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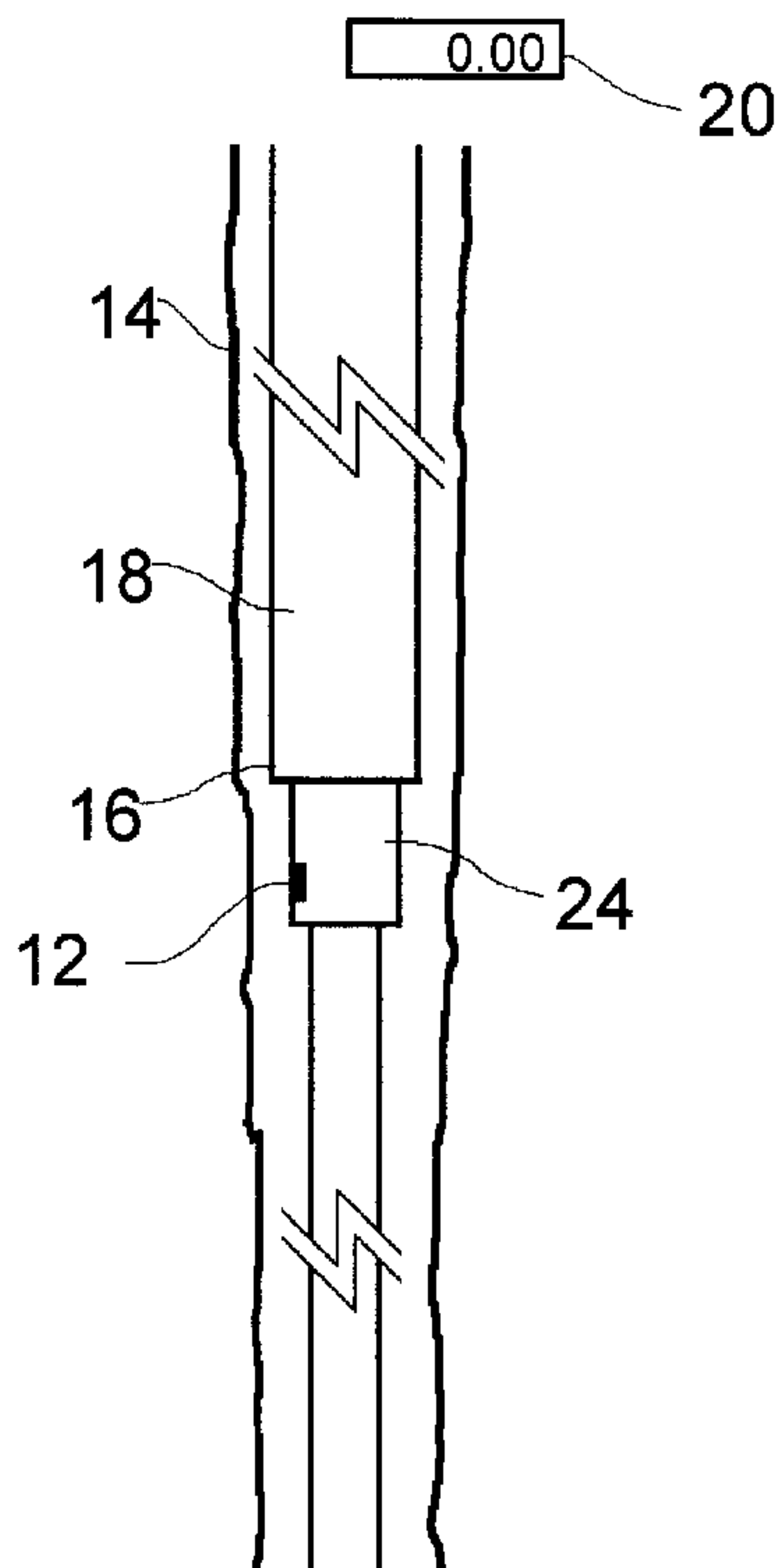
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(54) Titre : METHODE DE SURVEILLANCE DE LA VENUE DE GAZ DANS UN Puits PENDANT LE FORAGE D'UN Puits DE PETROLE ET DE GAZ ET DISPOSITIF CONSTRUIT CONFORMEMENT A LA METHODE

(54) Title: METHOD OF MONITORING GAS INFLUX INTO A WELL BORE WHEN DRILLING AN OIL AND GAS WELL, AND APPARATUS CONSTRUCTED IN ACCORDANCE WITH THE METHOD



(57) Abrégé/Abstract:

A method of monitoring gas influx into a well bore when drilling an oil and gas well. A first step involves positioning a pressure sensor in a well bore at a lower end of a well casing string. A second step involves connecting the pressure sensor to a pressure reader and monitoring the pressure reader for pressure changes indicative of gas influx.

ABSTRACT OF THE DISCLOSURE

A method of monitoring gas influx into a well bore when drilling an oil and gas well. A first step involves positioning a pressure sensor in a well bore at a lower end of a well casing string. A second step involves connecting the pressure sensor to a pressure reader and
5 monitoring the pressure reader for pressure changes indicative of gas influx.

TITLE OF THE INVENTION:

Method of monitoring gas influx into a well bore when drilling an oil and gas well, and apparatus constructed in accordance with the method

5 **FIELD OF THE INVENTION**

The present invention relates to a method of monitoring gas influx into a well bore when drilling an oil and gas well, and an apparatus constructed in accordance with the method.

10 **BACKGROUND OF THE INVENTION**

The influx of gas into a well bore can cause a "blow out" condition. Every drilling rig is equipped with a Blow Out Preventer, which consists of hydraulic rams that can close the well bore if a "blow out" condition is detected. Some Blow Out Preventers have "shear" rams, which are capable of shearing the pipe off; so that the well bore above the cut pipe can be closed off completely. Gas influx is presently detected by closely monitoring changes in circulation of drilling fluids.

SUMMARY OF THE INVENTION

According to the present invention there is provided a method of monitoring gas influx into a well bore when drilling an oil and gas well. A first step involves positioning a pressure sensor in a well bore at a lower end of a well casing string. A second step involves connecting the pressure sensor to a pressure reader and monitoring the pressure reader for pressure changes indicative of gas influx.

25 **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:

30 **FIG. 1** is a side elevation view of an oil and gas well installation in accordance with the preferred method of monitoring gas influx into a well bore when drilling an oil and gas well.

FIG. 2 is a side elevation view, in section, of a float collar installed in the oil and gas well illustrated in **FIG. 3**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

5 The preferred method of monitoring gas influx into a well bore when drilling an oil and gas well will now be described with reference to **FIG. 1** and **2**.

Referring now to **FIG. 1**, a pressure sensor 12 is positioned in a well bore at the lower end 16 of a well casing string 18. Referring to **FIG. 2**, pressure sensor 12 is then connected to
10 a pressure reader 20, which can then be monitored for pressure changes indicative of gas influx. Pressure sensor 12 may be positioned by incorporating pressure sensor 12 into a cavity, such as a side pocket 22, in tubular members, such as a float collar 24 as shown, that make up lower end 16 of well casing string 18. A fluid communication port 26 is then provided through float collar 24 to side pocket 22 to allow fluids in well bore 14 to
15 communicate with side pocket 22 in which pressure sensor 12 is positioned. Fluid communication port 26 has a protective closure 28 which closes fluid communication port 26 during cementing. Protective closure 28 is then removed after cementing.

The apparatus to be used to monitor gas influx into well bore is shown in **FIG. 2**. It
20 includes a tubular body, such as float collar 26, that has side walls 30 with an interior surface 32 and an exterior surface 34. Pressure sensor 12 is positioned within side pocket 22 formed in side walls 30. There is a passage 26 that extends from interior surface 32 into the body to provide fluid communication with side pocket 22; and means for communicating pressure sensor readings from pressure sensor 12 to a pressure reader positioned on surface, such as
25 transmitter 36, that may be either hard-wired or in wireless communication to the surface.

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.

What is Claimed is:

1. A method of monitoring gas influx into a well bore when drilling an oil and gas well, comprising the steps of:
 - 5 positioning a pressure sensor in a well bore at a lower end of a well casing string; and
 connecting the pressure sensor to a pressure reader and monitoring the pressure reader for pressure changes indicative of gas influx.
2. The method as defined in Claim 1, the pressure sensor being positioned in the well bore by
10 incorporating the pressure sensor into a cavity in tubular members making up the lower end of the well casing string.
3. The method as defined in Claim 2, the pressure sensor being positioned within a float collar at the lower end of the well casing string.
15
4. The method as defined in Claim 3, a fluid communication port being provided through the float collar to the cavity to allow fluids in the well bore to communicate with the cavity in which the pressure sensor is positioned.
- 20 5. The method as defined in Claim 4, the fluid communication port having a protective closure which closes the fluid communication during cementing, the protective closure being removed after cementing.
6. An apparatus for monitoring gas influx into a well bore, comprising:
 - 25 a tubular body having defining side walls with an interior surface and an exterior surface,
 a pressure sensor being positioned within a cavity formed in the side walls;
 a passage extending from the interior surface into the body to provide fluid communication with the cavity; and
30 means for communicating pressure sensor readings from the pressure sensor to a pressure reader positioned on surface.

6. The apparatus as defined in Claim 1, wherein the tubular body is a float collar.

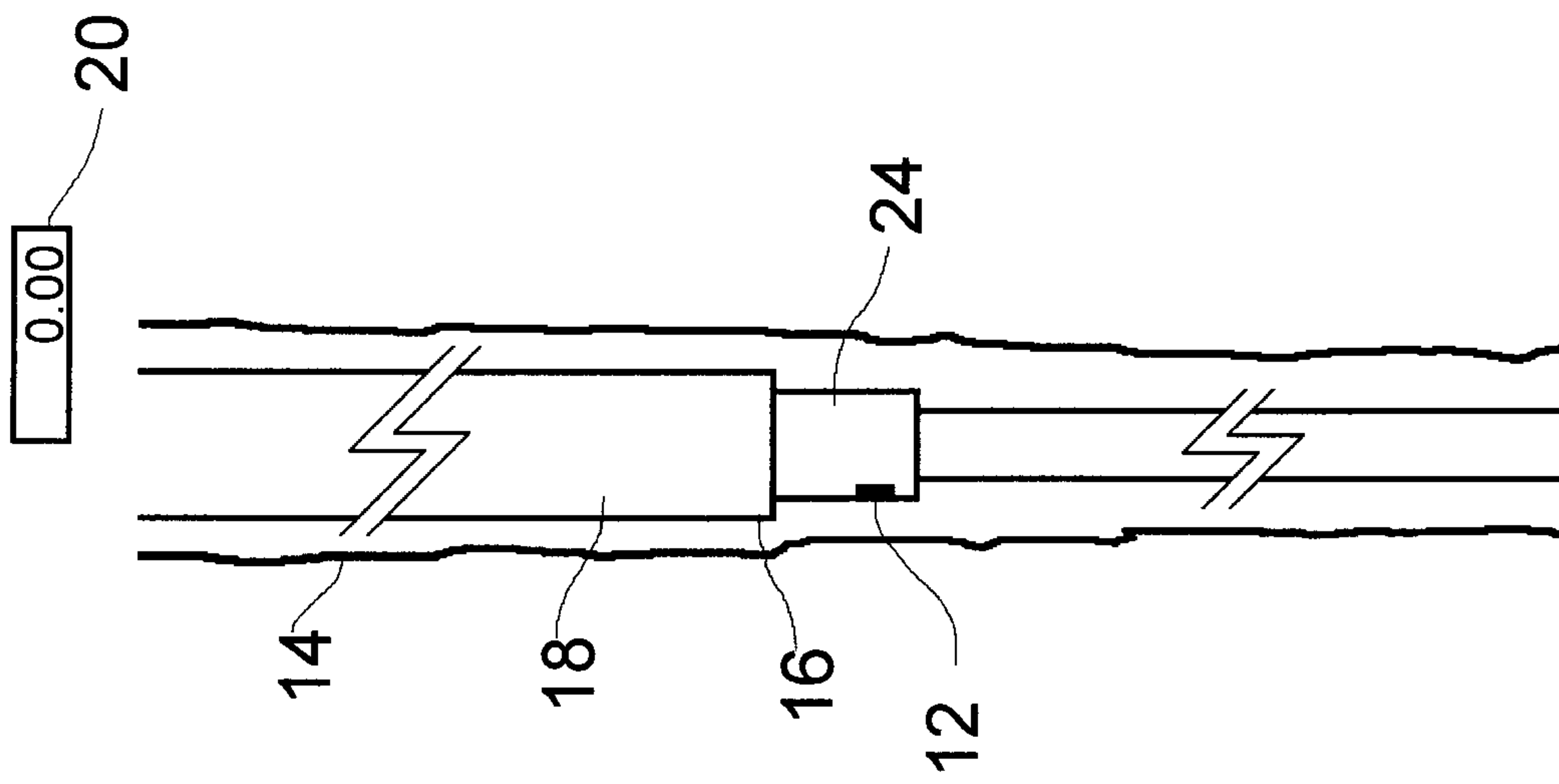


FIG. 1

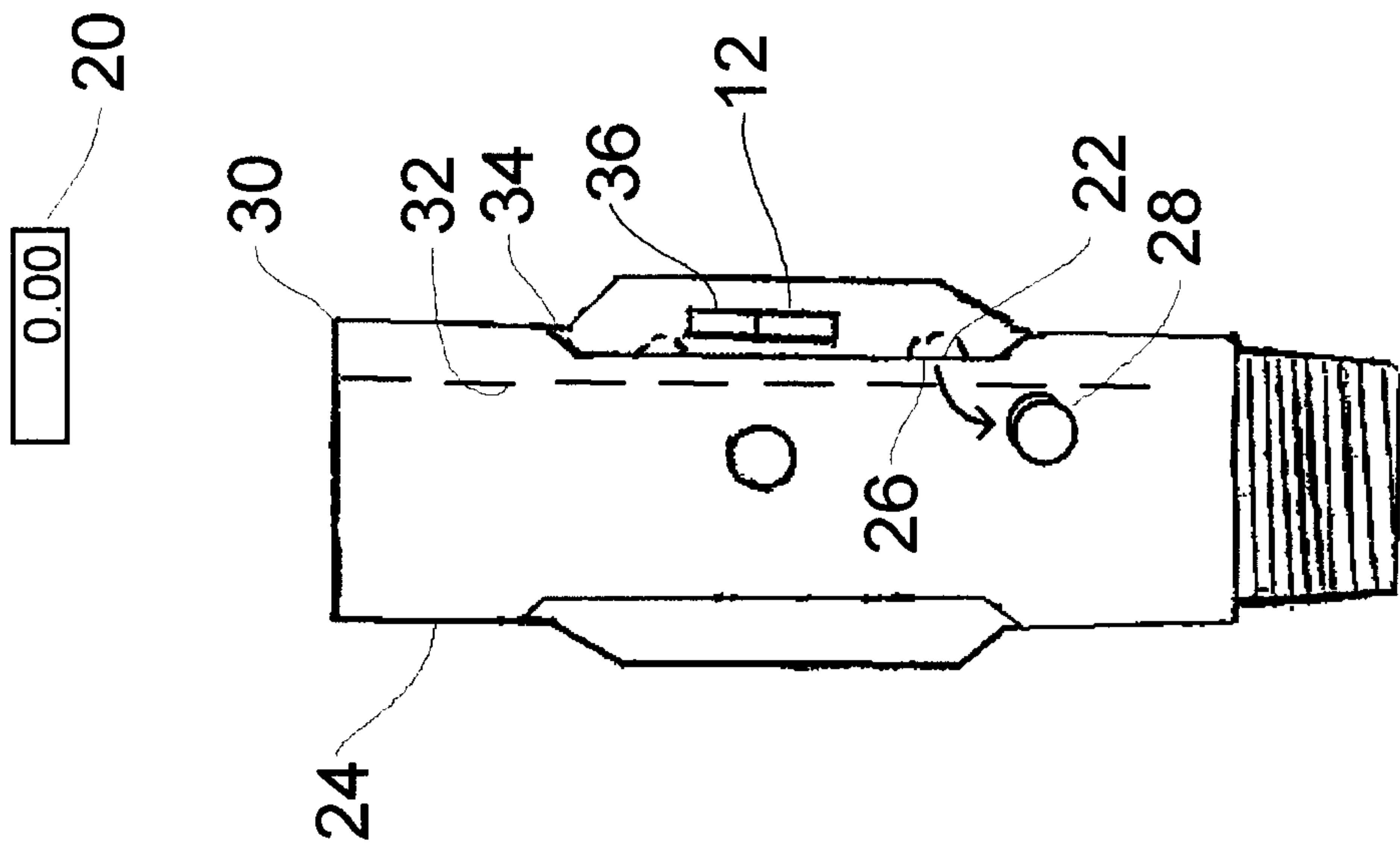


FIG. 2

