H. R. HUGHES.

LOAD INDICATING ATTACHMENT FOR DRILLING RIGS.

APPLICATION FILED NOV. 20, 1914.

1,183,646. Patented May 16, 1916.

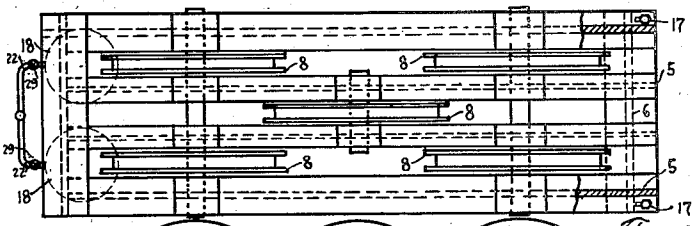


Fig. 2

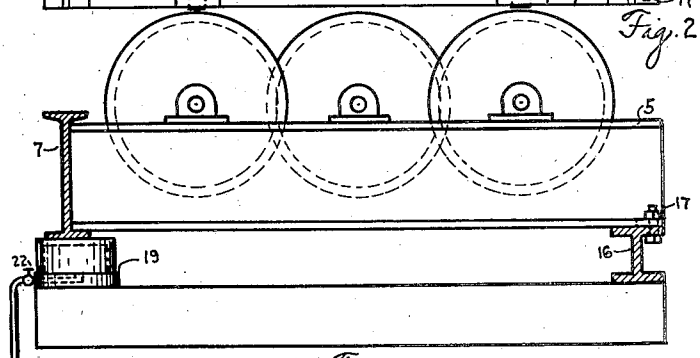


Fig. 3

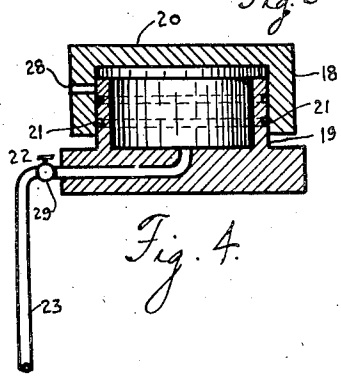


Fig. 4.

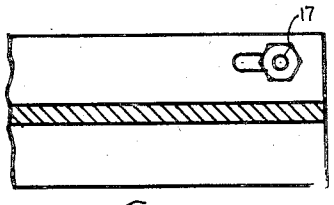


Fig. 5

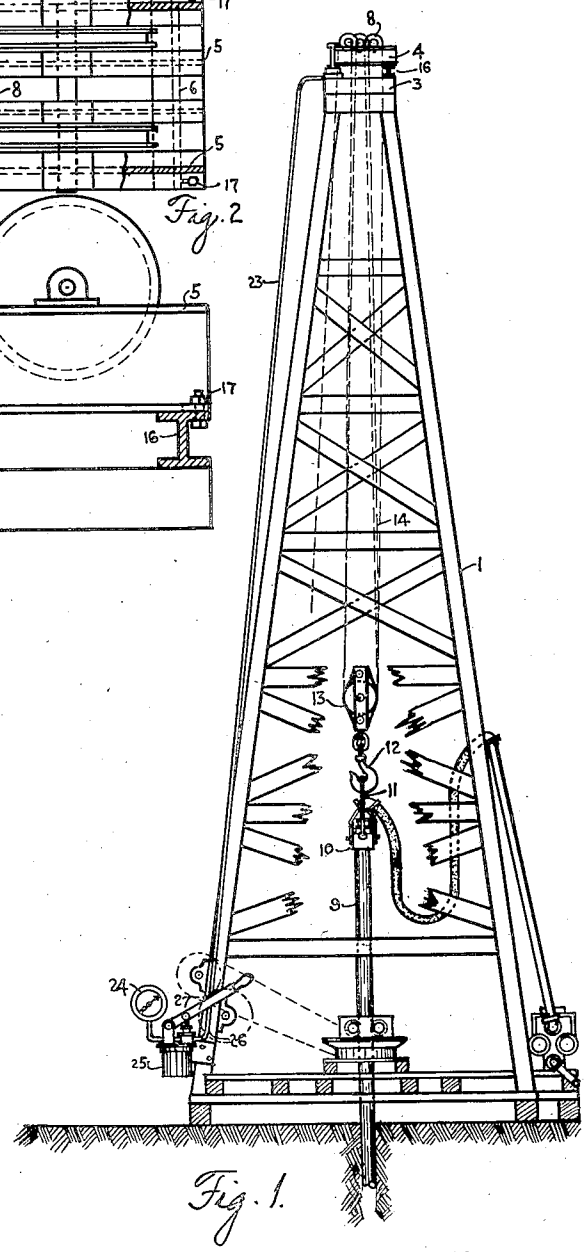


Fig. 1.

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LOAD-INDICATING ATTACHMENT FOR DRILLING-RIGS.

1,183,646. Specification of Letters Patent. Patented May 16, 1916.

Application filed November 20, 1914. Serial No. 873,217.

To all whom it may concern:

Be it known that I, HOWARD R. HUGHES, a citizen of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in Load-Indicating Attachments for Drilling-Rigs, of which the following is a specification.

This invention relates to new and useful improvements in a load indicating attachment for drilling rigs.

The object of the invention is to provide an attachment of the character described to be mounted on the derrick of a drilling rig and which will accurately indicate the comparative weight of the load sustained by the crown block of the derrick.

As is well known by those skilled in the art to which this invention pertains, the drilling pipe or stem is sustained from the crown block by means of a block and tackle mechanism and said stem extends down into the bore, sometimes a great distance. By means of the attachment herein described, should the drill stem separate down in the bore and some of the lower joints drop to the bottom thereof, that fact would immediately be indicated by my improved indicating device, and the operator would be immediately notified of the separation of the drill stem. It is also essential, or at least desirable, to know approximately the length or amount of drill stem suspended in the bore and by the use of the present invention this fact can be readily and accurately ascertained.

A further feature of this invention resides in the fact that it is mounted upon the top of the derrick and out of the way of the operator and when once placed in position it does not become necessary in the course of drilling the well, to remove the same.

A still further and important object of the invention is to show the operator of the drill rig, the amount of weight sustained by the drill bit, which is carried at the lower end of the drill stem.

A still further feature of the invention resides in the provision of a cheap and durable mechanism requiring few additional parts to the drilling rig now in common use, and one which will not be liable to get out of working order.

With the above and other objects in view, the invention has particular relation to certain novel features of construction, operation, and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1, is a side elevation of a drilling rig, a portion of the frame work of the derrick being broken away. Fig. 2, is a plan view of the crown block thereof, shown partially in section. Fig. 3, is a side elevation of a crown block, also shown partially in section. Fig. 4, shows a sectional side elevation of the hydraulic cylinder employed in the device and, Fig. 5, shows a fragmentary horizontal sectional view of one of the I-beams forming a part of the crown block, showing the anchorage of said crown block.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures; the numeral 1, refers to a derrick, which is of the ordinary and well known construction and which is provided with the derrick floor 2, whereon is mounted the mechanism ordinarily used in drilling, and which is also provided with the cap 3, forming the top of the derrick. The top of the derrick supports the crown block 4. This block is formed of the I beams 5, arranged in parallel relation and spaced apart and fixed in their position relative to each other, at one end by the cross bar 6, and at their other ends by the cross I beam 7, to which they are secured in any desirable manner. A plurality of pulleys or sheaves 8, are rotatably mounted on the crown block and between the respective I beams thereof.

The numeral 9 refers to the drill stem, to the upper end of which, as shown, is clamped the elevator 10, having the bail 11, in which the hook 12 engages, said hook pending from the tackle block 13.

The cable 14 is provided, which operates on the tackle block 13, and the pulleys 8 in the well known manner, and whose free end is attached to the drum 15, so that by the rotation of said drum, the tackle block 13 and the drill stem 9, depending therefrom, may be elevated. It is obvious that when said drill stem is elevated in the bore, its entire weight will be sustained from said crown block.

One end of the crown block is supported on the cross I beam 16, which is mounted

on the top of the derrick, and said end is anchored to said cross I beam by means of bolts 17, 17, which pass through alined orifices in the overlapping flanges of the I beams 5 and 16. Said alined orifices are oblong, as shown in Fig. 5, so as to permit a limited vertical movement of the opposite end of the crown block as will hereinafter be set forth.

Secured to the under side of the cross beam 7, at its opposite ends, are the inverted cylinders 18, 18. Two cylinders have been shown although in actual practice one or more may be used. Fixed to the top of the derrick and fitting in said cylinders are the hollow pistons 19, 19, forming oil chambers, as 20. Each piston has peripheral annular grooves in which the piston rings 21, 21 fit, serving the purpose of preventing the escape of oil from the chambers 20. Communicating with each of the oil chambers 20, through the base of the corresponding piston 19, is a conduit 22, said conduits uniting in the pipe 23. The pipe 23 is equipped with an indicator 24, having a dial and an indicating hand of the well known construction. The mechanism of the indicator is such that the amount of the fluid pressure delivered through the pipe 23 will be indicated by the hand of the indicator. The oil chambers 20 are filled with oil under compression and the oil cushions sustain the weight of the load carried by the crown block, so that as said weight is increased or decreased, the pressure on the oil cushions in the chambers 20, will be correspondingly increased or decreased, and any change of load will, in the manner hereinbefore specified, be immediately revealed by the indicator 24.

It is apparent that the oil will gradually leak out of the chambers 20, and for the purpose of keeping the chambers, at all times, filled with oil, I have provided the oil tank 25, which is equipped with the pump 26, manipulated through the hand lever 27. The discharge spout of this pump communicates with the pipe 23 and by it, any deficiency of oil in the chambers 20 may be supplied. In order to prevent too much oil from then being delivered to the chambers 20, each of the cylinders 18 has been provided with a safety orifice 28, which is so positioned in the wall of its cylinder 18 that when an excessive amount of oil is delivered into the chambers 20, the orifice 28, will clear the free end of the pistons 19 and said excess will be drained out through the orifice 28. Each of the conduits 22 is provided with the check valve, as 29, by means of which the flow of fluid therethrough may be regulated.

An indicating device of the character described, when constructed in accordance with the foregoing specification and the drawing attached thereto and made a part thereof, will be found to be simple and practical, and will immediately indicate the separation of the pipe sustained in the bore, or the loss of any of the joints from the lower end thereof and will also serve to indicate to the operator of the rig the exact amount of weight sustained by the drill bit carried by the lower end of the drill stem, this last mentioned feature being one of the chief merits of the invention.

While I have shown only one form of this invention, it is apparent that the mechanical structure thereof may be changed without departing from the principle of the invention, and I hereby reserve the right to make such modifications in the structure as will not depart from the scope of the appended claims.

What I claim is:—

1. A device of the character described including a derrick, a crown block mounted thereon and adapted to sustain a load, a means interposed between the crown block and derrick and supporting the crown block with a force variable with the movement thereof and admitting of the vertical movement of the block relative to the derrick and an indicating mechanism actuated through said means by the movement of the crown block and indicating the amount of weight sustained by said block.

2. In a device of the character described, the combination with a derrick of a crown block mounted thereon, an indicator, a hydraulic mechanism actuated through said crown block by the weight suspended therefrom and in turn actuating said indicator.

3. A device of the character described including a derrick, a crown block mounted on the derrick, a means for suspending a weight therefrom, a hydraulic mechanism, influenced by said weight, through said block, and an indicator actuated by said hydraulic mechanism.

4. A device of the character described, including a derrick, a hydraulic mechanism mounted thereon, a crown block sustained by said mechanism and from which a weight is supported, and an indicator influenced by said crown block, and indicating, through said mechanism, variations in the weight of said load.

5. A device of the character described including a derrick, a crown block mounted thereon, and adapted to sustain a load, a hydraulic cylinder and a piston therein, said hydraulic mechanism being positioned between the derrick and crown block and sustaining the weight of the latter, a fluid conduit communicating with the interior of said cylinder and an indicator carried by said conduit and influenced by the fluid pressure therein.

6. A well drilling device including a der-

rick and a crown block mounted thereon, adapted to support a weight, a hydraulic cylinder and a piston operating therein, said hydraulic mechanism being positioned between the crown block and derrick and sustaining the load of said crown block, a pressure gage, a fluid conduit through which said gage is influenced by the fluid pressure in said cylinder, so as to indicate the amount of pressure in said cylinder and the comparative weight sustained by the crown block.

7. A well drilling device including a derrick, a crown block mounted thereon, a hydraulic cylinder, interposed between the top of the derrick and the crown block and sustaining the weight of the crown block, a fluid indicator arranged near the floor of the derrick, a means connecting said indicator with said cylinder whereby the weight of the crown block is revealed by said indicator and a mechanism for introducing additional fluid into said cylinder to replace fluid lost by leakage and at the same time to increase the pressure in said cylinder to elevate said crown block.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HOWARD R. HUGHES.

Witnesses:
S. EPSTEIN,
C. E. REED.