



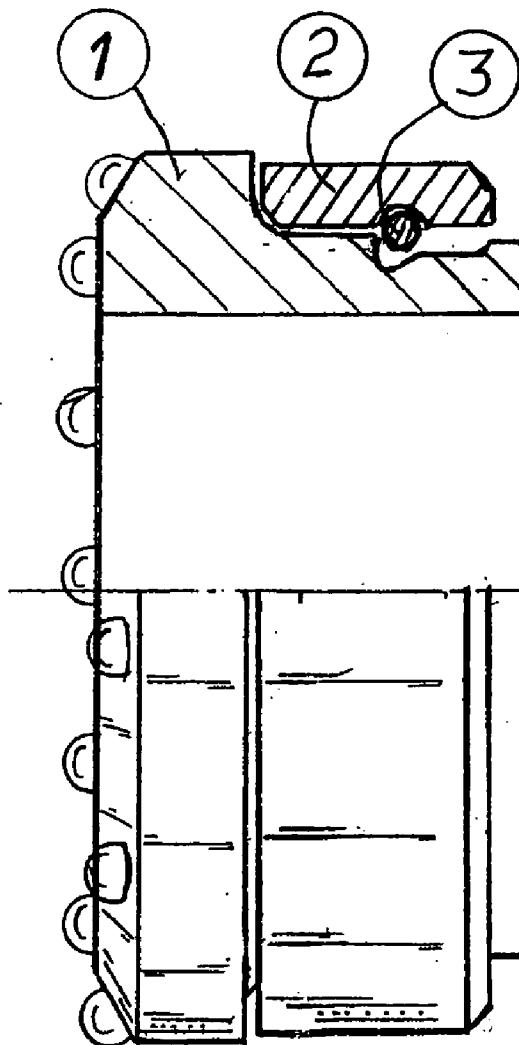
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(19) **United States**(12) **Patent Application Publication**
Välisalo(10) **Pub. No.: US 2012/0227985 A1**(43) **Pub. Date: Sep. 13, 2012**(54) **METHOD FOR COUPLING OF A CASING
TUBE TO A DRILL BIT****Publication Classification**(75) Inventor: **Juhani Välisalo**, Tampere (FI)(51) **Int. Cl.**
E21B 19/18 (2006.01)(73) Assignee: **OY ATLAS COPCO ROTEX AB**,
Tampere (FI)(52) **U.S. Cl.** **166/380**(21) Appl. No.: **13/508,618**(57) **ABSTRACT**(22) PCT Filed: **Nov. 9, 2010**(86) PCT No.: **PCT/FI2010/000068**§ 371 (c)(1),
(2), (4) Date: **May 8, 2012**

A method for connecting a casing tube to a drill bit. An annular groove is formed around an outer track of the bit. A drill shoe is utilized to connect the casing tube to the bit at a front edge of the bit. The connection ring is attached to the groove and the casing tube. If the connection ring is attached to the casing tube, at a first stage of the installation a chopped ring element is at least partially installed into the groove. At a second stage of the installation, the connection ring is pushed such that the ring element becomes strained simultaneously with moving into the groove, in which case when the connection ring is moved, the ring element moves in the groove and slides into the groove such that movement of the ring element to a deepest point of the groove is prohibited by a stopper.

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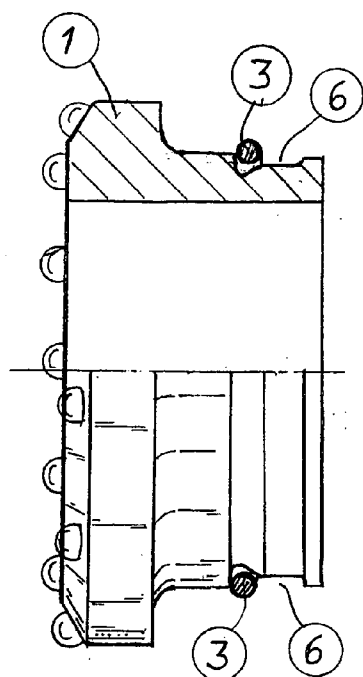


Fig. 1

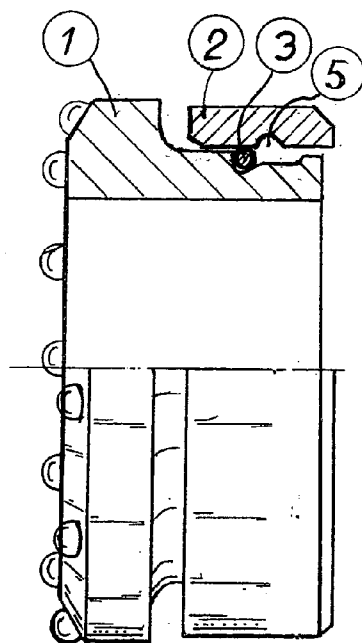


Fig. 2

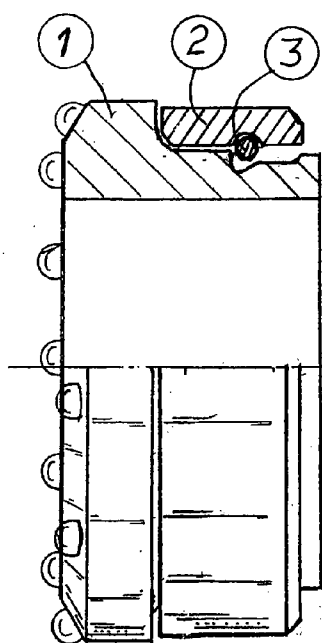


Fig. 3

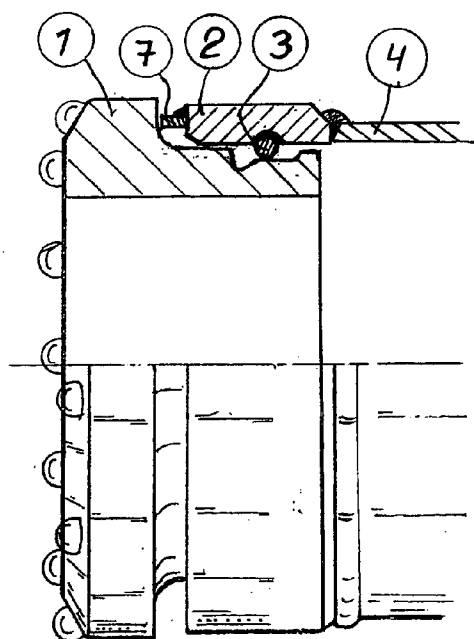


Fig. 4

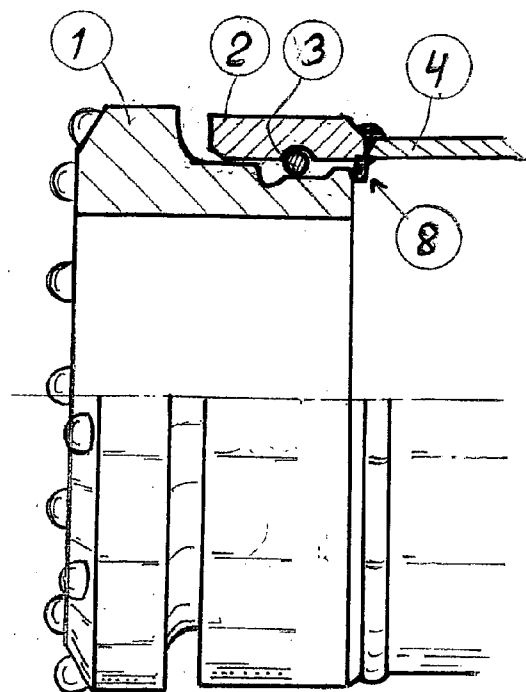


Fig. 5

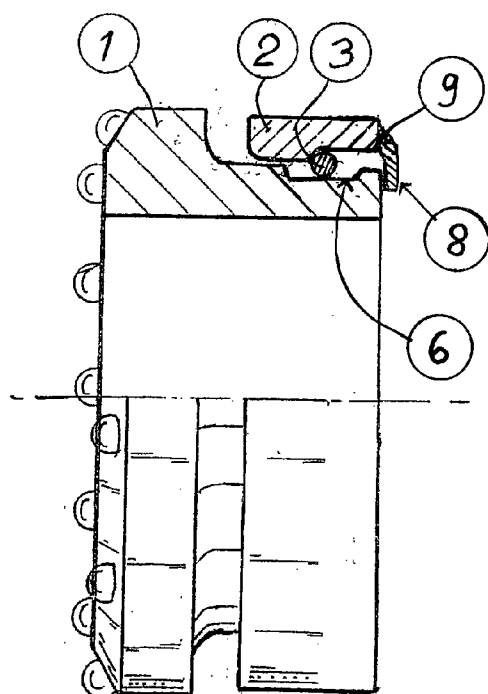


Fig. 6

METHOD FOR COUPLING OF A CASING TUBE TO A DRILL BIT

[0001] Invention relates to a method for coupling of a casing tube to a drill bit in which method an annular groove that circulates around the outer track is formed to the outer track of the bit and a drill shoe, such as a connection ring that can be installed around the bit, is used as an aid in order to connect the casing tube to the bit at its front edge which connection ring is attached both to the mentioned annular groove and on the other hand to the mentioned casing tube in which case at the first stage of the installation a chopped ring element is pushed at least partly into the groove located at the outer track of the bit.

[0002] Previously a method according to the above mentioned introduction is known from a Finnish patent publication Nr. 115787 in which publication the chopped ring element is located between the bit and the connection ring, such as drill shoe, into the grooves existing in the mentioned parts in order to lock these parts to each other. The staying of the ring element between the mentioned parts is ensured later not until the casing tube is welded to the connection ring.

[0003] The disadvantage of this method is the fact that the bit comes loose from the connection ring when the ring element in certain circumstances has a chance to come out from between the parts. The bit is transported with the connection ring and is stored. The welding of the casing tube which welding locks the ring element can occur only after a long time.

[0004] With the method according to the invention the ring element becomes locked between the bit and the connection ring immediately when it is being installed and the disadvantage occurring in the previously known solutions does not occur again. It is characteristic of the method according to the invention that at the second stage analogously

[0005] either a connection ring is pushed around the bit so far that the ring element located in the groove becomes strained at the same time into the groove existing at the inner surface of the connection ring in which case when one moves the connection ring, the ring element follows in the groove along the connection ring and slides in the groove of the bit in such a way that its movement to the deepest part of the groove is prevented by adding a stopper that restricts the movement of the connection ring to the structure, or

[0006] the ring element is installed into the groove of the bit when the connection ring is being drawn back on top of the bit and in front of it at least partly away from the location of the groove after which the connection ring is moved on top of the bit backwards and a locking piece is welded in order to restrict the axial slip of the connection ring.

[0007] The advantage of the invention is the fact that the connection ring or the drill shoe stays by the bit when the bit is being handled and also when it is attached to the drilling equipment when the drilling starts with that bit. Restriction of movement to be made for the connection ring is easy to create by welding only for example a little piece of metal or some pieces of metal to a location suitable for the purpose.

[0008] In the following the invention is described more detailed by referring to the accompanying drawing in which

[0009] FIG. 1 shows a ring element in the groove of the bit.

[0010] FIG. 2 shows a push of a connection ring on top of the bit.

[0011] FIG. 3 shows the final stage of the push of the connection ring in which the ring element is located into two opposite grooves.

[0012] FIG. 4 shows the distance of movement of the connection ring when the distance of movement is limited.

[0013] FIG. 5 shows the distance of movement of the connection ring when the distance of movement is limited in another way.

[0014] FIG. 6 shows another structure of the connection ring.

[0015] In the FIG. 1 there is the chopped ring element 3 that is located into the groove 6 existing at the outer surface of the bit 1. The groove 6 comprises a flat base part and a deep point into which the ring element 3 is located in the figure. The chopped ring element 3 has been chosen to become strained a little bit outwards in which case it does not become strained to the bottom of the deepest point of the groove 6.

[0016] In the FIG. 2 the pushing of the connection ring 2 on top of the bit 1 is shown. There is a bevel at the front edge of the connection ring 2 which bevel pushes the ring element 3 to the bottom of the groove 6 to the deepest point in which case the connection ring 2 can move to the left on top of the bit. The groove 5 of the connection ring 2 is about to move to the location of the ring element.

[0017] In the FIG. 3 there is a situation where the deepest point of the groove 6 of the bit 2 and the groove 5 of the connection ring 2 are together and the ring element 3 can in turn become strained into the groove 5 of the connection ring 2. When the connection ring 2 is now being pulled back away from the top of the bit, it can move as far as the ring element 3 moves to the other edge of the groove 6. The ring element 3 follows in the groove 5 of the connection ring.

[0018] In the FIG. 4 a situation is shown in which situation the movement of the connection ring 2 is limited with a help of a piece of metal 7 that is welded to it in such a way that it can move in axial direction only as far as the ring element 3 can move on the flat base part of the groove 6. In the FIG. 4 also a casing pipe 4 that is already welded to the connection ring 2 is shown. In the situation of the FIG. 4 the ring element 3 cannot move to the deepest part of the groove 6 in which case the reciprocal interlocking of the bit and the connection ring cannot come loose either.

[0019] FIG. 5 shows another solution in which the restriction of the movement of the connection ring 2 is made with a help of a piece which piece is welded to the rear end of the connection ring before the welding of the casing pipe 4. The limiting piece can be welded to the bit 2 or to the casing pipe 4, too.

[0020] In the FIG. 6 there is a connection ring 2 with a little changed structure. During the installation the piece 8 has not yet been attached to the ring 2. The installation is easiest to do when the bit 1 rests on a base supported by spikes, that is it rests on its drilling surface. First the connection ring 2 is installed on top of the bit 1 and is let to drop down against the bit shoulder. After that the ring element 3 is simply dropped into the groove 6 between the bit 1 and the connection ring 2 because the connection ring 2 is drawn back at least partly at the location of the groove 6. After that the connection ring 2 is lifted a little bit upwards to the position of the FIG. 6 in

which case the locking piece **8** can be welded with a welding **9** to the connection ring **2** in order to limit its movement towards the clamp contact area of the bit **2**. In this solution the groove **6** of the bit **2** has a flat base.

1. A method for connecting a casing tube to a drill bit, the method comprising:

forming at an outer track of the bit an annular groove that circulates around the outer track;

utilizing a drill shoe to connect the casing tube to the bit at a front edge of the bit, wherein the drill shoe can be installed around the bit, and wherein the connection ring is attached both to the annular groove and to the casing tube in which case at the first stage of the installation either

a chopped ring element is installed into the groove located at the outer track of the bit at least partly or

the connection ring is installed on top of the ring bit to the destination point, and

wherein at a second stage of the installation

the connection ring is pushed around the bit so far that the ring element in the groove becomes strained at the same time into the groove existing at the inner surface of the connection ring in which case when the connection ring

is being moved, the ring element follows in the groove along the connection ring and slides in the groove of the bit such that movement of the ring elements to the deepest point of the groove is prohibited by adding a stopper to the structure, wherein the stopper restricts the movement of the connection ring or

the ring element is installed into the groove of the bit when the connection ring is drawn back on top of the bit in front of the bit at least partly away from the location of the groove after which the connection ring is moved on top of the bit backwards and a locking piece is welded to restrict the axial movement of the connection ring.

2. The method according to claim **1**, wherein a ring that becomes strained outwards from the groove towards a larger diameter measurement is used as a ring element.

3. The method according to claim **1**, further comprising: forming a flat base part into the groove on the surface of the bit covering a distance that is allowed to be the axial movement of the connection ring and the ring element.

4. The method according to claim **3**, further comprising: welding stoppers to their locations during installation.

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