

UNITED STATES PATENT OFFICE

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TONG ACTUATOR

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6 Claims. (Cl. 255—35)

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This invention relates to a tong actuator.

The apparatus is particularly designed for use in connection with a drilling rig for actuating the tong by means of which the well pipe, or well casing, is made up in lowering the same into the well.

In well drilling the string of casing, or pipe, is suspended in the well from a rotary drilling machine and, as it is made up and lowered, additional sections of the casing, or pipe, are screwed onto the upper end of the string. A tong is used for this purpose. It is actuated, in one direction, by means of a cable which operates over the cathead of the drawworks and is operated, at the present time, in the other direction by means of a pull spring connected, at one end, to the tong handle by a cable and connected, at its other end, to a stationary anchor by a cable, but this spring is exposed and should it break, as often happens, it may swing around the derrick floor and injure the workmen. It is a prime object of the present invention to provide a housing wherein the spring and adjacent end of the cable are housed so that in case of breakage of the spring the cable will be held, or retained, so that it will not be liable to cause injury, or should the cable become detached from the spring its range of movement about the derrick will be greatly restricted so as to reduce the liability of injury.

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

Figure 1 shows a side view, partly in section, of the housing.

Figure 2 shows a fragmentary, perspective view.

Figure 3 shows a side view of the drawworks and rotary drilling machine showing the housing associated therewith; and

Figure 4 shows a plan view thereof.

In the drawings the numeral 1 designates the derrick floor as a whole whereon the drawwork 2 and the rotary drilling machine 3 are located. The drawwork has a cathead shaft 4 on which the conventional cathead 5 is fixed.

The rotary drilling machine includes a rotary table 6 which is driven from the drawworks by a suitable sprocket chain enclosed within the housing 7 in the usual manner.

The string of well pipe 8 is suspended in the well from the rotary table. As made up additional sections of the well pipe are screwed onto the upper end of the string by the tong 9. A cable

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10 is attached, at one end, to the tong handle and its other end is wound around the cathead 5. When a workman pulls on the free end 11 of the cable to tighten it around the cathead, and the cathead is rotated in a clockwise direction it will operate to exert a pull on the tong handle and this will rotate the section being screwed onto the upper end of the string. The free end 11 of the cable is then released.

In order to actuate the tong in the other direction to take a new hold on the pipe section the attachment hereinafter described has been provided.

The numeral 12 designates a tubular housing whose lower end is supported on a base 13. This base has an integral upstanding stud 14 over which the lower end of the housing is fitted and a transverse bolt 15 is fitted through the housing and stud having a head on one end and a nut 16 screwed onto the other end thereof.

The base 13 may be secured in position adjacent the derrick floor in any preferred manner. If the derrick foundation is concrete the base 13 may be anchored therein, or thereto, or if the derrick foundation is formed of timber the base 13 may be anchored thereto by lag screws and said housing 12 may be further braced in any desired manner so that it will be held securely in place.

Within the housing there is a strong coil spring 17 whose lower end is attached to cross bolt 18 which extends through the housing above the stud 14 and which has a head on one end and a nut 19 screwed onto the other end thereof.

There is a cable 20 one end of which is connected to the tong handle and whose other end is connected to the upper end of the spring 17. This cable 20 works through a side opening 21 in the housing and between the upper and lower sheaves 22, 23 which are mounted in said opening. These are mounted to rotate on the upper and lower transverse bolts 24, 25 which have the heads 26, 27 on one end and the nuts 28, 29 on their other ends.

There is an outwardly arched bracket 30 secured at its respective ends to the housing 12 above and beneath the opening 21 and this bracket has an opening 31. The cable 20 passes through the openings 21 and 31 and between the sheaves 22, 23 and is attached to the upper end of the spring 17, as shown in Figure 1.

As the tong is actuated in the direction of the arrow in Figure 4 the spring 17 is placed under tension and when the end 11 of the cable is released, to release the coils from the cathead 5,

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the spring 17 will operate to actuate the tong in the other direction so that the tong may take a new hold on the section being screwed onto the string. In case the spring 17 should, at any time, break the end of the cable in the housing 12 will usually be retained therein between the sheaves 22, 23 but in case the cable 22 should, in case of breakage, be withdrawn from the housing the bracket 30 will reduce its range of movement about the derrick floor so that the workmen will not be so liable to be injured.

The sheaves 22 and 23 may be guarded, on each side, by the guard plates 32, 33 which are welded to the housing 12, as shown in Figures 1 and 2.

While a spring is shown in the housing 12 for maintaining tension on the cable 20 any equivalent of said spring, such as a weight, may be enclosed within said housing for the same purpose.

What I claim is:

1. In apparatus for operating a pipe tong to screw together sections of a well pipe; an upstanding housing anchored adjacent a well rig and whose upper end is formed with a side opening, a pull spring in the housing whose lower end is anchored to the housing, a tong actuating cable working through said opening and connected, at one end, to the upper end of the spring, and whose other end is adapted to be connected to a tong handle, an antifriction roller mounted in and projecting through the housing opening and over which the cable works and side guards on the housing on opposite sides of the roller, a sheave mounted between the side guards and projecting through the opening and over which the cable works.

2. In apparatus for operating a pipe tong, an upstanding housing anchored in place and having a side opening, an outwardly arched bracket fixed to the housing and extended outwardly therefrom and having a guide opening aligned with the housing opening, a cable through said openings one end of which is adapted to be connected to the tong, means in the housing connected to the other end of the cable to maintain the cable, when connected to the tong, under tension, and side guards on the housing on opposite sides of the opening, a sheave mounted between the side guards and projecting through the opening and over which the cable works.

3. In apparatus for operating a pipe tong, an upstanding housing anchored in place and having a side opening, an outwardly arched bracket fixed to the housing and extended outwardly therefrom and having a guide opening aligned with the housing opening, a cable through said openings one end of which is adapted to be connected to the tong, means in the housing connected to the other end of the cable to maintain the cable, when connected to the tong, under tension, side guards on the housing on opposite sides of said opening, a sheave between, and mounted on said side guards within the bracket over which said cable works.

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4. In apparatus for operating a pipe tong, an upstanding housing anchored in place and having a side opening, a bracket fixed to the housing above and beneath the opening and extended outwardly from the housing and having a guide opening aligned with the housing opening, a cable through said openings one end of which is adapted to be connected to the tong, means in the housing connected to the other end of the cable to maintain the cable, when connected to the tong, under tension and opposed sheaves on the housing within the brackets between which the cable works.

5. In apparatus for operating a pipe tong, an upstanding housing anchored in place and having a side opening, an outwardly arched bracket fixed to the housing above and beneath the opening and extended outwardly from the housing and having a guide opening aligned with the housing opening, a cable through said openings one end of which is adapted to be connected to the tong, a sheave mounted on the housing to project through said opening and over which the cable works; a spring in the housing one end of which is anchored and whose other end is connected to the other end of said cable.

6. In apparatus for operating a pipe tong, an upstanding housing anchored in place and having a side opening, an outwardly arched bracket fixed to the housing and extended outwardly therefrom in front of the opening and having a guide opening aligned with the housing opening, a cable through said openings one end of which is adapted to be connected to the tong, a sheave mounted on the housing to project through said opening and over which the cable works, means anchored in the housing and connected to the other end of the cable to maintain the cable, when connected to the tong, under tension and side guards on the housing on opposite sides of the side opening.

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