Description

This invention relates to annular blowout preventers. In use the resilient packer of an annular blowout preventer can wear and be damaged. Changing the packer in present annular blowout preventers requires the removal of the upper end connection plus other elements of the BOP stack which are above the annular preventer such as the bell nipple, stripper, or rotating head. To do this clearance must be provided between the rig floor substructure and the top of the BOP to allow the top to be lifted clear to provide access to the packer. This is very inconvenient in snubbing operations. Also the top portion of most present annular blowout preventers is large and heavy which reduces the clearance and increases the difficulty of replacing the packer.

U.S. Patent No. 2154955 discloses a well casing control valve having removable side plates allowing access for ram changes.

U.S. Patent No. 2320974 discloses a ram type blowout preventer with removable side plates for changing internal ram operating mechanisms and rams.

U.S. Patent No. 2592197 discloses a ram type blowout preventer with side windows for each ram for insertion and removal of the rams with covers secured over the windows for each ram for insertion and removal of the rams with covers secured over the windows.

None of the known prior art recognizes the problem of changing the annular packer in an annular blowout preventer such as that described in U.S. Patent No. 4310139. Flat door covering windows for access to rams in a ram type blowout preventer do not teach that the packer of an annular blowout preventer could be removed in a manner other than through the top. An object is to provide an improved annular blowout preventer having simple and easy means for changing the annular packer.

According to the present invention there is provided an annular blowout preventer comprising a body having a central bore extending therethrough with an annular packer recess surrounding and opening to said bore, an annular packer positioned in said recess in surrounding relationship to said bore, means for loading said packer to seal within said bore, characterised in that the preventer includes an opening through the side of said body into said packer recess, a plug for sealing said opening, and means for retaining said plug in said opening, said plug having an interior surface for supporting the exterior surface of said packer in said opening.

A feature of the present invention is the provision of an improved annular blowout preventer in which the annular packer may be changed without regard to the vertical clearance available.

The invention will be described now by way of example only with particular reference to the accompanying drawings. In the drawings:

FIGURE 1 is a partial sectional partial elevation view of the improved annular blowout preventer of the present invention.

FIGURE 2 is a sectional view through the packer taken along line 2-2 in FIGURE 1.

FIGURE 3 is a view similar to FIGURE 1 with the retaining sleeve lowered below the body plug.

FIGURE 4 is an end view of the plug.

FIGURE 5 is a plan view of the plug.

FIGURE 6 is a sectional view similar to FIGURE 2, but of a modified form of the present invention.

Description of the Preferred Embodiments

Annular blowout preventer 10, as shown in FIGURE 1, includes body 12 having central bore 14 extending therethrough with packer recess 16 surrounding and opening onto bore 14. Body 12 includes lower flange 18, inner upstanding rim 20 and outer upstanding rim 22. Upper end closure 24 is threaded into rim 22 and has depending rim 26 extending to a position between rims 20 and 22, and forming annular chamber 28. Upper end closure 24 extends inward as flange 30 to proved shoulder 32 at the upper end of packer recess 16. Annular packer 34 is positioned in packer recess 16 between shoulder 32 and annular actuating plate 36. Means for axially loading annular packer 34 is provided by piston 38 which is slidable in chamber 28 responsive to pressure through port 38a and port 38b and connected to annular actuating plate 36 by annular arm 40.

Annular packer 34 includes resilient annulus 41 with upper insert plates 42 and lower insert plates 44 embedded therein. Annular packer 34 is split and preferably has two semi-annular sections 34a and 34b. as shown in FIGURE 2. Ring 46 is embedded in the exterior of resilient annulus 41 and has a plurality of tapped holes 48 to allow firm engagement of packer 34 during removal. Annular packer 34 is split as described and shown to allow it to be removed easily from recess 16 through opening 50 in rim 22 and depending rim 26 of end closure 24 as best seen in FIGURE 2.

Opening 50 includes inner rectangular opening 52 with shoulder 54 at its inner end and outer rectangular opening 56 with shoulder 58 facing outward at the inner end of opening 56. Plug 60 is shaped to fit closely into opening 52 and 56, to engage shoulder 54 and capture seal ring 62 between shoulder 64 on plug 60 and shoulder 58. The inner surface 66 of plug 60 is cylindrical to form a portion of the wall of recess 16. Plug 60 is retained in opening 50 by sleeve 68 which surrounds outer rim 22 of body 12 from a position above opening 50 to a position below opening 50. Suitable means for supporting sleeve 68 in its plug retaining position is provided in the form of lugs 70 secured to outer rim 22 by screws 72.

Whenever it is desired to replace packer 34 then screws 72 are removed and sleeve 68 is lowered to the position shown in FIGURE 3 so

that plug 60 can be removed. With plug 60 removed packer sections 34a and 34b can be removed even with a pipe extending through bore 14.

In the modified form shown in FIGURE 4, annular blowout preventer 80 includes outer rim 82 and depending rim 84 of end closure with inner rectangular opening 86 extending transversely thereof and outer rectangular openings 88 and 90 provide shoulders 92 and 94. Plugs 96 and 98 are positioned therein and seal rings 100 and 102 are positioned between shoulders 104 and 106 on plugs 96 and 98 and shoulders 92 and 94. Sleeve 108 surrounds rim 82 and retains plugs 96 and 98 in position sealing both ends of bore 86. Packer 110 includes sections 112 and 114 and has ring 116 embedded therein with tapped holes 118 to assist in removal of packer sections 112 and 114 through opposite sides of bore 86 after plugs 96 and 98 are removed.

Claims

1. An annular blowout preventer-comprising a body (12) having a central bore (14) extending therethrough with an annular packer recess (16) surrounding and opening to said bore, an annular packer (34) positioned in said recess in surrounding relationship to said bore, means (28, 38) for loading said packer to seal within said bore, characterised in that the preventer includes an opening (50) through the side of said body into said packer recess (16), a plug (60) for sealing said opening, and means (68) for retaining said plug in said opening, said plug (60) having an interior surface for supporting the exterior surface of said packer in said opening.

2. An annular blowout preventer according to claim 1 characterised in that said packer (34) includes two sections (34a, 34b).

3. An annular blowout preventer according to claim 1 or claim 2 characterised by including means (46, 48) in said packer allowing engagement therewith to pull said packer through said opening.

4. An annular blowout preventer according to any preceding claim characterised in that said retaining means (68) includes a sleeve surrounding said body and engaging the exterior of said plug.

5. An annular blowout preventer according to claim 4 characterised by including means (70) for retaining said sleeve in engagement with the exterior of said plug.

6. An annular blowout preventer according to claim 1 characterised in that said opening (86, 88, 90) extends through both sides of said body with a plug (96, 98) in each side of said opening, and said packer (110) is divided into two sections (112, 114).

7. An annular blowout preventer according to claim 1 characterised in that said packer has a resilient annulus (41) with a series of upper insert plates (42) embedded in the upper surface of the annulus and a series of lower insert plates (44) embedded in the lower surface of said annulus and said loading means includes an annular piston chamber (28) in said body with a piston (38) movable therein responsive to pressure admitted to said chamber on opposite sides of said piston whereby said piston axially loads said packer.

8. An annular blowout preventer according to claim 1 characterised by including a ring (46) embedded in the outer exterior of said packer and having threaded holes (48) therein, said threaded holes allowing engagement of said packer to pull it through said opening.

9. An annular blowout preventer according to claim 7 characterised by including an annular actuating plate (36) connected to said piston (38) engaging the underside of said packer, the arrangement being such that movement of said piston in one direction axially loads said packer to move inward into sealing position and movement of the piston in the other direction unloads said packer to allow it to relax from sealing position.

10. An annular blowout preventer according to claim 1 characterised in that said packer includes a single annular ring (46).

Patentansprüche

1. Ringförmiges Ausblasventil mit
- einem Körper (12), der mit einer sich hindurch erstreckenden Mittelbohrung (14) versehen ist, die eine sie umgebende und zu ihr hin offene Vertiefung (16) für ein ringförmiges Dichtungsstück aufweist,
- einem ringförmigen Dichtungsstück (34), das in der Vertiefung angeordnet ist, um die Bohrung zu umgeben,
- Mittel (28, 38) zum Belasten des Dichtungsstückes zwecks Abdichtung innerhalb der Bohrung, dadurch gekennzeichnet,
- daß das Ventil eine Öffnung (50) durch die Seite des Körpers zu der Dichtungsstückvertiefung (16), einen Stopfen (60) zum Verschließen der Öffnung und Mittel (68) zum Halten des Stopfens in der Öffnung aufweist,
- wobei der Stopfen (60) eine Innenfläche zum Abstützen der Außenfläche des Dichtungsstücks in der Öffnung besitzt.

2. Ringförmiges Ausblasventil nach Anspruch 1, dadurch gekennzeichnet,
- daß das Dichtungsstück (34) zwei Abschnitte (34a, 34b) aufweist.

3. Ringförmiges Ausblasventil nach Anspruch 1 oder 2, gekennzeichnet durch
- vorgesehene Mittel (46, 48) in dem Dichtungsstück, die einen Eingriff hiermit ermöglichen, um das Dichtungsstück durch die Öffnung zu ziehen.

4. Ringförmiges Ausblasventil nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß
- die Haltemittel (68) eine Hülse umfassen, die den Körper umgibt und in Wirkverbindung mit dem Äußeren des Stopfens steht.

5. Ringförmiges Ausblasventil nach Anspruch 4, gekennzeichnet durch

that plug 60 can be removed. With plug 60 removed packer sections 34a and 34b can be removed even with a pipe extending through bore 14.

In the modified form shown in FIGURE 4, annular blowout preventer 80 includes outer rim 82 and depending rim 84 of end closure with inner rectangular opening 86 extending transversely thereof and outer rectangular openings 88 and 90 provide shoulders 92 and 94. Plugs 96 and 98 are positioned therein and seal rings 100 and I02 are positioned between shoulders 104 and 106 on plugs 96 and 98 and shoulders 92 and 94. Sleeve 108 surrounds rim 82 and retains plugs 96 and 98 in position sealing both ends of bore 86. Packer 110 includes sections 112 and 114 and has ring 116 embedded therein with tapped holes 118 to assist in removal of packer sections 112 and 114 through opposite sides of bore 86 after plugs 96 and 98 are removed.

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2. An annular blowout preventer according to claim 1 characterised in that said packer (34) includes two sections (34a, 34b).

3. An annular blowout preventer according to claim 1 or claim 2 characterised by including means (46, 48) in said packer allowing engagement therewith to pull said packer through said opening.

4. An annular blowout preventer according to any preceding claim characterised in that said retaining means (68) includes a sleeve surrounding said body and engaging the exterior of said plug.

5. An annular blowout preventer according to claim 4 characterised by including means (70) for retaining said sleeve in engagement with the exterior of said plug.

6. An annular blowout preventer according to claim 1 characterised in that said opening (86, 88, 90) extends through both sides of said body with a plug (96, 98) in each side of said opening, and said packer (110) is divided into two sections (112, 114).

7. An annular blowout preventer according to claim 1 characterised in that said packer has a resilient annulus (41) with a series of upper insert plates (42) embedded in the upper surface of the annulus and a series of lower insert plates (44) embedded in the lower surface of said annulus and said loading means includes an annular piston chamber (28) in said body with a piston (38) movable therein responsive to pressure admitted to said chamber on opposite sides of said piston whereby said piston axially loads said packer.

8. An annular blowout preventer according to claim 1 characterised by including a ring (46) embedded in the outer exterior of said packer and having threaded holes (48) therein, said threaded holes allowing engagement of said packer to pull it through said opening.

9. An annular blowout preventer according to claim 7 characterised by including an annular actuating plate (36) connected to said piston (38) engaging the underside of said packer, the arrangement being such that movement of said piston in one direction axially loads said packer to move inward into sealing position and movement of the piston in the other direction unloads said packer to allow it to relax from sealing position.

10. An annular blowout preventer according to claim 1 characterised in that said packer includes a single annular ring (46).

Patentansprüche

1. Ringförmiges Ausblasventil mit
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- Mittel (28, 38) zum Belasten des Dichtungsstückes zwecks Abdichtung innerhalb der Bohrung, dadurch gekennzeichnet,
- daß das Ventil eine Öffnung (50) durch die Seite des Körpers zu der Dichtungsstückvertiefung (16), einen Stopfen (60) zum Verschließen der Öffnung und Mittel (68) zum Halten des Stopfens in der Öffnung aufweist,
- wobei der Stopfen (60) eine Innenfläche zum Abstützen der Außenfläche des Dichtungsstücks in der Öffnung besitzt.

2. Ringförmiges Ausblasventil nach Anspruch 1, dadurch gekennzeichnet,
- daß das Dichtungsstück (34) zwei Abschnitte (34a, 34b) aufweist.

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- vorgesehene Mittel (46, 48) in dem Dichtungsstück, die einen Eingriff hiermit ermöglichen, um das Dichtungsstück durch die Öffnung zu ziehen.

4. Ringförmiges Ausblasventil nach einem der vorstehenden Ansprüche, dadurch gekennzeichnet, daß
- die Haltemittel (68) eine Hülse umfassen, die den Körper umgibt und in Wirkverbindung mit dem Äußeren des Stopfens steht.

5. Ringförmiges Ausblasventil nach Anspruch 4, gekennzeichnet durch

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- vorgesehene Mittel (70) zum Halten der Hülse in Wirkverbindung mit dem Äußeren des Stopfens.

6. Ringförmiges Ausblasventil nach Anspruch 1, dadurch gekennzeichnet, daß

- die Öffnung (86, 88, 90) durch beide Seiten des Körpers verläuft, wobei ein Stopfen (96, 98) in jeder Seite der Öffnung vorhanden ist, und
- das Dichtungsstück (110) in zwei Abschnitte (112, 114) unterteilt ist.

7. Ringförmiges Ausblasventil nach Anspruch 1, dadurch gekennzeichnet, daß

- das Dichtungsstück einen nachgiebigen Ring (41) mit einer Reihe oberer Einsatzplatten (42), die in die obere Fläche des Ringes eingebettet sind, und eine Reihe unterer Einsatzplatten (44), die in die untere Fläche des Ringes eingebettet sind, aufweist, und
- die Belastungsmittel eine ringförmige Kolbenkammer (28) in dem Körper mit einem hierin befindlichen Kolben (38) aufweisen, der in Abhängigkeit von einem der Kammer auf gegenüberliegenden Kolbenseiten zugeführten Druck beweglich ist und dadurch das Dichtungsstück axial belastet.

8. Ringförmiges Ausblasventil nach Anspruch 1, gekennzeichnet durch

- einen Ring (46), der auf der Außenseite des Dichtungsstückes eingelassen ist und mit Einschraublöchern (48) versehen ist, die ein Erfassen des Dichtungsstückes erlauben, um dieses durch die Öffnung hindurchzuziehen.

9. Ringförmiges Ausblasventil nach Anspruch 7, gekennzeichnet durch

- eine ringförmige Betätigungsplatte (36), die mit dem Kolben (38) verbunden ist und in Wirkverbindung mit der Unterseite des Dichtungsstükkes steht, wobei die Anordnung so getroffen ist, daß eine Bewegung des Kolbens in der einen Richtung das Dichtungsstück axial belastet, um dieses in eine Abdichtposition nach innen zu bewegen, und eine Bewegung des Kolbens in der anderen Richtung das Dichtungsstück entlastet, um es diesem zu ermöglichen, aus der Abdichtposition freigesetzt zu werden.

10. Ringförmiges Ausblasventil nach Anspruch 1, dadurch gekennzeichnet, daß das Dichtungsstück einen Einzelring (46) besitzt.

Revendications

1. Obturateur annulaire de puits, comportant un corps (12) traversé par un alésage central (14), un évidement annulaire (16) pour garniture d'étanchéité entourant cet alésage et s'ouvrant sur celui-ci, une garniture d'étanchéité annulaire (34) placée dans ledit évidement et entourant ledit alésage, des moyens (28, 38) pour mettre sous contrainte la garniture d'étanchéité afin de réaliser l'étanchéité à l'intérieur de l'alésage, caractérisé en ce que l'obturateur comporte une ouverture (50) traversant le côté du corps et débouchant dans l'évidement (16) pour garniture d'étanchéité, un bouchon (60) pour fermer de façon étanche cette ouverture, et des moyens (68) pour retenir le bouchon dans cette ouverture, le bouchon (60) présentant une surface intérieure servant d'appui à la surface extérieure de la garniture d'étanchéité dans l'ouverture.

2. Obturateur annulaire de puits conforme à la revendication 1, caractérisé en ce que la garniture d'étanchéité (34) comporte deux parties (34a, 3b).

3. Obturateur annulaire de puits conforme à la revendication 1 ou à la revendication 2, caractérisé en ce qu'il comprend des moyens (46, 48) dans la garniture d'étanchéité permettant de venir en prise avec celle-ci afin de la tirer par l'ouverture.

4. Obturateur annulaire de puits conforme à l'une quelconque des revendications précédentes, caractérisé en ce que les moyens de retenue (68) comportent un manchon entourant le corps et venant en prise avec l'extérieur du bouchon.

5. Obturateur annulaire de puits conforme à la revendication 4, caractérisé en ce qu'il comprend des moyens (70) pour maintenir le manchon en prise avec l'extérieur du bouchon.

6. Obturateur annulaire de puits conforme à la revendication 1, caractérisé en ce que l'ouverture (86, 88, 90) traverse les deux côtés du corps avec un bouchon (96, 98) de chaque côté de l'ouverture, et en ce que la garniture d'étanchéité (110) est divisée en deux parties (112, 114).

7. Obturateur annulaire de puits conforme à la revendication 1, caractérisé en ce que la garniture d'étanchéité comporte un anneau élastique (41), dans la surface supérieure duquel sont encastrées plusieurs plaques supérieures rapportées (42) et dans la surface inférieure duquel sont encastrées plusieurs plaques inférieures rapportées (44), et en ce que les moyens de mise sous contrainte comprennent une chambre de piston annulaire (28), ménagée dans le corps, et un piston (38) mobile dans celle-ci sous l'action d'une pression admise dans la chambre de part et d'autre du piston de sorte que le piston met axialement la garniture d'étanchéité sous contrainte.

8. Obturateur annulaire de puits conforme à la revendication 1, caractérisé en ce qu'il comprend une bague (46) encastrée à la périphérie extérieure de la garniture d'étanchéité et dans laquelle sont percés des trous taraudés (48), lesdits trous taraudés permettant de venir en prise avec la garniture d'étanchéité pour tirer celle-ci par l'ouverture.

9. Obturateur annulaire de puits conforme à la revendication 7, caractérisé en ce qu'il comprend une plaque d'actionnement annulaire (36) reliée au piston (38) et en contact avec la surface inférieure de la garniture d'étanchéité, la disposition étant telle qu'un déplacement du piston dans un sens met axialement sous contrainte la garniture d'étanchéité pour la faire se déplacer vers l'intérieur et venir en position d'étanchéité, et qu'un déplacement du piston dans l'autre sens libère la garniture d'étanchéité pour lui permettre de quitter sa position d'étanchéité et de se détendre.

10. Obturateur annulaire de puits conforme à la revendication 1, caractérisé en ce que la garniture d'étanchéité comporte une seule bague annulaire (46).

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