

April 29, 1958

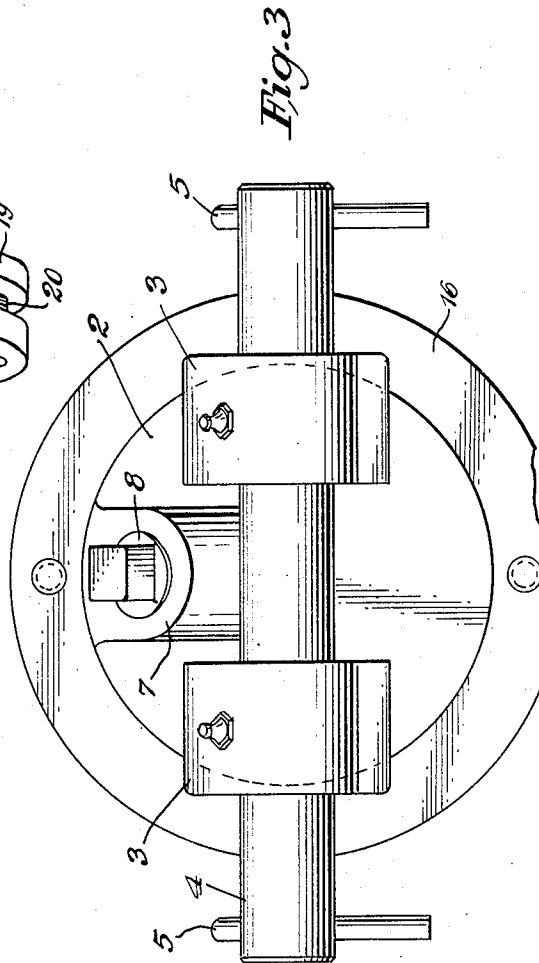
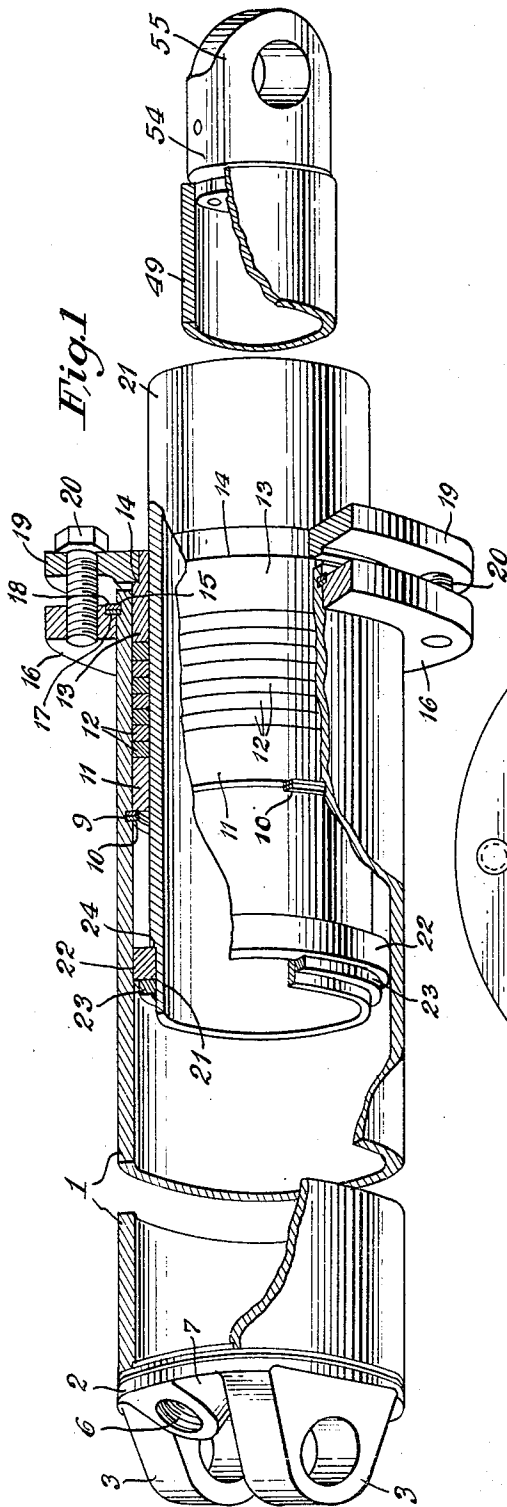
G. S. PARK

2,832,650

SEALING MEANS FOR HYDRAULIC CYLINDER

Filed Feb. 3, 1955

2 Sheets-Sheet 1



Inventor
Glenn S. Park
by Parker & Carter
Attorneys

1

2,832,650

SEALING MEANS FOR HYDRAULIC CYLINDER

Glenn S. Park, Streator, Ill., assignor to Anthony Company, Streator, Ill., a corporation of Illinois

Application February 3, 1955, Serial No. 485,901

4 Claims. (Cl. 308—3.5)

This invention relates to a hydraulic hoisting means such as a jack, and in the particular form illustrated it may conveniently be adapted for use as the hoisting or elevating means on a tipping or dump truck. It is, of course, not limited to this use. It has for one object to provide a construction in which one or more hydraulic cylinders may be associated with a piston and a source of fluid under pressure, and in which the construction of the cylinder or cylinders is such that the free end of the cylinder is reinforced to prevent outward enlargement or distortion.

Another object is to provide, in connection with such a cylinder construction, a telescopic hoist or jack including a plurality of cylinders, one within the other, and means for reinforcing the outer end of each cylinder and for retaining the packing adequately within each cylinder.

Another object is to provide a construction for the end of each cylinder of a telescopic hoist so arranged that the assembly is accomplished without the necessity of welding, riveting, or otherwise positively fixing the parts to the cylinders by heat-treatment.

Other objects will appear from time to time throughout the specification and claims.

The invention is illustrated more or less diagrammatically in the accompanying drawings wherein:

Fig. 1 is a perspective view of one form of the device with parts broken away and parts omitted;

Fig. 2 is a longitudinal partial section illustrating a multiple form of the device embodied in a telescopic hoist suitable for use in dumping or tipping truck bodies; and

Fig. 3 is an end elevation of the device of Fig. 2.

Like parts are designated by like characters throughout the specification and drawings:

In the structure as shown in Fig. 1 there is a single outer cylinder, a single inner cylinder, and a single hollow or tubular piston rod. Parts of the piston rod are omitted and parts of the single moving cylinder are omitted; particularly the end construction is omitted.

In Fig. 2 a jack or hoist is shown which includes an outer cylinder fixed with relation to the member which supports the total assembly and there are shown positioned within the outer cylinder two sliding telescopic cylinders instead of the single one shown in Fig. 1 and there is also shown in Fig. 2 the hollow or tubular piston rod. The end construction of all of the cylinders, both the fixed and the moving cylinders, is the same in each figure and a description of one will suffice for the others.

1 is an outer cylinder fixed to a cylinder head 2 which may be provided with one or more ears or trunnion bearings 3 within which a stub shaft 4 is positioned. The shaft may be held with respect to the bearings in which it is to be positioned when the apparatus is in use by cotter pins 5, 5, or otherwise. A threaded opening 6 may be formed in the enlargement 7 of the cylinder head 2. This may be connected to a source of pressure fluid or it may be closed by a cap screw 8 as shown in Fig. 2, if desired. The particular details of the ports and other means for moving pressure fluid to the assembly and for

2

permitting it to be withdrawn from the assembly are not shown as they form no essential part of the invention.

In any device of the general type shown in which a member slides inwardly and outwardly with respect to a cylinder, means for guiding the sliding member and means for preventing leakage of pressure fluid must be used. For this purpose the outer cylinder 1 may be grooved at 9 to receive a snap ring 10. A bearing member 11, which may be formed of metal or other suitable material, fits within the cylinder 1 and against the snap ring 9. Packing 12 is positioned within the cylinder 1 and against the bearing member 11. A second bearing member 13, which is preferably shaped to provide a collar 14, is positioned within the outer open end of the cylinder 1. The cylinder 1 is also grooved exteriorly at 15. A collar 16 is positioned upon the cylinder 1. It may be shouldered as at 17, if desired. Whether shouldered or not, a snap ring or other fastening means 18 is received in the groove 15 of the cylinder 1 and limits movement of the collar 16 in the outward direction with respect to the cylinder 1. It prevents the collar from slipping off of the cylinder. A second collar 19 is positioned about the bearing member 13 and against the shoulder 14 of that bearing member. This collar 19 and the collar 16 are provided with matching perforations within which screws 20 are received. By means of the screws the two collars may be drawn together to insure suitable compression of the packing 12 by drawing the bearing members 11 and 13 together. Other means, of course, might be utilized for drawing the collars 16 and 19 together. The collar 16 preferably fits with a tight fit about the cylinder 1 and is of such strength that it will effectively resist any tendency of the cylinder 1 to distort or to "bell" outwardly under the influence of pressure or any other force within the cylinder. The collar 16 thus serves both as a reinforcement in the cylinder 1 at its outward or free end and adjacent that end, and also as an anchoring means for the compression collar 19 with which it cooperates to permit relative movement of the two collars so as to exert suitable compression on the packing 12 and to hold the parts, including the bearing members 11 and 13, and the packing in suitable adjusted position.

The first or outermost movable cylinder 21, which is the only movable cylinder in Fig. 1, is positioned within the cylinder 1 and is sufficiently smaller in diameter to provide clearance between it and the cylinder 1 for the bearing members 11 and 13 and the packing 12. A bearing member 22 is fixed to or supported upon the cylinder 21 and is held in place by a ring 23. The bearing member 22 is of such size as to guide and steady the cylinder 21 in its movement and it may be held in place in any fashion. For example, it is seated against a shoulder 24 and is held in place by the ring 23. In its movement with relation to the cylinder 1, the cylinder 21 is guided primarily by the bearing members 11, 13 and 22. In Fig. 1 nothing is shown of the packing arrangement within the cylinder 21. This packing arrangement, however, is shown in Fig. 2. It is generally similar to the packing arrangement described in connection with cylinder 1. On the inner face of the cylinder 21 a groove 25 is formed within which a snap ring or other suitable limiting member 26 is positioned. A bearing member 27 is seated within the cylinder 21 and against the member 26. The packing 28 is positioned within the cylinder 21 and in part against the bearing member 27. A second bearing member 29 is positioned within the cylinder 21 and it extends outwardly beyond it and may be shouldered as at 30.

The cylinder 21 is grooved exteriorly as at 31. A collar 32 is positioned on the exterior of the cylinder 21 and fits tightly thereupon. It may be shouldered as at

3

33 and it is held against outward displacement with respect to the cylinder 21 by the snap ring 31a, or other suitable means. Positioned upon the outer portion of the bearing member 29, and preferably against the shoulder 30, is a collar 34. The collars 32 and 34 have matching perforations formed in them. The perforations in the collar 32, at least, are threaded to receive screws 35 by means of which the collars 32 and 34 are drawn together.

As thus described, the bearing members and collars on the exterior or outer end of the cylinder 21 are substantially the same as those above described in connection with the construction about the outer end of the cylinder 1.

Positioned within the cylinder 21 is a second movable cylinder 36. It is provided, adjacent its inner end, with a bearing member 37 seated against a shoulder 38 and held in place by a ring 39 or by other means. The bearing member 37 bears against the inner face of the cylinder 21. The bearing members 37, 27 and 29 guide the cylinder 36 in its movement with respect to the cylinder 21. The bearing and packing construction positioned within and adjacent the outer end of the cylinder 36 is the same as that above described in connection with cylinders 1 and 21 and comprises a bearing member 40 held in place by a ring 41. The bearing member 40 has positioned outwardly beyond it packing 42, beyond which is a second bearing member 43 shouldered at 44. A collar 45 is positioned on the cylinder 43 and is held in place by a ring 46. A second collar 47 is positioned upon the second bearing member 43 and against the shoulder 44 and is held adjustably with respect to the collar 45 by screws 48.

The construction thus far described comprises the fixed cylinder 1 and the moving cylinders 21 and 36 and their guiding and packing assemblies. The hollow piston construction will now be described.

A hollow or tubular member 49 comprises the piston member and it is mounted to slide within the cylinders. At its inner end it abuts a ring 50 welded on the tube 36. The tube 49 carries a bearing member 51 positioned against a shoulder 52 by a ring 53 welded to the tube 49. At its outer end the tubular piston member 49 is closed by a pluglike member 54 of which an eye member 55 forms a part. The piston 49 is guided in its movement of the bearing member 51 which it carries and by the bearing members 40 and 43 carried on the inner face of the cylinder 36.

There are several members in the device which serve as guide bearings or bearing members and which are also associated with packing and may be subjected to compression so that compression is exerted upon the packing adjacent them. Thus the members 11 and 13 are guide bearings because they furnish bearing supports for the tubular member 21. They are also associated with the packing 12 and when the screws 20 are tightened, they serve to exert or transmit a compression upon the packing. In that sense they might also be considered as packing glands and they serve, thus, both as supporting and guiding bearings and as members by means of which compression is transmitted to packing. Similarly, the members 27 and 29 are fixed in relation to the tube 21 and serve as guiding bearings for the tube 36 and also exert compression upon the packing 28 when the screws 35 are tightened. Also, similarly, the members 40 and 43 fixed in relation to the tube 36 act as bearing members for the tube 49 or piston 49 and when the screws 48 are tightened, the members 40 and 43 are effective to cause compression of the packing 42. These pairs of members 11 and 13, 27 and 29, and 40 and 43 all have a dual purpose or function since they act as bearing members and also as packing-retaining or compression members and in that sense as packing glands. Where in the specification or claims the word "gland" may appear, it will be understood as identifying these

4

members and not as limiting them specifically to glands and to glands alone, since they also have the other purpose and function above described.

Although I have shown operative forms of my device, the invention is not limited to the particular details shown. Many changes may be made in the form, shape and arrangement of parts without departing from the spirit of the invention.

The use and operation of my invention are as follows:

In general the device operates by supplying pressure fluid to it which causes the piston and the inner cylinder or cylinders, in case more than one is present, to move outwardly and thus a load is lifted or moved. When the pressure fluid is permitted to escape or is positively withdrawn from the cylinders they will, generally under the influence of the load, return to the collapsed position of Fig. 2. When pressure is exerted within a cylinder, if for any reason it becomes excessive it may have a tendency to distort the cylinder. In the past it has been found that sometimes pressure will distort a cylinder sufficiently to expand or otherwise distort its outer or free end. In effect, the pressure will cause the cylinder to "bell" outwardly. When this occurs the cylinder is useless and must be replaced because pressure will not be retained within the cylinder sufficiently to cause satisfactory operation. Sometimes in the past lugs or screws have been welded on the cylinder to receive the packing glands or collars which retain them. This has tended to weaken the cylinder. The present construction avoids any weakening effect on the ends of the cylinder or cylinders and, on the contrary, provides a positive reinforcing. The rings or collars 16, 32 and 45 each fit closely over the cylinders about which they are mounted. Each is of heavy section and furnishes, particularly in the radial direction, a very effective reinforcement for the cylinder end and, thus, when the cylinder for any reason comes under the effect of excessive pressure from within, the collars positioned about the cylinder ends prevent distortion. These collars, of course, serve the added function, in cooperation with a second collar in each case, that they are drawn together to compress the packing and to hold or move the packing glands in or into suitable adjusted position. Obviously they may be drawn together for this purpose or they may be separated to permit removal where packing must be replaced, or other replacements, adjustments or repairs are necessary, but always, under working conditions, the outer collars, such as the collars 16, 32 and 45 are present fitting tightly upon their respective cylinders and furnishing for each a strong and effective reinforcement to prevent distortion in the outward direction under the influence of pressure from within.

I claim:

1. In combination, a hollow tubular cylinder having a single outside diameter throughout its length, said cylinder having an open end and a closure at its opposite end, a bearing ring having a portion slidably positioned within and in contact with the inner surface of the open end of said cylinder and a portion extending outwardly therefrom, said bearing ring having a shoulder on said outwardly extending portion, a reinforcing ring slidably mounted on and in contact with the outer surface of said cylinder, a groove in the outer surface of said cylinder adjacent said open end, a snap ring in said groove and having an annular portion extending radially outwardly therefrom, a collar surrounding said bearing ring and having a portion seating on said shoulder and means for progressively adjustably drawing said reinforcing ring and collar together to hold said reinforcing ring outwardly against said snap ring annular portion.

2. The structure of claim 1 characterized by and including a groove in the inner surface of said cylinder and spaced inwardly from the open end of said cylinder, a second snap ring positioned within said groove and having an annular portion extending radially inwardly

5

into said cylinder, a second bearing ring slidably positioned within said cylinder and seated against said second snap ring annular portion between said open end and said snap ring, and packing in said cylinder between said first and second bearing rings whereby said drawing together of said collar and said reinforcing ring is effective to compress said packing between said first and second bearing rings.

3. In combination, a hollow tubular hydraulic cylinder having a circumferential open end and a closure for the opposite end thereof, a member positioned to slide within and to extend outwardly beyond the open end of said cylinder, a groove in the inner surface of said cylinder spaced inwardly from said open end, a snap ring positioned within said groove and having an annular portion extending radially inwardly into said cylinder, a first bearing ring positioned within said cylinder and against said snap ring annular portion between said snap ring and said open end, a packing positioned within said cylinder and against said first bearing ring between said first bearing ring and said open end, a second bearing ring having a portion slidably positioned within said cylinder open end against said packing and a portion outside said cylinder, said outside portion having a shoulder thereon, said sliding member being positioned for longitudinal movement in contact with said packing and in bearing contact with said first and second bearing rings, a reinforcing collar slidably mounted

6

on the outer surface of said cylinder and in contact therewith, a groove in the outer surface of said cylinder adjacent its open end, a second snap ring positioned in said groove and having an annular portion extending radially outwardly therefrom between said reinforcing collar and said open end, a compression collar positioned outside said cylinder about said second bearing ring and against said shoulder, and means for drawing said collars together to hold said reinforcing collar outwardly against said second snap ring annular portion and to compress said packing between said bearing rings.

4. The structure of claim 3 characterized by and including a member carried by the inner end of said sliding member and positioned to contact said first snap ring annular portion in response to outward movement of said cylinder whereby said first snap ring furnishes stop means limiting inward movement of said first bearing ring and outward movement of said sliding member.

References Cited in the file of this patent

UNITED STATES PATENTS

344,038	Fitts	June 22, 1886
1,174,788	Winn	Mar. 7, 1916
1,424,233	Berry	Aug. 1, 1922
1,784,554	Stukenborg	Dec. 9, 1930
2,204,365	Klemm	June 11, 1940
2,426,108	Loewe	Aug. 19, 1947
2,692,584	Armington	Oct. 26, 1954