Oct. 16, 1962 J. E. HUMPHRIES 3,058,525

PIPE CLEANING DEVICE

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Fig. 1.

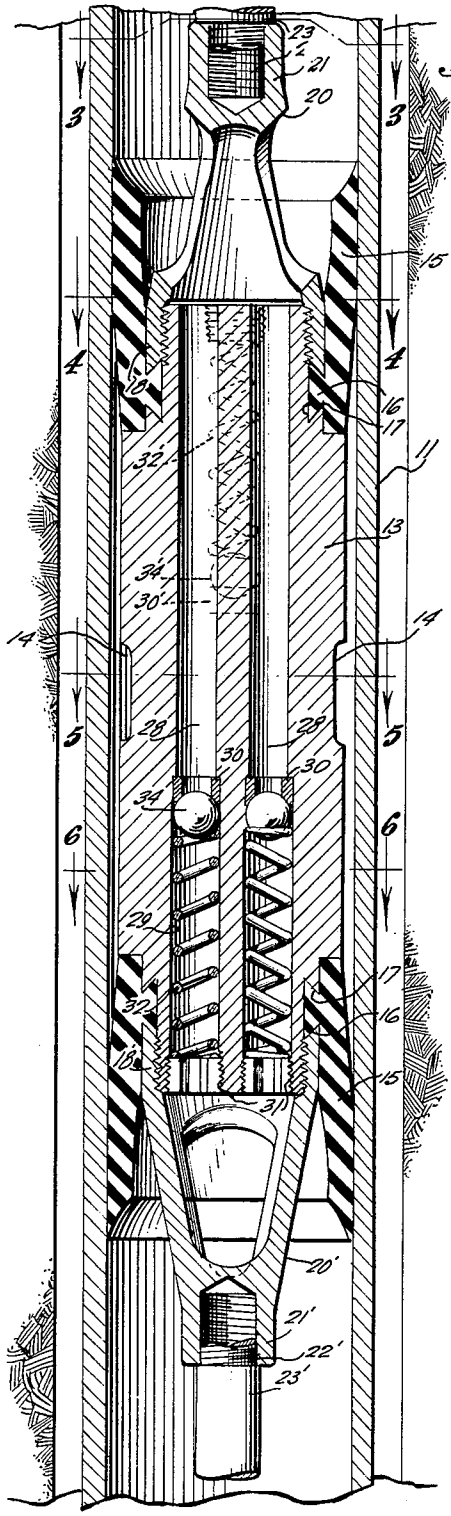
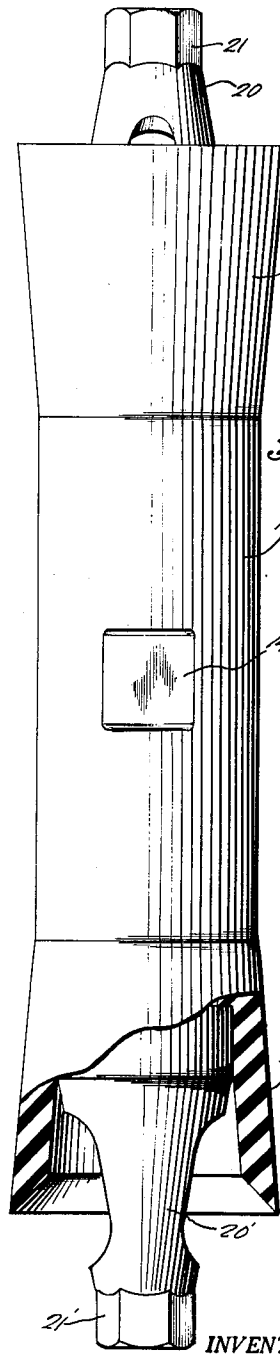


Fig. 2.



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Fig. 1.

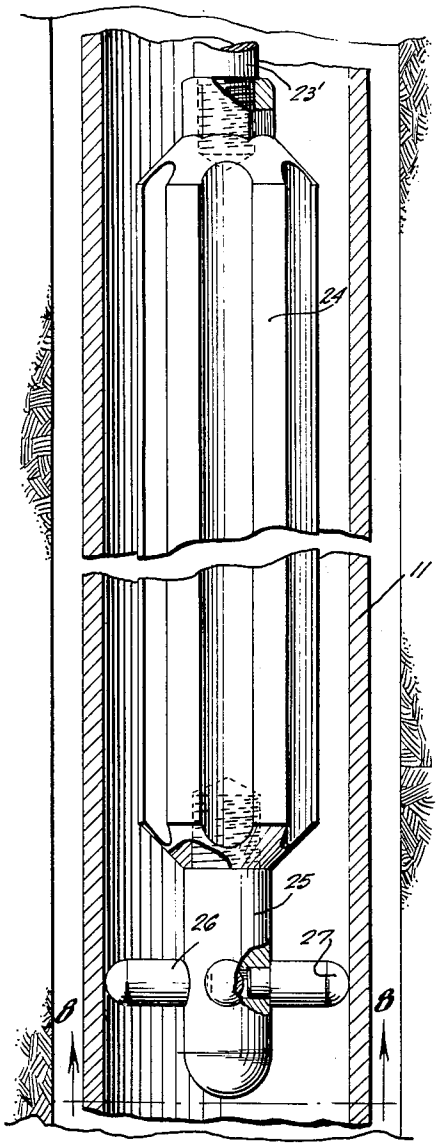


Fig. 3.

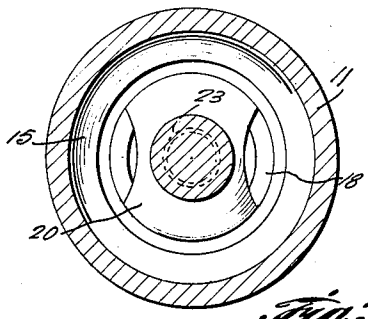


Fig. 4.

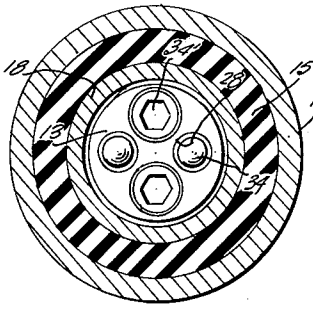


Fig. 5.

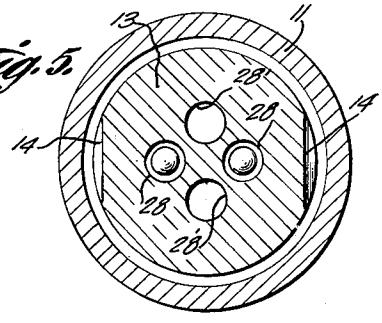


Fig. 6.

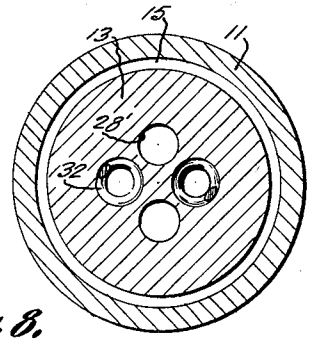
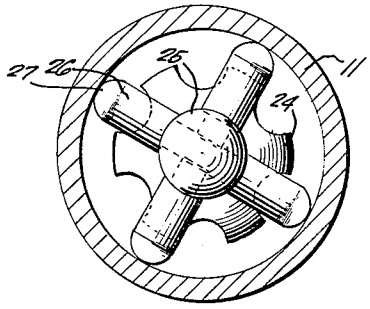


Fig. 8.



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PIPE CLEANING DEVICE

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4 Claims. (Cl. 166—177)

This invention relates to cleaning devices, and more particularly to a device for cleaning mud or other drilling fluid from the inside of a drill pipe.

A main object of the invention is to provide a novel and improved inside pipe wiper adapted to be used in a drilling pipe, the wiper being relatively simple in construction, being easy to use, and being provided with means to prevent return of drilling fluid wiped from the inside of a pipe back into the associated drilled bore.

A further object of the invention is to provide an improved device for cleaning mud or other drilling fluid from the inside of a drill pipe, said device being inexpensive to fabricate, being durable in construction, being provided with means to allow the drilling fluid to be pumped either in a forward or a rearward direction therethrough, and being usable with any pipe in which drilling is done in conjunction with fluid.

A still further object of the invention is to provide an improved pipe cleaning device which is weight-driven, which is arranged so that it can be either pushed or pulled by its associated weight, and which is completely reversible so that it is usable in either direction.

A still further object of the invention is to provide an improved device for cleaning mud or other drilling fluid from the inside of a drill pipe, said device being relatively compact in size, requiring a minimum amount of maintenance, and being usable as an aid in finding holes in the drilling pipe with which it is employed and for preventing blow-outs.

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIGURE 1 is a vertical cross sectional view taken through a section of drilling pipe in which is disposed the upper portion of an improved cleaning device constructed in accordance with the present invention.

FIGURE 2 is a side elevational view, partly in cross section, of the upper portion of the cleaning device, as employed in FIGURE 1.

FIGURE 3 is a horizontal cross sectional view taken on the line 3—3 of FIGURE 1.

FIGURE 4 is a horizontal cross sectional view taken on the line 4—4 of FIGURE 1.

FIGURE 5 is a horizontal cross sectional view taken on the line 5—5 of FIGURE 1.

FIGURE 6 is a horizontal cross sectional view taken on the line 6—6 of FIGURE 1.

FIGURE 7 is a fragmentary vertical cross sectional view taken through the lower portion of the drill pipe of FIGURE 1 and showing the weight member associated with the pipe cleaning structure of FIGURES 1 to 6.

FIGURE 8 is a horizontal cross sectional view taken on the line 8—8 of FIGURE 7.

Referring to the drawings, 11 designates a section of drill pipe to be cleaned, and 12 generally designates the upper portion of a pipe cleaning device constructed in accordance with the present invention. The assembly 12 comprises an elongated substantially cylindrical main body 13 formed at its intermediate portion with a pair of flattened, diametrically opposite surfaces 14, 14 engageable by a suitable wrench or similar implement to provide a non-rotatable grip on the body 13.

Secured to the opposite ends of the body 13 are respective flaring skirt members 15, 15 of resilient deformable material, such as rubber, or the like, said skirt members being adapted to engage the inside surface of the pipe 11 with a wiping action. As shown, the skirt members 15 are each provided with an inwardly directed internal annular dovetail-shaped rib 16, the ribs 16 being respectively receivable in correspondingly shaped annular recesses 17, 17 formed at the top and bottom end portions of the body 13, and being clampingly engageable by respective fastening collar elements 18, 18' threaded on said end portions, the collar elements 18, 18' cooperating with the recesses 17 to define dovetail-shaped annular clamping grooves in which the annular dovetail-shaped ribs 16 are received and clamped.

As shown, the main body 13 is substantially smaller in diameter than the inside diameter of the pipe 11 to be cleaned, and the skirt members 15 flare outwardly from the ends of the body 13, the outer end portions of the skirt members being normally of larger diameter than the inside diameter of the pipe 11 so that the skirt members 15 deform to make wiping contact with the inside surface of the pipe so that said skirt members act to wipe said inside surface and clear same of drilling fluid or other liquid material, responsive to the movement of the device in the pipe. The skirt members 15 also serve to clear the inside surface of the pipe of any mud or other material adhering thereto.

Integrally formed with the upper collar member 18, as viewed in FIGURE 1 is an axially extending bracket 20 formed with an internally threaded cup element 21 in which is threadedly engaged the end 22 of a supporting rod 23. The lower collar member 18' is similarly integrally formed with an axially extending bracket 20' provided with the internally threaded end portion 21' which threadedly receives the top end 22' of a depending rod member 23' which is secured to an elongated weight member 24.

As shown in FIGURE 7, the elongated weight member 24 is substantially smaller in diameter than the inside diameter of the pipe 11 and is formed at its bottom end with an elongated stud member 25 provided with a plurality of radially extending, angularly spaced guide pins 26 having rounded outer ends 27 adapted to slidably engage the inside surface of the pipe 11 and to thus guide the lower end of the cleaning device for axial movement in the pipe section and to aid in centering same. Thus, as shown in FIGURE 8, the stud portion 25 is provided with four equally spaced radially projecting guide pins 26.

The body 13 is formed with respective pairs of longitudinal bores 28, 28 and 28', 28', the bores 28 being enlarged at their lower portions, as shown at 29 and being provided with annular seats 30, 30 in the upper ends of the enlarged portions 29. Bearing ring elements 31, 31 are threadedly engaged in the lower ends of the enlarged bore portions 29, and positioned in said enlarged bore portions 29 are coil springs 32 which bear between the ring elements 31 and valve balls 34 urged by the springs against the annular seats 30, defining yieldable, normally closed, downwardly opening valves. The bores 28' are provided at their upper ends with similar enlarged portions containing valve balls 34' and coil springs 32' acting to bias the valve balls downwardly into seating engagement with annular seats 30', thereby defining yieldable, normally closed, upwardly opening valves. The yieldable valve balls 34 and 34' respectively allow passage of fluid therepast in either direction under pumping pressure but are otherwise maintained closed by their biasing springs 32 and 32'.

As will be readily apparent, the cleaning device may be mounted in the pipe either with the weight member 24 lowermost, as illustrated in FIGURES 1 and 7, or with the weight member 24 uppermost, since the device is completely reversible. The main body 13 containing the yieldable valve elements 34, 34' and provided with the

wiping skirt members **15**, **15** is pushed or pulled by the weight element **24**. In the arrangement illustrated in FIGURES 1 and 7, the supporting rod **23** is employed to control the downward movement of the wiping device under the pull of the weight member **24** and can be employed as a means for pulling the cleaning device out of the pipe after the pipe has been wiped clean. The device may also be employed as an aid in finding holes in the drilling pipe and in preventing blow-outs therein.

While a specific embodiment of an improved pipe cleaning device has been disclosed in the foregoing description, it will be understood that various modifications within the spirit of the invention may occur to those skilled in the art. Therefore, it is intended that no limitations be placed on the invention except as defined by the scope of the appended claims.

What is claimed is:

1. A pipe cleaning device comprising an elongated substantially cylindrical main body, flaring skirt members of resilient deformable material secured to the opposite ends of said body and being adapted to engage the inside surface of a pipe with a wiping action, said body being formed with at least two longitudinal passages, and respective yieldable, normally closed valve means in said passage, one valve means allowing passage of fluid therethrough in one direction and the other valve means allowing passage of fluid therethrough in the opposite direction.

2. A pipe cleaning device comprising an elongated substantially cylindrical main body, flaring skirt members of resilient deformable material secured to the opposite ends of said body and being adapted to engage the inside surface of a pipe with a wiping action, said body being formed with at least two longitudinal bores, yieldable normally closed valve means in one of the bores allowing passage of fluid under pressure only in one direction, and yieldable normally closed further valve means in the other bore allowing passage of fluid under pressure only in the opposite direction.

3. A pipe cleaning device comprising an elongated substantially cylindrical main body, flaring skirt members of resilient deformable material secured to the opposite ends of said body and being adapted to engage the inside surface of a pipe with a wiping action, said body being formed with at least two longitudinal bores, yieldable normally closed valve means in one of the bores allowing passage of fluid under pressure only in one direction, yieldable normally closed further valve means in the other bore allowing passage of fluid under pressure only in the opposite direction, respective connection bracket means secured to the opposite ends of said main body, and an elongated weight member connected to one of said bracket means.

4. A pipe cleaning device comprising an elongated substantially cylindrical main body, flaring skirt members of resilient deformable material secured to the opposite ends of said body and being adapted to engage the inside surface of a pipe with a wiping action, said body being formed with at least two longitudinal bores, yieldable normally closed valve means in one of the bores allowing passage of fluid under pressure only in one direction, yieldable normally closed further valve means in the other bore allowing passage of fluid under pressure only in the opposite direction, respective connection bracket means secured to the opposite ends of said main body, an elongated weight member connected to one of said bracket means, a stud member projecting axially from said weight member, and a plurality of radially extending, angularly spaced guide pins secured to said stud member and being slidably engageable with the inside surface of the pipe.

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