without the use of endwise thrust upon the entire series of followers.

A further object is to provide such an arrangement that will employ the standard shape and size of cup now in general use on the mandrel-type of pump construction.

My invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawings merely show and the following description merely describes one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is a longitudinal view, half in elevation and half in longitudinal section, showing an embodiment of the foregoing objects.

Fig. 2 is a longitudinal view of one of the series of follower members, half in elevation and half in longitudinal section.

Fig. 3 is an end elevation, looking in the direction of the arrow "A" of Fig. 2.

Fig. 4 is an end view of Fig. 5, looking in the direction of the arrow "B" of Fig. 5.

Fig. 5 is a longitudinal view, half in elevation and half in longitudinal section, of an end follower member.

Fig. 6 is a perspective view of a cup member employed in the embodiment.

Referring more in detail to the drawing, the reference numerals 7 and 8 designate end members of the instant pump arrangement. These members 7 and 8 are threaded, as shown at 9 and 10 respectively, for connecting with abutting elements. The member 7 has a smooth, axial bore 12 and has a tapped end portion 13 of larger diameter. An abutting follower member 14 has a threaded neck 15 that engages the tapped portion 13. The smooth bore 16 axial of the member 14 is of the same diameter as the bore 12 of the end member 7.

Between a shoulder 18 on the follower member 14 and the inner end of the end member 7 is disposed a wear ring 19 of suitable material, e. g., bronze, iron, etc., which is of slightly larger diameter than the end and follower members 7, 8 and 14. The ring 19 thereby bears the brunt of the wear upon the construction caused by the vertical pumping movements thereof in the casing.

The follower member 14 also has a neck 20 that has a beveled shoulder 21 connecting it with the body of the follower 14. The neck 20 is tapped and has approximately the same inside diameter as the tapped, inner end 13 of the end member 7. The mouth 22 of the neck 20 is thickened to provide a groove 23 between the shoulder 21 and such thickened portion.

Screwed into the tapped neck 20 is the threaded end 24 of the next follower 25. The follower 25, including the threaded end 24, likewise has an axial bore 26 of the same diameter as the bore 12. The follower 25 has a beveled shoulder 27, a groove 28 and a thickened mouth 29 similar to the corresponding parts of the follower member 14.

It will be noted that a shoulder 30 at the inner end of the tapped neck 20 provides an abutment for the threaded end 24.

A flexible cup member 31 has a beveled shoulder 32 leading to a radially inwardly projecting flange 33. A relatively sharp lip 34 around the other end of the cup member 31 is provided by an internal taper 35. The follower member 25 has

a surrounding edge 36 that conforms with the beveled shoulder 32 and provides an end-facing, annular recess 37 within the edge 36.

It is to be noted that the flange 33 of the cup member 31 is so dimensioned that the mouth 22 clamps said flange in the annular recess 37, when the members 14 and 25 are screwed home until the end face of the threaded end 24 engages the shoulder 30. Thus it seems clear that the members 14 and 25 are not dependent upon the cup member 31 for maintaining their relative positions. Therefore, it is believed clear that the cup member 31 may work loose, become lost, or wear out, and yet the members 14 and 25 would still be held in the positions, in order that other cup members might not become loosened.

A follower member 38 is substantially identical with the follower member 25. The member 38 has a threaded end 39 that abuts a shoulder 40 in the member 25, and has a recess 41, a surrounding edge 42, an axial bore 43, and a shoulder 44 connecting with an internally threaded mouth 45 similar to the correspondingly named parts of the follower 25. A cup member is suggested by broken lines 46 between the members 25 and 38. The cup member 46 is clamped in place similar to the cup member 31, and it also may come out without disturbing the relative positions of the other members, due to the abutment of the end 39 against the shoulder 40.

Another cup member 47 is clamped between the rim of the mouth 45 and an end-facing recess 48 in the end member 8, while the internally threaded mouth 45 is screwed home upon a threaded end 49 on the end member 8. It is of course to be understood that the number of the alternate cup members and follower members, such as 25, 38, may be varied at will. The cup members in my construction may be leather, composition, or other suitable, flexible material.

The end member 8 has an axial bore 50 alined with, and having the same inside diameter as, the other axial bores, heretofore mentioned. A wear ring 51 is arranged around a reduced portion of the end member 8, against a shoulder 52 thereon. Flattened sides 53 may be provided on opposite sides of the members for gripping same by means of a wrench or other tool.

In the use of my present construction, it is believed clear that the cup members may become worn, loose, or entirely fall out without disturbing the relative positions of the follower or end members or the other cup members, and that no mandrel is needed upon which to mount the present members. The use otherwise is believed clear to those skilled in the art, from the foregoing description.

While I have illustrated and described what I now regard as the preferred embodiment of my invention, the construction is, of course, subject to modifications without departing from the spirit and scope of my invention. I, therefore, do not wish to restrict myself to the particular form of construction illustrated and described, but desire to avail myself of all modifications that may fall within the scope of the appended claims.

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

1. In a piston construction, a cup member, axially bored follower members having a threaded connection with each other, each of said members having internal means for cooperation with other members to limit the inward screwing of the followers together, a recess, and a face, the face of one member operable in conjunction with the recess of another member to clamp the cup member when said follower members are screwed together, the said limiting means being arranged to prevent further inward screwing of one follower member into the other at a point where the cup member is firmly gripped between the follower members.

2. In piston construction, an annular cup member, axially bored follower members disposed at opposite sides of the cup member and having a threaded connection with each other through the center opening in the cup member, each follower member having a face at one end thereof and a recess intermediate the ends thereof, said face and recess movable towards each other to clamping positions at opposite sides of the cup member as the members are screwed together.

3. In pump construction, an annular cup member, axially bored follower members disposed at opposite sides of the cup member and having a threaded connection with each other through the center opening in the cup member, the follower members having oppositely disposed faces that move towards each other to clamping positions at opposite sides of the cup member as the members are screwed together.

4. In pump piston construction, an annular, compressible cup member having an inwardly directed flange, follower members axially bored to provide a hollow piston throughout said members disposed at opposite sides of the cup member and having a threaded connection with each other through the center opening in the cup member, the follower members having oppositely disposed faces that move towards each other to compress and clamp the flange therebetween as the members are screwed together, one of the follower members having a shoulder arranged to abut the end of the other follower member at a point where the flange is firmly clamped and compressed between the follower members.

5. In a device of the character described, a series of followers, each comprising a cylindrical body having an annular recess, an axially bored reduced and externally threaded portion at one side of said cylindrical body, and an internally threaded, reduced extension at the other side of said body having a face in a plane at right angles to the longitudinal axis of said body and an internal annular shoulder, the reduced externally threaded portion of said cylindrical body of one follower engaging the internally threaded extension of the body of another follower, and an annular cup member having a flange conforming to said recess and adapted to be clamped between the face and recess when complementary followers are joined together, said annular shoulder limiting the inward screwing of one follower into the other.

6. In a device of the character disclosed, a series of followers, each comprising a cylindrical body axially bored and having at one side thereof a beveled edge defining an annular recess, and an axially bored reduced portion extending from the bottom of said recess and parallel with the longitudinal axis of said body; said reduced portion being externally threaded; and a diametrically reduced portion at the other side of said body having a face parallel with said annular recess and being internally threaded; said reduced portion having an internal annular shoulder; and an annular cup member having a flange fitting the recess of the cylindrical body of one follower and adapted to be pressed thereinto by the face of a companion follower during the op-

eration of threadedly joining the followers, said shoulder limiting the relative movement toward each other.

7. In a device of the character disclosed, a hollow piston unit composed of a series of followers and end members; said followers each comprising a cylindrical body having an axial bore and longitudinal reduced extensions at each side thereof; one of said extensions being externally threaded and the other of said extensions being internally threaded and provided with a face; one side of said cylindrical body having a recess adjacent said externally threaded extension; an annular cup member fitting the recess of the cylindrical body of one follower and adapted to be pressed thereinto by the face on the internally threaded extension of another follower, and members associated with said followers, and wear rings on said end members.

8. In a device of the character disclosed, a series of followers forming a hollow pump piston, each comprising a cylindrical body having at one side thereof an inwardly beveled edge defining an annular recess, and a reduced portion axially bored and provided with external threads; and a reduced portion at the other side of said body; an annular cup member having a flange fitting said recess; said portion being internally threaded to receive the externally threaded extension of a companion follower and having a transverse face adapted to press said cup member into the recess of a companion follower, when said followers are tightened by threading association.

9. In a device of the character disclosed, a series of follower members, each comprising a cylindrical body having an axial bore and an annular recess in one side thereof; said body having reduced extension at both sides thereof and extending laterally therefrom; one of said extensions being externally threaded and axially bored and the other extension being internally threaded to receive the lateral extension of a companion member and provided with a face; a cup member; said face cooperating with the recess of a companion follower to press said cup member in said recess; said internally threaded extension having a shoulder below the threads thereof and said shoulder cooperating with the externally threaded extension to limit the relative inward movement of said followers.

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