

May 24, 1938.

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2,118,727

WEIGHT INDICATING DEVICE

Filed April 13, 1936

2 Sheets-Sheet 1

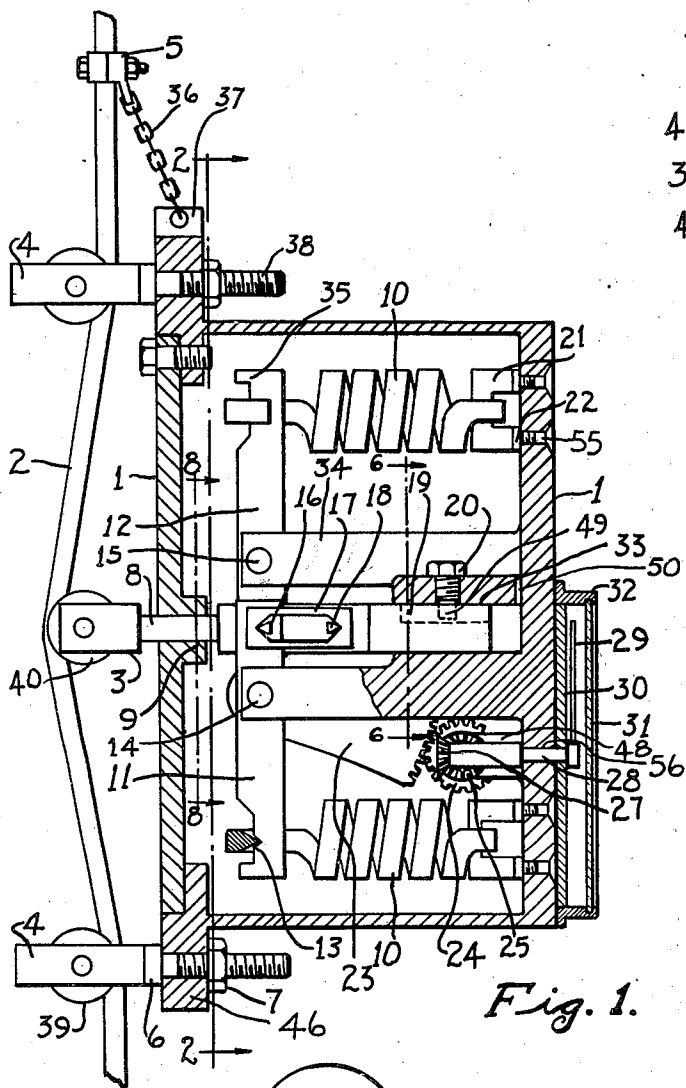


Fig. 1.

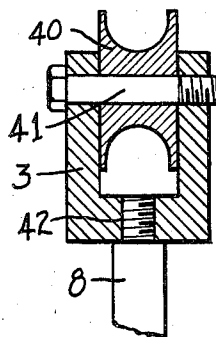


Fig. 3.

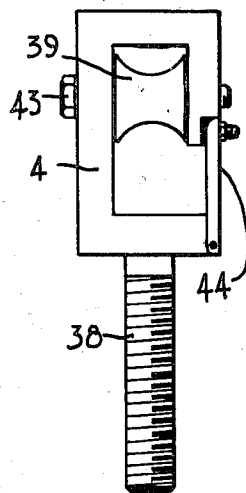


Fig. 4.

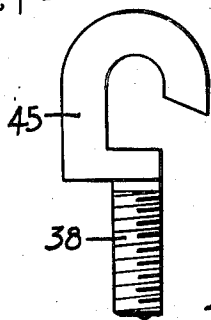


Fig. 5.

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2 Sheets-Sheet 2

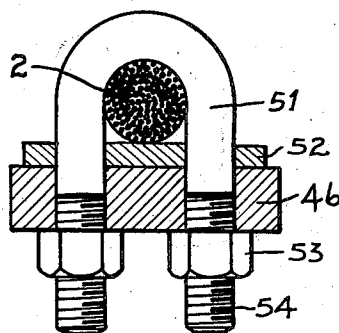
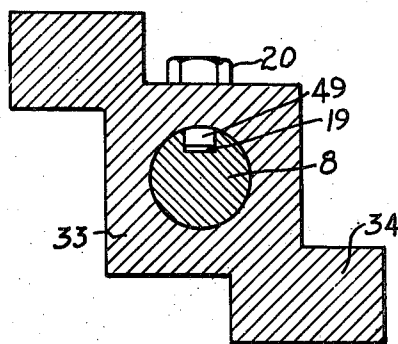
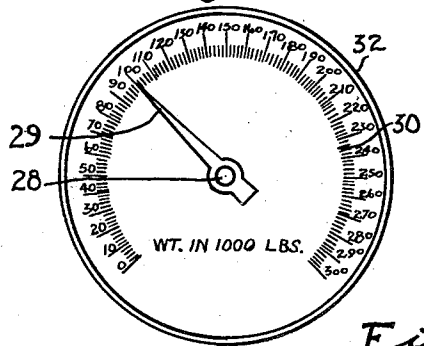
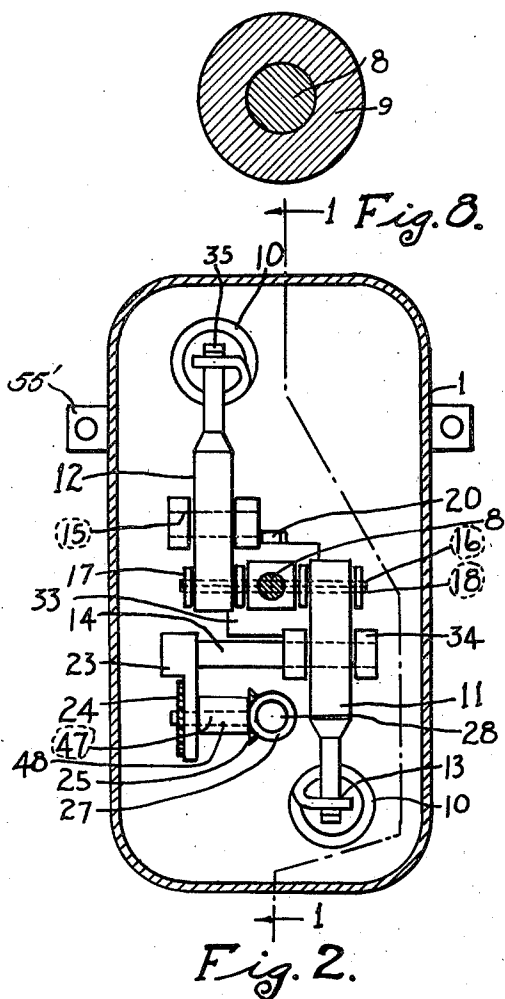


Fig. 7.

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UNITED STATES PATENT OFFICE

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WEIGHT INDICATING DEVICE

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Application April 13, 1936, Serial No. 74,154

8 Claims. (Cl. 265—1.6)

This invention relates to an apparatus for indicating the various loads encountered when using a cable hoisting device, particularly the hoisting devices used in drilling oil wells.

5 The usual method of drilling oil wells is to place a derrick and bore into the earth below said derrick. One of the most necessary parts of the equipment used in drilling a well is a cable hoisting device. This hoisting device is used to handle all the tools, pipe and etc., in drilling the well. The hoisting device consists of a length of cable with one end of said cable attached and wound on a reel. Said reel is adapted to wind and unwind said cable. The free part of said cable forming a block and tackle hoisting arrangement with the top of the derrick supporting said tackle with the free end of said cable passing over its sheave at the top of the derrick and down to and attached at the base of said derrick. Said end of said cable being fixed and having no movement as the loads on the hoisting device are lifted or lowered. Said end of said cable being known in the oil fields as the deadline. This deadline will be stressed as loads are applied by the hoisting device and this stress will vary directly with the load applied.

25 An object of the present invention is to provide and disclose an apparatus that will indicate the total load placed upon the derrick through use of the hoisting device.

30 An object of the invention is to disclose and provide an apparatus adapted to indicate the load on a hoisting device by means of the stress on the deadline of said hoisting device.

35 An object of the invention is to disclose and provide an apparatus capable of being attached to the deadline of a hoisting device adapted to indicate the weights suspended by said hoisting device.

40 Another object is to provide an efficient apparatus for indicating the weights suspended on a cable hoisting device.

45 Another object of the invention is to provide an efficient apparatus for indicating the tension on a cable.

Another object of the present invention is to provide and disclose an apparatus that is simple, accurate and efficient adapted to indicate the weights suspended on a cable hoisting device.

50 A still further object is to disclose and provide a device for indicating weights on a hoisting apparatus that is adapted to be used on different sizes of cables and for different numbers of cables in said hoisting apparatus.

55 A still further object of the present invention is

to disclose and provide a device of simple and efficient construction for indicating weights capable of being attached to a cable of a hoisting device.

A still further object of the invention is to provide and disclose an apparatus for indicating the weights suspended from the hoisting device of an oil well drilling rig.

A still further object is to provide an apparatus for automatically indicating the weights suspended by a cable hoisting device.

These and other objects, uses and advantages of this invention will become apparent to those skilled in the art from the following detailed description of one preferred embodiment of this invention and its manner of operation, it being understood that the invention is not limited to the device specifically described hereinafter as those skilled in the art will readily observe that numerous changes and modifications and further simplifications could be made in the device.

Fig. 1 is a longitudinal section, taken along the plane 1—1 indicated in Fig. 2, of the weight indicating device connected to a cable.

Fig. 2 is a section taken along the plane 2—2 indicated in Fig. 1.

Fig. 3 is an enlarged view partly in section of the cable deflecting head of the device.

Fig. 4 is an enlarged view of one of the cable receiving arms of the device.

Fig. 5 is an enlarged view of another type of cable arm for the device.

Fig. 6 is an enlarged section taken along the plane 6—6 indicated in Fig. 1.

Fig. 7 is a front elevation of the dial and indicating pointer of the device.

Fig. 8 is an enlarged section taken along the plane 8—8 indicated in Figure 1.

Fig. 9 is an enlarged view partly in section of a cable clamp that may be used in place of one of the arms of the device.

Referring particularly to the drawings, the housing or frame 1 encloses the spring operating mechanism of the device. The housing 1 is provided with the cable arm lugs 46. The cable arms 4 are attached to the lugs 46 by means of screw studs 38 and nuts 7. The deadline cable 2 of the hoisting device is run through the arms 4 along the sheaves 39 thereof and over the sheave 40 of the deflecting head 3. Said deflecting head 3 being between said arms 4 and said head adapted to deflect said cable between said arms. Said head 3 is provided with the sheave 40 and said head 3 is attached to the deflecting rod 8. Said housing 1 is provided with the

guides 9 and 33, the guide 9 being in the closure plate of the housing, in the form shown, while the guide 33 is formed on the inner side of the front wall, and said deflecting rod 8 is slidably mounted in said guides 9 and 33 and through the closure plate. Said guide 33 is provided with the screw 20 threaded therethrough and the screw is reduced to provide what may be termed a guide pin 49. The rod 8 is provided with a slot 19 to receive said pin to prevent the rod 8 from rotating in the guides 9 and 33. Said guide 33 is provided with a relief or vent hole 50.

The rod 8 is provided with a bearing rod 18 and said rod 8 is connected to the spring pull levers 11 and 12 by means of the bearing rod 18, connecting links 17 and bearing rod 16 which together with the rod 18 may be of the anti-friction type, as shown in Figure 1. The levers 11 and 12 are mounted in bifurcated outer ends of superimposed offset bearing posts 34 that are attached to the front wall and the guide member 33, as best shown in Figure 6. The lever 12 is rotatably mounted in the upper post 34 by means of the bearing pin 15. The lever 11 is connected to the lower spring 10 by means of the spring bearing hook 13 and is attached to the bearing shaft 14 that is rotatably mounted in the lower post 34. The lever 12 is connected to the upper spring 10 by means of a spring bearing hook similar to the hook 13. The levers 11 and 12 are provided with the lugs 35 to prevent the spring hooks 13 from slipping off the same. The springs 10 are attached to the front wall of the housing 1 by means of the substantially U-shaped brackets 21 and screws 55. Adjustment blocks 22 may be disposed between the wall and the arms of the U-shaped members, it being obvious that the blocks are used in sets of different sizes for that purpose, and which will be later described.

The bearing shaft 14 of the lever arm 11 extends through the post 34 and is rotatably mounted therein. The gear arm or segment 23 is attached to the free end of the bearing shaft 14 and is meshed with the gear 24. The gear 24 is attached to one end of the shaft 47 and the shaft 47 is rotatably mounted in the bearing 48 supported in the housing 1. The bevel gear 25 is attached to the opposite end of the shaft 47 and is meshed with the bevel gear 27. The bevel gear 27 is attached to one end of the shaft 28 and the shaft 28 is rotatably mounted in and through the bearing opening 56 provided in the front wall, as shown in Figure 1. The pointer 29 is attached to the opposite or outer end of the shaft 28.

The dial case 32 is attached to the outside of the front wall and encloses the dial 30 by means of the transparent cover plate 31. The dial 30 is attached to the back of the case 32 and said pointer cooperates with the graduations of the dial to indicate the load on a cable hoisting device or the tension on a cable.

In the operation of my invention the apparatus is assembled as shown in the Figs. 1 and 2 and attached to the deadline cable 2 of the hoisting device. A load on the hook of the hoisting device will cause a stress in the cable 2 and the stress in the cable 2 will cause the deflecting rod 8 to move into the housing 1 due to the cable 2 being deflected between the arms 4 by means of the deflecting head 3.

The movement of the deflecting rod 8, by means of the bearing rod 18, connecting link 17 and the bearing rod 16, pulls the ends of the levers 11 and 12. The levers 11 and 12 rotating on their

bearings 14 and 15 pull the tension pull springs 10. Said springs 10 are stressed or pulled until they balance the force applied to the rod 8 due to the deflection of the cable 2 and the load on said cable 2.

The movement of the lever 11 rotates the bearing shaft 14 in the lower post 34. Said movement of the bearing shaft 14 rocks or moves the gear arm or segment 23. The gear arm 23 is meshed with the gear 24 and the movement of the gear arm 23 rotates the gear 24 and the shaft 47. The bevel gear 25 is attached to the opposite end of the shaft 47 and the bevel gear 25 is meshed with the bevel gear 27. The movement of the bevel gear 25 rotates the bevel gear 27. The bevel gear 27 is attached to one end of the shaft 28 and the pointer 29 is attached to the opposite end of the shaft 28. The movement of the bevel gear 27 rotates the shaft 28 and moves the pointer 29 of the indicator, shown in Figures 1 and 7 in relation to the dial 30. The dial 30 thereof is provided with the division lines or graduations and these divisions are spaced so that the pointer 29 will indicate the weight on the cable hoisting device to which this invention is attached.

A cable hoisting device may have any number of cables or cables of any size or diameter supporting the load lifted thereby, and it is necessary that some means be provided for adjusting this weight indicating device for any number and size of cables used. The amount of force applied to the deflecting rod 8 due to the load on the cable 2 varies with the angle of deflection in the cable 2. The force on the deflecting rod 8 will increase as the angle in the cable 2 between the arms 4 and the deflecting head 3 is increased for the same load on the hoisting device. This invention has provided two methods for making the necessary adjustments.

First, the adjustment for the change in number or size of cables used may be made by disposing adjustment blocks 6 between the housing and the arms 4, as shown in Figure 1, the blocks being of different thicknesses so that blocks of the proper thickness can be used in accordance with the number and size of cables used. By using adjustment blocks in the manner set forth the same weight indicating dial, with the same divisions can be used to accurately indicate the weight of the load regardless of the number and size of cables used. It is of course understood that it is necessary to replace the adjustment blocks with blocks of the correct thickness each time the number and size of cables in the hoisting device is changed.

Another method of adjusting the weight indicating device is to provide interchangeable dials variously calibrated for the indicator so that a separate dial having the proper calibrations thereon is provided for each number and size of cables used with the hoisting device. Said dials to be so made that they can be removed and replaced with respect to the dial case in any well known manner. By using a separate dial for each number and size of cables used in the hoisting device it is not necessary to change the deflection angle of the cable between the arms of the device by use of the blocks. By this method of adjustment it will be necessary to change the dial each time the number or size of cables in the hoisting device is changed. The dial plate may be so made that each side of the dial plate will have indicating divisions. One side of the dial plate being for a certain given number or

size of cables in the hoisting device and the other side to indicate the weight suspended on a different number or size of cables. Said dial plates can be attached to said dial case by suitable dowel pins and fasteners to hold said dial plates in its relation to said pointer.

The position and tension of the springs 10 may be adjusted by increasing or decreasing the distance between spring hook 13 and the U-shaped members 21. The spring adjustment blocks 22 are adapted to make this adjustment for tension and position, it being necessary to use a block 22 of the required thickness. While I have illustrated U-shaped members 21, and adjusting blocks 22 for the purpose referred to, any other suitable and well known means may be employed therefor.

A sectional view of the deflecting head 3 is shown in the Fig. 3. The sheave 40 is adapted to take the cable 2 and said sheave 40 is rotatably mounted on the shaft 41. Said shaft 41 is attached to the frame of the deflecting head 3. Said deflecting head 3 is attached to the rod 8 by means of the screw stud 42.

Fig. 4 shows one type of the cable arms used with the invention. This part of the device is shown as cable arms 4 in Fig. 1. Said cable arms 4 are provided with a rotatable sheave 39. Said sheave 39 being mounted in the frame of said cable arm 4 by means of the bearing shaft 43 and said sheave 39 is adapted to take the cable 2. Said cable arms 4 being provided with the closure members 44 adapted to keep the cable 2 within said arms 4. The screw shanks 38 of the arms 4 are provided to attach the arms to the lugs 46.

Fig. 5 shows another type of cable arm that might be used with the device. The hook 45 is adapted to fit the cable 2 and the screw shank 38 is provided to attach the cable hook 45 to the lug 46.

Fig. 9 of the drawings shows a cable 2 attachment means that may be used in place of one of the cable arms 4. The U-bolt clamp 51 is adapted to clamp the cable into a fixed position in relation to the housing. The adjustment plate 52 is provided to adjust the position of cable 2 in relation to the deflecting head 3. The U-bolt 51 is provided with the threaded portions 54 and the cable 2 is attached to the weight indicating device by means of said U-bolt 51, the lug 46 and the nuts 53. This clamping arrangement can be used in place of one of the arms 4 but cannot be used to replace both of the arms.

The housing 1 is provided with apertured ears 55, as shown in Figure 2, to receive suitable securing means to attach the device to some fixed object with the indicator positioned in relation to the operator of the hoisting apparatus so that it can be readily read by the operator. However, the weight indicating device may be attached to the cable, as shown in Figure 1, and for that purpose I provide a clamp 5 to be secured to the cable and an ear 37 formed on the upper lug 46, with a chain 36 having its ends secured to the clamp and ear 37.

It will be noted in the form of the device as best shown in Figure 1, that the slidably mounted cable receiving means extends from the housing between the stationary cable receiving means, with a pair of spring actuated levers connected to the rod thereof, but I want it understood that only one spring actuated lever may be employed, and any one of the cable receiving means may

be slidably mounted and connected to the one lever for the purpose set forth.

While the particular apparatus herein described is well adapted to carry out the objects of the present invention, various modifications and changes may be made without departing from the principles of the invention. This invention includes all such modifications and changes as come within the scope of the appended claims.

I claim as my invention:

1. A weight indicating device for a cable hoisting apparatus, comprising a housing, a rod slidably mounted in the housing and having one end extending therethrough, bearing posts fixed in said housing and having bifurcated free ends, levers having one of their end portions pivoted in the bifurcated free ends and linked to the rod, adjustably mounted spring means connected to the opposite ends of the levers for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the post of the latter, a gear segment fixed to the shaft, means mounted on the housing and outer end of the rod for receiving the cable and for normally deflecting the latter so that the cable applies axial pressure on the rod upon it being subjected to tension for moving the rod in an opposite direction, indicating means on the housing, and connecting means between the segment and the indicating means for actuating the latter when movement is imparted to the rod.

2. A weight indicating device for a cable hoisting apparatus, comprising a housing, a closure for the housing, a rod slidably mounted in the housing and having one end extending through the closure, superimposed offset posts fixed in said housing and having bifurcated free ends, levers having one of their end portions pivoted in the bifurcated free ends, and linked to the rod, adjustable mounted spring means connected to the opposite ends of the levers, for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the post of the latter, a gear segment fixed to the shaft, spaced cable receiving means adjustably mounted on the housing, cable receiving means disposed between the first receiving means and fixed to the outer end of the rod, the cable having running engagement with at least one of the first receiving means and the second receiving means for normally deflecting the cable between the first receiving means to apply axial pressure to said rod on being subjected to tension, for moving the rod in an opposite direction, indicating means on the housing and connecting means between the segment and the indicating means for actuating the latter when movement is imparted to the rod.

3. A weight indicating device for a cable hoisting apparatus, comprising a housing, a closure for the housing, a rod slidably mounted in the housing and having one end extending through the closure, superimposed offset bearing posts fixed in said housing and having bifurcated free ends, levers having one of their end portions pivoted in the bifurcated free ends, linked anti-friction means connecting the levers to the rod, substantially U-shaped members adjustably mounted in the housing, spring means connected to the substantially U-shaped members and the opposite end of the levers for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the post of the latter, a gear segment fixed to the shaft, cable receiving means mounted on the housing and on the outer

end of the rod for normally deflecting the cable so that the latter applies axial pressure on the rod upon the cable being subjected to tension for moving the rod in an opposite direction, indicating means on the housing, and connecting means between the segment and indicating means for actuating the latter when movement is imparted to the rod.

4. A weight indicating device for a cable hoisting apparatus, comprising a housing, a closure for the housing, opposed guide means mounted on a wall of the housing and the closure respectively, a rod slidably mounted in the guide means and having one end extending through the closure, superimposed offset bearing posts fixed to the guide means on the wall and having bifurcated free ends, levers having one of their end portions pivoted in the free ends and linked to the rod, substantially U-shaped members adjustably mounted on the wall, spring means connected to the substantially U-shaped members and the opposite end of the levers for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the post of the latter, a gear segment fixed to the shaft, sheave carrying means mounted on the housing and outer end of the rod respectively, for receiving the cable and for normally deflecting the latter so that the cable applies axial pressure on the rod upon it being subjected to tension for moving the rod in an opposite direction, indicating means on the housing, and connecting means between the segment and the indicating means for actuating the latter when movement is imparted to the rod.

5. A weight indicating device for load carrying cables comprising a rod mounted for slidable movement, bifurcated fixed bearing means, lever means journaled between the bifurcated portions of the bearing means, and linked to the rod, spring means connected to the lever means for urging the rod in one direction, adjustably mounted cable receiving means, cable receiving means carried by the rod and arranged with respect to the adjustably mounted cable receiving means and cooperating therewith for normally deflecting the cable to cause the latter to move the rod in an opposite direction when the cable is under tension, indicating means including a removable dial, and means of connection between the rod and the indicating means for actuating the latter when movement is imparted to the rod.

6. A weight indicating device for load carrying cables, comprising a housing, a rod slidably mounted in the housing and having one end extending therethrough, bearing means in said housing, lever means mounted in the bearing means and linked to the rod, adjustably mounted spring means connected to the lever means for urging the rod in one direction, adjustably

mounted cable receiving means secured to the housing and extending outwardly therefrom, cable receiving means carried by the extending end of the rod and arranged with respect to the adjustably mounted cable receiving means and cooperating therewith for normally deflecting the cable to cause the latter to move the rod in an opposite direction when the cable is under tension, indicating means secured to the housing and arranged thereon in opposed relation with respect to the cable receiving means, and means of connection between the rod and the indicating means for actuating the latter when movement is imparted to the rod.

7. A weight indicating device for load carrying cables, comprising a rod mounted for slidable movement, fixed bearing posts and having bifurcated free ends, levers having one of their end portions pivoted in the bifurcated free ends and linked to the rod, adjustably mounted spring means connected to the opposite ends of the levers for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the post of the latter, adjustably mounted cable receiving means, cable receiving means carried by the rod and arranged with respect to the adjustably mounted cable receiving means and for cooperation therewith for normally deflecting the cable to cause the latter to move the rod in an opposite direction when the cable is under tension, indicating means, and means of connection between the shaft and the indicating means for actuating the latter when movement is imparted to the rod.

8. A weight indicating device for a cable hoisting apparatus, comprising a housing, guide means mounted in the housing, a rod slidably mounted in the guide means and having one end extending through the housing, offset bearing means mounted in the housing, levers having one of their end portions pivoted in the bearing means and linked to the rod, bracket means mounted in the housing, spring means connected to the bracket means and the opposite ends of the levers for urging the rod in one direction, a shaft providing the pivot of one lever and journaled in the bearing means of the latter, a gear segment fixed to the shaft, cable receiving means mounted on the housing, sheave means mounted on the extending end of the rod and cooperating with said cable receiving means for deflecting the cable so that the cable applies axial pressure on the rod upon the cable being subjected to tension for movement of the rod in an opposite direction, indicating means mounted on the housing, and geared connecting means between the segment and the indicating means for actuating the latter when movement is imparted to the rod.

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