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S. W. SOUTHERLAND
HYDRAULIC WEIGHT INDICATING DEVICE FOR HOISTS,
DERRICKS, AND THE LIKE

2,551,178

Filed Aug. 30, 1949

2 Sheets-Sheet 1

Fig. 1.

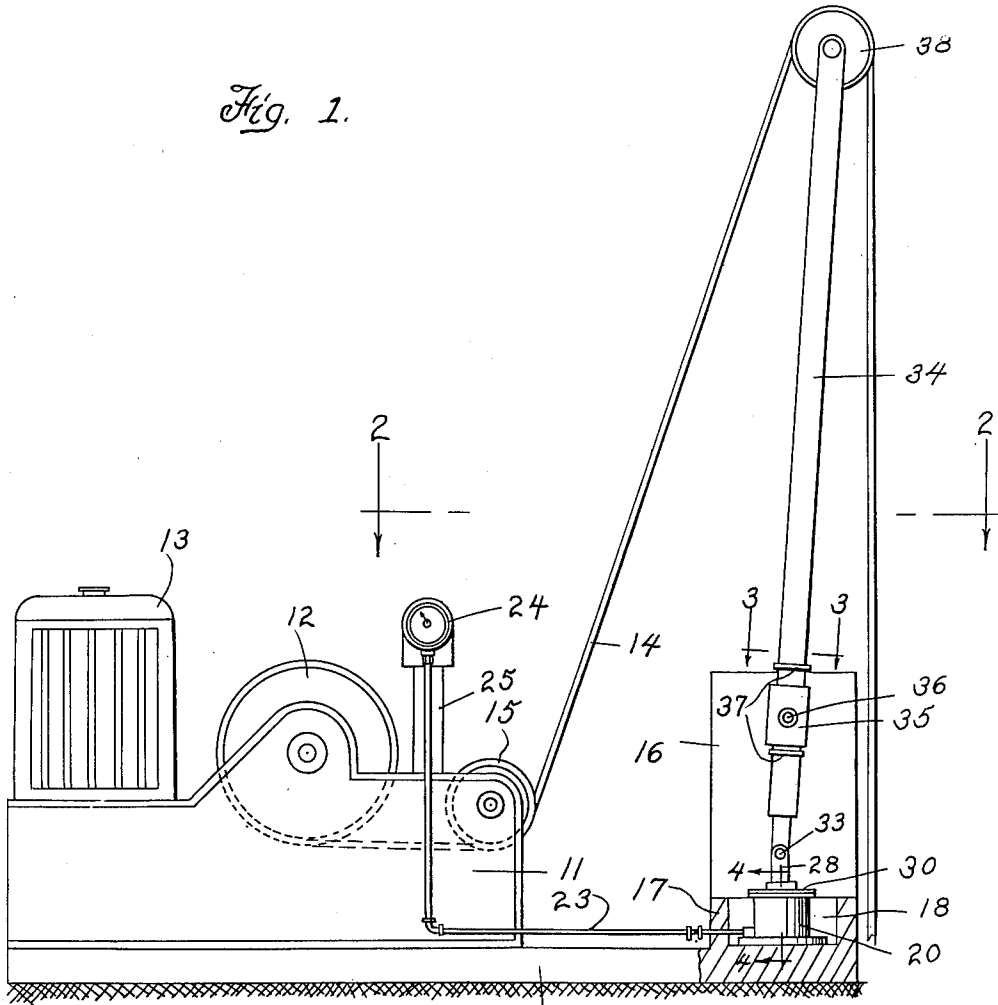


Fig. 2.

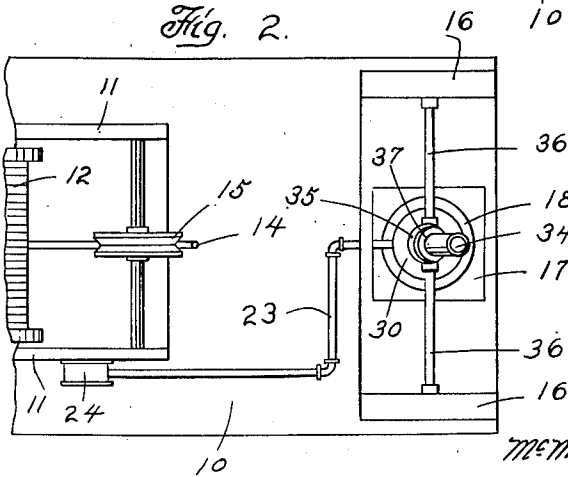
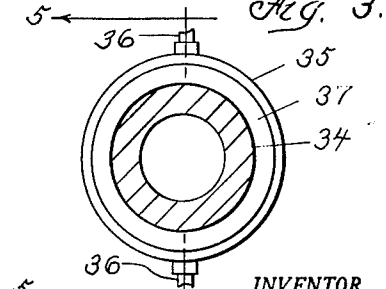


Fig. 3.



INVENTOR.
Shelva W. Southerland
BY

McMorrow, Beuman & Davidson
Attorneys

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Fig. 4.

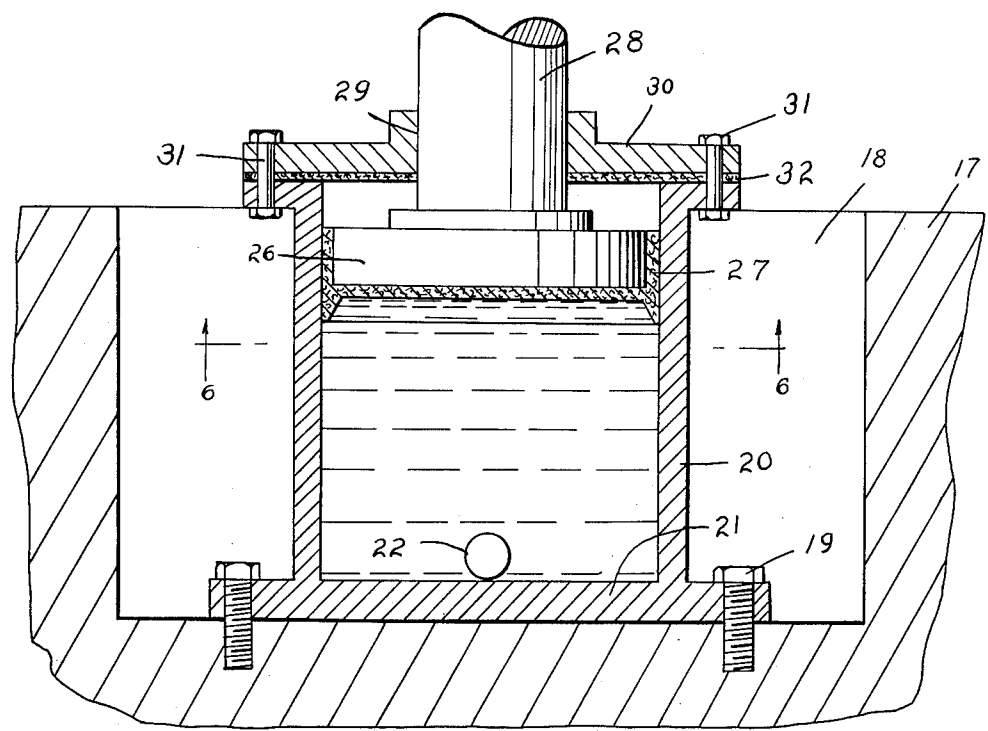


Fig. 5.

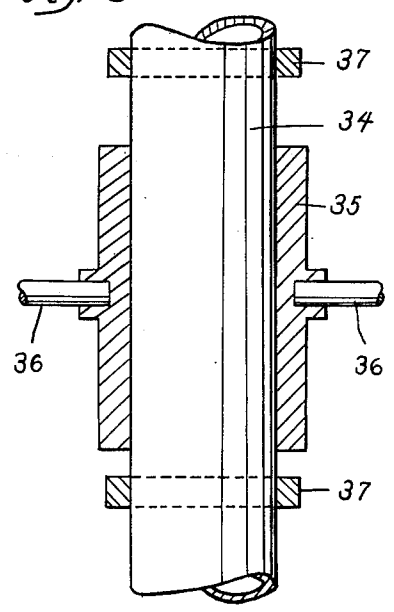
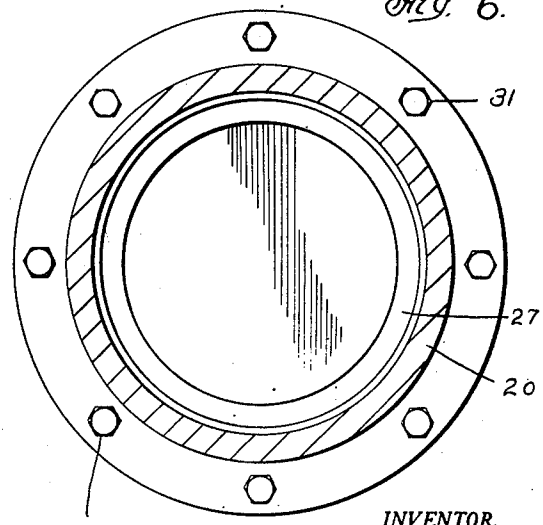


Fig. 6.



INVENTOR.
Shelva W. Southerland
BY

McCormack, Berman & Davidson
Attorneys

UNITED STATES PATENT OFFICE

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HYDRAULIC WEIGHT INDICATING DEVICE FOR HOISTS, DERRICKS, AND THE LIKE

Shelva W. Southerland, Carmi, Ill.

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2 Claims. (Cl. 73-151)

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My invention relates to a hydraulic weight indicating device for hoists, derricks and the like.

An important object of my invention is to provide a hydraulic device to measure the weight of the load placed upon the booms and cables of hoisting units and derricks.

A further object is to provide a device of the above mentioned type, adapted to measure the load upon the running line or cable of an oil well derrick.

A still further object of the invention is to provide a device of the above mentioned type which is highly simplified, strong and durable, and which may be permanently built into the hoisting unit or derrick with a minimum expenditure.

Other objects and advantages of the invention will be apparent during the course of the following description.

In the accompanying drawings, forming a part of this application, and in which like numerals are employed to designate like parts throughout the same,

Figure 1 is a side elevation of a conventional oil well derrick, having the hydraulic weight indicating device embodying the invention incorporated therein.

Figure 2 is a fragmentary horizontal section taken on line 2-2 of Figure 1.

Figure 3 is an enlarged generally horizontal section taken on line 3-3 of Figure 1.

Figure 4 is a greatly enlarged fragmentary central vertical section taken on line 4-4 of Figure 1.

Figure 5 is an enlarged fragmentary central vertical section taken on line 5-5 of Figure 3, and

Figure 6 is a horizontal section taken on line 6-6 of Figure 4.

In the drawings, where for the purpose of illustration, is shown a preferred embodiment of the invention, the numeral 10 designates a flat horizontal slab or base of a conventional oil well type derrick. Rigidly mounted upon the slab 10, near one end thereof, is a pair of opposed upstanding vertical side walls 11, which are spaced apart laterally, as shown. Rotatably mounted between the side walls 11 upon a shaft supported by the side walls is a winding drum or spool 12, adapted to be driven in a conventional manner by a suitable motor 13, rigidly mounted upon the slab 10. The drum 12 has a cable or running line 14 wound upon it and this cable passes under and about a freely rotatable pulley 15 mounted upon a shaft sup-

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ported by the side walls 11, near their forward ends.

At its forward end, the slab or base 10 has a pair of laterally spaced upstanding vertical posts or shoulders 16, and the slab is further provided between the posts 16, and at its transverse center with a rectangular upstanding boss 17 having a central recess 18, forming a chamber.

Rigidly mounted within the recess 18 by bolts 19 or the like is a hydraulic cylinder 20, having a closed bottom end 21 and having its axis vertically disposed. The cylinder 20 is provided in its side and close to the bottom end 21 with a small radial port 22, in communication with a hydraulic line or tube 23, leading to a suitable hydraulic gage 24, mounted upon an upright bracket 25, secured to the top of one side wall 11. Mounted for vertical reciprocation within the cylinder is a plunger 26, carrying packing or seal 27, or leather, fiber or the like, and including a short integral rod stem 28, which operates in a guide opening 29 of a cover plate 30. The cover plate 30 is rigidly secured to the cylinder 20 by bolts 31 and a compressible gasket 32 is provided between the cover plate and the top end of the cylinder 20.

The top end of the short plunger rod 28 is preferably bifurcated, and pivotally connected, as at 33, to the lower end of a cylindrical pole or mast 34, which is generally vertically disposed, as shown. The mast 34 is positioned equi-distantly from the posts 16 and extends slidably through a cylindrical sleeve 35, pivotally carried on horizontal shafts or trunnions 36, secured at their outer ends to the posts 16. The mast 34 is provided a short distance above and below the sleeve 35 with fixed stop rings 37, rigidly secured to the mast by welding, or the like. The axial movement of the mast 34 in the sleeve 35 is limited by the stop rings 37. The mast 34 extends upwardly for a substantial distance, as shown, and carries at its top a grooved wheel or pulley 38, over which the running line 14 passes, Figure 1. The free end of the running line extends downwardly, forwardly of the base 10, as shown to receive the load.

In operation, when a load is connected to the free end of the cable or running line 14, such load is transmitted through the pulley 38 to the mast 34. The mast being slidable within the sleeve 35, will shift downwardly slightly, its maximum travel being limited by the upper stop ring 37. This slight downward shifting of the mast under the load will force the plunger 26 downwardly in the cylinder 20, which, of course,

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with the line 23 is filled with suitable hydraulic fluid. When the fluid in the cylinder 20 is thus compressed, and some of it forced into the line 23, the gage 24 is actuated to visually indicate the weight of the load suspended from the cable 14. The gage 24 may be of any standard type, and may be properly calibrated to indicate the load in pounds, fractions of a ton, or the like. The gage should be adjusted so that when there is no load upon the mast 34, and the plunger 26 is supporting the mast and cable alone, the gage will read zero or no load. The lower stop ring 37 should be so positioned that when there is no load upon the mast, the lower ring substantially contacts the bottom of sleeve 35. The mast can swing slightly, as required, due to the trunnions 36 and pivot 33. The vertical movement of the mast may be slight, while the gage 24 covers a wide range of loads. This is possible because of the great difference in the diameters of the cylinder 20 and line 23, and because of the very slight compressibility of liquids.

It is thus seen that I have provided a hydraulic weight indicating device capable of use upon a wide variety of derricks, cranes, hoisting machines, and the like, the device accurately measuring the load being lifted by such machines.

It is to be understood that the form of my invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or the scope of the subjoined claims.

Having thus described my invention, I claim:

1. A derrick, comprising a base including spaced upstanding posts, trunnions secured to the posts above the base and extending between the posts, a sleeve pivotally secured to the trunnions for vertical swinging movement, an upstanding mast slidably mounted within the sleeve and extending above and below the sleeve and having its bottom end spaced above the base, a

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cylinder secured to the base below the bottom end of the mast, a plunger slidably mounted within the cylinder for reciprocation and including an upstanding rod pivotally connected with the bottom end of the mast, the cylinder being adapted to hold a fluid and having an outlet port, a weight indicating hydraulic gage positioned near the derrick and arranged in communication with the cylinder through the port thereof, and load carrying cable means connected with the mast to receive the load and transmit the weight of the load through the mast to the plunger.

2. A derrick, comprising a base including an upright post, a substantially vertical sleeve secured to the post and spaced above the base, a substantially vertical mast slidably mounted within the post for reciprocation and extending above and below the sleeve and having its lower end spaced above the base, a substantially vertical cylinder secured to the base below the lower end of the mast, a plunger mounted within the cylinder for reciprocation and connected with the lower end of the mast, the cylinder being adapted to hold a liquid and having a port, a hydraulic weight measuring gage connected with the derrick and arranged in communication with the cylinder through the port thereof, and load lifting means connected with the mast to receive the load and transmit its weight through the mast to the plunger.

SHELVA W. SOUTHERLAND.

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