HYDRAULIC OUTRIGGER JACK WITH SCREW LOCK

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11 Chims

ABSTRACT OF THE DISCLOSURE

A hydraulic jack for use on the outriggers of a mobile crane wherein the jack is provided with a screw lock as a safety feature, for maintaining the jack in a desired extended position. The jack includes a piston reciprocably mounted within a cylinder, and in one embodiment the screw lock includes a member threadably mounted within the piston and adapted to engage the end of the cylinder to thereby lock the jack in the extended position. In another embodiment the screw lock includes a member threadably mounted within the cylinder and adapted to engage the piston to thereby lock the jack in the extended position.

It is conventional to provide mobile cranes with outriggers, having hydraulic jacks on the ends thereof, for supporting the crane in a stabilized position on relatively rough terrain and to relieve the vehicle chassis from the stresses and strains of heavy loads being lifted by the crane at the job site. To stabilize the crane, the outriggers are moved outwardly transversely of the vehicle and the jacks are then extended vertically to engage the ground to thereby lift the vehicle wheels slightly off the ground whereby the crane loads are transmitted directly to the ground through the hydraulic jacks. In order to relieve the hydraulic fluid holding the jacks in the extended position from the pressure of the lifting loads, and as a safety feature in case of failure of a hose, valve or other hydraulic mechanism, it is customary to provide the jacks with suitable locking assembly for maintaining the jacks in the extended position.

Heretofore the lock assembly employed for maintaining the jacks in the extended position usually consisted of a pin adapted to be selectively received within one of a plurality of apertures formed in the piston rod housing. By this construction and arrangement, the pin is inserted transversely into the piston rod housing aperture nearest the outer surface of the cylinder housing end wall, whereby the engagement of the pin with the cylinder housing and wall prevents the piston from retracting into the cylinder. While these locking assemblies have been satisfactory for their intended purpose, they have been subject to certain objections in that they are limited in the degree of adjustment afforded by the pin type lock. For instance, if the terrain on which the crane is being supported requires the piston rod of the jack to be extended to a position where the desired aperture in the rod housing for receiving the locking pin is not adjacent the cylinder housing end wall, the jack cannot be locked at the desired extended position. In other words, there is no provision in the pin type lock assembly for locking the piston rod in an extended position other than the position determined by the apertures formed in the piston rod housing.

To overcome the disadvantages experienced with the pin type lock assemblies, the lock assembly of the present invention has been devised which comprises, essentially, a rod journaled on the jack cylinder and extending coaxially therewith, the rod being keyed to a threaded locking member, whereby when the rod is rotated, the locking member is caused to move longitudinally of the cylinder to a locking position between the piston head and one end of the cylinder to thereby lock the jack in the extended position.

In one embodiment the locking member is threadably mounted within the piston and adapted to engage one end of the cylinder, and in another embodiment the locking member is threadably mounted within one end of the cylinder and adapted to engage the piston.

IN THE DRAWINGS

FIG. 1 is a side elevational view of a mobile crane showing the general arrangement of the outriggers mounted thereon;

FIGS. 2, 3 and 4 are diagrammatic views showing the hydraulic outrigger jack of the present invention in retracted, extended and locked positions, respectively;

FIG. 5 is a top plan view of the jack of the present invention;

FIG. 6 is a sectional, side elevational view of one embodiment of the invention showing the jack in the retracted position;

FIG. 7 is a fragmentary sectional, side elevational view showing the jack illustrated in FIG. 6 in the extended position;

FIG. 8 is a fragmentary, sectional, side elevational view showing the jack illustrated in FIG. 6 in the extended, locked position;

FIG. 9 is a view taken along line 9—9 of FIG. 8.

FIG. 10 is a sectional side elevational view of another embodiment of the present invention showing the jack in the retracted position;

FIG. 11 is a fragmentary, sectional, side elevational view showing the jack illustrated in FIG. 10 in the extended position; and

FIG. 12 is a fragmentary, sectional, side elevational view showing the jack illustrated in FIG. 10 in the extended, locked position.

Referring to the drawings and more particularly to FIG. 1, a mobile crane 1 is illustrated having two pairs of transversely extending outriggers 2 and 3 slidably mounted on the vehicle chassis 4, the outriggers 2a, 2b and 3a, 3b in each pair being hydraulically actuated to slide outwardly, in opposite directions relative to each other. The jack assembly 5 of the present invention is connected to the outer end of each outrigger through a suitable collar plate 5a, the jacks being hydraulically actuated from the retracted position, as shown in FIG. 2, to the extended position as shown in FIGS. 3 and 4. As a safety feature, and in order to maintain the jack in the desired extended position, the jack is provided with a screw lock, to be described more fully hereinafter.

The details of construction of one embodiment of the jack assembly of the present invention is illustrated in FIGS. 6 to 8 wherein it will be seen that a tubular piston rod 6 is slidably mounted within a cylinder 7. The outer end of the piston rod is provided with a conventional ground-engaging pad 8 connected to the piston rod through a suitable ball-joint connector 9, the inner end of the piston rod having a piston 10 secured thereto by a washer 11 and nut assembly 12.

The end of the cylinder through which the piston rod extends is provided with a bushing 13 which seals the particular end of the cylinder and maintains the piston rod in alignment within the cylinder, the opposite end of the cylinder being sealed by an end wall 14. Hydraulic fluid supply and exhaust ports 15 and 16 are formed in the side wall of the cylinder and communicate with conduits 17 and 18 connected to a manifold block 19.

To move the hydraulic jack, thus far described, from the retracted position as shown in FIG. 6 to the ex-
3 tended position as shown in FIGS. 7 and 8, hydraulic fluid is admitted into the cylinder through port 15, and when moving the jack assembly to the retracted position, the fluid is admitted into the cylinder through port 16 while exhausting fluid through port 15.

In order to relieve the hydraulic fluid holding the jacks in the extended position from the pressure of the lifting loads, and as a safety feature in case of failure of a hose, valve or other hydraulic mechanism a screw lock assembly is provided and comprises, a shaft 20 journaled in the cylinder end wall 14, the shaft including diametrically opposed grooves 20a slidably receiving a pair of keys 21, 22 which are press-fit within a threaded sleeve 23, the sleeve being threadably mounted within a collar 24 rigidly mounted within the end of the piston rod 6. A handle 20b is secured to the outer end of the shaft to facilitate the rotation thereof, whereupon the shaft 20, keyed to the sleeve 23, causes the sleeve to be threadred through the collar 24 thereby moving longitudinally of the shaft until the end of the sleeve abuts the inner surface of the cylinder end wall 14, as shown in FIG. 8. While in this position it will be readily seen the rigid connection between the cylinder end wall 14, threaded sleeve 23 and collar 24 on the end of the piston rod locks the jack so that the piston rod cannot slide to the retracted position.

To release the lock assembly, the shaft 20 is rotated in the opposite direction to thereby thread the sleeve into the piston rod as shown in FIG. 7, thus moving the end of the threaded sleeve away from the cylinder end wall 14.

Another embodiment of the lock assembly is illustrated in FIGS. 10, 11 and 12 wherein it will be seen that the end wall 14 of the cylinder is provided with a housing 25 extending outwardly therefrom, the end wall 25b of the housing having a shaft 25a journaled therein. One end of the shaft is provided with a suitable handle 26a and the opposite end of the shaft has a pair of diametrically opposed keys 27 pressed therein and slidably received within grooves 28 formed in the bore of a threaded sleeve 29 mounted within a collar 30 rigidly secured to the cylinder end wall 14.

By this construction and arrangement, to lock the hydraulic jack, as shown in FIG. 12, the shaft 26 is rotated in a direction to cause the sleeve 29 to thread, through the collar 30 until the inner end of the sleeve abuts the piston 10. To release the lock assembly, the shaft is rotated in the opposite direction thus causing the sleeve 29 to be drawn into the housing 25 away from the piston 10, as shown in FIG. 11.

While the hydraulic jack and associated lock assemblies of the present invention have been described for use with mobile cranes, it will be readily appreciated by those skilled in the art that the jacks can also be mounted on outriggers employed in other types of vehicles or installations such as back hoes, scaffolds, and the like.

The terms and expressions which have been employed herein are used as terms of description and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof but it is recognized that various modifications are possible within the scope of the invention claimed.

What is claimed is:

1. A lock assembly for a hydraulic jack of the type having a piston and piston rod slidably mounted within a cylinder, the lock assembly comprising a shaft journaled on the cylinder and extending therein, means on said cylinder connected to rotate said shaft, locking means mounted within the hydraulic jack, and means operatively connecting said locking means to said shaft and to the hydraulic jack whereby upon rotation of said shaft by said means on said cylinder after said piston is moved to a selected position in said cylinder, said shaft longitudinally moves said locking means relative to said shaft to a locking position between and in contact with the piston and one end of the cylinder.

2. A lock assembly according to claim 1 wherein the shaft extends coaxially with respect to the longitudinal axis of the cylinder and the locking means extends coaxially with respect to the shaft.

3. A lock assembly according to claim 1 wherein the shaft is journaled on one end wall of the cylinder.

4. A lock assembly according to claim 1 wherein the locking means comprises a threaded sleeve.

5. A lock assembly for a hydraulic jack of the type having a piston and piston rod slidably mounted within a cylinder, the lock assembly comprising a shaft journaled on the cylinder and extending therein, a threaded sleeve having a bore mounted within the hydraulic jack, means operatively connecting said sleeve to said shaft and to the hydraulic jack comprising key means extending between said shaft and the bore of the sleeve, and collar means mounted within the hydraulic jack, and said sleeve being threadably received within said collar means, whereby upon rotation of said shaft said sleeve moves relative to said shaft to a locking position between the piston and one end of the cylinder.

6. A lock assembly according to claim 5 wherein the collar means is mounted within the piston through which the shaft and sleeve extend into the piston rod, whereby upon rotation of said shaft the sleeve is caused to move longitudinally of the shaft to thereby abut one end of the sleeve against one end wall of the cylinder to thereby lock the hydraulic jack.

7. A lock assembly according to claim 5 wherein the collar means is mounted on one end of the cylinder, whereby upon rotation of said shaft the sleeve is caused to move longitudinally of the shaft to thereby abut one end of the sleeve against the piston to thereby lock the hydraulic jack.

8. A lock assembly according to claim 7 wherein a housing is secured to said one end of the cylinder and extends outwardly therefrom for enclosing the shaft.

9. A lock assembly according to claim 7 wherein the collar means is provided with a portion extending inwardly of the cylinder adapted to be engaged by the piston when the jack is in the retracted position, whereby the piston is spaced from said one end of the cylinder.

10. A lock assembly as set forth in claim 1 in which said means operatively connecting said locking means to said shaft comprises a key and keyway coupling and wherein said keyway extends substantially the full length of one of said members.

11. A lock assembly as set forth in claim 1 in which said means on said cylinder connected to rotate said shaft comprises a handle member connected to said shaft exterior of said one end of said cylinder.

References Cited

UNITED STATES PATENTS

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OTHELL M. SIMPSON, Primary Examiner

U.S. Cl. X.R.

92—17; 212—145
UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,402,181
September 17, 1968
Julius L. E. Erickson et al.

It is certified that an error appears in the above identified patent and that said letters Patent are hereby corrected as shown below:

Column 1, lines 25 to 30, that portion of formula III reading "-OOCR" should read -- -OCOR --. Column 2, lines 3 to 7, formula I should appear as shown below:

\[
\begin{align*}
R & \quad \text{OH} \\
\end{align*}
\]

same column 2, lines 10 to 14, formulas III and IV should appear as shown below:

\[
\begin{align*}
\text{Saponification} & \quad R \quad \text{O} \\
\end{align*}
\]

Column 3, line 11, "alkyl" should read -- alkyl --; line 21, "isopropyl" should read -- isopropyl --; line 48, "Temperatures" should read -- Temperatures --; same line 48, "degree" should read -- degrees --; line 74,

\[
\begin{align*}
\lambda \quad \text{max.} & \quad \text{should read} \quad \lambda \quad \text{CCl} \quad \text{max.} \\
\end{align*}
\]

Column 4, line 8, "2-en-ol-1-one" should read -- 2-en-2-ol-1-one --; line 73, "19.60" should read -- 10.60 --.

Signed and sealed this 3rd day of March 1970.

(SEAL)
Attest:
EDWARD M. FLETCHER, JR.
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WILLIAM E. SCHUYLER, JR.
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