July 9, 1935. C. E. BURT 2,007,465

METHOD AND MEANS FOR INDICATING THE POSITION OF A DRILLING BIT IN A WELL CASING

Filed Sept. 12, 1934

Fig. 1.

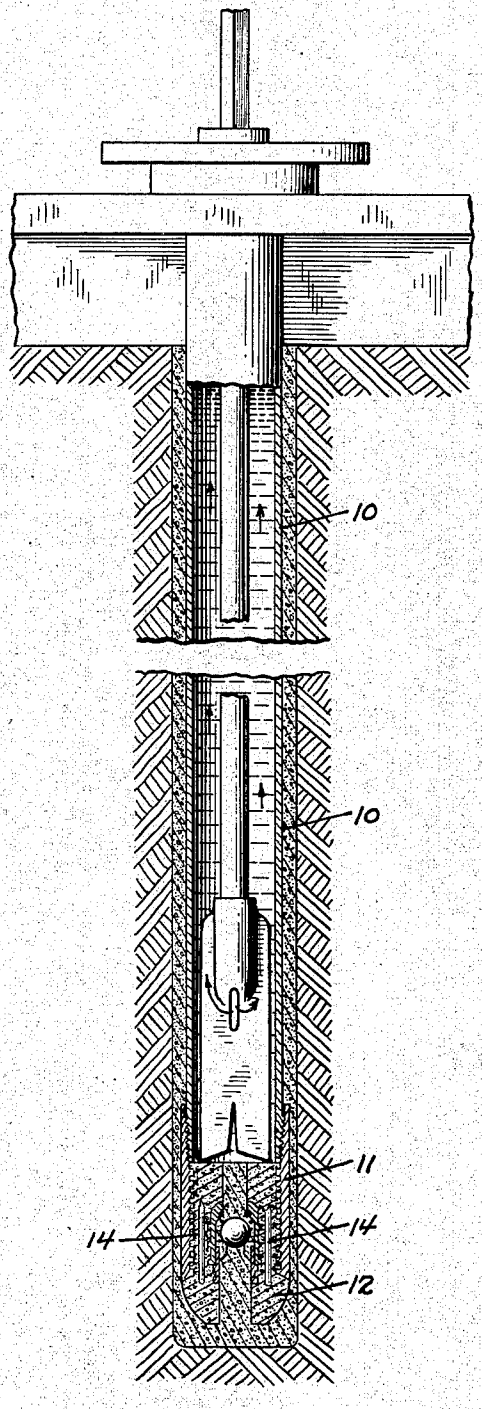
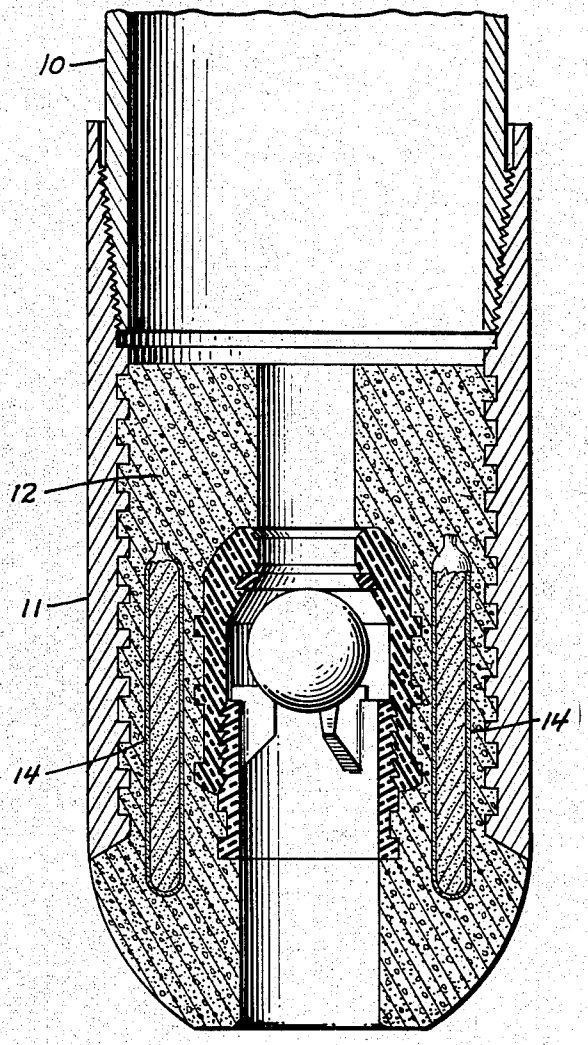


Fig. 2.



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Patented July 9, 1935 2,007,465

UNITED STATES PATENT OFFICE

2,007,465

METHOD AND MEANS FOR INDICATING THE POSITION OF A DRILLING BIT IN A WELL CASING

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Application September 12, 1934, Serial No. 743,644

8 Claims. (Cl. 255—1)

This invention relates to the art of drilling deep oil wells and particularly pertains to a method and means for indicating to the driller at the surface the depth of the bit in the bore.

In practically all oil fields it is common practice to discontinue drilling just before entering the oil sands and to set a string of casing. This casing is cemented into place and acts to prevent the walls from caving and to exclude waters and gases from intermediate strata from migrating along the casing. After this casing is set and cemented in, drilling is usually proceeded with into lower strata or into the oil producing sands.

For various reasons it is desirable that the driller be able to determine when the drilling bit is passing through the lower end of this casing and therefore it is the principal object of the present invention to provide a method and means for indicating to the driller that the drill is or has penetrated through the lower end of the casing.

To practice my invention, I fit the lower end of the casing with a member formed of drillable material and which will be engaged by the drill when it is desired to proceed with the drilling through the casing. This member is so constructed that a visible indication will be given to the driller by the circulating fluid when the drill commences pulverizing the same.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a view in central vertical section through an oil well bore showing the water string of casing set therein and the drilling about to be proceeded with, the casing being fitted with a device for practicing my invention.

Fig. 2 is an enlarged central vertical section through a device for practicing my invention.

In practically all instances the water string of casing 10 for an oil well bore is fitted at its lower end with what is known as a casing shoe 11 which in turn is usually fitted with a guide plug or a guide float plug 12. The function and operation of these devices is well known and understood and in prior practice these plugs have been constructed out of such materials as concrete and cast iron in order that they can be drilled out.

My present invention contemplates so constructing such a plug that when it is drilled up, a visible indication will be given at the mouth of the well indicating to the driller that the drill is passing through the lower end of the water string of casing. To accomplish this I prefer to construct the plug out of a granular or lapideous material such as a concrete mixture so that when it is pulverized by the drill, the granular particles thereof will be carried to the surface by the circulating fluid. I intend that the drilling of this plug furnish a visible indication in the drilling fluid that the drill is penetrating through the lower end of the water string. For this purpose, during the construction of the plug, a quantity of coloring agent is added to the cement mixture so that the material when drilled up will be of a color clearly distinguishable from the drilling mud or fluid. In actual practice, I have found that iron or ferric oxide Fe_2O_3 is a very suitable agent for this purpose and I prefer to use this agent in the quantity twenty percent by weight of the cement used in the mixture forming the plug. When such a mixture is used, the material of the plug assumes a very vivid red color clearly distinguishable from the drilling mud, and when the drill pulverizes the plug and these cuttings are carried to the surface by the drilling mud, they can be readily detected, thereby indicating to the driller that the drill is penetrating through the lower end of the water string of casing.

In the present instance, I have also shown a second medium for indicating that the drill is penetrating through the lower end of the casing. This second medium is a coloring agent which is a highly concentrated water soluble red dye in dry powder form. The dye which I have used in practice is what is known as Safranine dye. This dye is contained in dry form in chambers 14 formed within the plug so that when the drill pulverizes the plug, this dye will be released into the mud or circulating fluid, highly coloring the same so that when this fluid reaches the surface, a clear visible indication will be given to the driler that the drill is penetrating through the shoe of the water string.

In the present instance, I have enclosed the dry powder dye in two glass vials which are embedded within the plug during the formation thereof. The amount of dye which I have used is approximately one-half ounce, which I have found will give a very definite distinguishing color (red), to approximately one barrel of circulating fluid.

I have found that the plug is satisfactory without the dye when the material thereof is colored as previously described, and I have also found that the dye can be used alone without coloring the material of the plug, but, however, I prefer to use both.

In the present instance, I have disclosed my invention as being practiced by means of the

plug forming the guide or float shoe but it is obvious, of course, that this is not essential as it may be practiced in various other ways.

In practicing the invention, the plug is constructed as previously described and the water string of casing is set in place and cemented in. This cementing process usually leaves from twenty to forty feet of cement tailings in the lower end of the well casing which must be drilled up. After the casing has been cemented in, the drill is run downwardly through the casing to drill up the cement tailings remaining in the casing and to proceed through the casing into lower strata. During drilling, of course, mud fluid is circulated downwardly through the drill pipe, returning up the casing to the surface.

When the drill commences penetrating the plug at the lower end of the casing, the returns will show the cuttings of the plug due to their being of a color clearly distinguishable from the mud. Likewise, when the drill pulverizes the plug releasing the Safranine dye, this dye will immediately color the mud fluid so that the returns at the mouth will clearly indicate to the driller that the drill is penetrating through the lower end of the casing. This gives the driller an accurate check on the depth and also has a number of other advantages.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A method of determining when the drilling bit passes a certain point in a well casing in a deep oil well which includes the step of positioning a drilling fluid coloring agent in the well casing at said certain point where it will be released into the drilling fluid by the drilling bit when the latter passes that point.

2. A method of indicating that the drilling bit passing through a well casing in a deep oil well has passed a certain point in the well casing which includes the step of positioning a circulating fluid coloring agent consisting of a highly concentrated dry dye within the casing at said point in a manner whereby it will be released into the drilling fluid when the drilling bit passes said point.

3. A method of indicating that the drilling bit has penetrated through the lower end of a string of well casing in a well bore which includes the step of positioning a drilling fluid coloring agent in an obstructing position within the lower end of said casing in a manner whereby it will be released into the drilling fluid to color the same when the drilling bit passes through the lower end of the casing.

4. A method of indicating that the drilling bit has passed through the lower end of a string of well casing in a well bore which comprises securing a drillable container in the lower end of the well casing and containing a highly concentrated circulating fluid coloring agent, said container being positioned to be drilled up by the drilling bit as it passes through the lower end of the well casing to release said coloring agent into the circulating fluid.

5. As an article of manufacture, a tubular member adapted to be secured to a well casing, means secured interiorly of said member in a position to be engaged by a drilling bit passing therethrough, said means being drillable and containing a highly concentrated dye capable of being released into the drilling mud when the drilling bit penetrates said means.

6. As an article of manufacture, a tubular member adapted to be secured to a string of well casing, container means mounted interiorly of said tubular member and adapted to obstruct the passage of a drill through said tubular member, said container means being capable of being drilled up by a drilling bit, and a highly concentrated coloring agent contained within the container means whereby it will be released into the drilling mud when the drilling bit penetrates said container means.

7. As an article of manufacture, a casing shoe adapted to be secured to the lower end of a well casing, a plug secured within said casing shoe and of a material capable of being drilled up, said plug containing a highly concentrated circulating fluid coloring agent which will be released into the circulating fluid while a drilling bit is drilling up said plug.

8. As an article of manufacture, a casing shoe to be fitted to the lower end of a string of well casing, a cementitious plug secured in said casing shoe, the cementitious material of which said plug is formed being highly colored in contrast with the drilling fluid, said plug having a chamber formed therein, and a highly concentrated dye in said chamber releasable into the circulating fluid when the plug is drilled up by a drilling bit.

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