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(57) **ABSTRACT**

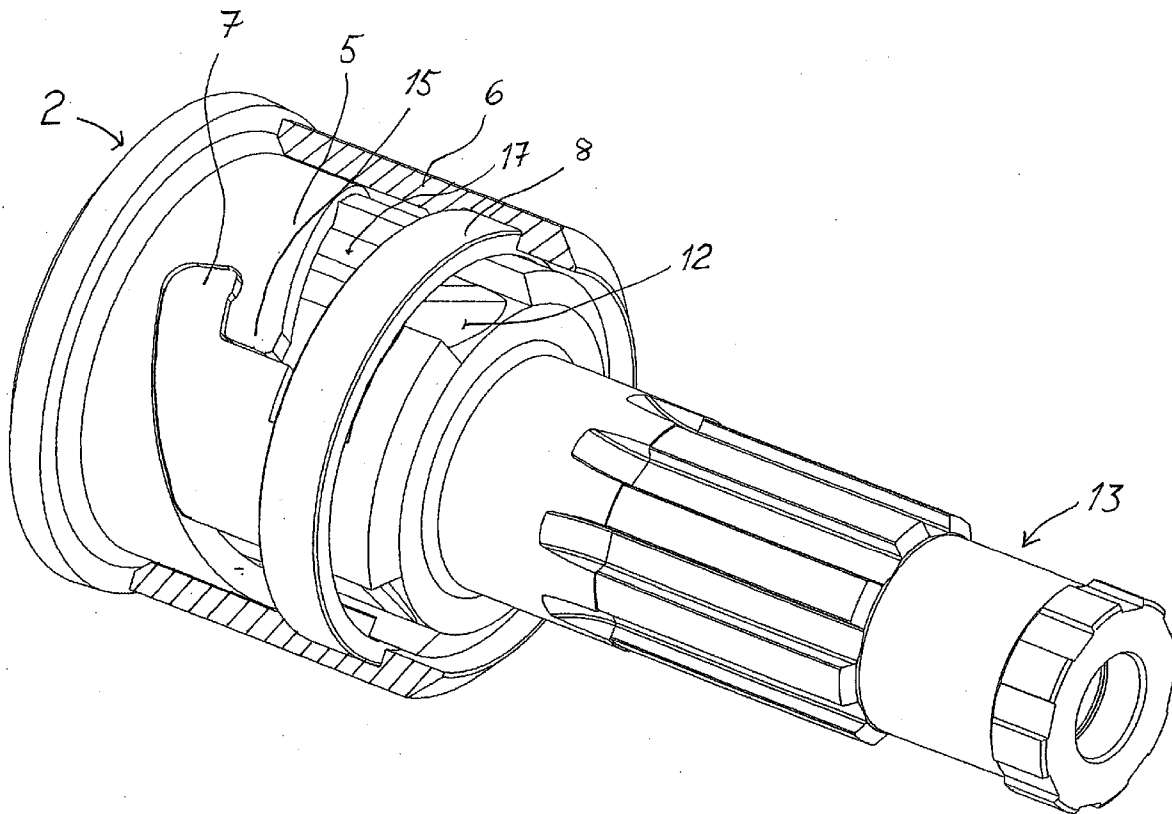
A bit assembly in a drilling apparatus working by hammering and for rotating said assembly comprising of a pilot bit (1), drilling the central part of the hole and a ring bit (2), fitted in connection with said pilot bit (1) and furnished with cylindrical inner surface drilling the outer surface of said hole, and further, between the pilot bit (1) and ring bit (2) a blocking arrangement of mutual rotation and axial movement, whereby opening of said blocking arrangement makes it possible to pull the pilot bit (5) off the hole, while ring bit (2) remains in the hole, and the bit assembly comprises a casing tube and its extension (6) and an interlocking system, which is through a ring-shaped device (8) from the extension (6) of the casing tube adapted to transfer pulling force from the pilot or ring bit to the casing tube extension (6) and said interlocking system can be opened in order to continue drilling with the ring and pilot bits (1, 2) when the casing tube remains in its place. That the ring like device (8) comprises parts directed to the inside, by means of which said device is permissively fitted to rotate into the traverse groove (10) on the outer surface of either the pilot or ring bit so that its motion is limited or blocked, in both axial directions.

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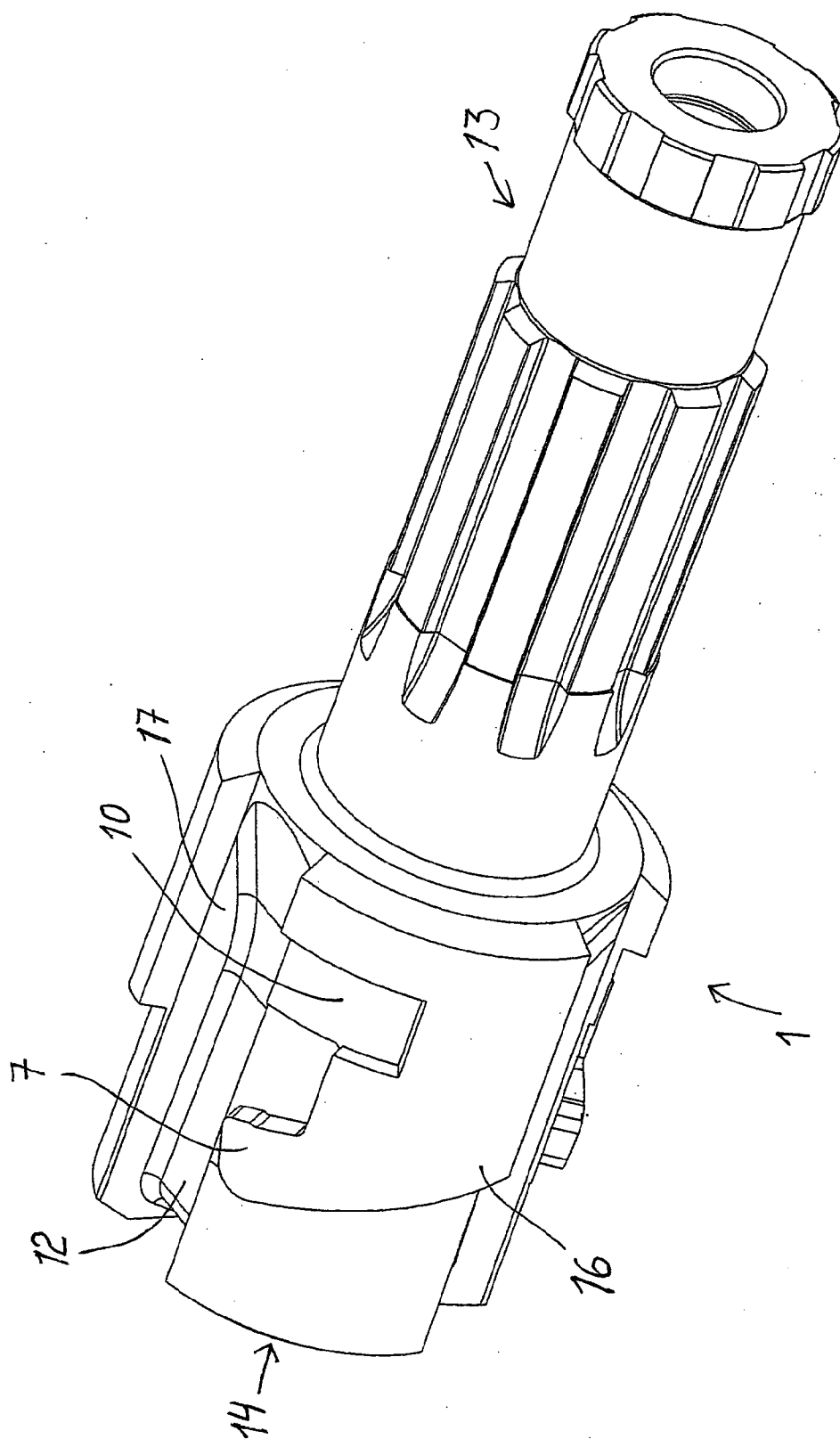


Fig. 1

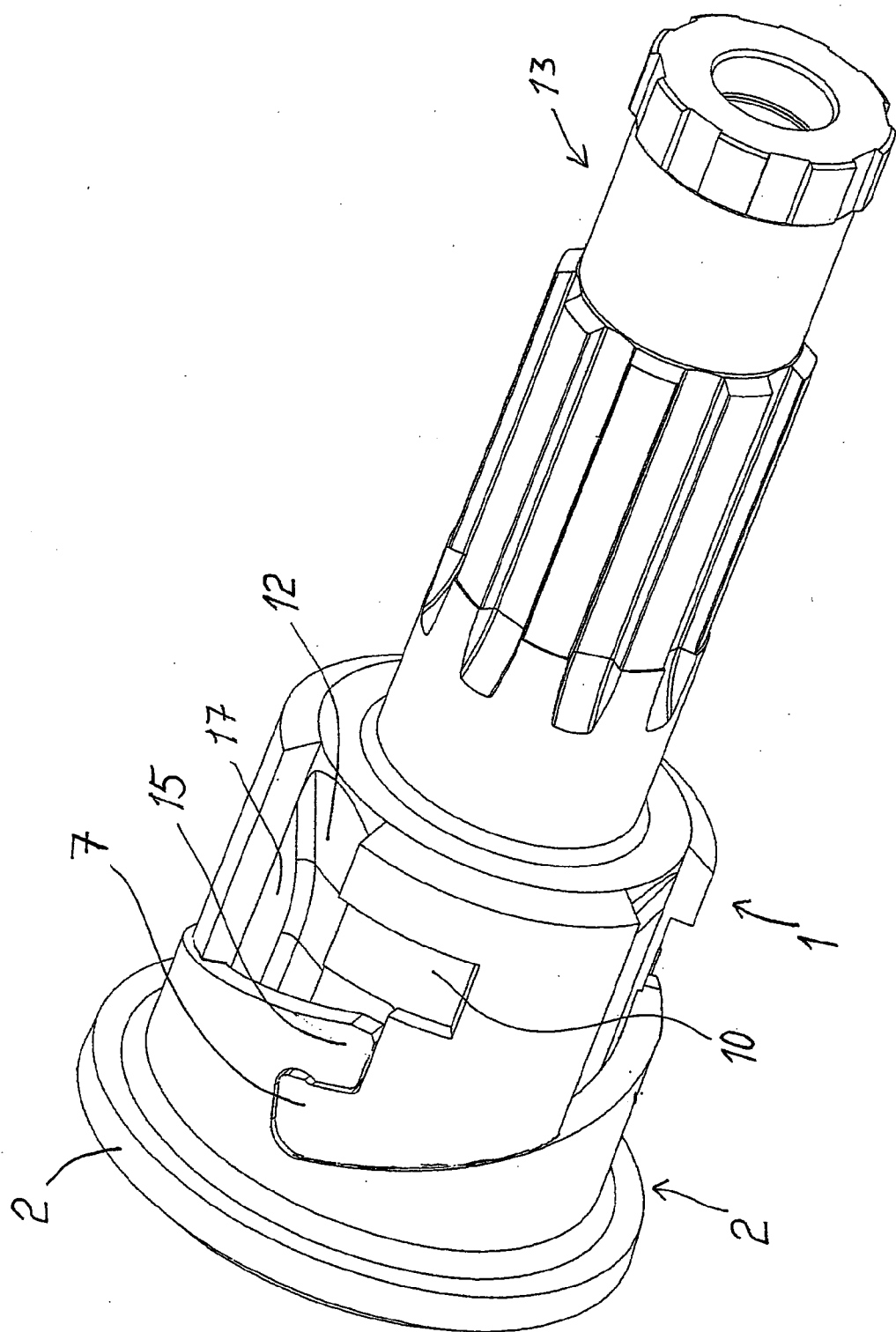


Fig. 2

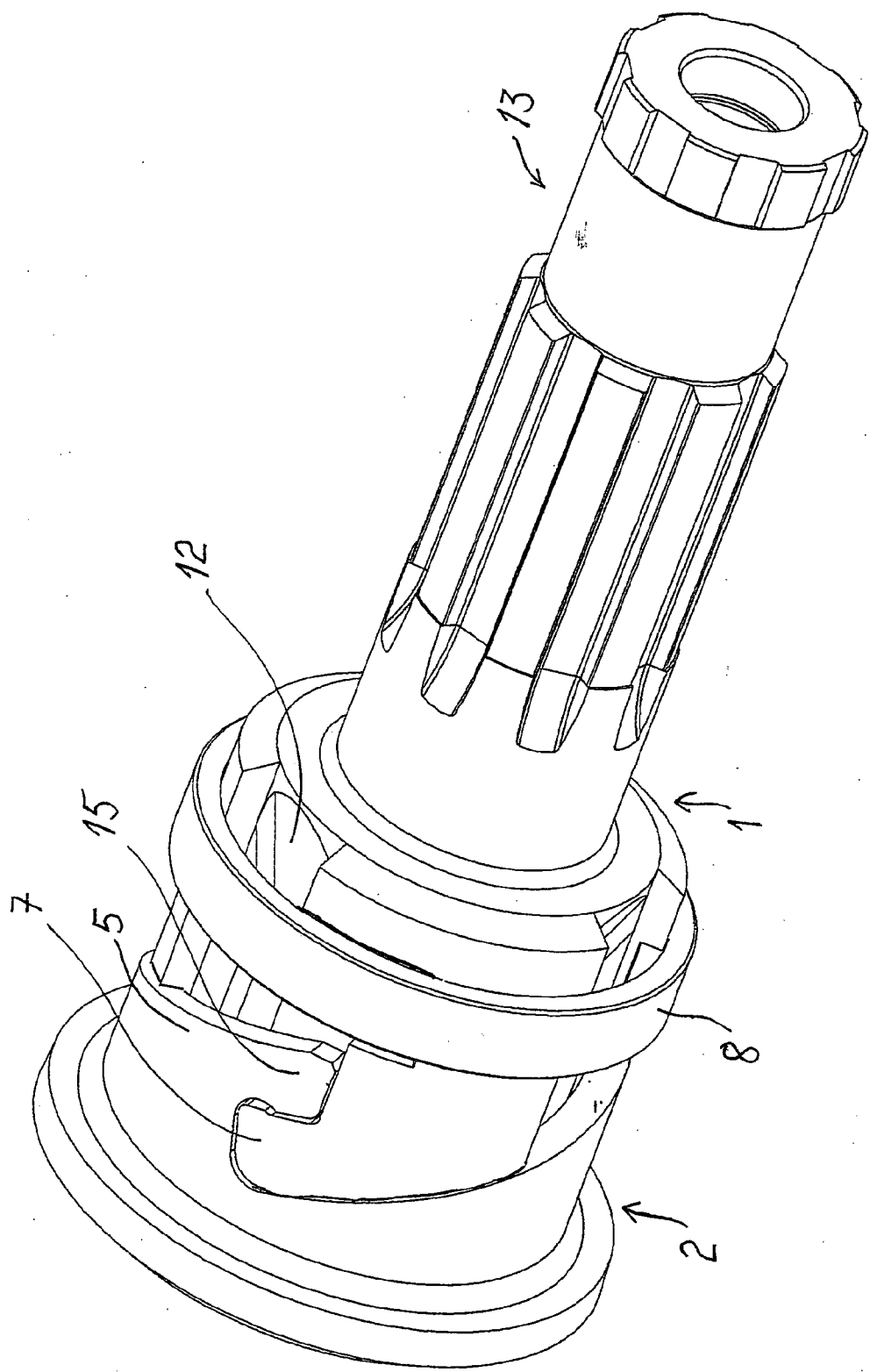


Fig. 3

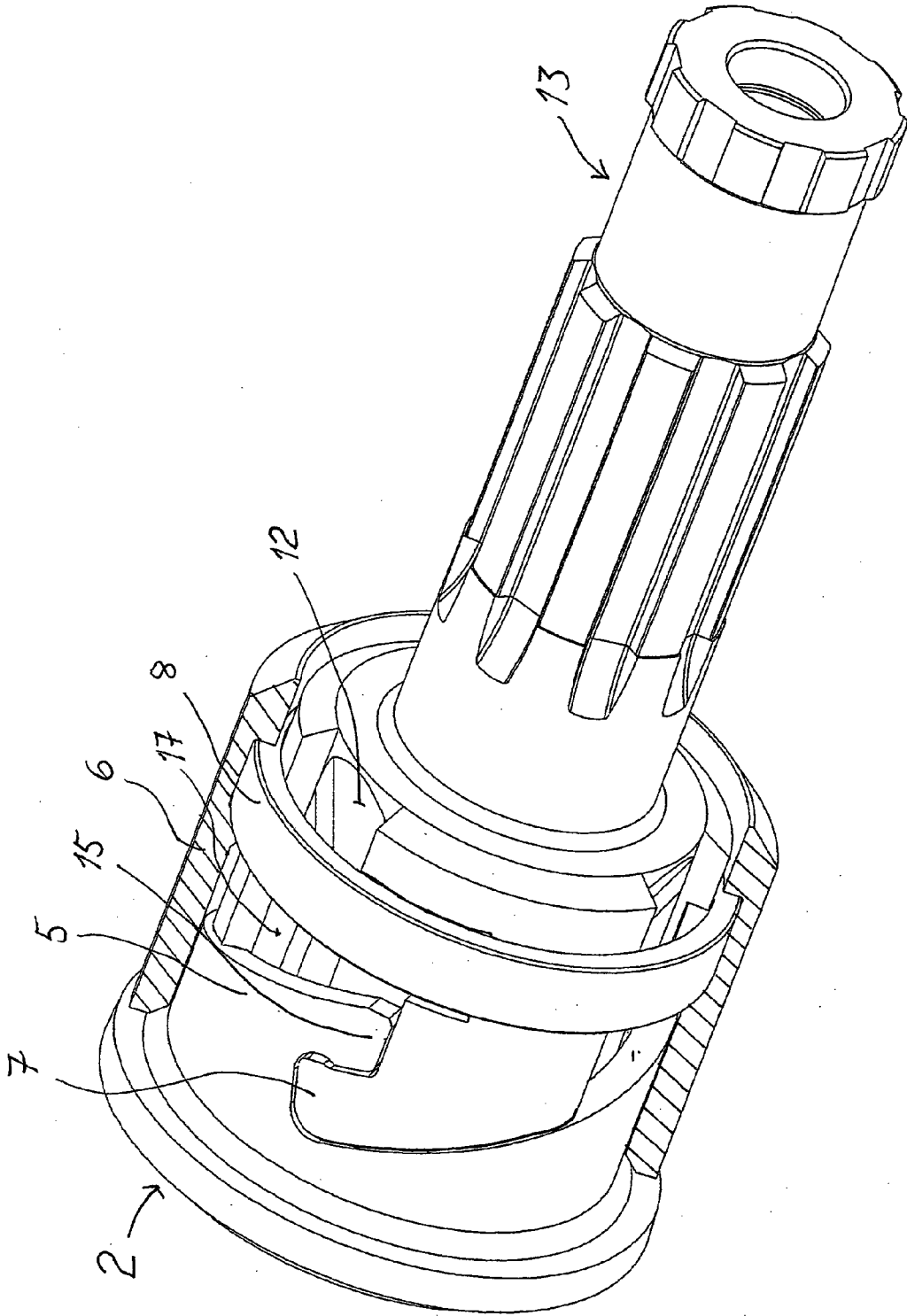


Fig. 4

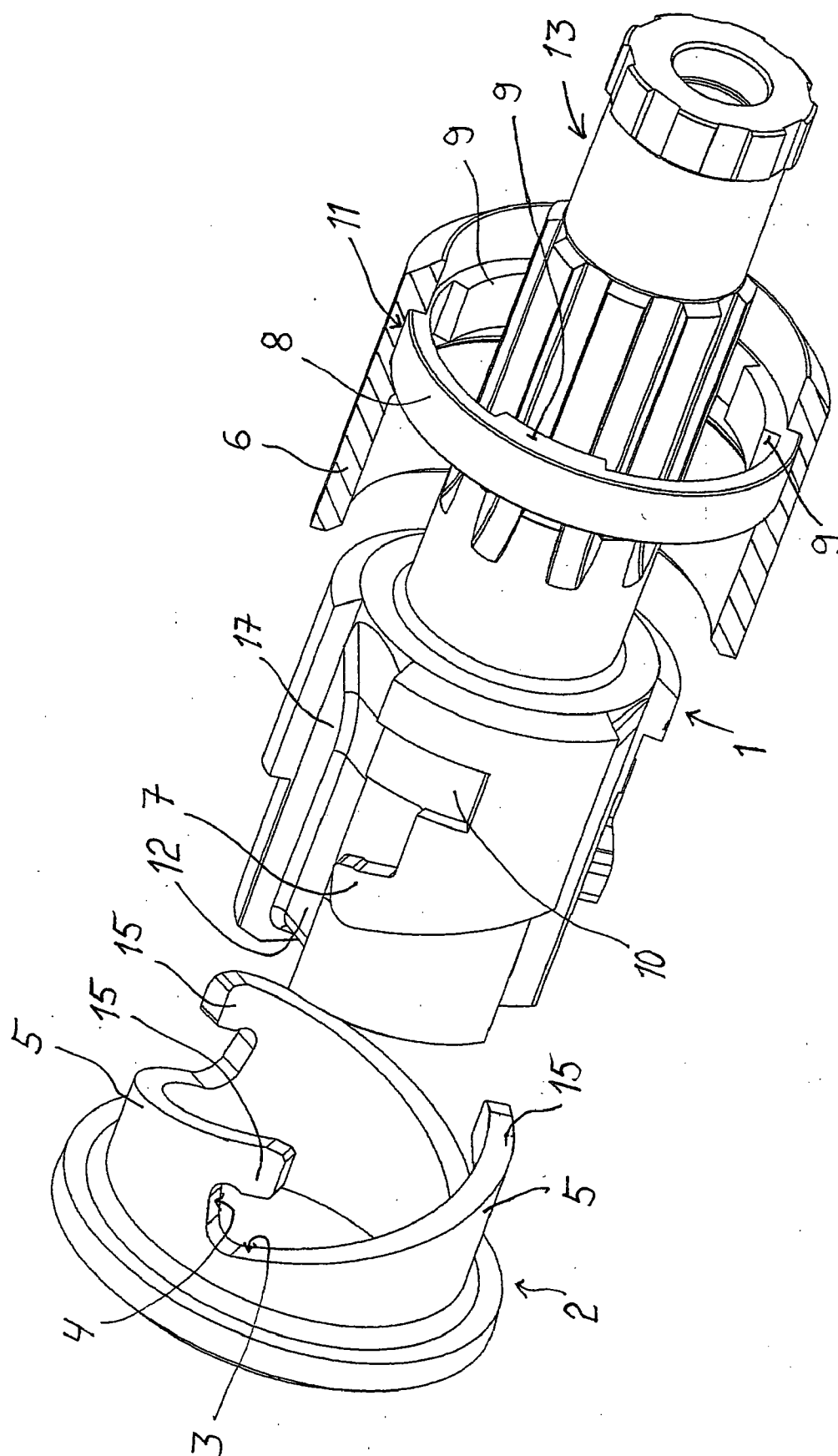


Fig. 5

BIT ASSEMBLY

[0001] The invention relates to a bit assembly in a drilling apparatus said apparatus working by hammering and/or rotating said assembly comprising of a pilot bit, drilling the central part of the hole and a ring bit fitted in connection with the said pilot bit and furnished with cylindrical inner surface drilling the outer surface of said hole, and further, between the pilot bit and the ring bit a blocking arrangement of mutual rotation and axial movement, whereby opening of said blocking arrangement makes it possible to pull the pilot bit off the hole, while the ring bit remains in the hole, and the bit assembly comprises a casing tube and its extension, and an interlocking system which is through a ring-shaped device from the extension of the casing tube adapted to transfer pulling force from the pilot or ring bit to the casing tube extension, and said interlocking system can be opened in order to continue drilling with the ring and pilot bits, when the casing tube remains in its place.

[0002] Previously known from publications WO2004/057148 is a drilling apparatus like the above presented comprising a pilot bit and a ring bit. However, with this solution it is not possible to continue drilling so that the protecting tube would be left in the drilled hole at wanted point.

[0003] From publication WO96/718798 it is known a drilling apparatus the casing tube and ring bit of which can be left in a drilled hole in the place wanted and drilling continued merely by the pilot bit, in other words by the middle bit. In this solution the diameter of the hole lessens essentially, when drilling is continued with the pilot bit only. In drilling made for anchorage the anchor bolt or cable sticks to this by continued drilling, this made smaller hole of its. The joint surface of anchorage is in this case formed smaller than which would be possible if the hole diameter would remain constant until the end of hole.

[0004] From publication EP 1144797 it is known a casing shoe most suitably fixed in the front edge of the casing tube by welding, which shoe is fixed around the ring bit by shrinking so that they can roll in regard to each other, but locked in axial direction. In the outer surface of the ring bit there must be a groove into which a ring like elevation part of the inner surface of the casing shoe is placed. A groove of this kind requires that the ring mantle of said ring bit of its wall thickness is enough for the groove.

[0005] From publication FI 98649 it is known a protecting tube release system, which has a ring that pulls the casing tube and can like bayonet-locking be locked on the outer surface of the pilot or the ring bit. On its inner surface the ring has grooves, and respectively there are elevation parts on the outer surface of the bit in order to produce mutual locking. In this solution the making of elevation parts on the cylindrical bit surface will be difficult. For instance, even on the pilot bit surface often formed flushing grooves are in this solution not utilized. In connection with the casing tube the tube extension is not used, but a cantilever ring, whereby the other axial direction remains unlocked. This results in difficulty, because if the casing tube is left too early in the hole the "finding" of it along again by means of the bits does not work, since the ring that pulls the casing tube cannot with the bit be returned into locking when it inside the casing tube escapes the bit.

[0006] In order to eliminate the disadvantages contained in the above presented solutions, and also to improve the technical effect of these solutions, a new bit assembly is devel-

oped, characteristic of which is that a ring like device comprises parts directed to the inside, by means of which said device is permissively fitted to rotate into the traverse groove on the outer surface of either the pilot or ring bit so that its motion is limited or blocked in both axial directions.

[0007] The advantage of the invention is that the casing tube, which during drilling is pulled into the hole can be left in the hole in the place wanted, for instance on hitting the rock, without pulling the drilling apparatus occasionally from the hole. When the pilot and also ring bits continue drilling without the casing tube therewith the diameter of the drilled hole remains unchanged. The ring bit which is often to be left in a finished hole, can for its part be made material saving, since the pulling system that pulls the casing tube into the hole comes in this solution around the pilot bit. When the casing tube is pulled by means of the pilot bit and not the ring bit the hammering surfaces between pilot and ring bits can be remarkably smaller in regard to former solutions, whereby the wall thickness of the pilot bit in its cylindrical portion can also be made smaller. On the other hand, the hammering faces between the ring like device according to the invention and the casing tube extension are easily made bigger, which extends the durability of the pilot bit. The ring like device can advantageously be locked on the pilot bit outer surface so that by locking at least apart of the flushing grooves or of the ring bit grooves on the pilot bit outer surface are utilized. This is possible, since according to the invention, the ring like device comprises on its inner surface elevating parts directed to the inside.

[0008] In the following the invention is closer disclosed with reference to the enclosed drawing, where

[0009] FIG. 1 presents a pilot bit of a drilling apparatus shown diagonally,

[0010] FIG. 2 presents a pilot bit of a drilling apparatus with a ring bit fitted in it,

[0011] FIG. 3 presents a drilling apparatus, where a ring like device that transmits pulling force to a casing tube is fitted for a pilot bit.

[0012] FIG. 4 presents a bit assembly of a drilling apparatus,

[0013] FIG. 5 presents parts of a bit assembly loose.

[0014] The FIG. 1 shows a pilot bit 1, comprising of a stem 13, a percussion face 14 furnished with bit buttons and a cylindrical portion 16, which has longitudinal grooves, such as flushing grooves 12 and grooves 17 lower than former ones intended for locking as well as transverse grooves 10 for locking. The front edge of the cylindrical portion 16 is as to its diameter a smaller cylindrical portion. The drill waste flushing grooves 12 are deeper than the longitudinal ones on the pilot bit surface.

[0015] FIG. 2 shows a ring bit 2 put in place around pilot bit 1. The parts like locking claws 7 and 15 are locking said bits 1 and 2 mutual unrotatable in one rotation direction and additionally mutual immovable in both axial directions.

[0016] FIG. 3 shows the ring like device 8 that transmits percussion or pulling force to the casing tube and is installed around the pilot bit 1. There are on the outer surface of the pilot bit longitudinal low grooves 17 as well as from them outgoing transverse grooves 10. On the inner surface of device belongs from the inner surface projecting parts 9, which are fitted to run in said longitudinal grooves 17 and further when hitting transverse grooves 10, so that device 8 adheres like a bayonet coupling around the pilot bit 1. Thus the device becomes also detachable from above the pilot bit 1.

[0017] FIG. 4 shows a section view of a casing extension 6 which is to be welded in the end of the casing tube, which is fixed around the ring like device, for instance by shrinking, whereby the shrinking joint is left loose so that mutual rotation is possible for the parts. However, they will in axial directions be locked to each other, but for them a small mutual clearance 5-10 mm in the axial direction is remained. The casing tube is not shown, but it is by a known way, for instance, fixed by welding fixed to the extension 6.

[0018] FIG. 5 shows the loose components according to the invented structure. For the inner projecting parts 9 of the ring like device 8 there are grooves 10 on the cylindrical portion of the pilot bit 1, into which grooves the parts 9 can be screwed by a small rotary motion of one of them. The pilot bit 1 can also be threaded through the device 8 in both directions. The ring bit 2 must always be left in the ending hole, if even the casing tube, inclusive its extension 6, is left in the hole.

[0019] In the figures there are presented the pulling arrangement of the casing tube from the pilot bit 1 by means of the ring like device 8 to the extension 6 of the casing tube. Said pulling can also be arranged by means of the said ring like device 8 from the outer surface of the ring bit 2 correspondingly to the extension 6 of the casing tube.

1. A bit assembly in a drilling apparatus working by hammering and/or rotating said assembly comprising of a pilot bit (1) drilling the central part of the hole and a ring bit (2), fitted in connection with said pilot bit (1) and furnished with cylindrical inner surface drilling the outer surface of said hole, and further, between the pilot bit (1) and ring bit (2) a blocking arrangement of mutual rotation and axial movement, whereby opening of said blocking arrangement makes it possible to pull the pilot bit (5) off the hole, while ring bit (2) remains in the hole, and the bit assembly comprises a casing

tube and its extension (6) and an interlocking system, which is through a ring-shaped device (8) from the extension (6) of the casing tube adapted to transfer pulling force from the pilot or ring bit to the casing tube extension (6) and said interlocking system can be opened in order to continue drilling with the ring and pilot bits (1, 2) when the casing tube remains in its place, characterized in that the ring like device (8) comprises parts directed to the inside, by means of which said device is permissively fitted to rotate into the traverse groove (10) on the outer surface of either the pilot or ring bit so that its motion is limited or blocked in both axial directions.

2. A bit assembly according to claim 1 characterized in that the ring like device (8) is in axial direction locked in the extension (6) of the casing tube as fitted in the ring like groove (11) that belongs to the inner surface of extension (6) so that it can rotate in said extension.

3. A bit assembly according to claim 1 characterized in that the extension (6) of the casing tube furnished with a ring like groove (11) is shrunk around the ring like device (8).

4. A bit assembly according to claim 1 characterized in that the pilot bit (1) or the ring bit (2) can by means of mutual rotation be opened off the ring like device (8) into position where it can be threaded through said device.

5. A bit assembly according to claim 1 characterized in that the ring like device (8) is in a way like bayonet coupling fixed in the traverse and ending grooves (10) in the outer surface of the pilot bit (1).

6. A bit assembly according to claim 1 characterized in that the longitudinal flushing groove (12) on the surface of the pilot bit (1) is deeper than the longitudinal interlocking grooves (17) and traverse grooves (10) on the pilot bit surface.

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