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(54) **DRILL COMPONENTS WITH IDENTIFICATION TAGS**

(57) A drill component for percussive drilling comprising: a forward end and a rearward end; at least one coupling section for coupling to another drill string com-

ponent or a processing tool; and a main body; characterized in that: the drill component further comprises at least one identification marker.

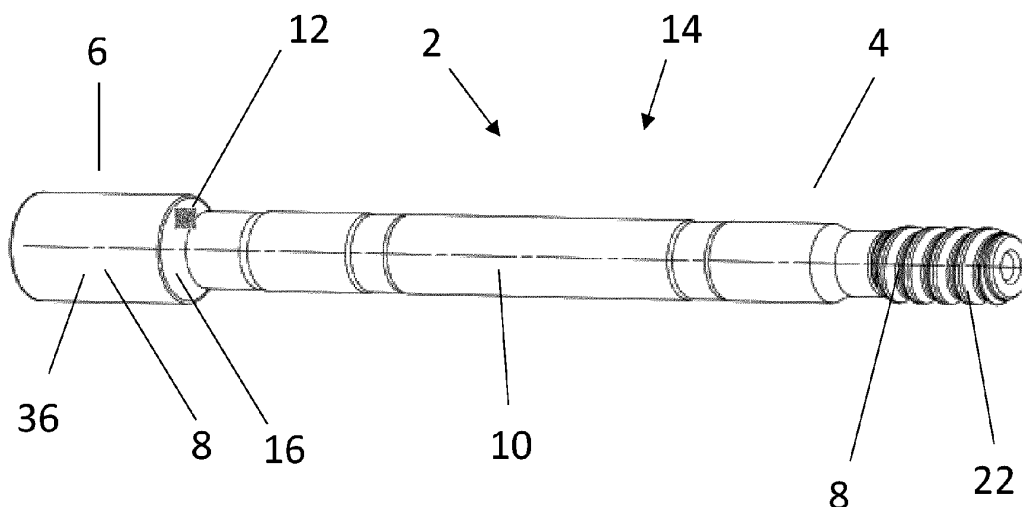


Fig 1

Description

Field of invention

[0001] The present invention relates to a drill component for percussive drilling having an identification tag.

Background art

[0002] Percussion drill bits are widely used both for drilling relatively shallow bores in hard rock and for creating deep boreholes wherein a drill string is employed. In 'top hammer drilling' a terrestrial machine is operative to transfer a combined impact and rotary drive motion to an upper end of the drill string. Whilst a drill bit which has a plurality of inserts or buttons, made from a hard material, mounted on its front face is positioned at the lower end is operative to crush the rock and form the boreholes. The cuttings resulting from the rock breaking action need to be removed so that the next impact will hit solid rock again and therefore break the new rock more efficiently than if the cuttings were still present. Therefore, a flushing media, such as water, is supplied from the drill string to the front face of the drill bit through flushing holes via a central flushing channel and returned through an annular space formed between the drill string and the hole. In down-the-hole (DTH) drilling the impact device is in the drill hole.

[0003] It is desirable to be able to identify drill components, in terms of serial number, of the component for efficient product tracking and enablement of recycling. It is further desirable to be able to track drilling parameters from specific drill bits for process improvement purposes. The current method of identifying drill string component is to attach a label with the product information on. The problem with this is that it easily comes detached during the drilling operation. Therefore, the problem to be solved is how to be able to identify drill string components in a way that will survive the steel wash and harsh drilling environment.

Summary of the Invention

[0004] It is an objective of the present invention to provide a drill component for percussive drilling comprising: a forward end and a rearward end; at least one coupling section for coupling to another drill string component or a processing tool; and a main body; characterized in that: the drill component further comprises at least one identification marker. Advantageously, this enables the identification of drill components to be maintained during operation, so that information about the product's drilling performance can be gained. Further, this enables easier recycling of components.

[0005] In one embodiment, the component is a drill rod or tube.

[0006] In one embodiment, the at least one identification marker is located between the main body and one

of the coupling sections. Advantageously, this area is less exposed to steel wash and wear and therefore the identification tag is more likely to survive the drilling operation.

[0007] In one embodiment, there is sloped surface positioned between the main body and the coupling section and the identification marker is positioned on the sloped surface. Advantageously, this area is less exposed to steel wash and wear and therefore the identification tag is more likely to survive the drilling operation.

[0008] In one embodiment, the identification marker is located towards the rearward end of the drill rod or tube. Advantageously, this area is less exposed to steel wash and wear and therefore the identification tag is more likely to survive the drilling operation.

[0009] In one embodiment the identification marker is located on at least one of the coupling sections. Preferably, if the identification tag is positioned on the coupling section it is located such that when the drill rod or tube is connected to another drill component or to a processing tool the identification is hidden and therefore unexposed and protected from steel wash. In other words, the identification marker is positioned on the coupling section where it is unexposed to the exterior of the drill component.

[0010] In one embodiment, the identification marker is located on at least one the coupling sections such that it is located in an interface between the coupling section and another drill component when the drill components are coupled together. Advantageously, the identification tag is then unexposed and protected from steel wash so that it is more likely to survive the drilling operation.

[0011] In one embodiment the coupling section comprises a chamfer that projects axially and radially inwardly from an endmost surface on one or more of the coupling sections and wherein the identification marker is located on the chamfer. Advantageously, the identification tag is then unexposed to steel wash and protected from being worn away when the drill component is connected to another drill component or a processing tool. Therefore, the identification marker has an increased chance of survival so that the information stored can still be read at the end of the drilling operation.

[0012] In one embodiment the coupling section is a male coupling section comprising a non-threaded section and a threaded section, wherein the non-threaded section is positioned between the threaded section and the main body and wherein the identification marker is positioned on the non-threaded section of the coupling section. Advantageously, the identification tag is then unexposed to steel wash and protected from being worn away when the drill component is connected to another drill component or a processing tool. Therefore, the identification tag has an increased chance of survival so that the information stored can still be read at the end of the drilling operation.

[0013] In another embodiment the component is a shank adapter comprising a machine section and a spline

section.

[0014] In one embodiment the identification marker is located between the machine section and the spline section. Advantageously, this area is less exposed to steel wash and therefore the identification marker is more likely to survive the drilling operation.

[0015] In one embodiment, the shank adapter further comprises a radially projecting shoulder on the rearward end of the shank adapter and wherein the identification marker is located on the forward side of the shoulder. Advantageously, this area is less exposed to steel wash and therefore the identification marker is more likely to survive the drilling operation.

[0016] In one embodiment, the identification marker is located on the coupling section of the shank adapter. Advantageously, this area is less exposed to steel wash and therefore the identification marker is more likely to survive the drilling operation.

[0017] In one embodiment the coupling section comprises a chamfer that projects axially and radially inwardly from an endmost surface on the coupling section and wherein the identification marker is located on the chamfer. Advantageously, this area is unexposed to steel wash and therefore the identification marker is more likely to survive the drilling operation.

[0018] In one embodiment the coupling section is a male coupling section comprising a non-threaded section and a threaded section, wherein the non-threaded section is positioned between the threaded section and the machine section and wherein the identification marker is positioned on the non-threaded section of the coupling section.

[0019] In another embodiment the component is a hammer for down the hole drilling.

[0020] In one embodiment the identification marker is a radio frequency identification (RFID) tag.

[0021] In another embodiment the identification marker is encoded with one-dimensional or two-dimensional optical machine-readable code.

Brief description of drawings

[0022] A specific implementation of the present invention will now be described, by way of example only, and with reference to the accompanying drawings in which:

Figure 1 is a schematic drawing of an MF rod.

Figure 2 is a schematic drawing of a drifter rod.

Figure 3 is a schematic drawing of a drill tube.

Figure 4 is a schematic drawing of a drifter male / male rod showing the chamfer on the male coupling section.

Figure 5 is a schematic drawing of a drill rod comprising a shoulder.

Figure 6 is a schematic drawing of a shank adapter.

Figure 7 is a schematic drawing of a shank adapter with a shoulder.

Figure 8a is a schematic drawing of the top view of an endmost surface.

Figure 8b is a schematic drawing of the side view of the endmost surface having an indentation.

Detailed description

[0023] Figure 1 shows a drill component 2 for percussive drilling, comprising a forward end 4 and a rearward end 6; at least one coupling section 8 for coupling to another drill string component (not shown) or a processing tool (not shown); a main body 10 and at least one identification marker 12. The rearward end 6 is the end of the drill component 2 is located nearer to the hammer or drifter when in operation. The forward end 4 is the end of the drill component 2 that is nearer to the processing tool when in operation. The drill component 2 may have one or two coupling sections 8. If the drill component 2 has two coupling sections 8 then they could either be one male coupling section 22 and one female coupling section 36 as shown in figure 1, or both be female coupling sections 36, or both be male coupling sections 22. The drill component could be a drill rod or tube 14. Preferably, the identification marker 12, otherwise known as a tag, is positioned in a location on the drill component 2 that is less exposed to steel wash.

[0024] Figure 1 shows an example where the drill component 2 is an MF rods 14 having one male coupling section 22 and one female coupling section 36.

[0025] Figure 2 shows an example where the drill component 2 is a drifter rod 14 having two male coupling sections 22.

[0026] Figure 3 shows an example of where the drill component 2 is a tube 14 having one male coupling section 22 and one female coupling section 36.

[0027] Figures 1 and 2 show an embodiment of the invention wherein the at least one identification marker 12 is located between the main body 10 and one of the coupling sections (8).

[0028] Preferably, there is sloped surface 16 positioned between the main body 10 and one of the coupling sections 8 and the identification marker 12 is positioned on the sloped surface 16.

[0029] In one embodiment, the identification marker 12 is located towards the rearward end 6 of the drill rod or tube 14. In other words, the identification marker 12 is located in proximity to the rearward end 6 of the drill rod or tube 14. For example, the identification marker 12 could be positioned on the sloped surface 16 positioned in between the main body 10 and the coupling section 8 on the rearward end 6.

[0030] Figure 3 shows an alternative embodiment

wherein the identification marker 12 is located on at least one of the coupling sections 8. Preferably, if the identification marker 12 is positioned on the coupling section 8 such that when the drill rod or tube 14 is connected to another drill component or to a processing tool the identification marker 12 is hidden and therefore unexposed and protected from steel wash. In other words, the identification marker 12 is positioned on the coupling section where it is unexposed to the exterior of the drill component when it is coupled to another part. In one embodiment the identification marker 12 is located on at least one of the coupling sections 8 such that it is located in an interface between the coupling section 8 and another drill component 2, which could be a second drill rod or tube 14, a shank adapter 28, a hammer or other drill component when the drill components 2 are coupled together.

[0031] In one embodiment the coupling section 8 is a male coupling section 22 comprising a non-threaded section 24 and a threaded section 26, wherein the non-threaded section 24 is positioned between the threaded section 26 and the main body 10 and wherein the identification marker 12 is positioned on the non-threaded section 24 of the coupling section 8 as shown in figure 3. Alternatively, the coupling section 8 could be a tapered section and the identification marker 12 could be positioned on the tapered section such the identification marker 12 becomes unexposed to the exterior of the drill component 2 when coupled to either another drill component or a processing tool. If instead the identification marker 12 is located on a female coupling 36, the identification tag would be located internally such that it is hidden once coupling to a male coupling section 22.

[0032] Figure 4 shows two embodiments, one wherein the coupling section 8 comprises a chamfer 18 that projects axially and radially inwardly from an endmost surface 20 on one or more of the coupling sections 8 and wherein the identification marker 12 is located on the chamfer 18. The other embodiment shown in Figure 4 is that the identification marker 12 is located on the endmost surface of the coupling section 8. As will be understood, the locations of the identification markers 12 can be similarly placed on the endmost surface a female coupling section.

[0033] Figure 5 shows an embodiment wherein there is a shoulder 34 positioned between one of the coupling sections 8 and the main section 10; and the identification tag 12 is located between the shoulder 34 and the coupling section 8.

[0034] In one embodiment, the drill rod or tube 14 comprises at least two identification markers 12. These two or more identification markers 12 could be positioned in any combination of the locations detailed hereinabove or hereinafter. Advantageously, having more than one identification marker 12 increases the chance that at least one of the identification markers 12 is readable after the drilling operation.

[0035] In one embodiment, the drill rod or tube 14 comprises one coupling section 8 on each end, and one identification

marker 12 is positioned on each coupling section 8 or between each coupling section 8 and the main body 10.

[0036] Figures 6 shows an alternative embodiment wherein the component 2 is a shank adapter 28 comprising a machine section 30, a spline section 32 and a coupling section 8'. The spline section 32 is located on the forward end 4 of the shank adapter 28. The shank adapter may have either a male or female coupling end 8'.

[0037] In one embodiment the identification marker 12 is located between the machine section 30 and the spline section 32 and / or between the machine section 32 and the coupling section 8'. Preferably, there is a sloped surface sloped surface 16' positioned between the machine section 30 and spline section 32 and the identification tag 12 is positioned on the sloped surface 16'.

[0038] Figure 7 shows another embodiment, wherein there is optionally, the shank adapter 28 further comprising a radially projecting shoulder 34' on rearward end 6 of the shank adapter 28. The identification marker 12 could be located on the shoulder 34', either on the forward side 4 or the rearward side 6, or it can be located adjacent to the shoulder 34', on either the forward side 4 or the rearward side 6.

[0039] In another embodiment, the identification marker 12 is located on the coupling section 8'. Preferably, if the identification marker 12 is positioned on the coupling section 8' it is located such that when the shank adapter 28 is connected to another drill component or a processing tool the identification marker 12 is hidden and therefore unexposed and protected from steel wash. In other words, the identification marker is positioned on the coupling section where it is unexposed to the exterior of the drill component. In one embodiment, the identification marker 12 is located on the coupling section 8' such that it is located in an interface between the coupling section 8 and another drill component 2 when the drill components 2 are coupled together.

[0040] In another embodiment the coupling section 8' of the shank adapter 28 comprises a chamfer 18' that projects axially and radially inwardly from an endmost surface 20' on the coupling section 8' and wherein the identification marker 12 is located on at least one of the chamfers 18'.

[0041] In another embodiment the coupling section 8' of the shank adapter 28 is a male coupling section comprising a non-threaded section and a threaded section, wherein the non-threaded section is positioned between the threaded section and the machine section 30 and wherein the identification marker 12 is positioned on the non-threaded section of the coupling section 8'. Optionally, the shank adapter 28 comprises a shoulder 34' and the identification marker 12 is located between the shoulder 34' and the coupling section 8.

[0042] In one embodiment, the shank adapter 28 comprises at least two identification markers 12. These two or more identification markers 12 could be positioned in any combination of the locations detailed hereinabove or

hereinafter. Advantageously, having more than one identification marker 12 increases the chance that at least one of the identification markers 12 is readable after the drilling operation.

[0043] Figure 8A shows a top view of an endmost surface 20" of a coupling section, wherein an identification marker is positioned 12 on the endmost surface 20", like one of the embodiments described in connection with Figure 4. The endmost surface 20" may be the endmost surface of any type of coupling section, including a male or a female coupling section.

[0044] In some embodiments, the identification marker 12 may be located in an indentation 25, adapted for having the identification marker 12 positioned therein. This is shown in Figure 8B, showing a side view of the endmost surface 20" shown in Figure 8A, comprising the indentation 25. As will be understood, even though the example in Figure 8B shows an indentation on an endmost surface 20", the identification marker 12 can be located in an indentation in all of the embodiments described herein.

[0045] In some embodiments, the depth, and/or the length, and/or the width of the indentation 25 is dimensioned based on the depth, and/or the length, and/or the width of the identification marker 12. In some embodiments, the depth, and/or the length, and/or the width of the indentation 25 is approximately the same, or slightly larger, than the depth, and/or the length, and/or the width of the identification marker 12.

[0046] In another embodiment the component 2 is a hammer for down the hole drilling. The identification marker 12 is located in a position on the DTH hammer that is least exposed to wear.

[0047] In another embodiment the component 2 is a drill bit. The identification marker 12 is positioned in an area that is least exposed to wear. For example, on the chamfer 18 of the coupling section 8, on the endmost surface 20" or in an indentation 25 on the endmost surface 20".

[0048] In one embodiment the identification marker 12 is a radio frequency identification (RFID) tag.

[0049] In another embodiment the identification marker 12 is encoded with one-dimensional or two-dimensional optical machine readable code. The identification marker 12 could be for example, but not limited to, a Quick Response (QR) code, a High Capacity Colored Two Dimensional Code, a European Article Number code, a DataMatrix code, or a MaxiCode.

[0050] Preferably, the identification marker 12 is a DataMatrix code. A data matrix code is a two-dimensional bar code which may be in the form of a square or rectangular symbol made up of individual modules of predetermined size in the form of dots or squares. The individual modules form an ordered grid of contrasting (e.g. dark or light) modules, bordered by a finder pattern used to specify the orientation and structure of the symbol. The identification tag can in this case be used to store information about a very large amount of individual sintered bodies, depending on the size of the data matrix code.

The size may typically be 12x12 modules, or larger depending on needs. In an error correction algorithm, several damaged or blurred modules can be corrected for. Advantageously if a data matrix code is used more information can be stored in a smaller area. Further, only approximately 32-72% of the data matrix code needs to be intact in order for the information to be read, therefore even if the data matrix code is slightly damaged the information can still be read. It may be preferable that the ID tag used has an industry standard associated with it.

[0051] If the identification marker 12 is in the form of one-dimensional or two-dimensional optical machine readable code it could be laser engraved on or it could be etched, impressed, imprinted or painted on or added using any other suitable method.

Claims

1. A drill component (2) for percussive drilling comprising:
 - a forward end (4) and a rearward end (4);
 - at least one coupling section (8) for coupling to another drill component (2) or a processing tool; and
 - a main body (10);
 - characterized in that:**
 - the drill component (2) further comprises at least one identification marker (12).
2. The drill component (2) according to claim 1 wherein the drill component (2) is a drill rod or tube (14).
3. The drill component (2) according to any of the previous claims wherein the at least one identification marker (12) is located between the main body (10) and one of the coupling sections (8).
4. The drill component (2) according any of the previous claims where there is sloped surface (16) positioned between the main body (10) and the coupling section (8) and the identification marker (12) is positioned on the sloped surface (16).
5. The drill component (2) according to any of the previous claims wherein the identification marker (12) is located towards the rearward end (6) of the drill rod or tube (14).
6. The drill component (2) according to any of the previous claims wherein the identification marker (12) is located on at least one of the coupling sections (8).
7. The drill component (2) according to any of the previous claims wherein the identification marker (12) is located on at least one the coupling sections (8) such that it located in an interface between the cou-

pling section (8) and another drill component (2) when the drill components (2) are coupled together.

8. The drill component (2) according to any of the previous claims wherein the coupling section (8) comprises a chamfer (18) that projects axially and radially inwardly from an endmost surface (20) on one or more of the coupling sections (8) and wherein the identification marker (12) is located on the chamfer (18). 5 10
9. The drill component (2) according to any of the previous claims wherein the coupling section (8) is a male coupling section (22) comprising a non-threaded section (24) and a threaded section (26), wherein the non-threaded section (24) is positioned between the threaded section (26) and the main body (10) and wherein the identification marker (12) is positioned on the non-threaded section (24) of the coupling section (8). 15 20
10. The drill component (2) according to claim 1 wherein the drill component (2) is a shank adapter (28) comprising a machine section (30) and a spline section (32). 25
11. The drill component (2) according to claim 10 wherein the identification marker (12) is located between the machine section (30) and the spline section (32). 30
12. The drill component (2) according to claim 10 or 11 further comprising a radially projecting shoulder (34') and wherein the identification marker (12) is located on the shoulder (34'). 35
13. The drill component (2) according to any of claims 10-12 wherein the identification marker (12) is located on the coupling section (8').
14. The drill component (2) according to any of claims 10-13 wherein the coupling section (8') comprises a chamfer (18') that projects axially and radially inwardly from an endmost surface (20') on the coupling sections (8) and wherein the identification marker (12) is located on the chamfer (18'). 40 45
15. The drill component (2) according to any of claims 10-14 wherein the coupling section (8) is a male coupling section (22') comprising a non-threaded section (24') and a threaded section (26'), wherein the non-threaded section (24') is positioned between the threaded section (26') and the machine section (30') and wherein the identification marker (12) is positioned on the non-threaded section (24') of the coupling section (8). 50 55
16. The drill component (2) according to claim 1 wherein the component (2) is a hammer for down the hole

drilling or a drill bit.

17. The drill component (2) according to any one of the previous claims, wherein the identification marker (12) is located in an indentation (25) adapted for having the identification marker (12) therein.

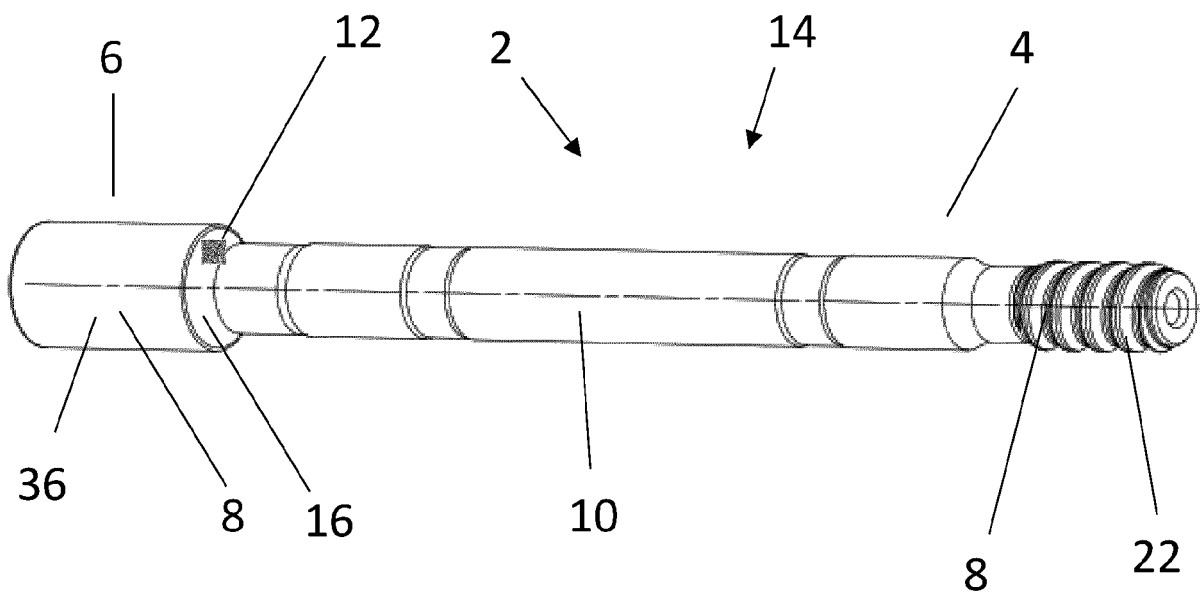


Fig 1

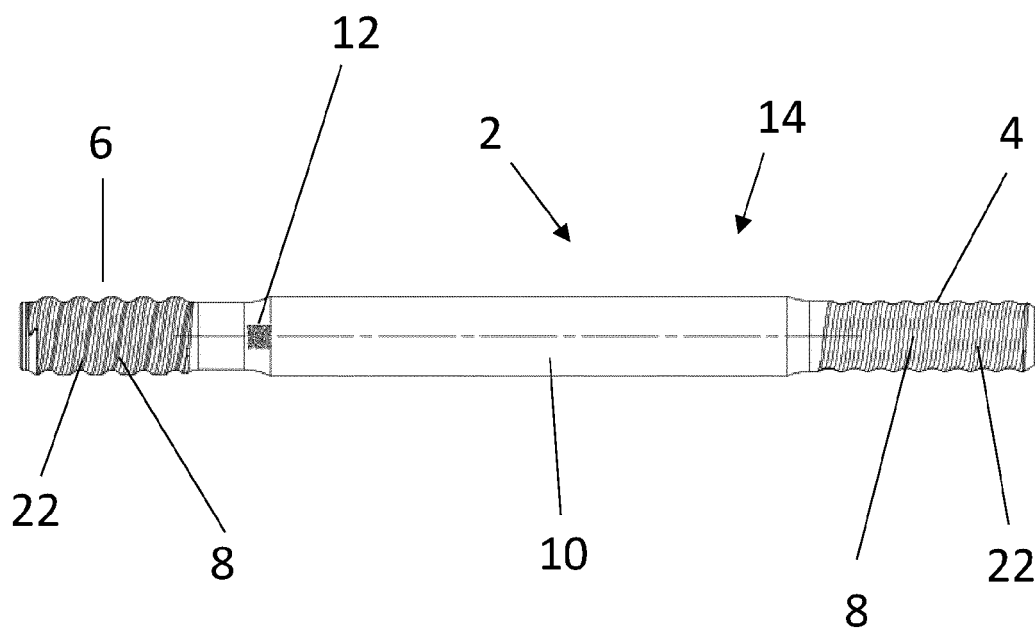


Fig 2

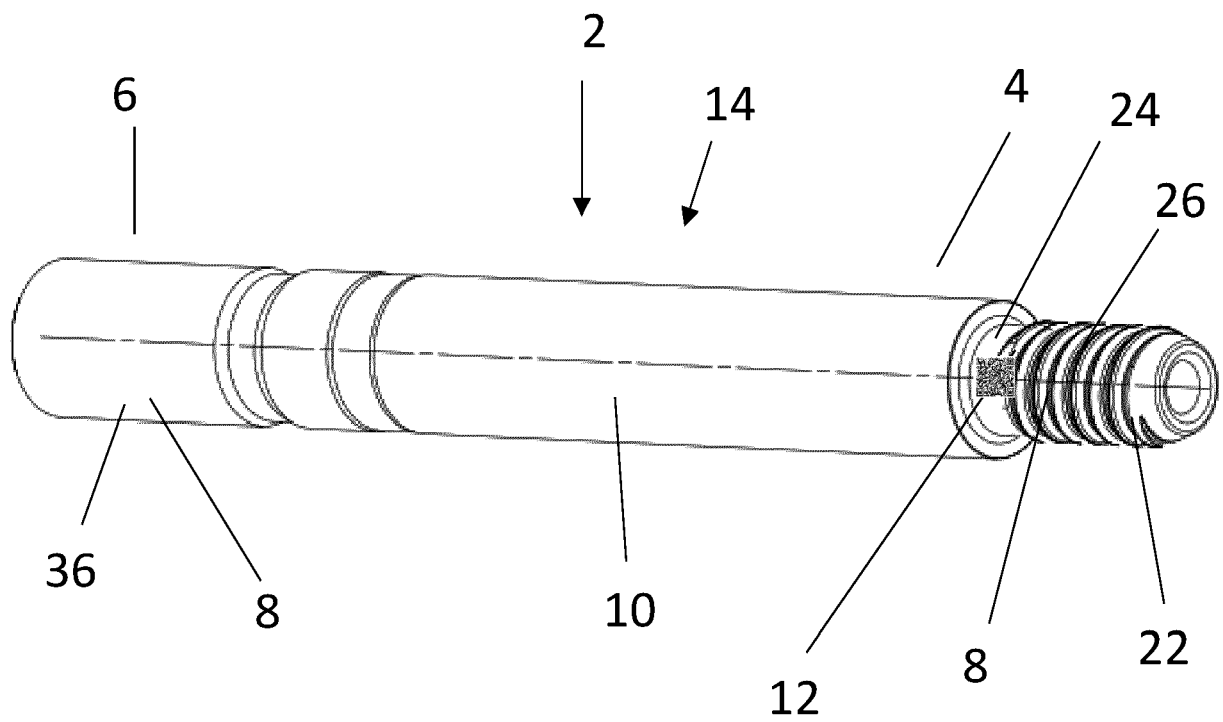


Fig 3

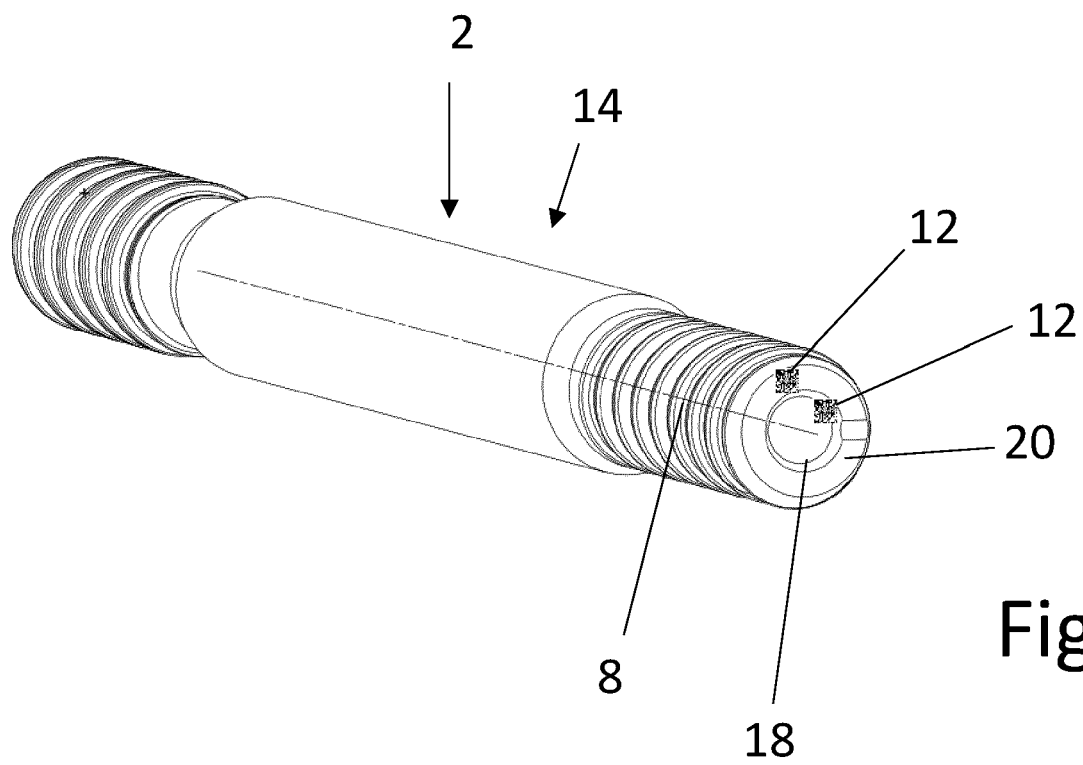


Fig 4

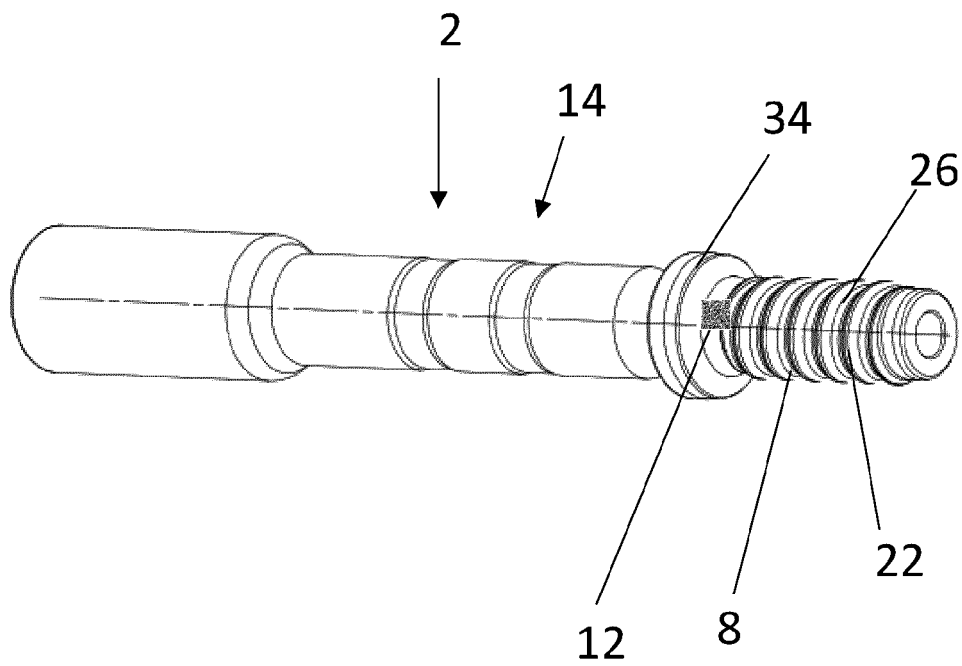


Fig 5

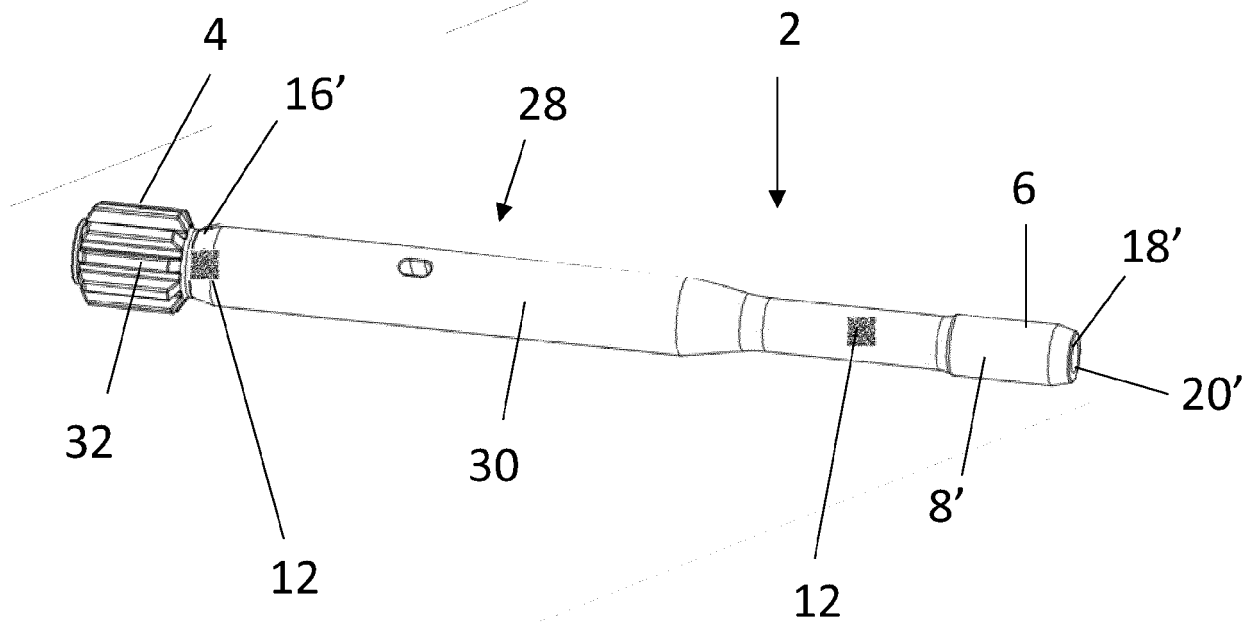
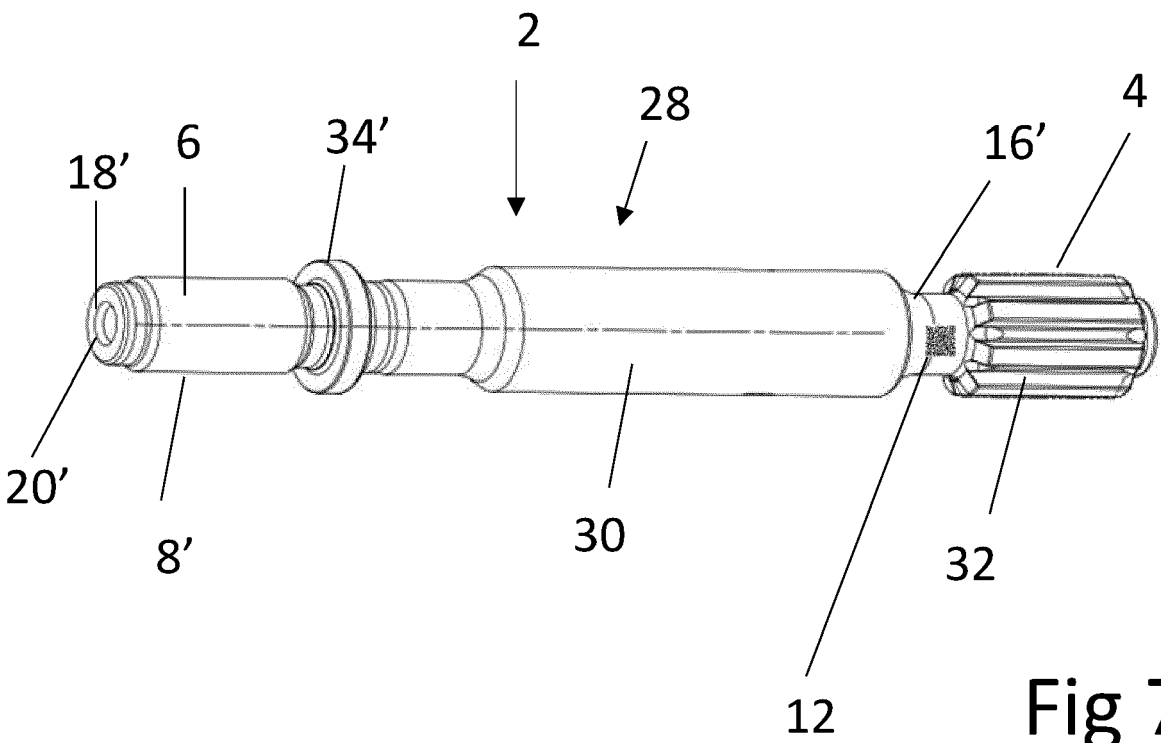


Fig 6



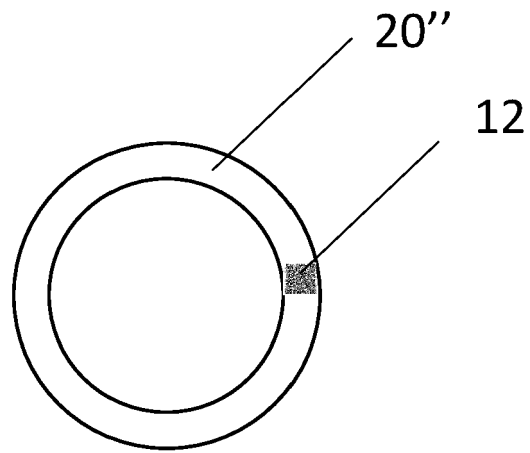


Fig 8A

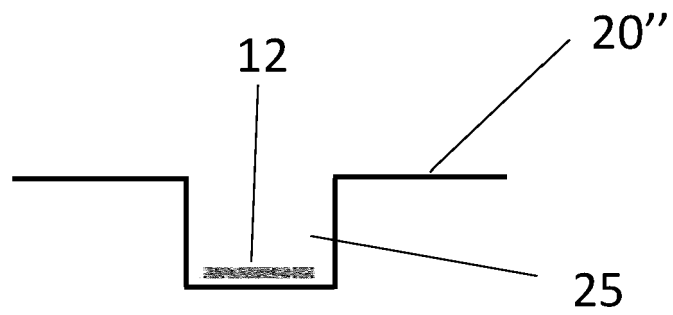


Fig 8B



EUROPEAN SEARCH REPORT

Application Number

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EPO FORM 1503 03.82 (P04C01)

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CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

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