

April 22, 1941.

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2,238,895

CLEANSING ATTACHMENT FOR ROTARY WELL DRILLS

Filed April 12, 1939

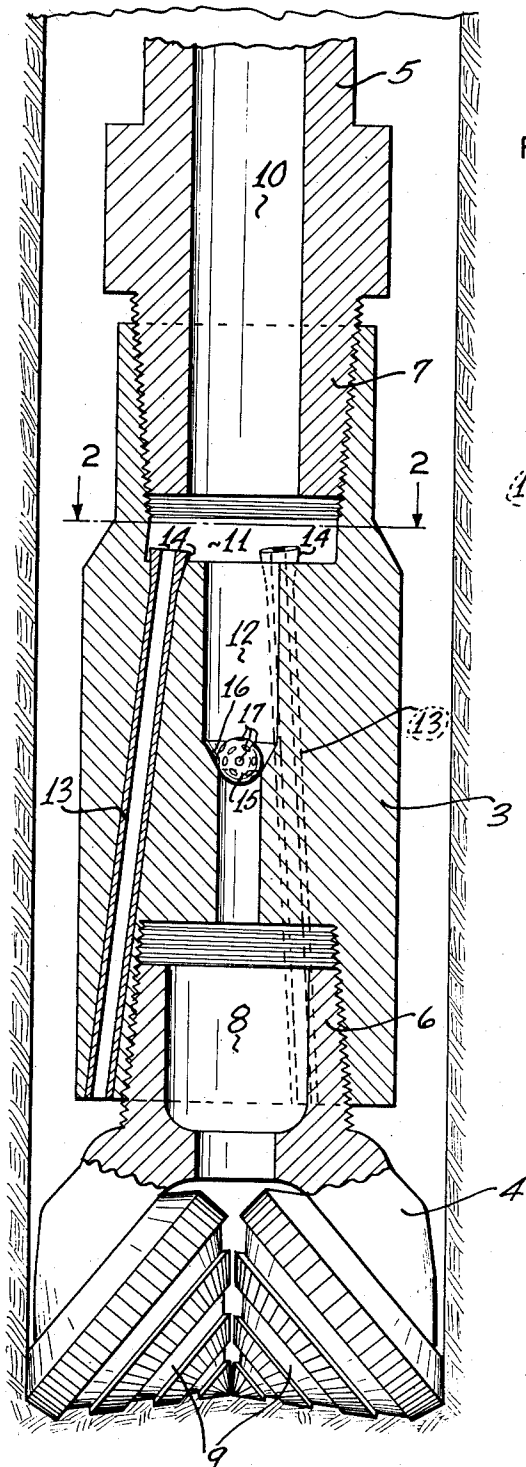


FIG. 1.

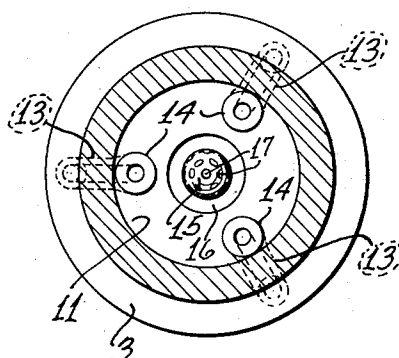


FIG. 2.

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2,238,895

CLEANSING ATTACHMENT FOR ROTARY
WELL DRILLS

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Application April 12, 1939, Serial No. 267,361

5 Claims. (Cl. 255-71)

This invention relates to cleansing attachments for rotary well drills, one of the objects being to increase the speed of drilling operations in deep wells by providing the drill with a means which will tend to maintain the drill in a clean and effective drilling condition.

In the rotary system of drilling wells heretofore employed, it is the usual practice to pump a fluid such as water through a drill pipe to a hollow drill having an opening adjacent the cutting edges of the drill. The liquid discharged from the drill is intended to remove cuttings, sand, and the like, from the lower portion of the well. However, the cuttings, etc., have a tendency to collect and pack around the outer faces of the drill. Under certain conditions, such as when high gas pressure is encountered in drilling through sand, the sand may pack so tightly around the drill that it becomes stuck, or at least the rotary speed of the drills is greatly reduced. Moreover, when material is tightly packed around the drill it is very difficult, if not impossible, to remove the drill from the hole to clean the same.

An object of this invention, therefore, is to provide a cleansing means for a rotary well drill, which will tend to prevent material from packing around the drill.

Another object of this invention is to produce a cleansing means which under normal operating conditions will provide for the forcible washing of both the cutting edges of the drill and the outer face of drill adjacent to the wall of the hole being drilled.

A further object of this invention is to provide a cleansing means which will rapidly and effectively remove tightly packed material from around a well drill without removing the drill from the well.

More specifically stated, an object of the invention is to provide a cleansing means for a well drill wherein approximately all of the liquid flowing toward the drill may be diverted toward the outer faces of the drill whenever the cuttings and the like become so tightly packed around the drill as to interfere with its drilling operation.

With the foregoing and other objects in view, the invention comprises the novel construction, combination and arrangement of parts hereinafter more specifically described and shown in the accompanying drawing, which illustrates one form of the invention. However, it is to be understood that the invention comprehends changes, variations and modifications within the scope of the claims hereunto appended.

Fig. 1 is a vertical section illustrating a cleans-

ing attachment embodying features of this invention, the rotary cutters being diagrammatically in elevation.

Fig. 2 is a section on the line 2-2 in Fig. 1.

To illustrate the invention I have shown a cleansing attachment including a fluid-distributing member, or housing, 3 interposed between a rotary well drill 4 and a tubular member 5 at the lower end of the usual hollow drill pipe. The rotary drill 4 is provided with a tapered upper portion 6 screwed into the lower portion of the housing 3, and the tubular member 5 has a tapered lower end portion 7 screwed into the upper portion of the housing 3, as shown in Fig. 1.

The rotary drill 4 is provided with an internal passageway 8 for the transmission of fluid to cutters 9 at the lower portion of the drill. The tubular member 5 is provided with a passageway 10 through which fluid is forced under pressure from a source of supply. It will be understood that the tubular member 5 merely forms the lower end of the usual drill pipe which may be of any desired length depending upon the depth of the hole being drilled.

The housing 3 is provided with an internal chamber 11 adapted to receive fluid from the tubular member 5. An approximately central discharge passageway 12 extends downwardly from said chamber 11 to conduct fluid from said chamber to the passageway 8 in the drill 4.

As most clearly shown in Fig. 1, fluid conductors 13 may be frictionally secured in diverging passageways extending from the chamber 11 to the lower face of the housing. These fluid conductors 13 receive fluid from the chamber 11 and discharge the same onto the outer face of the drill.

The fluid passing through the conductors 13 frequently contains grit or similar substances causing the inner faces of the conductors to wear away. These conductors are, therefore, preferably removable so that they may be replaced. Each conductor may be located in and removed from the housing through the relatively large threaded opening at the upper end of the housing.

To prevent the fluid conductors from being forced downwardly through the diverging openings, the upper end portions of said conductors are provided with enlarged tapered portions 14 adapted to be seated on beveled seats at the upper portions of said diverging openings.

In the operation of the cleansing attachment, as fluid is forced into the chamber 11 from the tubular member 5, a portion of the fluid in said

chamber will flow through the passageways 12 and 8 from which the fluid is projected onto the rotary cutters 9 of the drill. Fluid is also discharged from the chamber 11 through the diverging fluid conductors 13 onto the outer face of the drill.

During the normal operation of the rotary drill 4, fluid is preferably simultaneously projected onto the outer face of the drill and its cutters 9. This forcible washing action of the outer face of the drill and its cutters will tend to prevent material from packing around the drill so that the drill can be freely rotated to provide a rapid and efficient drilling operation.

While the fluid discharged from the diverging fluid conductors prevents material from packing around the drill under usual drilling conditions, under certain conditions, such as when a very high gas pressure is encountered in drilling through sand, material may become so tightly packed around the drill as to stop or at least slow down the rotation of the drill. Under such conditions, I have found that by forcing substantially all the fluid entering the chamber 11 through the diverging fluid conductors 13, the increased pressure and volume of liquid will usually wash away the material packed around the drill so that it may be freely rotated.

As an illustration of a means for obstructing the flow of fluid through the passageway 12 communicating with the internal passageway 8 of the drill and diverting said flow of fluid to the diverging fluid conductors 13, I have shown a ball valve member 15 adapted to be located on a beveled valve seat 16 in the discharge passageway 12. The ball member 15 may be located on the valve seat 16 by dropping the ball through the upper end of the drill pipe, from which it will fall by gravity to the position shown in Fig. 1. The upper portion of the passageway 12 is enlarged as shown in Fig. 1 to receive the ball 15, and the wall of said enlarged portion serves as a guide to direct the ball 15 onto the valve seat 16.

The ball valve member is provided with perforations 17 extending entirely through the ball and it is only slightly larger in diameter than the diameter of the reduced portion of the passageway 12 below the valve seat. The ball is preferably made of relatively soft material, such as lead, so that after a period of time usually sufficient to clean the outside of the drill, the ball will become worn to such an extent by fluid passing through the perforations that it will be forced entirely through the reduced portion of the passageway 12 by the pressure of the fluid in the enlarged portion of said passageway.

It will be observed that I have provided a very effective and flexible cleansing attachment for rotary drills. Under the usual drilling conditions, material is prevented from packing around the drill and if under certain conditions material becomes tightly packed around the drill, so as to retard or stop the drilling operation, this material can be rapidly washed away from the drill without raising the drill from the well. In other words, I have found that by using my washing attachment the speed of the drilling operations is very substantially increased under normal drilling conditions, and if the drill becomes stuck it can be rapidly loosened to provide for the continuance of the drilling operation.

To illustrate the invention, I have shown the cleansing attachment screwed onto the tapered portion 6 of the drill. However, it will be under-

stood that the cleansing attachment may be integrally secured to the drill to form an integral part thereof, without departing from the spirit of my invention.

I claim:

1. In a cleansing attachment for a rotary well drill having an internal passageway for the transmission of fluid to the cutting edges of the drill, a housing adapted to be secured to the upper portion of said drill, said housing being provided with an internal chamber, an inlet for introducing fluid into said chamber, an approximately central discharge passageway for conducting fluid from said chamber to the passageway in the drill, and diverging openings extending from said chamber to the lower face of the housing, removable fluid conductors extending through said diverging openings for transmitting fluid from said chamber onto the outer face of the drill, and manually controlled means for obstructing the flow of fluid through said central discharge passageway so as to increase the flow of liquid through the fluid conductors in said diverging openings, said means including a ball valve member adapted to fall by gravity to obstruct the passage of fluid through said central discharge passageway, said housing having a beveled valve seat in said central discharge passageway and a guide wall for directing said valve member onto said valve seat.

2. In a cleansing attachment for a rotary well drill having an internal passageway for the transmission of fluid to the cutting edges of the drill, a housing adapted to be secured to the upper portion of said drill, said housing being provided with an internal chamber, an inlet for introducing fluid into said chamber, an approximately central discharge passageway for conducting fluid from said chamber to the passageway in the drill, and diverging openings extending from said chamber to the lower face of the housing, removable fluid conductors extending through said diverging openings for transmitting fluid from said chamber onto the outer face of the drill, said housing being provided with beveled seats at the upper portion of said diverging openings, the upper ends of said fluid conductors having tapered portions cooperating with said beveled seats to prevent the conductors from being forced through the diverging openings, and manually controlled means for obstructing the flow of fluid through said central discharge passageway so as to increase the flow of liquid through the fluid conductors in said diverging openings, said means including a perforated ball valve member adapted to fall by gravity to obstruct the flow of fluid through said central discharge passageway, said housing having a beveled valve seat in said central discharge passageway and a guide wall for directing said valve member onto said valve seat, said ball valve member having a diameter only slightly larger than the diameter of said central discharge passageway and being made of relatively soft material so that after a period of time the ball valve member will become worn and pass through said central discharge passageway to provide for the unobstructed flow of fluid therethrough.

3. In combination in a rotary well drill, a rotary drill bit, a housing attached thereto, said housing having a fluid conducting passageway therein to conduct a stream of washing fluid therethrough and to discharge the same onto the outer face of the drill bit, said drill and hous-

ing being provided with axial communicating bores and means to restrict one of said bores.

4. In combination in a rotary well drill, a rotary drill bit, a housing attached thereto, said housing having a fluid conducting passageway therein to conduct a stream of washing fluid therethrough and to discharge the same onto the outer face of the drill bit, said drill and housing being provided with axial communicating bores, one bore having a shoulder, and a valve manually placeable on said shoulder to restrict said bore.

5. In combination in a rotary well drill, a ro-

tary drill bit, a housing attached thereto, said housing having a fluid conducting passageway therein to conduct a stream of washing fluid therethrough and to discharge the same onto the outer face of the drill bit, said drill and housing being provided with axial communicating bores, the bore in the housing having an enlarged chamber from which fluid may find its way to the passageway and to the bore and means in the axial bore to restrict the same and divert at least some of the fluid therefrom to the fluid conducting passageway.

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