

TELESCOPIC HYDRAULIC HOIST APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention:

This invention relates to telescopic hydraulic hoist mechanisms, and in particular to such mechanisms that are made from rolled aluminum stock, are fast-acting; have greater bearing life and air breathers for the space between hydraulic stages, thereby preventing dirt from being sucked into the hydraulic mechanism.

2. Related Art:

The Commercial Intertech Distribution Services Hydraulic Cylinder Division catalogue, (Date ?) pages 24-34 illustrates a number of "Dump Cylinder Identification Drawings" each representing a particular telescopic hydraulic mechanism respectively identified as "ANTHONY"; "COMMERCIAL"; "CUSTOM HOIST"; "FONTAINE"; "PEABODY GALION"; "GLENCO/FARMHAND"; "HEIL "OLD STYLE" HPT SERIES"; "HEIL "NEW STYLE" HPT SERIES"; "HYCO 900-2000 SERIES"; "HYCO 10,000 SERIES"; "HYCO 30,000 SERIES"; "HYCO 70,000 SERIES"; "JOHNSON"; "LESSARD"; "MAILHOT/"C" MODEL"; "MAILHOT/"M" MODEL COVER TUBE DESIGN"; "MARION MFG."; "NORDIC/NORD-SEN METAL INDUSTRIES"; "PERFECTION"; "PERFECTION FARM HOISTS"; "PRINCE"; AND "WARD CO". These telescopic hydraulic dump cylinders collectively disclose various state-of-the-art features of such mechanism, for example an oil port in the base trunnion and various seal mechanisms.

Additionally, U.S. Patent No. 3,958,376 to Campbell and entitled: "Extendible Tower Structure" discloses a plurality of nesting tower sections that can be telescopically raised into an extended position for supporting a load thereat. Hydraulic cylinders within the tower sections extend the tower sections. U.S. Patent No. 4,928,488 to Hunger and entitled: "Hydraulically-Operated Support Device for Semitrailers" discloses an extending cylinder in the bottom of which is formed a load-raising cylinder for a load-raising piston. A pump subassembly includes three independently operable pumps for generating and controlling the hydraulic operating pressure.

Finally, U.S. Patent No. 4,471,944 to Leray et al. and entitled: "Telescopic Jack" discloses a plurality of coaxial tubular telescopic elements mounted within a cylinder and each pair of adjacent tubular telescoping elements has two pairs of cooperating annular recesses on their inner and outer surfaces which cooperate with an elastic ring to limit the outward movement of an inner tubular element relative to its adjacent outer element.

The prior art telescopic hydraulic mechanisms are prone to abnormal wear of their bearings, operate slowly, have inadequate sealing which admits dirt into the hydraulic cylinders and are heavy.

SUMMARY OF THE INVENTION

A primary object of the invention is to provide a telescoping hydraulic hoist of the type specified herein and which is significantly lighter than prior art hoists of a similar type.

It is a feature of the present invention that the telescopic hydraulic hoist is made of drawn-over-manual (DOM) aluminum tubing consisting of a specially formulated alloy.

An advantage of the present invention is that the hydraulic hoist is lighter and more easily transported and positioned for use than similar prior art devices.

Another object of the present invention is to provide a telescoping hydraulic hoist of the type specified herein and which has increased operating speed.

It is a feature of the present invention that the telescopic hydraulic hoist may be contracted or expanded at increased speed over that obtained by such hoists constructed of steel.

It is an advantage of the present invention that the telescoping hydraulic hoist moves rapidly into or out of operating position.

It is a further object of the invention to provide a telescoping hydraulic hoist of the type specified herein that prevents dirt from being sucked past the wipers.

It is a feature of the present invention to provide space between the stages above the seals so that air breathes therein to prevent dirt

from entering the seals between the telescopic stages.

It is a further advantage of the invention that dirt is prevented from entering the seals between the telescopic stage of the hydraulic hoist.

It is yet a further object of the invention to provide a telescoping hydraulic hoist having extended life.

It is yet a further feature of the invention that the tube surface provides a wearing surface for the bearings.

It is yet a further advantage of the invention that the bearings of each stage coact with the telescopic tube surface.

BRIEF DESCRIPTION OF THE DRAWINGS

The above objects, features and advantages of the invention are believed readily apparent from the following description of a preferred embodiment of the best mode of carrying out the invention, wherein:

Figure 1 is a partial side sectional view of the aluminum hydraulic telescopic hoist according to the invention;

Figure 2 is a bottom view of the hydraulic hoist;

Figure 3 is a top view of the hydraulic hoist;

Figure 4 is a partial cut away view of the aluminum hydraulic hoist in an extended position.

DETAILED DESCRIPTION

Formerly, hydraulic telescopic hoists were made from steel alloy tubing and consequently they were heavy and subject to corrosion. In accordance with the present invention, the hydraulic telescopic hoist is made of an aluminum alloy tubing and is thereby considerably lighter and is not subject to corrosion. A suitable aluminum alloy for the purposes of the present invention has the following exemplary composition: Silicon 0.35; iron 0.40; copper 0.10; manganese 0.20-0.7; magnesium 1.0-1.8; chromium 0.06-0.20; zinc 4.0-5.0; titanium 0.01-0.06; zirconium 0.08-0.20; misc. trace elements 0.05-0.15; aluminum remainder.

The aluminum alloy tubes in the exemplary embodiment of the invention described herein typically have a variable length dependent on the desired telescopic length of the hoist and a thickness of substantially .050".

Fig. 1 illustrates an aluminum alloy hydraulic hoist 10 having five stages 12,14,16, 18 and 20 in the non-extended position and mounted to a base casting 22. Grease nipple 24 provides a means for applying grease to rod-eye casting 26, which enables attachment of the hydraulic hoist 10 to either the bed of a dump truck or the frame of a dump truck, for example, thereby enabling the bed of the dump truck to be elevated. Base casting 22 includes hydraulic fluid inlet 28 and threaded portion 30 (Fig. 4) for attaching a first stage aluminum alloy

tube 12 thereto. An O-Ring 32 is provided as a seal as indicated in Fig. 1. an extra wide bearing 34, 36, 38, 40 and 42 is respectively provided for aluminum alloy tube stages 12, 14, 16, 18, 20 and 22 and including respective stop rings 44, 46, 48, 50 and 52.

Variable length stroke limiters 54, 56, 58 60 and 62 are mounted within hoist 10 to provide respective stroke lengths of movement of each of hydraulic stages 12, 14, 16, 18 and 20 as illustrated in Fig. 1. Gland nut bearings 64, 66, 68, 70 and 72 are respectively provided at the upper end of exterior housing 10 and the upper ends of hydraulic stages 12, 14, 16, 18, and 20. Heavy duty wipers 74, 76, 78, 80 and 82, made of rubber or some other suitable material, are fixed to each of the upper portions of respective bearings 64, 66, 68, 70 and 72. An O-Ring is fitted between inner casing 86 and rod-eye casting 88, and which is fitted with air bleeder 90 connecting with the inside 92 of the hydraulic hoist 10.

Single-acting air breathers 94, 96, 98, 100 and 102 are positioned on each of hydraulic stages 12, 14, 16, 18 and 20 as illustrated in Figs. 1 and 4. Locking screws 104, 106, 108, 110 and 112 serve to attach each of the air breathers 94, 96, 98, 100 and 102 to their respective hydraulic stages. With the hydraulic device 10 positioned between the bed of a dump truck and the frame thereof (not shown) the introduction of hydraulic fluid into the hydraulic devices 10 through fluid inlet 28, the various hydraulic stages 12, 14, 16, 18 and 20 extend from the position illustrated in Fig. 1 to that shown in Fig. 4, whereby air is caused to

escape from air breathers 94, 96, 98, 100 and 102 thereby enabling each stage of the hydraulic device to more rapidly move from a collapsed position as shown in Fig. 1 to an expanded position as shown in Fig. 4.

The following features of the invention are evident from a consideration of the preceding description:

- 1.) The hydraulic hoist is double-acting as hydraulic fluid may be fed from either end;
- 2.) The various components of the hydraulic hoist are not welded, thereby preventing any distortion of the hydraulic hoist;
- 3.) Because the stages are threaded, the hydraulic device is easily maintained;
- 4.) There is a long overlap of the hydraulic stages thereby enabling the hydraulic hoist to have a long overall extension and which is achieved by bringing each of the various stages to the base and thereby increasing the strength of the hydraulic hoist;
- 5.) Because the various stages are sealed on the inside, scratches or dents on the exposed stages surfaces do not affect sealing;
- 6.) There is a quicker response of the hydraulic stages due to the hydraulic feed and the fact that no wear bands pass a port; and
- 7.) The use of air breathers which prevents dust and dirt from entering the hydraulic stages.

The above description serves only to describe exemplary embodiments of the best mode of making the invention to demonstrate

the features and advantages of its construction and operation. The invention is not intended to be limited thereby, as those skilled in the art of product-rentention packages will readily perceive modifications of the above-described embodiments. Thus the invention is intended to be limited only by the following claims and the equivalents to which the claimed components thereof are entitled.



What is claimed is:

1. A telescopic multi-stage hydraulic hoist, comprising:

an aluminum alloy base member including a hydraulic fluid inlet and a rod-eye;

a first stage aluminum alloy tube attached to said base member;

a number of additional aluminum alloy tube stages configured within said first stage tube and aligned with said base member thereby providing an overlap between said tube stages;

a respective seal mounted on the inside of each tube stage;

and

an aluminum alloy top member and including means for attaching the innermost of said tube stages thereto, a grease nipple for greasing said rod-eye and an air breather.

2. A telescopic multi-stage hydraulic hoist according to claim 1, further comprising a cushion member mounted in said base to cushion the downward motion of said first tube stage.

3. A telescopic multi-stage hydraulic hoist according to claim 1, further comprising a respective air breather mounted to each tube stage.

4. A telescopic multi-stage hydraulic hoist according to claim 1, further comprising a respective locking screw for retaining each of said tube



stages with respect to an adjacent tube stage.

5. A telescopic multi-stage hydraulic hoist according to claim 1, further comprising a bearing and bearing retaining means for each of said tube stages and mounted to said base member; a respective O-Ring seal and seal retainer for each said bearing and variable length stroke limiters for varying the stroke length of each of said tube stages.

6. A telescopic multi-stage hydraulic hoist according to claim 2, further comprising a respective air breather mounted to each tube stage.

7. A telescopic multi-stage hydraulic hoist according to claim 6, further comprising a respective locking screw for retaining each of said tube stages with respect to an adjacent tube stage.

8. A telescopic multi-stage hydraulic hoist according to claim 7, further comprising a bearing and bearing retaining means for each of said tube stages and mounted to said base member; a respective O-Ring seal and seal retainer for each said bearing and variable length stroke limiters for varying the stroke length of each of said tube stages.

9. A telescopic multi-stage hydraulic hoist according to claim 8, further comprising a respective air breather mounted to each tube stage.