DUAL ACTION DRILL PIPE MUD WIPER

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ABSTRACT

A resilient drill pipe mud wiper having a dual wiping action that is capable of being mounted on the drill pipe below a split bushing of a rotary table that drives a Kelly. As the drill pipe is moved updwardly from a bore hole containing drilling mud, the mud wiper by a dual wiping action removes mud adhering to the drill pipe therefrom and allows the scraped drilling mud to drain downwardly into the bore hole by gravity. The mud wiper is of such structure that a bit of greater transverse cross section than that of the drill pipe to which it is secured, may pass through the mud wiper without damage to the latter.

10 Claims, 6 Drawing Figures
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DUAL ACTION DRILL PIPE MUD WIPER

BACKGROUND OF THE INVENTION

1. Field of the Invention
Dual action drill pipe mud wiper.

2. Description of the Prior Art
In the past, the removal of drilling mud adhering to a drill pipe as the latter is raised upwardly in a bore hole has been a troublesome problem.

The primary purpose in devising the present invention is to supply a mud wiper in which the components defining same are locked into fixed relationship with one another, and as a result a resilient mud wiper is provided that is of unitary structure and one that has a dual wiping action on drill pipe as the latter is moved upwardly through the invention.

A further object in devising the present invention is to supply a mud wiper for drill pipe that is of such structure that a bit of greater transverse cross section than that of the drill pipe may be inadvertently drawn through the mud wiper without doing damage thereto.

SUMMARY OF THE INVENTION

A dual action mud wiper adapted for being disposed below the split bushing of a rotary table on a drilling rig, and when so positioned capable of having a drill string moved upwardly therethrough to remove mud adhering to the drill string.

The device includes a stiffener ring of substantially greater internal diameter than the external diameter of the drill pipe. The stiffener ring is enveloped in the ring shaped peripheral portion of a flat generally circular body, which body is formed from a resilient material, preferably rubber. The body inwardly from the peripheral portion develops into upper and lower sheets, which sheets are separated by a space of substantial depth. The upper and lower sheets have coaxially aligned upper and lower circular openings formed therein, which openings are of slightly less diameter than the external diameter of the drill pipe.

The lower sheet has two lower ports formed therein on opposite sides of the lower opening, and the lower opening and two lower ports being connected by two lower slits. The upper sheet has two upper ports formed therein on opposite sides of the upper opening, and these upper ports being connected to the upper opening by two upper slits. The upper and lower slits are preferably normally disposed to one another.

The lower opening, lower slits and two lower ports cooperate to define two lower flaps in the mud wiper which deform upwardly to wipe mud from the drill pipe as the drill pipe is moved upwardly through the device.

The upper sheet also has two upper flaps formed therein due to the cooperation of the upper openings, upper slits and upper ports, with these upper flaps also tending to move upwardly and wipe mud from the drill pipe as the drill pipe is moved upwardly through the device.

The lower pair of flaps and the upper flaps are separated by a space of sufficient depth that the flaps do not contact one another when deformed upwardly. Mud that is carried on the drill string upwardly past the lower pair of flaps is removed from the drill string by the second pair of flaps and flows into the space previously mentioned, with the mud subsequently draining from this space by flowing downwardly through the lower pair of ports into the bore hole. The upper pair of ports at all times maintains the space in a vented condition, to permit mud carried therein to flow freely therefrom by gravity through the lower port into the bore hole. The stiffener ring maintains the circular generally flat body in this configuration during the time that the drill string is being moved upwardly therethrough. Both the stiffener ring and the resilient body may be formed from rubber, but with the stiffener ring having a substantially greater Shore hardness than the Shore hardness of the body.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a combined side elevational and vertical cross sectional view of a portion of a drilling rig and the mud wiper in engagement with a drill string;

FIG. 2 is a top plan view of the mud wiper when disposed in the position shown in FIG. 1;

FIG. 3 is a bottom plan view of the mud wiper when disposed in the position shown in FIG. 1;

FIG. 4 is a transverse cross sectional view of the mud wiper;

FIG. 5 is a side elevational view of the mud wiper;

and

FIG. 6 is a transverse cross sectional view of the mud wiper, with a drill string being moved upwardly therethrough, and illustrating the manner in which the mud wiper exerts a dual wiping action on the drill string to remove mud therefrom.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In FIG. 1 a portion of a drilling rig is shown that includes a split bushing 1 that is drivingly supported in a rotary table 2 that is mounted on the floor 3 of a derrick (not shown). The mud wiper 4, which is the present invention, is shown in engagement with a drill pipe 5 that is being moved upwardly through the bushing 1 by conventional means (not shown).

The mud wiper 4 includes a stiffener ring 6 that has an internal diameter that is substantially greater than the external diameter of the drill pipe 5. The stiffener ring 6 is embodied in the peripheral portion of a circular, generally flat resilient body 7 that is preferably formed from rubber. The resilient ring 6 is preferably formed from rubber having a Shore hardness of between 80 to 95, while the Shore hardness of the body 7 is preferably within a range of 55 to 65. The body 7 inwardly from the peripheral portion thereof develops into a circular second portion, which portion includes an upper and a lower sheet 8 and 9 respectively. The upper and lower sheets 8 and 9 respectively have centrally disposed coaxially aligned openings 9 and 10 formed therein that are of slightly smaller diameter than the external diameter of the drill pipe 5 that they are to engage.

The upper sheet 8 has two upper ports 11 formed therein that are situated on opposite sides of the upper opening 9 with these upper ports 11 being connected by slits 12 to the upper opening 9. The upper opening 9, upper port 11, and upper slits 12, cooperate to define a pair of upper flaps 13 in the upper sheet 8, which flaps deform upwardly when the drill pipe is moved upwardly relative to the mud wiper 4 as shown in FIG. 6. The upper and lower sheets 8 and 9 respectively are separated by a space 14 as best seen in FIG. 4.
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The lower sheets 9 as can best be seen in FIG. 3 has two lower ports 14 formed therein on opposite sides of the lower opening 10, with the lower ports being connected to the lower opening 10 by two slits 15. The lower opening 10, the lower pair of ports 14 and the lower pair of slits or slots 15 cooperate to define two flaps 16 that may deform upwardly to wipe mud from the drill pipe 5 as the latter is moved upwardly through the mud wiper 4 when the latter is disposed as shown in FIG. 1. It will be noted in FIGS. 2 and 3 that the upper flap 13 are angularly disposed relative to the lower flaps 16 with this angulation preferably being 90°.

In FIG. 6 it will be seen that as the drill pipe 5 is moved upwardly through the mud wiper 4, the lower flaps 16 deform upwardly to wipe mud from the drill pipe, and any mud passing these flaps entering the space 14. Mud entering the space 14 may flow downwardly therefrom by gravity through the two lower ports 14. The upper ports 11 at all times maintain the space 14 in a vented condition, so that no negative pressure is formed therein that tends to restrain the free flow of mud therefrom through the lower ports 14. Any mud entering the space 14 is scraped therefrom by the upwardly deformed upper flap 13, and this scraped mud running downwardly into the space 14 to drain therefrom through the lower port 14. Mud draining from the mud wiper 4 by gravity, falls downwardly into the bore hole (not shown) from which the drill string 5 is being raised upwardly. The stiffener ring 6 prevents the body 7 from deforming out of its flat configuration as shown in FIG. 4 when drill pipe is moved upwardly through the mud wiper 4 as illustrated in FIG. 1.

The use and operation of the invention has previously been explained in detail and need not be repeated.

I claim:

1. In combination with an oil well drilling rig having a rotary table that includes a split bushing through which drill pipe that supports a bit may be moved upwardly from a bore hole containing drilling mud, a device for subjecting said drill pipe to a dual wiping action to remove said mud therefrom as said drill pipe is moved upwardly relative to said rotary table when said device is situated below said bushing, said device including:

   a. a stiffener ring of substantially greater diameter than the external diameter of said drill pipe; and
   b. a circular, generally flat, resilient body that includes a ring-shaped peripheral portion which envelopes said stiffener ring, with said body inwardly from said peripheral portion developing into upper and lower sheets that define a space of substantial depth therebetween, said upper and lower sheets having coaxially aligned upper and lower circular openings formed therein of slightly lesser diameter than the external diameter of said drill pipe, and with those portions of said upper and lower sheets defining said upper and lower openings being in pressure wiping contact with the exterior surface of said drill pipe, said lower sheets having two oppositely disposed ports formed therein on opposite sides of said lower opening, which lower sheet has two oppositely disposed lower slits formed therein that extend between said lower opening and said two lower ports and said two lower slits cooperatively defining two oppositely disposed lower flaps in said lower sheet that deform upwardly to wipe mud from said drill pipe as the latter is moved upwardly relative to said device, and with any of said mud on said drill pipe that passes said lower flaps entering said space and draining therefrom by gravity through said lower ports into said well bore.

2. The device as defined in claim 1 wherein said stiffener ring is formed from rubber having a first shore hardness and said body is formed from rubber having a second shore hardness substantially less than said first shore hardness.

3. The device as defined in claim 2 wherein there is a differential of at least 20 between the shore hardness of said body and said stiffener ring.

4. The device as defined in claim 2 wherein said first shore hardness lies in a range of between 80 and 95.

5. The device as defined in claim 4 wherein said second shore hardness is substantially 60.

6. The device as defined in claim 1 in which said upper sheet has two upper ports defined therein on opposite sides of said upper opening, with said upper sheet having two oppositely disposed upper slits formed therein that extend between said upper opening and said two upper ports, with said upper opening, said two upper ports and said two upper slits cooperatively defining two oppositely disposed upper flaps in said upper sheet that deform upwardly to wipe mud from said drill pipe that may have entered said space when said drill pipe is moved upwardly relative to said device, which mud scraped from said drill pipe by said two upper flaps is contained within said space and subsequently drained therefrom by gravity through said two lower ports into said well bore.

7. The device as defined in claim 6 wherein said pairs of upper and lower flaps are angularly disposed relative to one another.

8. The device as defined in claim 6 wherein said pairs of upper and lower flaps are normally disposed relative to one another.

9. The device as defined in claim 6 wherein the depth of said space is sufficiently great that said pairs of lower and upper flaps remain out of contact when deformed upwardly to wipe said mud from said drill pipe.

10. The device as defined in claim 6 wherein said drill string has a bit of greater external diameter than the external diameter of said drill pipe mounted on the lower end thereof, and said pairs of upper and lower flaps are of sufficient area and formed from rubber of such shore hardness that they may deform upwardly to permit said bit to pass upwardly therethrough without damage to said device.

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