

Oct. 30, 1956

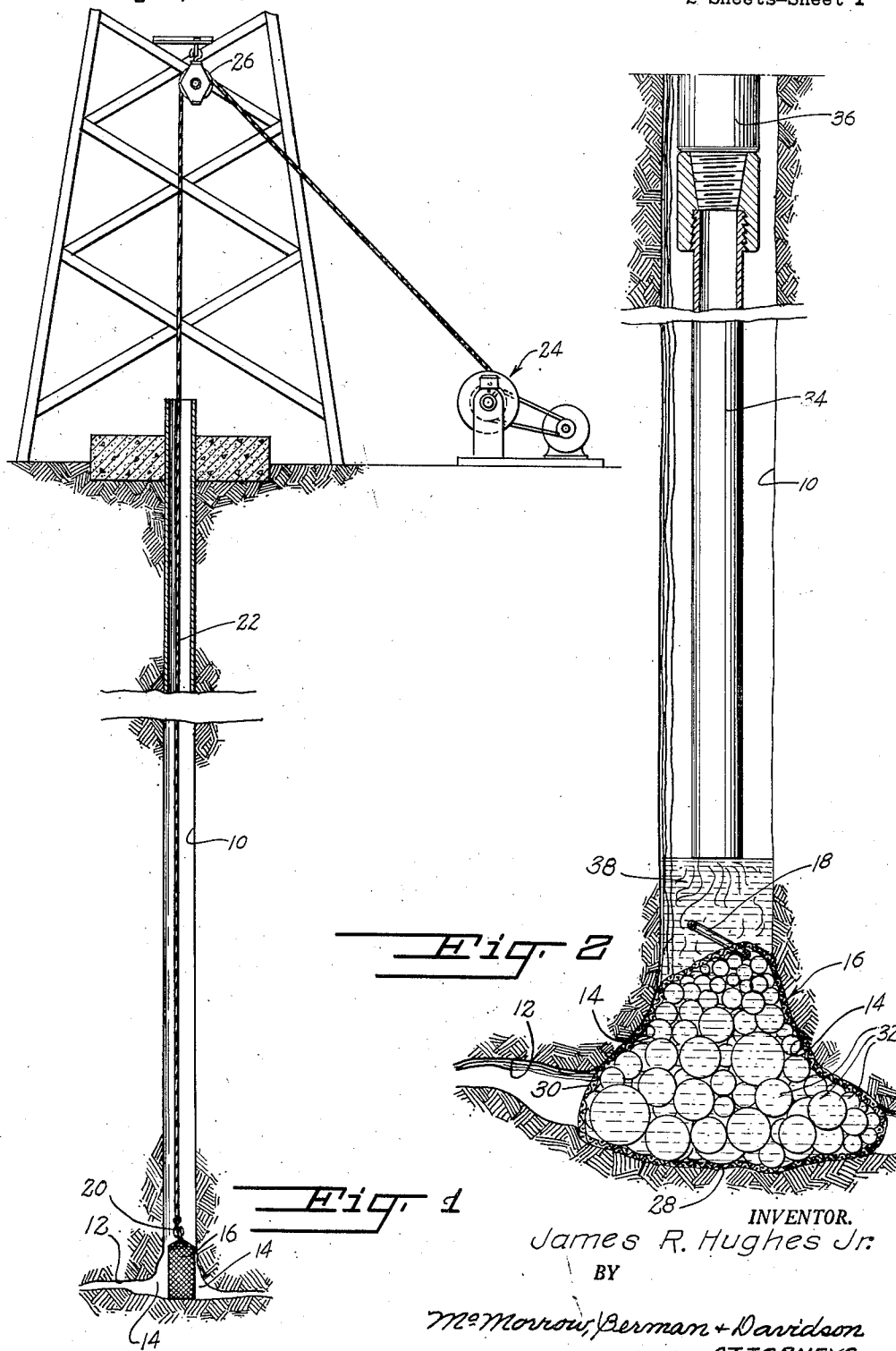
J. R. HUGHES, JR

2,768,693

METHOD OF PREVENTING THE LOSS OF DRILLING MUD

Filed Aug. 6, 1954

2 Sheets-Sheet 1



INVENTOR.  
James R. Hughes Jr.  
BY

McMorrow, Berman + Davidson  
ATTORNEYS

Oct. 30, 1956

J. R. HUGHES, JR

2,768,693

METHOD OF PREVENTING THE LOSS OF DRILLING MUD

Filed Aug. 6, 1954

2 Sheets-Sheet 2

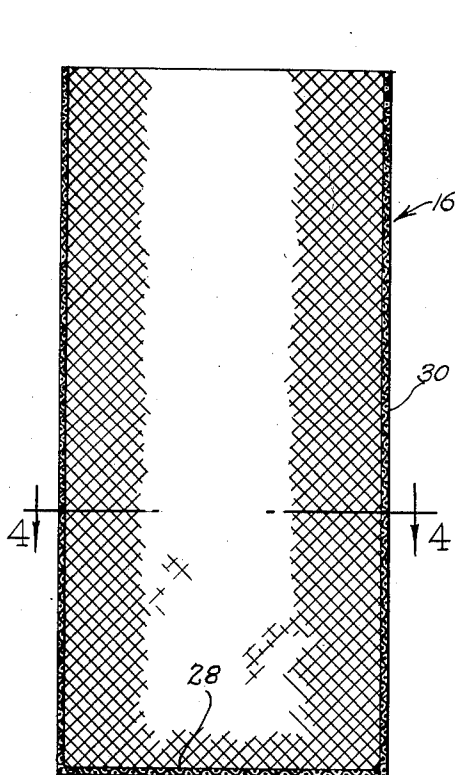


Fig. 3

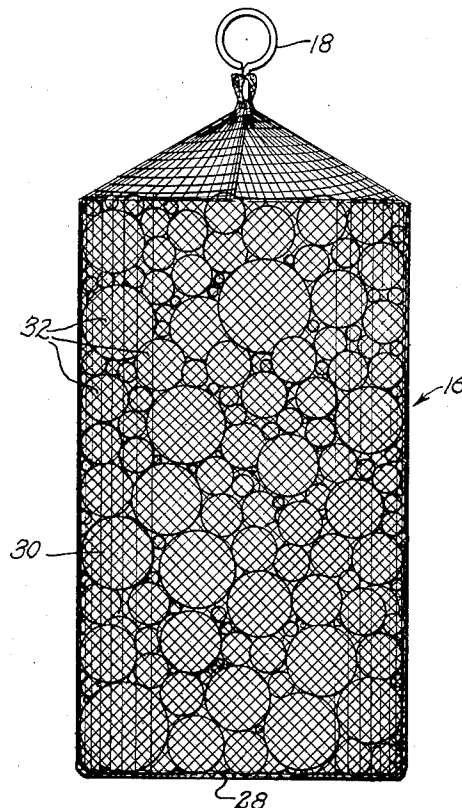


Fig. 5

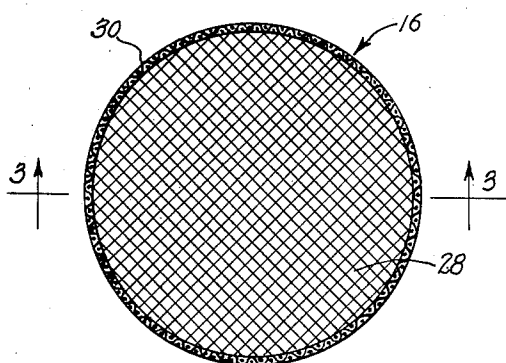


Fig. 4

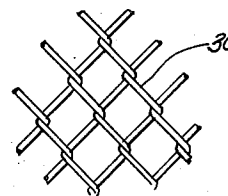


Fig. 6

INVENTOR.  
James R. Hughes Jr.  
BY

McMorrow, Berman + Davidson  
ATTORNEYS

1

2,768,693

## METHOD OF PREVENTING THE LOSS OF DRILLING MUD

James R. Hughes, Jr., Raton, N. Mex.

Application August 6, 1954, Serial No. 448,239

2 Claims. (Cl. 166—21)

This invention relates to improvements in method and means for sealing wells to prevent loss of drilling mud therefrom.

In the drilling of wells, particularly deep wells, the drill bit frequently penetrates a pocket or crevice into which the drilling mud employed in such drilling operations escapes from the well hole. It frequently occurs that the pocket or crevice opening into the well hole is of such large capacity that continued operation of the drill and the circulation of drilling mud through the well hole results in serious loss of drilling mud. When such a condition is encountered, the drilling operation must be interrupted until such time as the portal of the crevice or pocket can be plugged.

The primary object of this invention is to enable efficient and rapid plugging of the portal of a pocket or crevice which opens into the well hole, so that the drilling operation may be resumed with but a minimum loss of time.

Another object is to enable conventional equipment to be used in lowering a bag containing solids for partially damming the portal of the pocket or crevice.

The above and other objects may be attained by employing this invention which involves depositing in a well hole, solids of assorted sizes to partially dam portal or portals leading from the well hole to a pocket or crevice beneath the surface of the ground, filling the spaces between the solids with a plasticized composition which hardens in contact with the solids and cooperates therewith in forming in the well hole a plug which fills and closes the portals, and drilling through the portion of the plug which lies within the well hole.

Other features include a flexible porous container enclosing the solids for preventing escape of solids through the portals and into the pockets or crevices opening into portals and through which the plasticized composition may pass and enter the spaces between the solids.

In the drawings:

Figure 1 is a fragmentary sectional view through a well showing a porous flexible container in which are confined solids and resting on the bottom of the well hole adjacent a crevice in accordance with the present invention;

Figure 2 is a fragmentary enlarged sectional view similar to Figure 1 showing the container expanded and the solids conforming to the bottom of the well hole and engaged in portals at the junction of crevice with the well hole;

Figure 3 is a vertical sectional view through the flexible porous container before the solids have been introduced thereto;

Figure 4 is a horizontal sectional view taken substantially on the line 4—4 of Figure 3;

Figure 5 is a view similar to Figure 3 showing the porous flexible container filled with solids ready for use; and

Figure 6 is a fragmentary enlarged side view of a portion of the container.

2

Referring to the drawings in detail, a well hole 10 is shown as communicating at its lower end with a pocket or crevice 12 through portals 14. The penetration by the drill bit employed in drilling the well hole 10 into the crevice 12 is signalled to the operator on the ground surface by the fact that the drilling mud employed fails to return to the surface. This indicates that the drilling mud is escaping into a pocket or crevice.

In accordance with the present invention, when the operator of the drill rig becomes aware of the loss of the drilling mud, the drilling operation is suspended and the drill string is withdrawn from the well hole after which a plug designated generally 16 is connected by an eye 18 to a hook 20 carried by a cable 22 trained over a windlass 24 and over a block 26 carried by the drill rig, is let down into the well hole 10.

The plug 16 comprises a container 16' having a bottom 28 and a side wall 30 formed of reticulated fabric, the container being filled with solids 32 which are preferably spherical in form and of assorted sizes. While the spherical form of the solids is preferable, it is to be understood that it is not essential so long as the solids are capable of fluent movement relative to one another so that when the plug rests freely on the bottom of the well hole, as illustrated in Figure 2, the solids will spread outwardly and enter and close the portals of the pocket or crevice.

With the portals 14 partially dammed by the solids 32 and body of the container 16', a nozzle 34 is attached to a pipe string 36 which is lowered into the well hole 10 as illustrated in Figure 2 and a suitable plastic composition 38 is pumped through the pipe string 36 into the well hole adjacent the deformed container 16 and solids 32 so as to flow through the container and between and around the solids and complete the damming of the portals 14.

After the plastic material 38 has been introduced into the well hole, the pipe string 36 and nozzle 34 are withdrawn and the plastic composition is allowed to set in contact with the spherical solids 32 in order to seal the portals 14. Upon the setting of the plastic material, the drilling operation is resumed and that portion of the plug which is within the well hole is drilled through so that dams are located in the portals 14 which prevent escape of subsequently introduced drilling mud into the pocket or crevice 12.

From the foregoing it will be evident that the escape of drilling mud may be readily arrested with but a minimum of effort and consumption of time so that a drilling operation may be resumed without serious loss.

While in the foregoing there have been shown and described preferred embodiments of the method and apparatus of the present invention, it is to be understood that minor changes in the steps and operations involved, and in the details of construction, combination and arrangement of parts may be resorted to without departing from the spirit and scope of the invention as claimed.

What is claimed is:

1. In a method of sealing off portals of a crevice opening into the bottom of a well hole, the steps of letting down into the well hole to the bottom thereof a quantity of substantially spherical solids of relatively large size which are free to move relative to each other, while confining the quantity of solids against escape of individual solids through the portals and into the crevice and permitting solids to gravitate into closing relation to the portals, then thereafter applying to the quantity of solids some plastic composition in a manner to cause the composition to seal the spaces between the solids closing the portals.

3

2. In a method of sealing off portals of a crevice opening into the bottom of a well hole, the steps of letting down into the well hole to the bottom thereof a quantity of substantially spherical solids of relatively large size which are free to move relative to each other, while confining the quantity of solids against escape of individual solids through the portals and into the crevice and permitting solids to gravitate into closing relation to the portals, then thereafter applying to the quantity of solids some plastic composition in a manner to cause the composition to seal the spaces between the solids closing the portals, and between these solids and the portals.

5

4

## References Cited in the file of this patent

## UNITED STATES PATENTS

|           |                       |               |
|-----------|-----------------------|---------------|
| 2,167,191 | Vietti et al. -----   | July 25, 1939 |
| 2,368,424 | Reistle -----         | Jan. 30, 1945 |
| 2,504,462 | Sprague et al. -----  | Apr. 18, 1950 |
| 2,573,690 | Cardwell et al. ----- | Nov. 6, 1951  |
| 2,609,880 | Dyer -----            | Sept. 9, 1952 |
| 2,648,522 | Armentrout -----      | Aug. 11, 1953 |
| 2,699,212 | Dismukes -----        | Jan. 11, 1955 |
| 2,708,973 | Twining -----         | May 24, 1955  |