WEIGHT SENSING ATTACHMENT FOR CABLE ANCHORS

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Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

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WEIGHT SENSING ATTACHMENT FOR CABLE ANCHORS

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This invention relates in general to apparatus for indicating the load or weight on the lines of cable hoist systems employed in connection with rotary well drilling rigs, and in particular to the conversion of cable anchoring devices for such lines to combined weight indicating and anchoring units.

Cable anchors of the type to which this invention relates have gone into extensive use and comprise a body member adapted to be fixed to a stationary support, a snubbing drum fixed on the body member apart from the drum for dead-ending the cable, and a clamping means by which the clamped end of the cable may be caused to wind around the drum. The clamp relieves the strain on the clamp and the clamp permits of feeding fresh cable into the system as required without dismantling the anchoring device.

The primary object of this invention is to provide a weight sensing unit for converting a cable anchor of the character described to a combined cable anchoring and weight indicating apparatus without necessitating any change in the construction of the cable and drum. It is another object of this invention to provide a simply constructed and inexpensive adapter unit such as described, which may be readily interposed between a stationery supporting structure and a cable anchor of the type described, as a mounting therefor and to convert the anchor for use as a weight indicator when connected with a suitable indicator, the resulting converted unit having all of the advantages of its cable anchoring component plus the advantage of accurate indication of the weight on the cable anchored thereto.

This invention possesses many other advantages and has other objects which may be made more easily apparent from a consideration of one embodiment of the invention. For this purpose there is shown in a drawing accompanying and forming part of the present specification. This form will now be described in detail, illustrating the general principles of the invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of the invention is best defined by the appended claims.

Referring to the drawings:

Fig. 1 is a fragmentary side elevational view partly in section of a weight sensing unit constructed in accordance with this invention; Fig. 2 is an end elevation of the unit looking in the direction of the arrow 2 of Fig. 1; Fig. 3 is an end elevation of the unit partly in section looking in the direction of the arrow 3 of Fig. 1; Fig. 4 is an enlarged fragmentary side elevation partly in section of the weight sensing unit of this invention as it would appear when in use as a mounting for a cable anchor and as connected with a weight indicator; Fig. 5 is an enlarged sectional view taken substantially on the line 5—5 of Fig. 4; Fig. 6 is a fragmentary front elevational view of the apparatus shown in Fig. 4.

The present invention as shown in the accompanying drawings comprises a weight sensing unit A for converting a cable anchor B of the type shown in Fig. 4, to a combined cable anchor and weight indicator, the cable C being caused to wind around the dead line of a hoist system for a rotary well drilling rig.

The sensing unit A hereof is designed for use in connection with a cable anchor of the type which includes an upstanding body member 7 having a base portion 8 at its lower end provided with openings 9 whereby normally the base portion would be secured to a stationary support such as the structure D here shown and which may be a part of or secured on the well derrick structure or drill platform of a well. At its upper end the body member 7 supports for rotation on the pivot pins 43 and 44 a snubbing drum 11 adapted to have a plurality of loops of the cable C wound thereon.

The cable C is dead-ended on the body member 7 by means of a releasable cable clamp 12 located below the axis of the drum 11 and to one side of the drum. The cable extends past the clamp to a reel or spool of cable not shown, whereby fresh cable can be fed into the system as required without dismantling the cable anchor, it only being necessary to loosen the clamp and extend fresh cable into the system through the device.

Essentially the weight sensing device A, this invention comprises a tiltable mounting member for the cable anchor unit 7, means for tiltably securing the mounting member on the support D, and a sensing element which responds to bodily movement of the supporting member incident to loads imposed on the cable and includes means for operatively connecting the sensing element with an indicator. As here provided the sensing adapter includes substantially a plate-like mounting member 14 pivotally or hingedly connected at one end to one end of a similar plate-like base member 15 so as to overlie the latter member.

A hydraulic sensing element 16 is mounted between the members 14 and 15 and connected with the other ends thereof so as to respond to tilting movement of the mounting member 14. Means in the form of a fitting 17 is provided on the sensing element 16 whereby an operational connection may be made, as by means of a fluid line 18, with a weight indicator 19. The indicator may be located at any suitable point in sight of the operators of the drilling rig.

Movement limiting means 20 is provided between the members 14 and 15 to limit the tilting movement of the member 14 within safe limits in consideration of the limited movement of the sensing element, to prevent damage of the latter.

The mounting member 14 is provided with openings 9 in the base portion 8 of the anchor unit B whereby a U-bolt 22 and nuts 23 may be employed as shown in Figures 4 and 5 to rigidly secure the base portion 8 to the member 14 with the loop portion 22 of the bolt depending below the plate as a part of the movement-limiting means 20. A similar U-bolt 24 is secured by nuts 25 on the stationary support D, extends through the member 15 and is secured to the loop portion 24 to complete the means 20, for limiting the tilting of the member 14.

At one end, the member 14 is provided with opposed depending and apertured ears 26 which embrace an upward ending 27 on the base member 15, the ear 27 having an enlarged transversely apertured head portion 27', the aperture through which registers with the apertures in the ears 26 to accommodate a turnbuckle or the like in place of cotter pins 29. Suitable anti-friction bearings 30 and 31 are seated in the ears 26 and opposite ends of the head 27 respectively, as shown in Fig. 3.

The base member 15 is secured to the support structure D by means of bolts 32 and nuts 33, the U-bolts 24 and nuts 25 also serving to secure the base member to the support as will be seen with reference to Figs. 4 and 5.

The sensing element 16, as best shown in Fig. 1, includes a cylinder 34 having an integral end wall 35, and a removable end wall 36. A piston 37 is operable in the cylinder between the end walls 35 and 36, the upper end of fluid above the piston. A filling opening 38 in the cylinder, closed by a removable plug 39, provides for charging the cylinder and associated hydraulic system with the desired amounts of fluid and for controlling the weight indicating action best to suit the conditions at hand.

The removable wall 36 of the cylinder 34 has a vent port 36' to prevent entrapped air or fluid from interfering with the movement of the piston 37. This wall is coupled to the base member 15 by means of a pair of depending ears 40 thereon, a pivot block 41, ears 42 on the base member 15 and pivot pins 43 and 44 respectively pivot-
ally connecting the ends of the block with said ears. These pivot pins are normal one to the other whereby a ... into angular movement of the member 14 relative to the base member 15.

The anchor unit B mounted as here provided on the unit A, will move bodily on the mounting member 14 responsive to variations in the load or pull on the cable C and as a result thereof the member 14 on which the unit 37 is pivoted causes the piston 37 to move and transmit through the fluid contained in the cylinder, the line 18 and the indicator 19, forces for actuating the indicator to show the load on the cable C. The drum will relieve the strains on the cable clamp. The clamp when loosened makes it possible readily to extend fresh cable into the system without disturbing or in any manner adjusting the combined anchor and indicator other than loosening of the clamp.

It is important to note that the opposed mounting members 14 and 15 are connected for relative movement about an axis which is below the axis of the snubbing drum 11 of the cable anchor mounted on the cable anchor supporting surface of the plate 14, and that the plate 15 is provided with a mounting face adapted to be secured to the supporting structure D. Thus, the weight sensing attachment as here provided constitutes a simple, compact and inexpensive unit subject to ready application to a cable supporting drum of the type herein described for converting a电缆 anchor to a combined weight indicator and cable anchor having all of the efficiency of the cable anchor as herebefore used, plus provision for an accurate indication of the weight on the cable anchored thereto.

I claim:

1. In a weight sensing unit for attachment to a cable anchoring device, a combined weight indicating and cable anchoring unit for a load sustaining cable wherein said anchor device is provided with a base adapted to be immovably fixed to a support, a pair of opposed members, means connecting said opposed members for relative pivotal movement, means between and connected with said members for limiting relative movement thereof, a pair of said opposed members being adapted to be fixed to a stationary support, means on the other of said members providing a seat for the body member of said cable anchor, said other member having means providing for the fixation of said body member to said seat so as to prevent relative movement between said seat and said body member, a hydraulic sensing element connected with said opposed members for operation responsive to relative movement between said opposed members, and means on the sensing element for fixing a connection thereof with an indicator.

2. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit for a load sustaining cable wherein said anchoring device is provided with a base adapted to be immovably fixed to a support, a pair of opposed members, means connecting said opposed members for relative pivotal movement, means between and connected with said members for limiting relative movement thereof, said members being adapted to be mounted between the base of said cable anchoring device and a stationary support, and a load sensing element mounted between and fixedly connected with said opposed members for operation responsive to movement of the opposed members on which said cable anchoring device is mounted.

3. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit for a load sustaining cable wherein said anchoring device is provided with a base, a pair of opposed members for relative pivotal movement, said opposed members being adapted to be mounted between the base of said cable anchoring device and a stationary support, and the other member immovably fixed to the base of the cable anchoring device, a sensing element, means connecting said opposed members for operation responsive to relative movement between said members in a direction away from one another, means on said members for operatively connecting said element with an indicator, and a sensing element for connecting said members and sensing element for limiting relative movement between said opposed members.

4. In combination, a snubbing drum, a body member on which said drum is mounted for limited rotary movement, a cable clamp fixed on said body member for dead-ending a load sustaining cable after the winding of the cable around the drum, a sensing unit responsive to movement of said sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a pair of opposed members, means connecting said opposed members for relative movement, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.

5. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a load sensing element mounted between and connected with said opposed members for operation responsive to movement of said other member, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.

6. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a load sensing element mounted between and connected with said opposed members for operation responsive to movement of said other member, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.

7. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a load sensing element mounted between and connected with said opposed members for operation responsive to movement of said other member, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.

8. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a load sensing element mounted between and connected with said opposed members for operation responsive to movement of said other member, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.

9. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a load sensing element mounted between and connected with said opposed members for operation responsive to movement of said other member, means on the sensing element for connecting the sensing element with an indicator, and a sensing element for limiting relative movement between said opposed members.
unit including a pair of opposed members, means connecting said members for relative pivotal movement, one of said opposed members being adapted to be fixed to a stationary support, the other of said members being adapted to serve as a seat for the body member of said cable anchor and having means providing for the fixation thereof to said body member for movement therewith, a hydraulic sensing element disposed between said seat and said connected with said opposed members for operation responsive to relative movement between said opposed members, means on the sensing element for effecting an operative connection thereof with an indicator, and interconnected stop members connected with said opposed members between said first named means and said sensing unit for limiting relative movement of said opposed members.

9. In combination, a snubbing drum, a body member on which said drum is mounted for limited rotary movement, a cable clamp fixed on said body member for dead-ending a load-sustaining cable at a point to one side of said drum, a tiltable mounting member, means fixing said body member to said mounting member for movement therewith and against movement relative thereto, means for tilitably mounting said mounting member on a stationary support, a load sensing element connected with said tiltable member for operation responsive to the tilting thereof and the body member as a unit, means on said sensing element for operatively connecting the sensing element with an indicator, and means cooperative with the means for fixing said body member to said mounting member for limiting tilting movement of said mounting member.

10. In a weight sensing unit for an attachment to a cable anchor, the cable anchor comprising a snubbing drum mounted for turning on a body member and adapted to receive a plurality of windings of a cable, and a cable clamp on said body member for dead-ending the cable after the winding thereof around the drum; said sensing unit including a pair of opposed members, means connecting said members for relative movement about an axis below the axis of said drum, one of said opposed members having a surface adapted to be secured to the body member of said cable anchor, a hydraulic sensing element connected with said opposed members for operation responsive to relative movement between said opposed members, means on the sensing element for effecting an operative connection thereof with an indicator, interconnected elements connected with said members for limiting relative movement thereof, and means including one of said elements for fixing said body member to said other member.

11. In combination, a snubbing drum, a body member on which said drum is mounted for rotary movement, a cable clamp fixed on said body member for dead-ending a load-sustaining cable at a point to one side of said drum, a tiltable mounting member, means fixing said body member to said mounting member for movement therewith and against movement relative thereto, means mounting said mounting member for movement about an axis below said body member, a load sensing element pivotally connected with said tiltable member and said last named means, and means on said sensing element for operatively connecting the sensing element with an indicator.

12. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit for a load sustaining cable, a pair of opposed members, one of which has a surface adapted to mount the cable anchor, means connecting said members for relative pivotal movement about an axis below said cable anchor, means between and connected with said members for limiting relative movement thereof, the other of said members being adapted to be fixed to a stationary support, and a hydraulic load sensing element pivotally connected with said opposed members for operation responsive to movement of the opposed member on which said cable anchoring device is mounted, said connecting means and said element being respectively located adjacent the ends of said members, and means on the sensing element for connecting the sensing element with an indicator.

13. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit for a load sustaining cable, a pair of opposed members, said members being adapted to be mounted between the cable anchoring device and a stationary support, with one of said members having a surface fixed to the stationary support and the other member having a surface fixed to the cable anchoring device, means pivotally connecting said members between said surfaces; means between and connected with said members for limiting relative movement thereof, a load sensing element mounted between and pivotally connected with corresponding ends of said opposed members for operation responsive to movement of the member on which said cable anchoring device is mounted, means on the sensing element for connecting the sensing element with an indicator, and means for limiting relative movement of said members.

14. In a sensing unit for converting a cable anchoring device to a combined weight indicating and cable anchoring unit, a pair of opposed members, said members having openings therein for providing for the fastening of one member to a stationary support and for the fastening of the anchoring device upon the other member, means connecting said other member with said one member for movement upwardly therefrom about an axis below said cable anchor; means for limiting such movement of said other member, a hydraulic sensing unit comprising a piston, means forming a universal joint connecting said piston with said other member, a cylinder in which the piston is operable, means forming a universal joint connecting said cylinder with said one member, and means on the cylinder for effecting an operative connection of the sensing element with an indicator.

References Cited in the file of this patent

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Patent No.</th>
<th>Inventor</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>680,371</td>
<td>Brittan</td>
<td>Aug. 13, 1901</td>
</tr>
<tr>
<td>1,692,057</td>
<td>Smith</td>
<td>Nov. 20, 1928</td>
</tr>
<tr>
<td>1,934,201</td>
<td>Miller</td>
<td>Nov. 7, 1933</td>
</tr>
<tr>
<td>2,025,928</td>
<td>Wunsch</td>
<td>Dec. 31, 1935</td>
</tr>
<tr>
<td>2,235,279</td>
<td>Bunker</td>
<td>Mar. 18, 1941</td>
</tr>
<tr>
<td>2,282,685</td>
<td>Simms</td>
<td>May 12, 1942</td>
</tr>
<tr>
<td>2,349,228</td>
<td>Wolff</td>
<td>May 16, 1944</td>
</tr>
<tr>
<td>2,488,070</td>
<td>Spalding</td>
<td>Nov. 15, 1949</td>
</tr>
</tbody>
</table>