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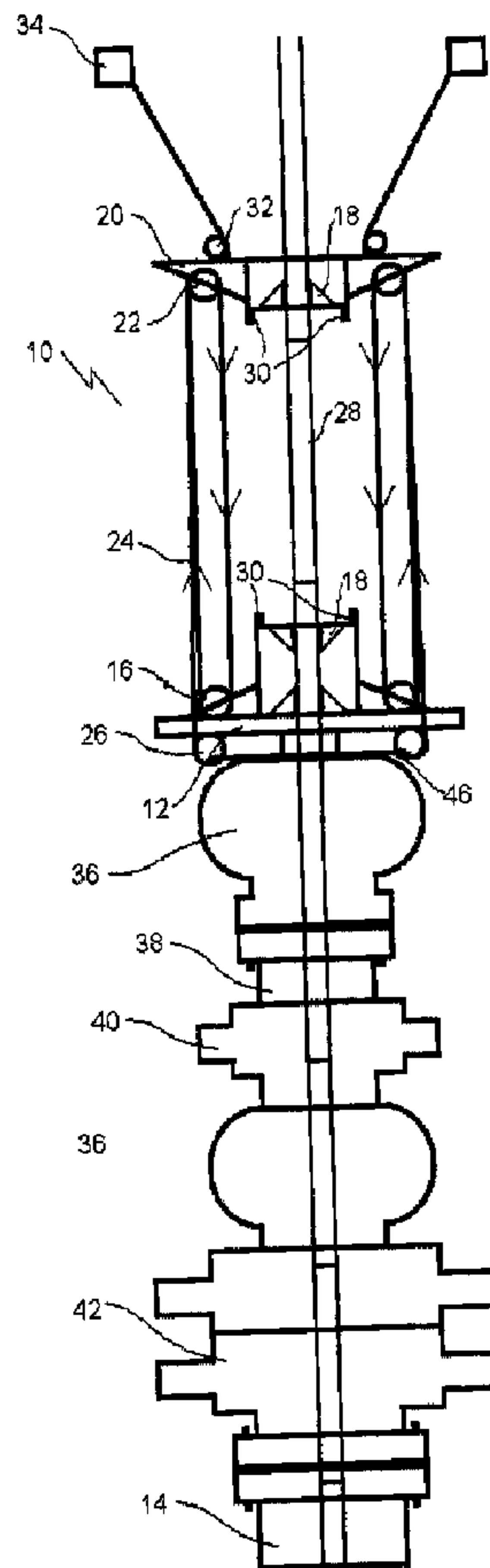
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(54) Titre : APPAREIL DE CURAGE SOUS PRESSION DE TUYAU ENTRAINE PAR TREUIL ET CABLE

(54) Title: WINCH AND CABLE DRIVEN PIPE SNUBBING APPARATUS



(57) **Abrégé/Abstract:**

A winch and cable driven pipe snubbing apparatus which includes a stationary body and a travelling body. The stationary body is adapted to be affixed onto a well head and has at least one pair of spaced apart rotatably mounted pulleys. A first set of slips is

(57) **Abrégé(suite)/Abstract(continued):**

positioned on the stationary body. The travelling body is disposed above the stationary body and also has at least one pair of spaced apart rotatably mounted pulleys. At least one winch is mounted to either of the stationary body or the travelling body. Cable extends from the winch around one pulley of each of the at least one pairs of pulleys mounted on the stationary body and around one pulley of each of the at least one pairs of pulleys mounted on the travelling body. The winch draws in cable to pull the travelling body vertically downward toward the stationary body, thereby forcing pipe into the well head.

ABSTRACT OF THE DISCLOSURE

A winch and cable driven pipe snubbing apparatus which includes a stationary body and a travelling body. The stationary body is adapted to be affixed onto a well head and has at least one pair of spaced apart rotatably mounted pulleys. A first set of slips is positioned on
5 the stationary body. The travelling body is disposed above the stationary body and also has at least one pair of spaced apart rotatably mounted pulleys. At least one winch is mounted to either of the stationary body or the travelling body. Cable extends from the winch around one pulley of each of the at least one pairs of pulleys mounted on the stationary body and around one pulley of each of the at least one pairs of pulleys mounted on the travelling body. The
10 winch draws in cable to pull the travelling body vertically downward toward the stationary body, thereby forcing pipe into the well head.

TITLE OF THE INVENTION:

Winch and cable driven pipe snubbing apparatus

FIELD OF THE INVENTION

5 The present invention relates to pipe snubbing apparatus which is used to insert and remove pipe from an oil well or a gas well and, in particular, such a unit which is driven by an arrangement of winches and cables.

BACKGROUND OF THE INVENTION

10 Virtually all pipe snubbing apparatus currently used to insert and remove pipe from oil wells or gas wells are hydraulically actuated. Some recent accidents with hydraulic snubbing apparatus has resulted in renewed interest in winch and cable driven pipe snubbing apparatus. For example, in one recent accident, the hydraulic pipe snubbing apparatus failed without warning and well pressure propelled a length of pipe from the well with such force
15 that it killed a rig worker who had the misfortune to be standing in the vicinity.

 United States Patent 1,894,912 (Otis 1933) is an example of a cable driven pipe snubbing apparatus. However, the configuration of the Sage et al patent is not viewed as being suited to the present needs of the oil and gas industry.

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 United States Patents 3,999,610 (Sage et al 1976) and 4,119,297 (Gunther 1978) use a combination of cables and hydraulics.

SUMMARY OF THE INVENTION

25 What is required is an alternative configuration of winch and cable driven pipe snubbing apparatus.

 According to the present invention there is provided a winch and cable driven pipe snubbing apparatus which includes a stationary body and a travelling body. The stationary
30 body is adapted to be affixed onto a well head and has at least one pair of spaced apart rotatably mounted pulleys. A first set of slips is positioned on the stationary body. The travelling body is disposed above the stationary body and also has at least one pair of spaced

apart rotatably mounted pulleys. Means is provided for moving the travelling body vertically upward and away from the stationary body. At least one winch is mounted to either of the stationary body or the travelling body. Cable extends from the at least one winch around one pulley of each of the at least one pairs of pulleys mounted on the stationary body and around one pulley of each of the at least one pairs of pulleys mounted on the travelling body. As the at least one winch draws in cable, the travelling body is pulled vertically downward toward the stationary body, thereby forcing pipe into the well head.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other features of the invention will become more apparent from the following description in which reference is made to the appended drawings, the drawings are for the purpose of illustration only and are not intended to in any way limit the scope of the invention to the particular embodiment or embodiments shown, wherein:

FIGURE 1 is a front elevation view of a winch and cable driven pipe snubbing apparatus constructed in accordance with the teachings of the present invention, with the travelling body in a raised position.

FIGURE 2 is a front elevation view of the winch and cable driven pipe snubbing apparatus illustrated in **FIGURE 1**, with the travelling body in a lowered position.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The preferred embodiment, a winch and cable driven pipe snubbing apparatus generally identified by reference numeral 10, will now be described with reference to **FIGURES 1 and 2**.

Structure and Relationship of Parts:

Referring now to **FIGURE** , there is shown winch and cable driven pipe snubbing apparatus 10. Snubbing apparatus 10 includes a stationary body 12 adapted to be affixed onto a well head 14. Stationary body 12 has two pairs of spaced apart rotatably mounted pulleys 16 as shown, however, any convenient number is possible. There is also a first set of slips 18 on stationary body 12. A travelling body 20 is disposed above stationary body 12 where travelling body 20 has two pairs of spaced apart rotatably mounted pulleys 22. There is also

included a primary pair of winches 26 mounted in spaced apart relation to stationary body 12, and slips 18. A cable 24 extends from each winch of the primary pair of winches 26 around one of the pulleys of the pair of pulleys 16 mounted on stationary body 12 and around one of the pulleys of the pair of pulleys 22 mounted on travelling body 20. A timing chain 28
5 extends between primary pair of winches 26 to coordinate the operation of primary pair of winches 26 so that they draw in cable 24 in unison to pull travelling body 20 vertically downward toward stationary body 12, thereby forcing pipe 28 into the well head 14. There are impact absorbing stops 30 provided to dampen physical contact when travelling body 20 comes in physical contact with stationary body 12. There is also a secondary pair of winches
10 32 positioned on travelling body 20 which serve as means for moving travelling body 20 vertically upward and away from stationary body 12 by means of cables 24 extended from each secondary pair of winches 32 to a rig 34.

Referring to **FIGURE 1**, stationary body 12 is connected to well head 14 by multiple
15 parts, which may vary from case to case. As shown, stationary body 12 is directly mounted to a snub annular 36, which is mounted to an equalize spool 38, which is mounted to a snub pipe ram 40, which is mounted to another snub annular 42, which is mounted to a double blow out preventer 44, which is mounted on well head 14.

20 Operation:

The operation of winch and cable driven pipe snubbing apparatus 10 will now be discussed with reference to **FIGURES 1** and **2**. Referring now to **FIGURE 1**, pipe 28 is gripped by slips 18 on travelling body 20. Primary winches 26 wind in cable 24 around pulleys 22 and 16. This pulls travelling body 20 down toward stationary body 12, forcing
25 pipe 28 into well head 14. A chain 46 may be connected between the winches to synchronize the timing. When travelling body 20 reaches stationary body 12 as shown in **FIGURE 2**, absorbing stops 30 dampen the physical contact to avoid any damage. Slips 18 on stationary body 12 then grip the pipe and slips 18 on travelling body 20 are loosened, so that travelling body 20 may be raised by winches 32, connected by cable 24 to rig 34. The process may then
30 be repeated.

The apparatus 10 as described has many advantages, such as increased safety, being

able to snub 30' of pipe per stroke, which makes the process quicker, and a reduced crew size, for example, from the customary eight workers to about five.

5 In this patent document, the word "comprising" is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. A reference to an element by the indefinite article "a" does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be one and only one of the elements.

10 It will be apparent to one skilled in the art that modifications may be made to the illustrated embodiment without departing from the spirit and scope of the invention as hereinafter defined in the Claims.

**THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE
PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:**

- 5 1. A winch and cable driven pipe snubbing apparatus, comprising:
a stationary body adapted to be affixed onto a well head, the stationary body having at
least one pair of spaced apart rotatably mounted pulleys;
a first set of slips on the stationary body;
a travelling body disposed above the stationary body, the travelling body having at
10 least one pair of spaced apart rotatably mounted pulleys;
means for moving the travelling body vertically upward and away from the stationary
body;
at least one winch mounted to one of the stationary body or the travelling body;
cable extending from the at least one winch around one pulley of each of the at least
15 one pairs of pulleys mounted on the stationary body and around one pulley of each of the at
least one pairs of pulleys mounted on the travelling body, such that when the at least one
winch draws in cable the travelling body is pulled vertically downward toward the stationary
body, thereby forcing pipe into the well head.
- 20 2. The winch and cable driven pipe snubbing apparatus as defined in Claim 1, wherein the
stationary body and the travelling body come in physical contact, with impact absorbing stops
being provided to dampen such physical contact.
3. The winch and cable driven pipe snubbing apparatus as defined in Claim 1, wherein more
25 than one pair of pulleys is provided on each of the stationary body and the travelling body in
order to increase the mechanical advantage.
4. The winch and cable driven pipe snubbing apparatus as defined in Claim 1, wherein a pair
of winches are provided in spaced relation.
- 30 5. The winch and cable driven pipe snubbing apparatus as defined in Claim 4, wherein a
timing chain extends between the pair of winches and serves to coordinate the operation of

the pair of winches.

6. The winch and cable driven pipe snubbing apparatus as defined in Claim 1, wherein at least one secondary winch is positioned on the travelling body and serves as means for moving the travelling body vertically upward and away from the stationary body when cables are extended from the at least one secondary winch to a rig.

7. A winch and cable driven pipe snubbing apparatus, comprising:

a stationary body adapted to be affixed onto a well head, the stationary body having more than one pair of spaced apart rotatably mounted pulleys;

a first set of slips on the stationary body;

5 a travelling body disposed above the stationary body, the travelling body having more than one pair of spaced apart rotatably mounted pulleys;

a primary pair of winches mounted in spaced apart relation to the stationary body;

10 cable extending from each winch of the primary pair of winches around one pulley of each of the more than one pair of pulleys mounted on the stationary body and around one pulley of each of the more than one pair of pulleys mounted on the travelling body;

a timing chain extending between the primary pair of winches to coordinate the operation of the primary pair of winches so that they draw in cable in unison to pull the travelling body vertically downward toward the stationary body, thereby forcing pipe into the well head;

15 impact absorbing stops being provided to dampen physical contact when the travelling body comes in physical contact with the stationary body; and

a secondary pair of winches positioned on the travelling body and serving as means for moving the travelling body vertically upward and away from the stationary body by means of cables extended from the each of the secondary pair of winches to a rig.

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