

June 19, 1923.

H. R. HUGHES

1,459,102

LOAD INDICATOR

Filed July 29, 1921

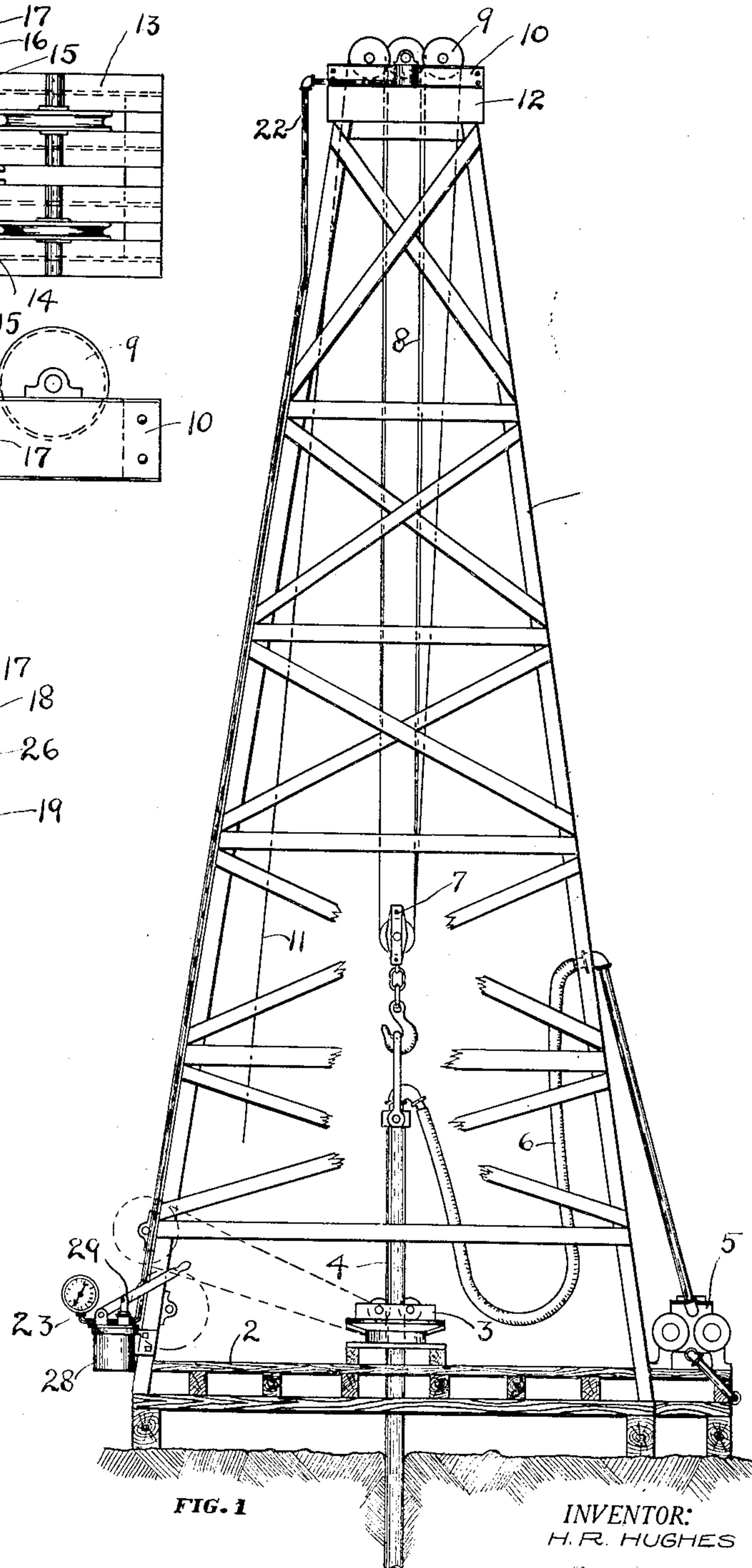
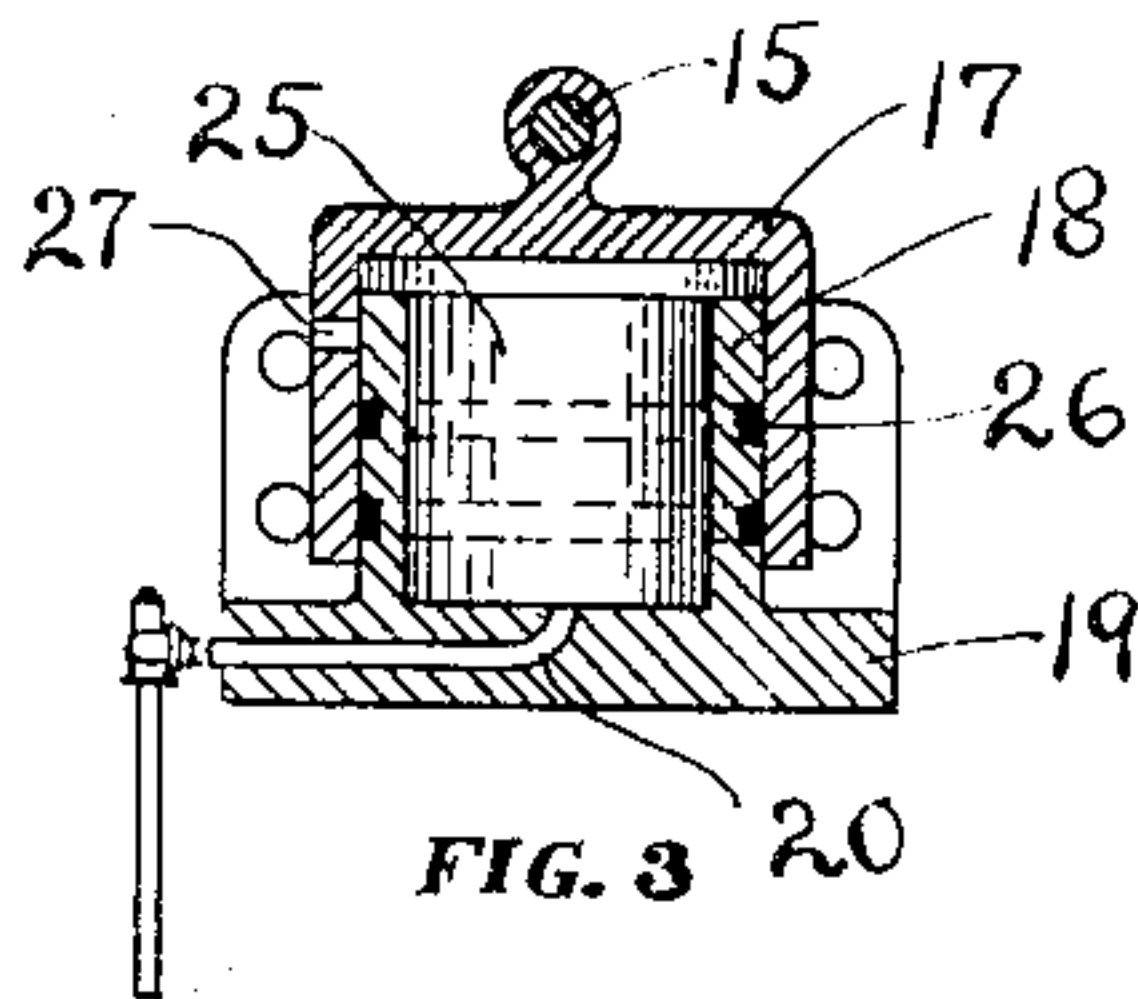
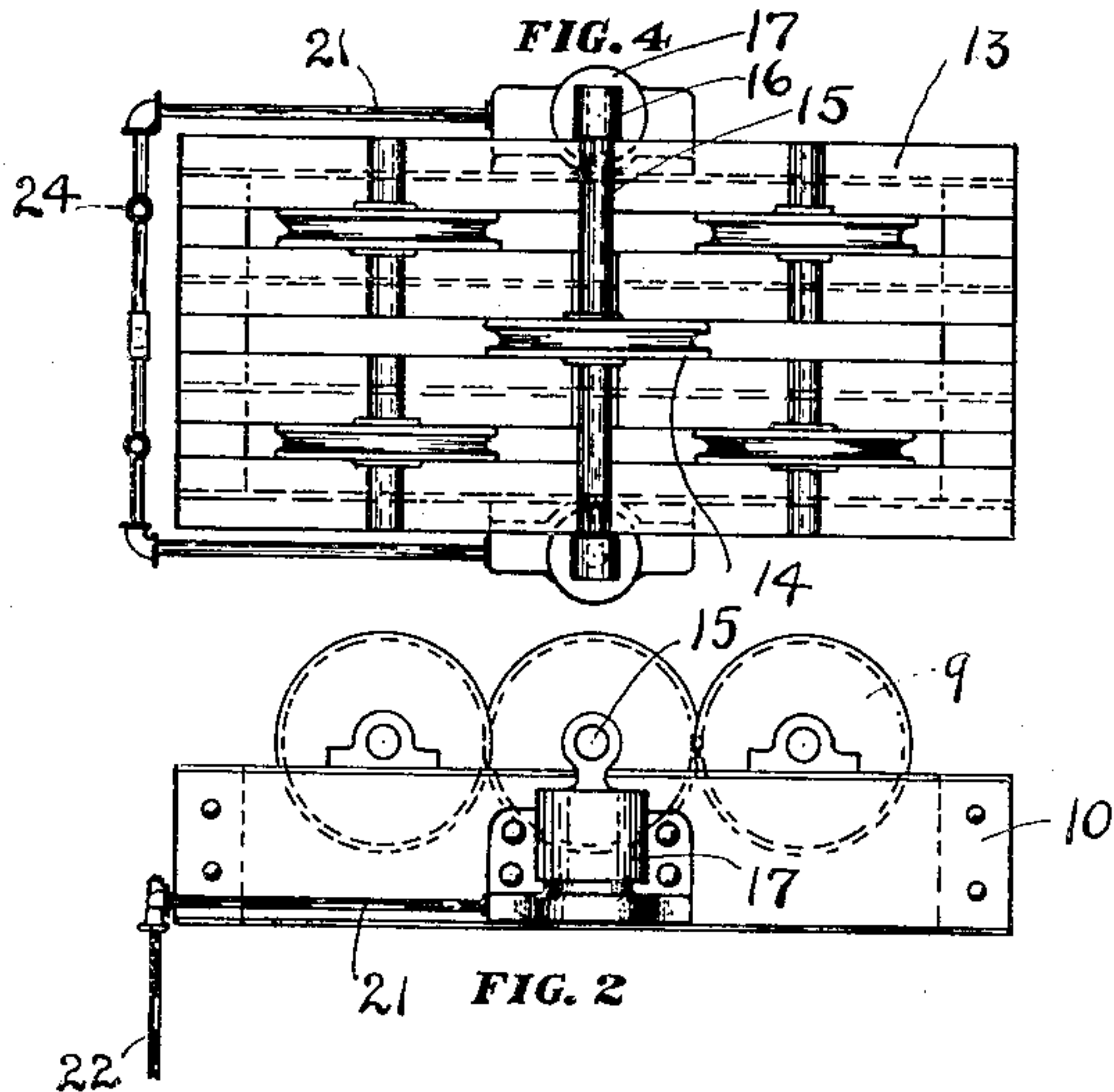


FIG. 1

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HIS ATTORNEY.



# UNITED STATES PATENT OFFICE.

HOWARD R. HUGHES, OF HOUSTON, TEXAS.

## LOAD INDICATOR.

Application filed July 29, 1921. Serial No. 488,465.

*To all whom it may concern:*

Be it known that I, HOWARD R. HUGHES, a citizen of the United States, residing at Houston, Harris County, Texas, have invented a certain new and useful Improvement in Load Indicators, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to load indicators to be used particularly on derricks in well drilling.

The object of my invention is to provide a load indicator which is so arranged as to sustain but a part of the load suspended by the cable and to still furnish an accurate indication of the weight of the load being handled.

My invention finds its most important use in indicating the weight of drill stem and drill suspended on the cable from the crown block of the derrick in drilling for oil, water, gas, etc. The weight of the drill stem above the drill in deep wells is sometimes enormous, and it is not only harmful to the bit to allow this weight to rest completely on the drill, but the greatest efficiency cannot be obtained in operations where the load on the bit is excessive. The indicator may also be injured or broken by too heavy a load. By sustaining but a certain fractional part of the load on the indicator, the dial may be so arranged to show the load with the same accuracy as though the whole weight rested upon the indicating device.

Referring to the drawing herewith, Fig. 1 shows a side elevation of a drilling rig, part of the derrick being broken away for greater clearness. Fig. 2 is a side elevation showing in more detail the crown block on the upper end of the derrick. Fig. 3 is a vertical section through one of the pistons of the indicator, and Fig. 4 is a top plan view of the crown block.

This invention is an improvement on the device shown in my prior Patent No. 1,183,646, issued May 16, 1916. The derrick indicated at 1 is of conventional design and is shown as having a platform 2 upon which is centrally mounted a rotor 3 shown somewhat diagrammatically as gripping the upper end of the drill stem 4. The drill stem is shown as projecting downwardly into the

earth, and has on the lower end thereof, not shown, a drill of any ordinary construction such as is used in rotary drilling. A mud pump 5 is connected through a pipe and hose 6 to a swivel at the upper end of the drill stem for discharging flushing fluid downwardly through the drill stem into the well.

The drill stem is sustained by a traveling block 7 around which the cable 8 is adapted to pass. The said cable 8 passes over the different pulleys 9 of the crown block 10 at the upper end of the derrick. The forward end of the cable extends downwardly at 11 to be wound upon a hoisting drum of ordinary construction, not shown.

The crown block 10 is supported on the cross members 12 at the upper end of the derrick and usually consists of a plurality of pulleys or sheaves supported for rotation by the parallel I-beams 13. I have shown five of these pulleys in the embodiment disclosed in this drawing. But one of these pulleys is connected with the indicator. When five of such pulleys or sheaves are employed I contemplate mounting the central pulley 14 upon a separate shaft 15 which is supported at each end in bearings 16 formed on the upper ends of caps 17 of my indicating device. The two caps 17 are identical in construction. In Fig. 3 I have shown a vertical section through one of these members. The cap 17 is adapted to fit closely but slidably over an upstanding cylinder 18 which is formed with a closed lower end integral with a supporting plate 19. A laterally extending passage 20 is formed in the supporting plate 19. This passage accommodates a small pipe 21 which is connected fluid-tight therewith. One of these pipes 20 is connected with each of the cylinders 18, the two pipes 21 being themselves connected with the downwardly extending pipe 22 leading to an indicator 23 of some well known construction. In the pipe 21 I provide a regulating valve 24 for the purpose of controlling the flow of fluid through the said pipe. The cap 17 of the pressure chamber 25 formed within the cylinder 18 is adapted to maintain a fluid tight fit by means of packing rings 26 formed between the contacting surfaces of the cylinder 18 and the cap 17. I have also formed in the cap 17 at a point spaced slightly from the upper end of the cap, a laterally extending



opening 27. This opening, as will be noted is, under ordinary circumstances, slightly below the upper edge of the cylinder 18.

I contemplate using a liquid, such as oil, within the pressure chamber 25, the said oil being adapted to fill this chamber and the pipes 21 and 22 leading to the indicating dial at 23. Connected with the pipe 22 at its lower end, I have provided a container 28 for a surplus amount of oil, and in this container I have fitted a pump of a hand operated type 29. This pump I have connected with the pipe 22 in such manner that a new supply of oil may be forced into the system when the supply already there has been depleted through leakage or otherwise. When an excess of oil has been forced into the system by the pump at any time the cap 17 will be thereby elevated to such an extent as to allow an escape of the surplus oil from the opening 27 in the cap 17.

In the operation of this device, only a portion of the load will rest upon the pulley 14 connected with the indicating system. If, for example, the cable is threaded over each of the separate pulleys or sheaves of the crown block and downwardly around the sheaves of the traveling block 7 in the usual manner, only about one-fifth of the load will be sustained by the sheave 14. It will therefore be an easy matter to calculate the proportion of the actual load indicated by the pressure of the fluid against the indicator at

23. The dial may be readily adjusted to register the exact weight of the drill stem. This will avoid the likelihood of breaking or injuring the indicator by allowing excessive loads to rest upon the indicating device. A somewhat lighter construction of the device will be possible and the liability of injury avoided.

While I have shown an indicating device which is fluid operated, I wish it understood that the idea of sustaining but a small portion of the load upon the indicating device is not confined entirely to fluid operated indicators, as it is obvious that an indicator consisting of gears or levers operated from a shaft of the pulley 14 could also be operated under the same plan.

Having thus described my invention, what I claim as new and desired to protect by Letters Patent is:

In a load indicator the combination of a derrick, a crown block thereon having a plurality of sheaves, a load supporting cable passing over each of said sheaves, one only of said sheaves being mounted on a shaft supported by a pressure transmitting means, and a weight indicator connected with said transmitting means adjacent the lower end of said derrick.

In testimony whereof, I hereunto affix my signature, this the 16th day of July A. D. 1921.

HOWARD R. HUGHES.