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(54) **WASHPIPE STABILISATION**

SPÜLROHRSTABILISATION

STABILISATION DE TUBE DE SURFORAGE

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Description

[0001] The invention relates to washpipe assemblies for use in well bores.

[0002] It is common in the oil and gas drilling industry for equipment to become trapped in a well bore so that access to the region of well bore downhole of the equipment is restricted or prevented. Equipment becomes trapped for a variety of reasons. For example, sediment may settle about the equipment, the formation surrounding the equipment may collapse or the equipment may even be deliberately cemented. In order to remove equipment trapped under these circumstances, it is necessary to remove the external material retaining the equipment within the well bore. It is well known that this may be achieved by means of a washover string. This type of string cuts the external material from the trapped equipment and transfers the cut material to the surface by means of well bore fluid flow passing uphole through the annulus.

[0003] A conventional washover string typically incorporates a washover shoe, a washpipe, a drive sub (collectively referred to as the washpipe assembly) and a drive shaft linking the drive sub to drive equipment located at the surface. The washover shoe is rigidly connected to the washpipe and has the function of cutting the external material preventing the trapped equipment from being removed. Cutting elements, such as tungsten inserts, are provided for this purpose. Both the washover shoe and the washpipe are typically of a cylindrical shape having large inner and outer diameters. The large inner diameters define a bore which is capable of receiving the trapped equipment as the washover shoe cuts through the external material and moves downhole. The washpipe is rigidly connected to the drive sub which provides a connection between the washpipe and the drive shaft. The washover string is rotated by means of the drive equipment located at the surface and is pressed onto the external material until sufficient material has been cut to release the trapped equipment.

[0004] In order to guide the movement of the washover string as the washover shoe cuts through the external material, stabilising means is generally provided on the drive shaft. The centralisation of the washover shoe within the well bore is critical to the efficient and effective use of a washover string. However, centralisation of the washover shoe is often hindered when the direction of travel of the washover string is capable of being influenced by the external profile of the trapped equipment. In these circumstances, the portion of the washover string below the stabilising means tends to bend allowing the washover shoe to deviate from its preferred course.

[0005] It is an objection of the present invention to provide a washpipe assembly which does not tend to deviate from its preferred course when the washover shoe engages the trapped equipment to be washed over.

[0006] The present invention provides a washpipe assembly as set forth in the appended claim 1.

[0007] The distance between the stabiliser and washover shoe in the washpipe assembly of the present invention is considerably less than in traditional washpipe assemblies. The close proximity of the stabiliser to the washover shoe reduces the degree of bend in the washover string between the washover shoe and the stabiliser. Consequently, the tendency of the washover shoe to deviate from the preferred path down the well bore is reduced.

[0008] It is preferable for the washover shoe to be a cylinder defining a bore, the cylinder of the washover shoe being provided with cutting located within the well bore, characterised in that, a washpipe stabiliser is provided on the washpipe so that, when in use, deflection of the washover shoe from a desired position is substantially prevented.

[0009] The distance between the stabiliser and washover shoe in the washpipe assembly of the present invention is considerably less than in traditional washpipe assemblies. The close proximity of the stabiliser to the washover shoe reduces the degree of bend in the washover string between the washover shoe and the stabiliser. Consequently, the tendency of the washover shoe to deviate from the preferred path down the well bore is reduced.

[0010] It is preferable for the cylinder of the washover shoe to be provided with cutting members located on the lower end portion thereof. Thus, as the washover shoe cuts external material surrounding trapped equipment and subsequently progresses down the well bore, the trapped equipment may be received within the bore of the washpipe assembly.

[0011] The stabiliser is preferably provided as a plurality of blade members projecting from an exterior surface of the washpipe. The stabiliser preferably incorporates five blade members and each blade member is preferably arranged in a helix about the washpipe. Furthermore, each blade member is preferably provided with a cutting edge. It is also desirable for the stabiliser to be provided on a portion of the washpipe adjacent the washover shoe.

[0012] The washpipe assembly of the present invention has the advantage over the prior art assemblies of providing means for supporting the washpipe off the wall of the well bore or well bore casing, and thereby reducing the torque required to rotate the washover string and the tendency of the washover shoe to deviate from its preferred path down the well bore.

[0013] A specific embodiment of the present invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a cross-section view of a washpipe assembly according to the present invention;

Figure 2 is a side view of the stabiliser shown in Figure 1;

Figure 3 is an end view of the stabiliser shown in Figure 2; and

Figure 4 is a cross-section view of the washpipe assembly of Figure 1 located within a well bore above trapped equipment.

[0014] The washpipe assembly 2 shown in Figure 1 incorporates a number of components rigidly attached to one another by means of threaded connections 4,6,8. The components include a washover shoe 10, a lower washpipe 12, an upper washpipe 14 and a drive sub 16. The lower washpipe 12 is rigidly attached to the upper washpipe 14 by means of threaded connection 6 and thereby provides a complete washpipe 18 of the desired length. The lower end of the washpipe 18 is rigidly attached to the washover shoe 10 by means of threaded connection 4. The upper end of the washpipe 18 is rigidly attached to the drive sub 16 by means of threaded connection 8. When in use, the drive sub 16 is threadedly connected to a drive shaft 20 (shown in Figure 4).

[0015] The washpipe 18 is provided with a stabiliser 22 incorporating five blade members 24 arranged in a helix about the lower washpipe 12. The blade members 24 are formed as an integral part of the lower washpipe 12 and may be provided by machining, welding or any other suitable manufacturing techniques. A detailed view of the washpipe 18 is provided by Figures 2 and 3. The washpipe assembly 2 has dimensions suitable for a 244 mm (9.625 inch) well bore casing having an inner diameter of 220 mm (8.681 inches). The outer diameter 26 of the washpipe is 206 mm (8.125 inches) and the outer diameter 28 of the blade members 24 is 216 mm (8.500 inches). The washpipe 18 defines a washpipe bore 30 having a diameter 32 of 185 mm (7.285 inches). The bore 30 and the length of the washpipe 18 are of sufficient magnitude to receive trapped equipment when the washpipe assembly 2 is in use. An appropriate length of washpipe 18 may be arranged prior to use by selecting suitable lengths of lower and upper washpipe sections 12, 14 or by using a suitable number of standard length washpipe sections. Each blade member 24 of the stabiliser 22 has a helix angle 34 of 5.2° and has a width 36 at 90° to the helix of 67 mm (2.625 inches). Furthermore, each blade member 24 is provided with a cutting edge 25.

[0016] The washover shoe 10 has substantially the same outer diameter as the washpipe 18 and is provided with a bore 38 having substantially the same diameter as the washpipe bore 30. The bores 30,38 of the washpipe 18 and the washover shoe 10 are in fluid communication with one another and with a bore 40 provided in the drive sub 16. When in use, the bores 30,38,40 of the washpipe assembly 2 are in fluid communication with the surface via a bore 42 provided in the drive shaft 20 (see Figure 4).

[0017] The lower end portion 44 of the washover shoe 10 has a smaller internal diameter and a larger external diameter than the main body of the washover shoe 10.

Tungsten inserts (not shown) are provided on the external surface 46, the lower surface 48 and the internal surface 50 of the lower end portion 44 so as to provide means for cutting external material from equipment trapped within a well bore. The lower end portion 44 has an external diameter equal in magnitude to that of the outer diameter 28 of the blade members 24. The external diameter of the lower end portion 44 may alternatively have a greater magnitude than the outer diameter 28, but should not have a magnitude less than the outer diameter 28 since this would prevent the passage of the stabiliser 22 passed the trapped equipment during the washover operation. The lower surface 48 of the washover shoe 10 is provided with fluid courses (not shown) which allow the flow of well bore fluid passed the external material being cut, thereby cooling the washover shoe 10 and removing cut portions of the external material.

[0018] The washover operation of the washpipe assembly 2 is shown in Figure 4 of the accompanying drawings. The washpipe assembly 2 is attached to a drive shaft 20 and run down a well bore 52 until the washover shoe 10 abuts external material 54 preventing removal of trapped equipment 56. The external material 54 is removed by rotating the drive shaft 20 and the washpipe assembly 2 by means of the drive equipment located at the surface. External material 54 cut from the trapped equipment 56 is removed by a flow of well bore fluid passing downhole through the bores 42,40,30,38 of the washover string, through the fluid courses and uphole through the annulus 58. The direction of flow of the well bore fluid is indicated by arrows A, B and C.

[0019] As the washover shoe 10 cuts away the external material 54, the washover string is pushed downhole. As the washover shoe 10 progresses down the well bore 52, the trapped equipment 56 is received within the bores 38,30 of the washover shoe 10 and the washpipe 18. The tendency of the washover shoe 10 to be deflected from a central position within the well bore 52 is reduced by the guiding effect of the stabiliser 22. The washpipe assembly 2 is moved down the well bore 52 so that the washover shoe 10 cuts away the external material 54 located both above the trapped equipment 56 and between the trapped equipment 56 and the well bore 52. Movement of the washpipe assembly 2 down the well bore 52 is continued until the stabiliser 22 passes the trapped equipment 56. The blade members 24 of the stabiliser 22 not only guide the washover shoe 10, but also act as a milling tool and clean the interior surface of the well bore 52 in the region of the trapped equipment 56.

[0020] The present invention is not limited to the specific embodiment described above. Alternative arrangements and suitable materials will be apparent to a reader skilled in the art.

Claims

1. A washpipe assembly (2) for use in a well bore, the washpipe assembly (2) comprising a washover shoe (10) and a washpipe (14) for receiving material cut from the well bore, **characterized in that** the washover shoe (10) is spaced from and attached to the washpipe (14) by means of a stabiliser section (12) located between and threadedly engaged with the washover shoe (10) and washpipe (14); wherein the stabiliser section (12) comprises a cylindrical portion and a plurality of blade members (24), the blade members (24) being provided on an exterior surface of the stabiliser section (12) and each being provided with a cutting edge; and wherein the stabiliser section (12) has an inner diameter substantially the same as the inner diameter of adjacent portions of the washover shoe (10) and washpipe (14), and has an outer diameter substantially the same as the outer diameter of the washover shoe (10), whereby, when in use, the stabiliser section (12) stabilises the washpipe assembly (2) so as to ensure the washover shoe (10) remains concentric with the well bore when the washover shoe (10) encounters an obstruction, and reams the well bore in the region of washing over so as to clean well bore cut by the washover shoe (10).
2. A washpipe assembly as claimed in claim 1, wherein the washover shoe (10) is a cylinder defining a bore, the cylinder of the washover shoe (10) being provided with cutting members mounted on the lower end portion (44) thereof.
3. A washpipe assembly as claimed in claim 2, wherein the bore of the washover shoe (10) is adapted to receive equipment located within the well bore.
4. A washpipe assembly as claimed in any of the preceding claims, wherein the washpipe (14) is an elongate cylinder defining a bore.
5. A washpipe assembly as claimed in claim 4, wherein the bore of the washpipe is adapted to receive equipment located within the well bore.
6. A washpipe assembly as claimed in any of the preceding claims, wherein each blade member (24) is arranged in a helix about said cylindrical portion.
7. A washpipe assembly as claimed in any of the preceding claims, wherein the stabiliser incorporates five blade members (24).

Patentansprüche

1. Spülrohrbaugruppe (2) für den Einsatz in einem

Bohrloch, wobei die Spülrohrbaugruppe (2) folgendes umfasst: einen Spülrohrschuh (10) und ein Spülrohr (14) zum Aufnehmen von Material, das aus dem Bohrloch geschnitten wurde, **dadurch gekennzeichnet, dass** der Spülrohrschuh (10) von dem Spülrohr (14) durch eine Stabilisatorsektion (12) beabstandet und an dieser angebracht ist, wobei sich die Stabilisatorsektion (12) zwischen dem Spülrohrschuh (10) und dem Spülrohr (14) befindet und in Schraubverbindung mit diesen steht; wobei die Stabilisatorsektion (12) einen zylindrischen Abschnitt und eine Mehrzahl von Messerelementen (24) umfasst, wobei die Messerelemente (24) auf einer Außenfläche der Stabilisatorsektion (12) vorgesehen und jeweils mit einer Schneidkante versehen sind; und wobei die Stabilisatorsektion (12) einen Innendurchmesser hat, der im Wesentlichen derselbe ist wie der Innendurchmesser benachbarter Abschnitte des Spülrohrschuhs (10) und des Spülrohrs (14), und einen Außendurchmesser hat, der im Wesentlichen derselbe ist wie der Außendurchmesser des Spülrohrschuhs (10), so dass beim Gebrauch die Stabilisatorsektion (12) die Spülrohrbaugruppe (2) stabilisiert, um zu gewährleisten, dass der Spülrohrschuh (10) mit dem Bohrloch konzentrisch bleibt, wenn der Spülrohrschuh (10) auf ein Hindernis stößt, und das Bohrloch im Spülbereich freiräumt, um das vom Spülrohrschuh (10) geschnittene Bohrloch zu reinigen.

2. Spülrohrbaugruppe nach Anspruch 1, bei der der Spülrohrschuh (10) ein eine Bohrung definierender Zylinder ist, wobei der Zylinder des Spülrohrschuhs (10) mit Schneidelementen versehen ist, die an seinem unteren Endabschnitt (44) montiert sind.
3. Spülrohrbaugruppe nach Anspruch 2, bei der die Bohrung des Spülrohrschuhs (10) so gestaltet ist, dass sie in dem Bohrloch befindliche Ausrüstung aufnimmt.
4. Spülrohrbaugruppe nach einem der vorherigen Ansprüche, bei der das Spülrohr (14) ein eine Bohrung definierender länglicher Zylinder ist.
5. Spülrohrbaugruppe nach Anspruch 4, bei der die Bohrung des Spülrohrs so gestaltet ist, dass sie in dem Bohrloch befindliche Ausrüstung aufnimmt.
6. Spülrohrbaugruppe nach einem der vorherigen Ansprüche, bei der jedes Messerelement (24) schraubenförmig um den genannten zylindrischen Abschnitt herum angeordnet ist.
7. Spülrohrbaugruppe nach einem der vorherigen Ansprüche, bei der der Stabilisator fünf Messerelemente (24) aufweist.

Revendications

1. Ensemble de tube de surforage (2) pour utilisation dans un forage de puits, l'ensemble de tube de surforage (2) comportant un bloc de surforage (10) et un tube de surforage (14) destiné à recevoir la matière découpée dans le forage de puits, **caractérisé en ce que** le bloc de surforage (10) est espacé de et fixé sur le tube de surforage (14) au moyen d'une section de stabilisateur (12) disposée entre et engagée de manière vissée avec le bloc de surforage (10) et le tube de surforage (14); la section de stabilisateur (12) comporte une partie cylindrique et plusieurs éléments de lame (24), les éléments de lame (24) étant prévus sur une surface extérieure de la section de stabilisateur (12) et étant pourvus chacun d'un bord de coupe; et la section de stabilisateur (12) a un diamètre interne sensiblement le même que le diamètre interne des parties adjacentes du bloc de surforage (10) et du tube de surforage (14), et a un diamètre externe sensiblement le même que le diamètre externe du bloc de surforage (10), de sorte que, lors de l'utilisation, la section de stabilisateur (12) stabilise l'ensemble de tube de surforage (2) afin de s'assurer que le bloc de surforage (10) reste concentrique au forage de puits lorsque le bloc de surforage (10) rencontre une obstruction, et taille le forage de puits dans la zone de surforage de façon à dégager le forage de puits découpé par le bloc de surforage (10).
2. Ensemble de tube de surforage selon la revendication 1, dans lequel le bloc de surforage (10) est un cylindre définissant un alésage, le cylindre du bloc de surforage (10) étant pourvu d'éléments de coupe montés sur la partie d'extrémité inférieure (44).
3. Ensemble de tube de surforage selon la revendication 2, dans lequel l'alésage du bloc de surforage (10) est prévu pour recevoir un équipement disposé à l'intérieur du forage de puits.
4. Ensemble de tube de surforage selon l'une quelconque des revendications précédentes, dans lequel le tube de surforage (14) est un cylindre allongé définissant un alésage.
5. Ensemble de tube de surforage selon la revendication 4, dans lequel l'alésage du tube de surforage est prévu pour recevoir un équipement disposé à l'intérieur du forage de puits.
6. Ensemble de tube de surforage selon l'une quelconque des revendications précédentes, dans lequel chaque élément de lame (24) est disposé en hélice autour de ladite partie cylindrique.
7. Ensemble de tube de surforage selon l'une quel-

conque des revendications précédentes, dans lequel le stabilisateur incorpore cinq éléments de lame (24).

Fig.1.

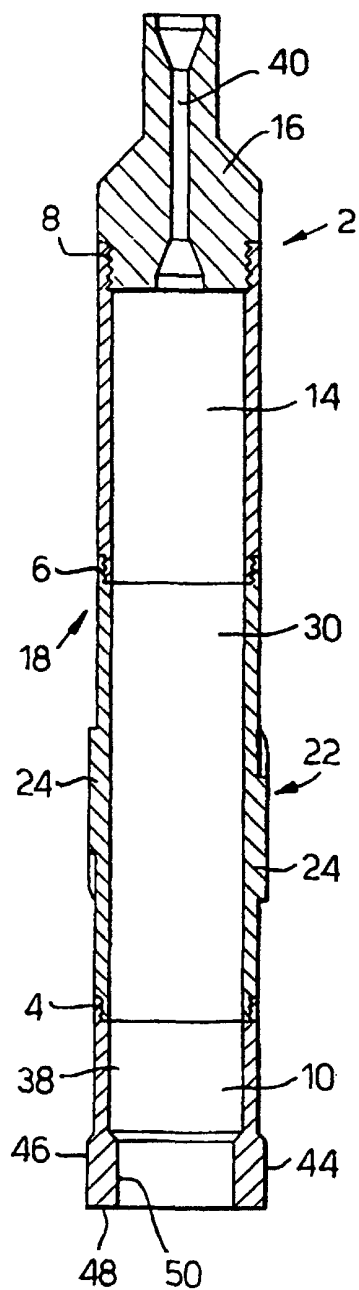


Fig.2.

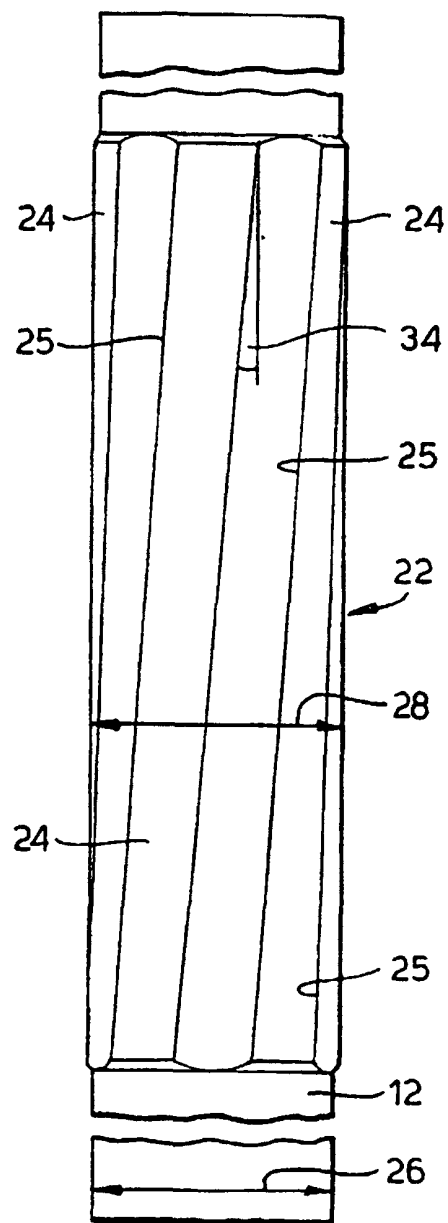


Fig.3.

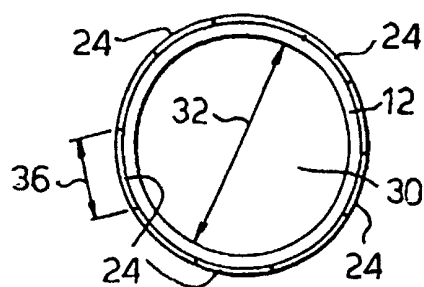


Fig.4.

