Feb. 9, 1926. 1,572,719

W. H. HAZLETT

CROWN BLOCK STRING WEIGHER

Filed July 23, 1924 2 Sheets-Sheet 1

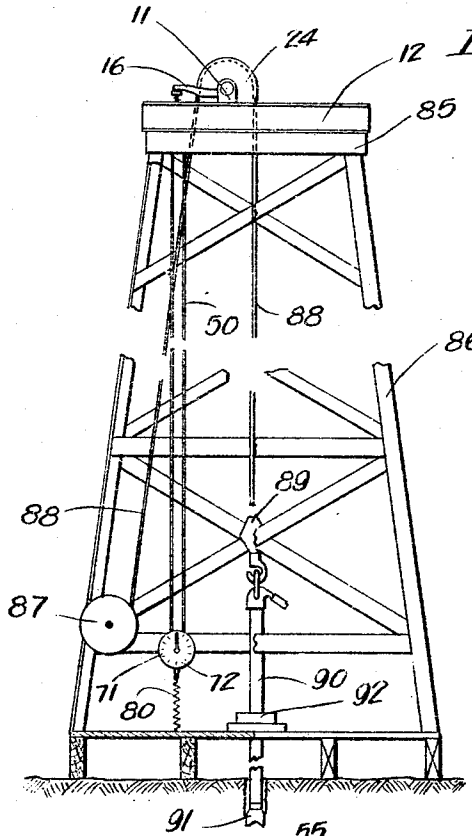
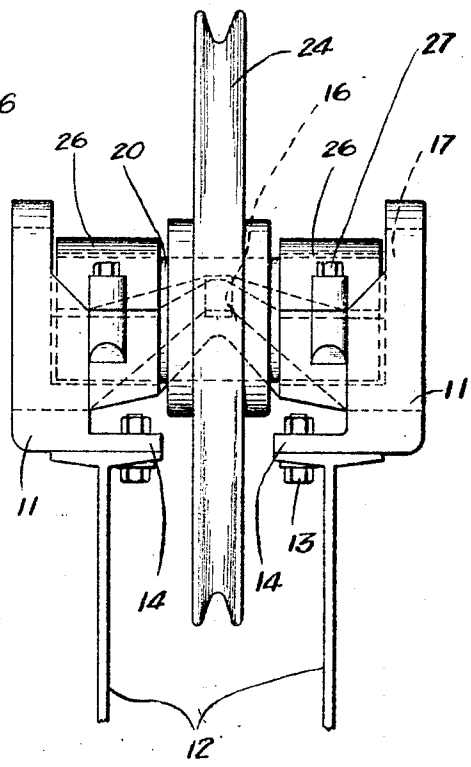


Fig. 1.

Fig. 4.



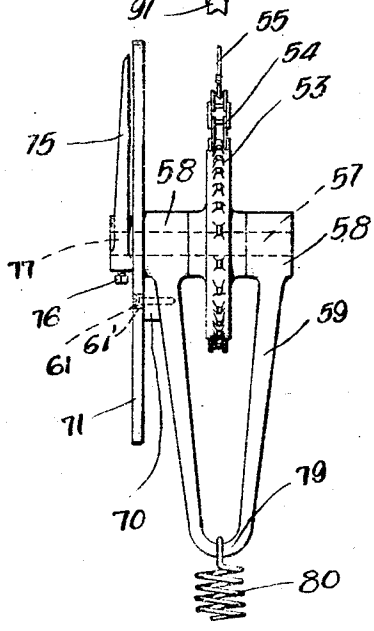


Fig. 6.

INVENTOR:
WALTER H. HAZLETT.
BY
Graham & Harris
ATTORNEYS.

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Fig. 3.

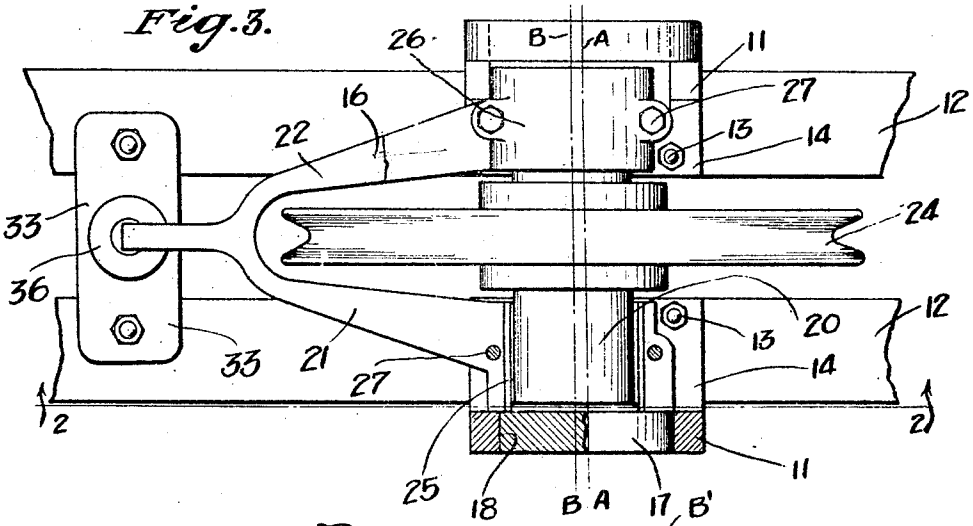


Fig. 2

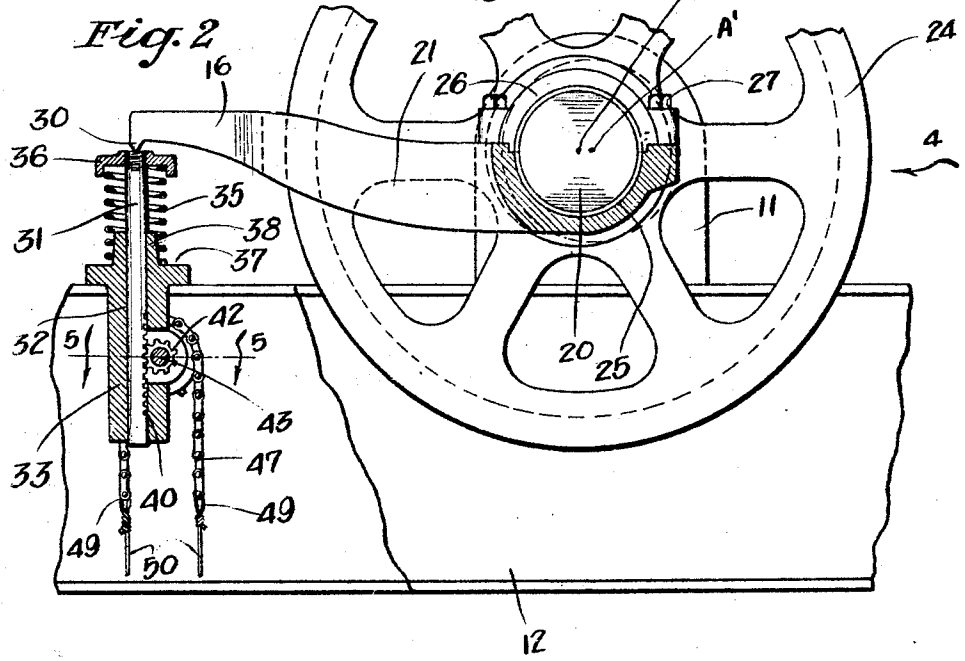
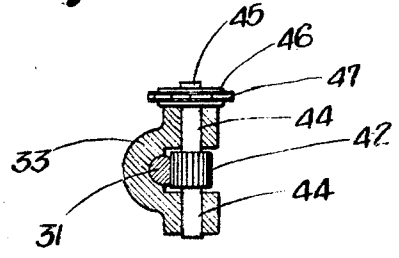


Fig. 5



INVENTOR:
WALTER H. HAZLETT,
BY
Graham & Harris
ATTORNEYS.

Patented Feb. 9, 1926. 1,572,719

UNITED STATES PATENT OFFICE.

WALTER H. HAZLETT, OF LONG BEACH, CALIFORNIA, ASSIGNOR OF ONE-HALF TO VANE M. STEDMAN, OF WHITTIER, CALIFORNIA.

CROWN-BLOCK STRING WEIGHER.

Application filed July 23, 1925. Serial No. 727,675.

To all whom it may concern:

Be it known that I, WALTER H. HAZLETT, a citizen of the United States, residing at Long Beach, in the county of Los Angeles, State of California, have invented a new and useful Crown-Block String Weigher, of which the following is a specification.

This invention relates to the oil well industry; and it relates particularly to a weighing means associated with crown-blocks which are employed in this industry.

In the rotary system of drilling oil wells, the wells are drilled by means of a drill bit which is rotated by a rotary table situated at the top of the well, through a string of drill pipe, this drill pipe being supported at its upper end by a travelling block. The cable of this travelling block extends over the sheaves of a crown-block situated at the top of the derrick and from thence it may extend to a draw works on which it is wound.

It is an object of this invention to provide, in a crown-block of this character, a means for determining the weight of the drill pipe.

It is also an object of the invention to provide an indicating means associated with the crown-block, and this indicating means may be located so that it can be conveniently read.

It is a still further object of the invention to provide a device of this character which shall have few parts, these being of sturdy and durable construction and nevertheless adapted for accurate operation.

Further objects and advantages will be made evident hereinafter.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a diagrammatic view showing one advantageous embodiment of my invention.

Fig. 2 is a partially sectioned view taken substantially on the line 2—2 of Fig. 3, this view showing clearly the crown-block construction of my invention.

Fig. 3 is a partially sectioned plan view corresponding to Fig. 2.

Fig. 4 is an end view of the crown-block, taken as indicated by the arrow 4 of Fig. 2.

Fig. 5 is a horizontal section, taken on the line 5—5 of Fig. 2.

Fig. 6 is a side view of an indicator, which may advantageously be employed in my invention.

In the drawings, the numeral 11 is applied to fulcrum blocks, which are shown as secured on parallel extending I-beams 12 by means of bolts 13, the latter extending through the flanges 14 of the fulcrum blocks 11. A bifurcate lever 16 pivots in the blocks 11 by means of circular fulcrum portions 17 which rest within the cylindrical bearing openings 18 of the fulcrum blocks 11. The fulcruming axis of the lever 16 is indicated by the broken line A—A of Fig. 3, and by the point A′ of Fig. 2. Rigidly secured on a shaft 20 between the branches 21 and 22 of the bifurcate lever 16, is a sheave 24. The shaft 20 is rotatably supported in additional and internal bearings 25, provided by the lever arm 16, these bearings 25 being completed by bearing caps 26, which are shown as secured in place by cap screws 27. The axis on which the shaft 20 rotates is indicated by the broken line B—B of Fig. 3 and the point B′ of Fig. 2, the distance A′—B′ being the length of the short arm of the lever 16.

At the outer end of the eccentrically supported lever 16, there is formed a depending nose 30, which rests on the upper end of a plunger 31 adapted to be moved thereby, this plunger being shown as supported in a bore 32 of a bracket 33. The distance between the axis A′ and the nose 30 being the longer arm of the lever 16, the plunger 31 may be held in normal position by means such as a spring 35, which may be retained in place by a head 36, screwed on the upper end of the plunger 31, and by an upper face 37 of the bracket 33, this spring 35 being shown as retained and centered by a conical protuberance 38 of the bracket 33. Engaging ratchet teeth 40, formed on the lower end of the plunger 31, is shown a pinion 42, which is rigidly secured to a shaft 43, this shaft being rotatably supported in the bearings 44, provided by the bracket 33.

On the shaft 43, and preferably on an extending end thereof, I may secure an upper sprocket 46, over which sprocket motion transmitting means such as an upper sprocket chain 47 may extend. Secured to each end 49 of the upper sprocket chain 47, are shown connecting members 50, which may be in the form of wires extending toward an indicator of any preferred type. In the form shown, a sprocket wheel 53 of the indicating arrangement of the invention,

is engaged by a lower sprocket wheel chain 54, this chain having the lower ends 55 of the connecting members 50 secured thereto. The shaft 57 on which the sprocket 53 is secured, is rotatably supported in bearings 58, provided by the U-frame 59. Secured to the U-frame 59, as by means of a suitable screw 61, which may extend through an adjustment slot 61′ into the lug 70, is shown a dial 71, which has suitable scale indications 72, as suggested in Fig. 1, arranged on the face thereof. A pointer 75 may be secured by means of a set screw 76, or its equivalent, to the end 77 of the shaft 57, which extends through the dial plate 71. Connected to the bend 79 of the U-frame 59, is shown a suitable retaining and tensioning member, which may be in the form of a coil spring 80, the lower end of which may, as shown in Fig. 1, be secured to any fixed support or to the floor of the derrick, in order at all times to maintain the connecting members 50 taut.

As best shown in Fig. 1, a crown-block which includes features of my invention may be mounted at the top 85 of an oil well derrick 86 and the indicator be so situated, near the floor of the derrick, that it may be easily read.

By the traveling block 89 is supported the drill pipe 90 having a bit 91 situated at the lower end thereof, this drill pipe being rotated by any rotary table 92; and the cable 88 may take any required number of laps over sheaves not shown before passing to the draw works 87.

The operation of the device described, is as follows: The weight of the drill pipe being placed on the sheave 24, through the cable 88, tends to swing the lever 16 on the fulcrum axis A′. This causes the nose 30 to press downwardly on the plunger 31 and to rotate the pinion 42. A rotation of the pinion 42 causes a rotation of the upper sprocket wheel 46, resulting in a movement of the sprocket wheel chain 47. This movement is transferred through the connecting members 50 and the chain 54 to the indicator sprocket wheel 53. The sprocket wheel 53, rotating the shaft 57, causes the pointer 75 to swing and to indicate on the suitably graduated and adjusted dial 71, the amount of weight placed on the cable 88.

My device is also very useful on other occasions. For example, if the drill string should break, say substantially half way from the surface, the indicator will immediately register one-half the previous total weight of the drill pipe, thereby immediately indicating to the driller that the drill pipe has broken off substantially half way down. My device may also be used to obtain a maximum efficiency from the drill bit. It may be considered that a drill pipe is supported in two places, by the crown-block and by the drill bit engaging the bottom of the well, unless all of the weight of the drill pipe is supported by the crown-block. But when the drill bit engages the bottom of the well, a portion of the weight is supported thereby. The twisting off of drill pipes may be blamed in large part on the fact that the drill bit jams at the bottom of the hole, due to an excessive contact therewith. By the use of my invention, I regulate contact with the bottom of the hole and produce maximum efficiency without the danger of jamming. If the total weight of the drill pipe is known, then during the cutting of the hole by the drill, the weight indicated on the dial 71 may be subtracted from the total weight of the drill pipe, leaving the weight supported by contact between the drill bit and the bottom of the hole.

In the drawings, I have shown a very simple form of my invention; but it should be understood that my invention may be used in conjunction with various and more intricate types of crown-blocks, my invention being as readily applied to a crown-block having a number of sheaves as to the crown-block having one sheave, as shown in the drawings.

Although I have herein described one complete embodiment of my invention, it will be understood that various features thereof might be independently employed and also that various modifications might be made by those skilled in the art, without the slightest departure from the spirit and scope of my invention, as the same is indicated above and in the following claims.

I claim as my invention:

1. In combination, in a crown-block weigher; a lever fulcrumed on a crown-block; means for resiliently resisting the movement of said lever; a sheave carried by said lever; a plunger operated by said lever when a weight is carried by said sheave; and means actuated by said plunger for indicating said weight.

2. In combination, in a crown-block weigher; a lever fulcrumed on a crown-block; means for resiliently resisting the movement of said lever; a sheave carried by said lever eccentrically with respect to the fulcrum of said lever; a plunger operated by said lever when a weight is placed on said sheave; a sprocket operated by said plunger; a means for indicating the weight placed on said sheave; and means through which said indicating means is actuated by said sprocket.

3. In combination, in a crown-block weigher: a lever having a pair of relatively spaced bearing portions; means for resiliently resisting the movement of said lever; journals secured to a crown-block for supporting said lever, said journals being adapted to receive said bearing portions of

said lever; a sheave supported by said lever between said bearing portions; and means operated by said lever when a weight is carried by said sheave.

4. In combination, in a crown-block weigher: a lever having a pair of relatively spaced bearing portions; means for resiliently resisting the movement of said lever; means for receiving said bearing portions and thus supporting said lever on a crown-block; a sheave carried by said lever between said bearing portions, said sheave being supported eccentrically with respect to the pivotal axis of said lever; a plunger adapted to be engaged and operated by said lever when a weight is carried by said sheave; and means operated by said plunger for indicating the weight carried by said sheave.

5. In combination, in a crown-block weigher: a bifurcate lever; means supported on a crown-block for pivotally supporting said lever; means for resiliently resisting the movement of said lever; a sheave rotatable between the ends of said lever; an indicator; and means between said lever and said indicator for causing said indicator to register the magnitude of a load carried by said sheave.

6. In combination, in a crown-block weigher: a bifurcate lever; means supported on a crown-block for pivotally supporting said lever; means for resiliently resisting the movement of said lever; a sheave rotatable between the ends of said lever; a plunger engaged by said lever, said plunger having a rack formed thereon; a pinion engaged by said rack; a sprocket movable with said pinion; an indicator; and means connecting said pinion and said indicator for causing said indicator to register according to the movement of said sprocket.

7. A combination as in claim 6 in which said indicator includes a dial and a pointer.

8. A combination as in claim 6 comprising also means for creating a tension in said connecting means.

9. A combination as in claim 7 comprising also means permitting relative adjustment of said dial.

10. In combination, in a crown-block weigher; a lever having a bifurcated portion which provides relatively spaced bearing portions; means for resiliently resisting the movement of said lever; journals in which said bearing portions rest and whereby said lever is pivotally supported on a crown-block; a shaft extending between said bearing portions, said shaft being arranged eccentrically with respect to the pivotal axis of said lever; a sheave pivotally carried upon said shaft between said bearing portions of said lever; a plunger arranged to be engaged and operated by a motion of said lever when a weight is placed thereon by said sheave; an upper sprocket adapted to rotate when said plunger is operated; an indicator having a lower sprocket; and means for operating the sprocket of said indicator when said upper sprocket is actuated in a manner to operate said indicator so as to indicate the load carried by said sheave.

11. In combination, in a crown-block weigher: a lever having a bifurcated portion which provides relatively spaced bearing portions; means for resiliently resisting the movement of said lever; journals in which said bearing portions rest and whereby said lever is pivotally supported on a crown-block; a shaft extending between said bearing portions, said shaft being arranged eccentrically with respect to the pivotal axis of said lever; a sheave pivotally carried upon said shaft between said bearing portions of said lever; a plunger arranged to be engaged and operated by a motion of said lever when a weight is placed thereon by said sleeve; an upper sprocket adapted to rotate when said plunger is operated; a floating indicator having an indicator sprocket; an endless member extending between said upper sprocket and said indicator sprocket whereby said indicator is operated to indicate the load carried by said sheave; and means for keeping said endless member under tension.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 11th day of July, 1924.

WALTER H. HAZLETT.

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Certificate of Correction.

It is hereby certified that in Letters Patent No. 1,572,719, granted February 9, 1926, upon the application of Walter H. Hazlett, of Long Beach, California, for an improvement in "Crown-Block String Weighers," an error appears requiring correction as follows: In the heading to the printed specification, line 6, date of filing application, for "July 23, 1925" read *July 23, 1924;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 23d day of March, A. D. 1926.

[SEAL.]

M. J. MOORE,
Acting Commissioner of Patents.

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It is hereby certified that in Letters Patent No. 1,572,719, granted February 9, 1926, upon the application of Walter H. Hazlett, of Long Beach, California, for an improvement in "Crown-Block String Weighers," an error appears requiring correction as follows: In the heading to the printed specification, line 6, date of filing application, for "July 23, 1925" read *July 23, 1924;* and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

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M. J. MOORE,
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