July 20, 1948. C. J. BROWN ET AL 2,445,659

CLEAN OUT APPARATUS FOR DRILL STEEL

Filed Sept. 24, 1945

Fig. 1.

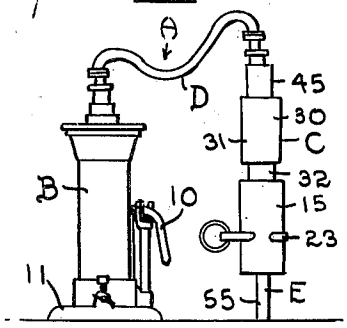


Fig. 2.

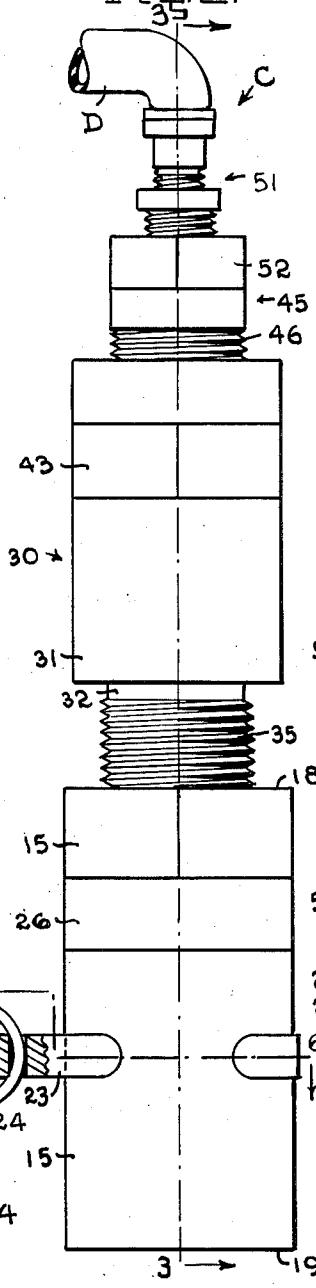


Fig. 3.

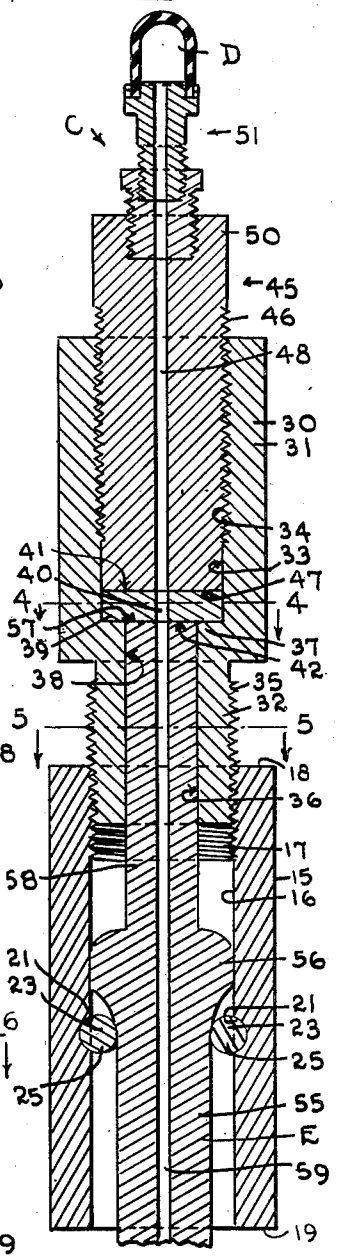


Fig. 4.

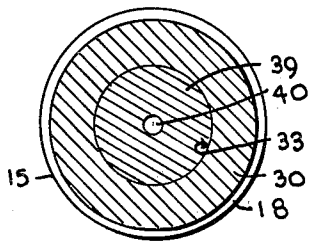


Fig. 5.

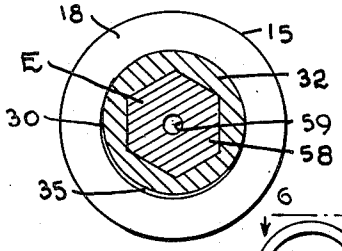
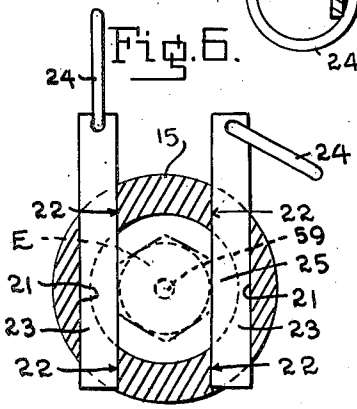


Fig. 6.



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CLEANOUT APPARATUS FOR DRILL STEEL

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Application September 24, 1945, Serial No. 618,124

5 Claims. (Cl. 279—20)

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This invention relates to clean out apparatus for drilling tools, such as jackhammer drill steel and wagon drill steel. Such drilling tools are provided with lubricating fluid passageways extending longitudinally of the relatively long shank or stem thereof and ending at the outer face of the lower portion of the drill bit.

An important object of the invention is to provide a clean out apparatus for expeditiously forcing foreign matter from the lubricating fluid passageways in such drilling tools, by employing a fluid under pressure.

Another important object is to provide such an apparatus, including a force pump, which will utilize the full pressure of the pump, and will not cause the forcing fluid to leak from the juncture of the apparatus and drill stem.

Still another important object is to provide an apparatus as last described which may be employed to force foreign matter from the passageway in the drill stem and/or bit, without removing the latter from the bore hole.

A major object is to provide such an apparatus which is particularly sturdy in the construction of the coupling means between the upper end of the drill stem and the rest of the apparatus.

Other objects and advantages of the invention will be apparent during the course of the following detailed description of the invention, taken in connection with the accompanying drawing, forming a part of this specification, and in which drawing:

Figure 1 is a side elevation of the novel apparatus, attached to the protruding end of a drill stem.

Figure 2 is an elevation of the means for coupling the drill stem to the rest of the new apparatus.

Figure 3 is a vertical section substantially upon the line 3—3 of Figure 2 and showing one form of drill steel coupled thereto.

Figures 4 and 5 are transverse sections substantially upon their respective lines of Figure 3.

Figure 6 is a transverse section substantially upon the line 6—6 of Figure 2, with two forms of drill steel shanks shown in transverse cross section—one cross section in dots and dashes and the other in dashes.

In the specification, wherein for the purpose of illustration is shown a preferred embodiment of the invention and wherein similar reference characters designate corresponding parts throughout the several views, the new apparatus is designated as A, the pump thereof as B, a novel coupling means thereof as C, between a drill steel E and rest of the novel apparatus, a connection thereof as D, between B and C, and a conventional drill steel as E.

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The pump A may be any suitable force pump, adapted to be charged with a suitable fluid, as needed, and to discharge volumes of this fluid, under pressure, to the connection D, which may be a heavy rubber tube, and which is suitably connected at one of its ends with the fluid under pressure within the pump A. The pump A may be hand operated, as by the pump handle 10 and have a base 11 so that it may be disposed upright upon a supporting surface, as the ground.

As for the novel coupling means C, the same includes a lowermost tubular member 15 with the bore 16 thereof screw threaded as at 17, from its upper edge 18 to intermediate its lower edge 19. Extending transversely through the wall of the tubular member are two non-radially disposed, spaced-apart pairs of openings 21 with the two openings 22 of each pair in axial alignment and the axes of the two pairs disposed in parallelism. Slidably extending through each pair 21 is a pin or retainer 23 with one of its ends which projects from the opening 22, provided with a finger hold, as the ring 24, and its other end also projecting from the opening 22. The openings 22 are so disposed that when the pins 23 are in place the intermediate portions 25 of their shanks extend into the bore 16, as may be seen in Figures 3 and 6. The purpose of this will be subsequently described. The lowermost tubular member 15 may be provided with a wrench hold, or flattened surface 26 in its outer face, which may be adjacent one end thereof.

Coupled to the lowermost tubular member 15 is an intermediate tubular member 30 which comprises an upper or major tubular portion 31 and a lower or minor tubular portion 32. The bore 33 of the portion 31, is screw threaded, as at 34. The lower or minor tubular portion 32 is of a diameter less than that of the portion 31, is exteriorly screw threaded as at 35 and its bore 36 (which is, of course, smaller in diameter than is the bore 16) together with an interiorly disposed shoulder or ledge 37 formed at the juncture of the portions 31 and 32, forms a socket 38, particularly when taken with the disc 39 to be next described.

The disc 39 is provided with a centrally or axially disposed perforation 40, is of a diameter to fit snugly within the bore 33 and has substantially flat and paralleling upper and lower faces 41 and 42 respectively. It rests upon the shoulder 37.

Screw threads 17 and 35 are adapted to adjustably couple the tubular members 15 and 30 together and, to assist this, the exterior face of the upper portion 31 may be flattened, as at 43 for better gripping by a wrench or the like.

Associated with the intermediate tubular mem-

ber 30 is an uppermost tubular member 45, provided with exterior screw threads 46 intermediate its ends but, preferably, closer its lower end face 47. These screw threads are adapted to cooperate with the interior screw threads 34 of the portion 30 whereby the member 45 may be adjusted so that its end face 47 bears tightly against the upper face 41 of the disc 39. The axially-disposed channel or bore 48 within the tubular member 45 may have a diameter substantially the same in size as that of the diameter of the perforation 40 through the disc 39 and aligns therewith.

At the upper end 50 of the member 45 is suitable hollow coupling means 51 for securing one end of the connection D thereto with the opening through the connection D in communication with the channel 48. The exterior face of the member 45, may be provided, at its upper end 50, with any suitable means to assist in coupling the tubular members 30 and 45 together, as the wrench holds 52.

From the foregoing it will be seen that there is a clear passageway for fluid under pressure from the pump B through the means D and thence through the means C.

The drill steel E shown in Figure 3 is one of several, having shanks or stems which may be round in transverse cross section, as in the so called wagon steel, or polygonal in transverse cross section, as shown in Figure 3 and characterized in the so-called jackhammer steel. In any case, the shank or stem 55 is generally provided with an enlargement 56 spaced below its upper flat end face 57, so that there is a stem portion 58 above this enlargement 55 and extending to the flat end face 57. The stem may be quite long, or in several coupled together sections and terminates in a suitable bit (not shown) at its lower end. Extending through the stem 55 from the face 57 to and opening from the bit is a continuous course or bore 59. Primarily, this course 59 is for the flow of lubricating fluid to the exterior of the bit but this same course is employed for forcing fluid under pressure from the pump B and through C and D to the course 59.

When this is desirable, as when the course 59 becomes more or less tightly packed with foreign matter, as earth, rock particles, mud or combinations of them, in the vicinity of the bit, the drill rig may be uncoupled from the drill stem and the coupling C applied. This is done (while the pins 23 are removed from the openings 22) by capping the upper end or stem portion 58 of the shank 55 with the coupling C. That is, the lowermost tubular member 15 is lowered over the portion 58 until the pins 23 may be inserted into the openings 22 to extend just below the enlargement 56 on the stem 55, as in Figure 3. Next, the uppermost tubular member 45 is screwed down until its lower end face 47 has forced the disc 39 tight against the uppermost flat end face 57 of the drill stem 55. Thereupon the pump B may be set in operation to force fluid therein (as thin clean oil) through the connection D to and through the coupling means C and thence through the course 59 to force the foreign matter from the course 59. When the pump B operates easily it is apparent that the course 59 has been cleared or unstopped, the pump may be stopped, and after a short interval to allow the pressure of the oil within the means A and drill stem to subside, they may be uncoupled by withdrawing the pins 23, the coupling C removed and the rig be recoupled to the drill stem. Such oil as may be in the course 59 will function to lubricate the bit until the lubricating fluid is flowing freely.

The pins 23, disposed as they are adjacent the lowermost end of the connection D and bearing against the lowermost portion of the enlargement 56 prevent the connection C from being blown or forced from the drill stem, no matter how much pressure the fluid may exert, yet the pins may be readily removed both by means of the rings 24 and blows upon their free projecting ends.

It is now obvious that, even if the distance between the enlargement 56 and the upper face 57 of the drill stem may vary, there may be a tight connection between the means A and the drill stem so that the fluid under pressure will not leak, be wasted nor the pressure be reduced. This is, of course, effected by adjustment of the tubular members 30 and 45 with respect to each other. Obviously the disc 39 need not be seated upon the shoulder 37 to effect this, just so the disc firmly contacts the face 57 of the drill stem, for the periphery of the disc 39 is in engagement with the bore 33 of the upper portion 31 of the tubular member 30.

It should be pointed out that any minor rotation of the coupling means C, as a whole, with respect to the drill stem is of no consequence and, while the inserted pins 23 prevent any rotation of the coupling means C, as a whole, with respect to the drill stem, when the shank thereof is polygonal, cylindrical shanks are as readily accommodated by the coupling means C.

By employing the pins 23, no major rotation of the coupling means C with respect to the drill stem is necessary, in coupling the two together or uncoupling them.

Various changes may be made to the form of the invention, herein shown and described, without departing from the spirit of the invention or scope of the claims.

What is claimed is:

1. In apparatus for cleaning out the plugged lubricating fluid course in drill steel, having an upwardly extending stem with said course opening at the upper extremity of said stem, said apparatus including means for conducting fluid under pressure to said course, including a lowermost tubular member, an intermediate tubular member, an uppermost tubular member and a disc carried thereby, said lowermost tubular member having a bore greater in diameter than the widest transverse cross section of the upper end portion of said stem, with the upper section of said bore provided with screw threads, and means to couple said lowermost tubular member to the upper extremity of said stem, said intermediate tubular member having exterior screw threads upon its lower portion, cooperating with the first-named screw threads, a downwardly-extending, drill stem extremity-receiving opening, and interior screw threads above said opening, said uppermost tubular member having a lowermost flat face and exterior screw threads above said face, cooperating with the interior screw threads of said intermediate tubular portion, and said disc being disposed within said intermediate tubular member, above said opening, and provided with a perforation extending axially therethrough, said disc being constructed and arranged to slidably contact the interior face of said intermediate tubular portion and contact said flat face, and the upper extremity of said stem.

2. In apparatus for cleaning out the plugged lubricating fluid course in drill steel, having an upwardly extending stem with said course open-

ing at the upper extremity of said stem, said apparatus including means for conducting fluid under pressure to said course, including a lowermost tubular member, an intermediate tubular member, an uppermost tubular member and a disc carried thereby, said lowermost tubular member having a bore greater in diameter than the widest transverse cross section of the upper end portion of said stem, with the upper section of said bore provided with screw threads, and means to couple said lowermost tubular member to the upper extremity of said stem, said intermediate tubular member having exterior screw threads upon its lower portion, cooperating with the first-named screw threads, a downwardly-extending, drill stem extremity-receiving opening, a shoulder above said opening and interior screw threads above said opening, said uppermost tubular member having a lowermost flat face and exterior screw threads above said face, cooperating with the interior screw threads of said intermediate tubular member, and said disc being disposed within said intermediate tubular member, above said opening, and provided with a perforation extending axially therethrough, said disc being constructed and arranged to slidably contact the interior face of said intermediate tubular member and said flat face and said shoulder.

3. In apparatus for cleaning out the plugged lubricating fluid course in drill steel having an upwardly extending stem with said course opening at the upper extremity of said stem, said apparatus including means for conducting fluid under pressure to said course, including a lowermost tubular member having a bore greater in diameter than the widest transverse cross section of the upper end portion of said stem, two spaced-apart pairs of openings extending transversely through the wall of said tubular member, the two openings of each pair being in alignment, and the longitudinal axes of both pairs being in parallelism, a pin extending through each pair of openings and constructed and arranged to frictionally contact said stem, an intermediate tubular member coupled to said lowermost tubular member and having a downwardly opening socket, an inwardly extending shoulder above said socket, and a perforated disc within said intermediate tubular member, having a lower face constructed and arranged to contact said stem, when the latter is within said socket, with said perforation axially aligned with said course, and with the periphery of said disc in sliding contact with the wall of the bore of said intermediate tubular member, said disc being disposed below the upper end of said intermediate tubular member, and above said openings and shoulder, an uppermost tubular member coupled to said intermediate tubular member and having a pressure fluid opening above said disc, and aligned with said perforation.

4. In apparatus for cleaning out the plugged lubricating fluid course in drill steel having an upwardly extending stem with said course opening at the upper extremity of said stem, said apparatus including means for conducting fluid under pressure to said course, including a lowermost tubular member having a bore greater in diameter than the widest transverse cross section of the upper end portion of said stem, two spaced-apart pairs of openings extending transversely through the wall of said tubular member, the two openings of each pair being in alignment, and the longitudinal axes of both pairs being in parallelism, a pin extending through each pair of openings and constructed and arranged to

frictionally contact said stem, an intermediate tubular member coupled to said lowermost tubular member and having a downwardly opening socket, an inwardly extending shoulder above said socket, and a perforated disc within said intermediate tubular member, having a lower face constructed and arranged to contact said stem, when the latter is within said socket, with said perforation axially aligned with said course and with the periphery of said disc in sliding contact with the wall of the bore of said intermediate tubular member, said disc being disposed below the upper end of said intermediate tubular member, and above said openings and shoulder, and an uppermost tubular member coupled to said intermediate tubular member and having a pressure fluid opening above said disc, and aligned with said perforation, the longitudinal axes of said pins within said openings substantially paralleling the horizontal planes of the upper and lower faces of said disc.

5. In apparatus for cleaning out the plugged lubricating fluid course in drill steel having an upwardly extending stem with said course opening at the upper extremity of said stem, said apparatus including means for conducting fluid under pressure to said course, including a lowermost tubular member having a bore greater in diameter than the widest transverse cross section of the upper end portion of said stem, two spaced-apart pairs of openings extending transversely through the wall of said tubular member, the two openings of each pair being in alignment, and the longitudinal axes of both pairs being in parallelism, a pin extending through each pair of openings and constructed and arranged to frictionally contact said stem, an intermediate tubular member coupled to said lowermost tubular member and having a downwardly opening socket and an inwardly extending shoulder above said socket, a perforated disc within said intermediate tubular member, having a lower face constructed and arranged to contact said stem, when the latter is within said socket, with said perforation axially aligned with said course and with the periphery of said disc in sliding contact with the wall of the bore of said intermediate tubular member, said disc being disposed below the upper end of said intermediate tubular member, and above said openings and shoulder, an uppermost tubular member having a pressure fluid opening above said disc, and aligned with said perforation, the longitudinal axes of said pins within said openings substantially paralleling the horizontal planes of the upper and lower faces of said disc, and means to permit adjustment of the position of said disc at various distances from said shoulder.

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