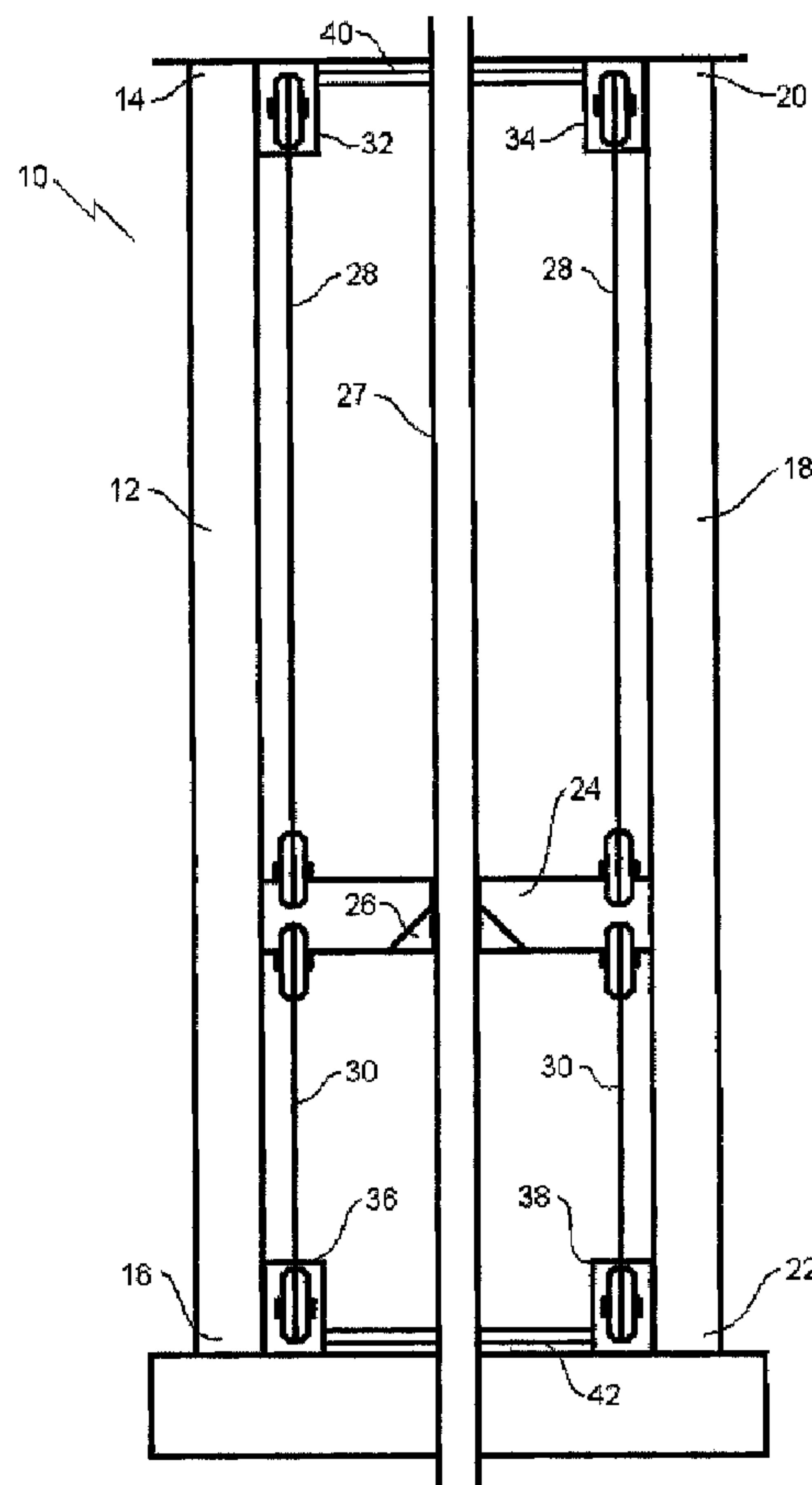


(74) **Agent:** THOMPSON, DOUGLAS B.

(54) Title: CABLE DRAWN SNUBBING APPARATUS



A cable drawn snubbing apparatus includes a first track and a second track in parallel spaced relation. A carriage extends between and engages the first track and the second track. Pipe engaging slips are carried by the carriage. Upper cables extend from the

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

carriage to an upper end of the first track and the second track. Lower cables extend from the carriage to a lower end of the first track and the second track. Upper winches exert a force upon the upper cables to pull the carriage toward the upper end. Lower winches exert a force upon the lower cables to pull the carriage toward the lower end.

ABSTRACT OF THE DISCLOSURE

A cable drawn snubbing apparatus includes a first track and a second track in parallel spaced relation. A carriage extends between and engages the first track and the second track. Pipe engaging slips are carried by the carriage. Upper cables extend from the carriage to an upper end of the first track and the second track. Lower cables extend from the carriage to a lower end of the first track and the second track. Upper winches exert a force upon the upper cables to pull the carriage toward the upper end. Lower winches exert a force upon the lower cables to pull the carriage toward the lower end.

TITLE OF THE INVENTION:

Cable drawn snubbing apparatus

FIELD OF THE INVENTION

5 The present invention relates to 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 drawn by 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 have resulted in renewed interest in cable drawn pipe snubbing apparatus. 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 that it killed a rig worker
15 who had the misfortune to be standing in the vicinity.

 United States Patent 1,894,912 (Otis 1933) is an example of a cable drawn 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.

20

 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 a cable drawn snubbing apparatus better suited to the current needs of the oil and gas industry.

 According to the present invention there is provided a cable drawn snubbing apparatus which includes a first track and a second track. The first track has an upper end and
30 a lower end. The second track is in parallel spaced relation to the first track and has an upper end and a lower end. A carriage extends between and engages the first track and the second track. Pipe engaging slips are carried by the carriage. Upper cables extend from the carriage

to the upper end of the first track and the upper end of the second track. Lower cables extend from the carriage to the lower end of the first track and the lower end of the second track. Upper drive means are provided for exerting a force upon the upper cables to pull the carriage toward the upper end of the first track and the upper end of the second track. Lower drive
5 means are provided for exerting a force upon the lower cables to pull the carriage toward the lower end of the first track and the lower end of the second track.

BRIEF DESCRIPTION OF THE DRAWINGS

10 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:

15 **FIGURE 1** is a side elevation view of a cable drawn snubbing apparatus constructed in accordance with the teachings of the present invention.

FIGURE 2 is a top plan view of the cable drawn snubbing apparatus illustrated in **FIGURE 1**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

20 The preferred embodiment, a cable drawn 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 1**, there is shown cable drawn snubbing apparatus 10,
25 which includes a first track 12 having an upper end 14 and a lower end 16 and a second track 18 in parallel spaced relation to first track 12, which also has an upper end 20 and a lower end 22. A carriage 24 extends between and engages first track 12 and second track 18. Pipe engaging slips 26 are carried by carriage 24, and engage pipe 27. Upper cables 28 extend from carriage 24 to upper end 14 of first track 12 and upper end 20 of second track 18. Lower
30 cables 30 extend from carriage 24 to lower end 16 of first track 12 and lower end 22 of second track 18. There is upper drive means provided by upper winches 32 and 34 for exerting a force upon upper cables 28 to pull carriage 24 toward upper ends 14 and 20 of first

track 12 and second track 18 respectively. There is also lower drive means provided by lower winches 36 and 38 for exerting a force upon lower cables 30 to pull carriage 24 toward lower ends 16 and 22 of first track 12 and second track 18, respectively. Upper winches 32 and 34 and lower winches 36 and 38 are coupled by timing belts 40 and 42, respectively, to operate
5 synchronously.

Referring to **FIGURE 2**, an example of how carriage 24 engages first track 12 and second track 18, where each side of carriage 24 is received within the respective track, and tracks 12 and 18 extend partially around the sides to provide stabilization. Rollers 44 are
10 shown to reduce friction when carriage 24 is raised or lowered. It will be understood that other engagement strategies are possible. For example, the sides of carriage 24 could receive tracks 12 and 18 instead of the opposite.

15 Operation:

The operation and use of cable drawn snubbing apparatus 10 will now be discussed with reference to **FIGURES 1** and **2**. Apparatus 10 is arranged as shown in **FIGURES 1** and **2** with pipe 27 engaged by slips 26, and carriage 24 engaging first and second tracks 12 and 18. At the beginning of a stroke, carriage 24 is at the upper ends 14 and 20 of first and second
20 tracks 12 and 18. Lower winches 36 and 38, synchronized by timing belt 42, pull lower cables 30 which in turn pull carriage 24 toward lower ends 16 and 22 of first and second tracks 12 and 18. As carriage 24 is lowered, pipe 27 is forced downward into a drilled well. At the bottom of the stroke, winches 36 and 38 stop pulling lower cables 30, and winches 32 and 34, synchronized by timing belt 40, pull upper cables 28 which in turn raises carriage 24.
25 The stroke can then be repeated.

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
30 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.

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 cable drawn snubbing apparatus, comprising:
a first track having an upper end and a lower end;
a second track in parallel spaced relation to the first track, the second track having an
upper end and a lower end;
a carriage extending between and engaging the first track and the second track;
10 pipe engaging slips carried by the carriage;
upper cables extending from the carriage to the upper end of the first track and the
upper end of the second track;
lower cables extending from the carriage to the lower end of the first track and the
lower end of the second track;
15 upper drive means for exerting a force upon the upper cables to pull the carriage
toward the upper end of the first track and the upper end of the second track; and
lower drive means for exerting a force upon the lower cables to pull the carriage
toward the lower end of the first track and the lower end of the second track.
- 20 2. The cable drawn snubbing apparatus as defined in Claim 1, wherein the upper drive means
includes two upper winches coupled by a timing belt to operate synchronously.
3. The cable drawn snubbing apparatus as defined in Claim 1, wherein the lower drive means
includes two lower winches coupled by a timing belt to operate synchronously.

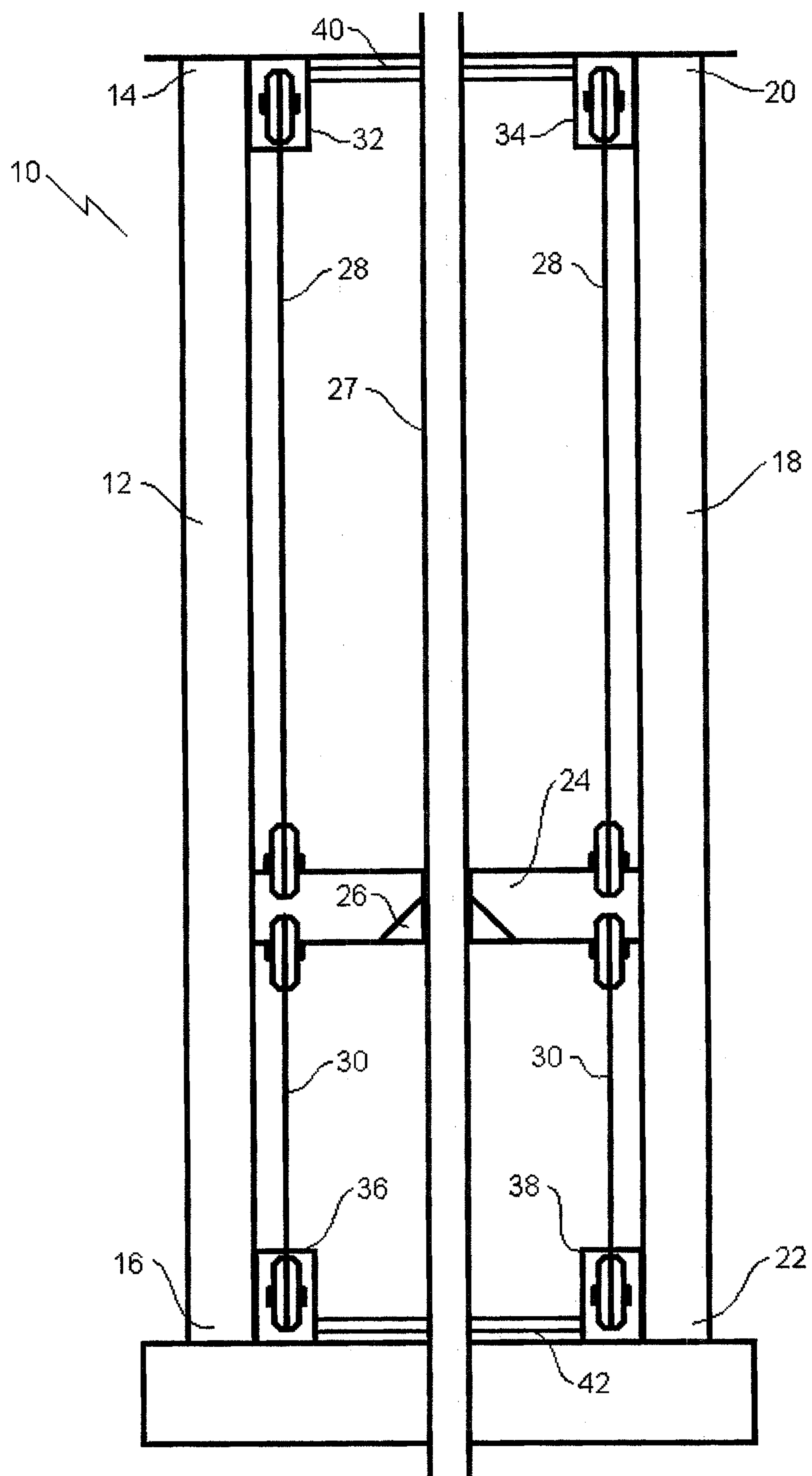


FIG. 1

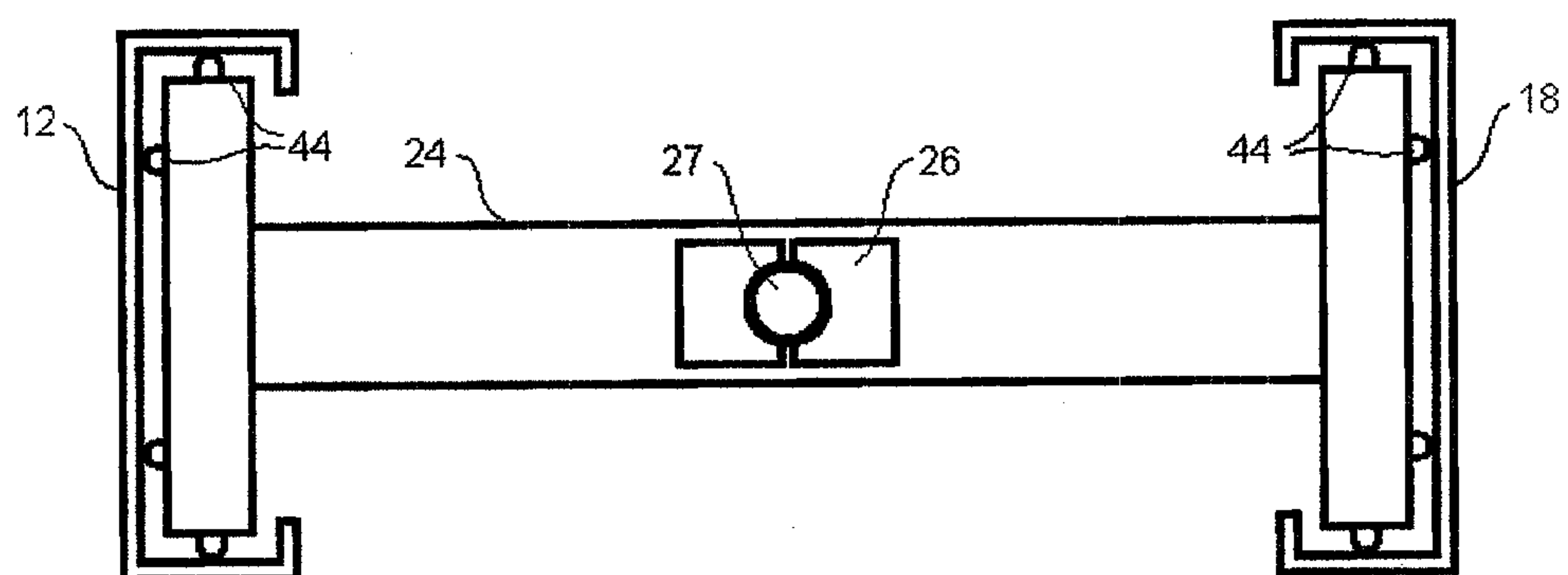


FIG. 2

