SHOCK-ABSORBING BEAM HANGER ASSEMBLY

James P. Ratigan, Los Angeles, Calif., assignor to J. P. Ratigan, Inc., Los Angeles, Calif., a corporation of California

Application April 24, 1956, Serial No. 157,830
2 Claims. (Cl. 267—1)

This invention relates to the well pumping art and finds particular usefulness in connecting the polish rod of an oil well pump to support cables which operate over the horsehead.

An important object of the present invention is to provide an improved form of cushion device for supporting the polish rod.

Another object is to provide an improved form of wire line grip operable in pairs to support the cushion device.

Other and related objects and advantages will appear more fully hereinafter.

In the drawings:

Figure 1 is a perspective view partly broken away showing a well pump installation embodying my invention.

Figure 2 is an enlarged view partly in section showing my improved cushioned beam hanger assembly.

Figure 3 is a sectional elevation taken substantially on the lines 3—3 as shown in Figure 2.

Figure 4 is a transverse sectional plan view taken substantially on the lines 4—4 as shown in Figure 2.

Figure 5 is a sectional plan view taken substantially on the lines 5—5 as shown in Figure 2.

Figure 6 is a perspective view of the rubber cushion employed in connection with my invention.

Referring to the drawings, the cushioned beam hanger assembly embodying my invention employs a pair of wire line clamps 10 which are substantially identical and a cushion support generally designated 11. The wire line clamps 10 are clamped on parallel cables 12 which extend downward from a horsehead assembly 13 mounted on the usual walking beam 14. The upper ends of the cables 12 are secured to the horsehead 13 by any convenient means (not shown). Each of the wire line clamps 10 is provided with a downwardly extending yoke 15 for supporting an outwardly directed trunnion 16 provided on the cushion support 11. Retainer bolts 16a hold the yokes 15 and trunnions 16 in assembled relationship.

The polish rod 17 extends axially through the cushion support 11 and projects downward through the usual well head assembly 18 and is connected to the sucker rods (not shown) which operate the well pump. A polish rod clamp 19 of any suitable type grips the polish rod, and the lower surface 20 of the clamp 19 rests on the upper tubular projection 21 on the sliding collar 22. A rubber cushion 23 of generally cylindrical form is supported within the metallic shell 24, and the sliding collar 22 rests on the upper end of this cushion 23. The downward force imposed on the polish rod 17 causes the sliding collar 22 to distort the rubber cushion 23 within the shell 24 to provide a cushioned support. As the walking beam 14 oscillates, the horsehead 15 raises and lowers the cables 12, thereby causing the beam hanger assembly of my invention to raise and lower the polish rod 17. The cushion device 11 avoids shock loading of the polish rod and its connected sucker rods when the walking beam 14 reverses direction during its operating cycle. The lifting force is thus cushioned and reduces the peak loads which would otherwise be imposed on the sucker rods upon each reversal of the stroke.

Proceeding to a more detailed description of the individual parts of my improved beam hanger assembly, each of the wire line clamps 10 comprises an elongate body 25 having parallel side walls 26, a top wall 27 and a bottom wall 28. The top and bottom walls are apertured as shown at 29 and 30 to provide clearance for the support cables 12 which extend through the body and through these apertures. The curved front wall 31 and the flat back wall 32 on the body 25 cooperate with the other walls to define a box-like construction having a central recess 33. A cable-contacting shoe 34 is mounted within the recess 33 and is provided with a longitudinal groove 35 for engagement with the wire line or cable 12. Rearwardly projecting bosses 36 extend from the back wall 32 and are threaded to receive the clamping bolts 37. The inner end of the clamping bolts engage the shoe 34. A retaining bolt 38 may be provided if desired for holding the shoe 34 against displacement when the clamping bolts 37 are retracted. This retaining bolt 38 is threaded into the shoe 34 and extends through an aperture 39 provided in the back wall 32. When the clamping screws 37 are retracted, the cable 12 is engaged against the curved inner wall 31 of the body 25. The body 25 may be clamped at any adjusted position along the length of the cable 12 so that both of the wire line clamp devices 10 may be positioned at the same relative elevation.

Each of the wire line clamps 10 is provided with a yoke 15 formed integrally with the body 25 and merging into the side walls 26 as shown clearly in Figure 3. The yoke is positioned in line with the cable 12 so that bending stresses in the clamp body or cable are avoided.

The shell 24 of the cushioning device 11 is provided with a cylindrical wall 40 having a central bore 41. A bottom flange or wall 42 is integrally joined with the cylindrical wall 40 and closes the lower end of the bore 41. The collar 22 is slidably mounted within the bore 41 and rests on the upper end of the rubber cushion 23. The rubber cushion 23 is inserted axially into the bore 41 through the upper end thereof in the absence of the sliding collar 22 and clamp 19. The collar 17a at the extreme upper end of the polish rod 17 is disconnected to permit the collar 23 to be lowered over the polish rod. During this installation operation the usual spacing clamp (not shown) is clamped to the polish rod and rests on the well head 18 to support the polish rod and sucker rods. The weight on the polish rod 17 applied through the clamp 19 to the collar 22 causes the collar 22 to move downward within the bore 41 to distort the cushion sleeve 23. A plurality of lateral ports 43 are provided in the cylindrical wall 40 and distributed at equal spacing around the wall 40. The inner surfaces of these ports are rounded as shown at 44 to form a smooth juncture with the bore 41. When the rubber sleeve 23 is subjected to an endwise load by the sliding collar 22, portions of the sleeve adjacent the lateral ports 43 are caused to project outwardly into the ports as shown in Figure 2. The hardness of the rubber and the size of the ports 43 is so chosen that under the endwise loads applied by the polish rod 17 the rubber of the sleeve 23 moves into the ports 43 but does not project for any substantial distance beyond the outer diameter of the cylindrical wall 40. The rounded corners 44 joining the ports 43 to the bore 41 prevent the extrusion of the rubber as it moves into and out of the ports 43 as the load varies on the polish rod 17. While the sleeve 23 is described as being formed of rubber, it is recognized that either natural or synthetic rubber or compounds thereof
may be employed. The essential feature is that the material of the sleeve shall distort sufficiently under endwise load to cause lateral protrusion of the material into the ports 43 in the cylindrical confining wall 40, and that the material shall be sufficiently resilient to return substantially to its original shape when the endwise load is removed. A Shore hardness of 70-75 has been found satisfactory.

The rubber cushion sleeve 23 is provided with a central bore 45 through which the polish rod 17 passes, and each end of the cushion sleeve is preferably provided with a tubular extension 46. One of the tubular extensions 46 fits into the central opening 47 in the bottom wall 42 of the shell 24 and the other extension 46 projects into the bore 48 on the sliding collar 22. These projections 46 serve as pilots to center the rubber sleeve 23 within the shell 24. The same sleeve 23, shell 24 and sliding collar 22 may be employed with polish rods of various diameters. A smaller polish rod does not fit the bore 45 closely, but the rubber sleeve collapses radially under endwise load so that a smaller diameter polish rod will function with good results.

The change in endwise force applied by the polish rod 17 is caused by the difference in the tension in the sucker rods on the upstroke as compared to the downstroke, and also is affected by acceleration forces applied by the horsehead through the cables 12. The movement of the sliding collar 22 within the bore 40 is very slight but is sufficient to cushion the shock loads which would otherwise be applied to the polish rod 17.

The construction of the polish rod clamp 19 forms no part of the present invention, and any desired form of polish rod clamp can be used. I prefer to employ that type of clamp shown in my copending application, Serial No. 556,797, filed October 2, 1944, now Patent No. 2,551,656, granted May 8, 1951.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. In a cushioning device, the combination of: a rigid cylindrical shell open at its upper side and closed at its bottom side, the cylindrical walls of said shell having a plurality of circular apertures, said shell extending above the area occupied by said apertures to form a guide cylinder; a rubber cylinder filling said shell; a rigid piston covering the end of said rubber cylinder disposed at the open upper end of said shell and movable in said guide cylinder; and means for forcing said piston toward the bottom of said shell within said guide cylinder, thereby to axially compress said rubber cylinder and radially expand fixed areas thereof through said circular apertures.

2. In a cushioning device, the combination of: a rigid cylindrical shell open at its upper side and closed at its bottom side, the cylindrical walls of said shell having a plurality of circular apertures, said shell extending above the area occupied by said apertures to form a guide cylinder; a rubber cylinder filling said shell; a rigid piston covering the end of said rubber cylinder disposed at the open upper end of said shell and movable in said guide cylinder; means for forcing said piston toward the bottom of said shell within said guide cylinder, thereby to axially compress said rubber cylinder and radially expand fixed areas thereof through said circular apertures; diametrically disposed trunnions at opposite sides of said shell adjacent its upper end for suspending said shell; said rubber cylinder having a longitudinally extending bore to receive a rod; and means for connecting said rod to said piston.

References Cited in the file of this patent

UNITED STATES PATENTS

107,035 Gardiner September 6, 1970
126,794 Fields May 14, 1872
1,415,112 Perlitz May 9, 1922
1,562,053 Ratigan November 17, 1925
1,750,510 Day March 11, 1930
1,864,080 Madge June 21, 1932
1,935,389 Hamquist November 21, 1933
2,004,712 Thiry June 11, 1935
2,038,527 Eaton April 28, 1935
2,122,859 Guy July 5, 1938
2,241,409 Mason May 13, 1941

FOREIGN PATENTS

668,848 France July 22, 1929