

(19) **DANMARK**

(10) **DK/EP 3587705 T3**



Patent- og
Varemærkestyrelsen

(12) **Oversættelse af
europæisk patentskrift**

-
- (51) Int.Cl.: **E 04 G 17/065 (2006.01)** **F 16 B 5/10 (2006.01)** **F 16 B 21/02 (2006.01)**
- (45) Oversættelsen bekendtgjort den: **2021-10-18**
- (80) Dato for Den Europæiske Patentmyndigheds bekendtgørelse om meddelelse af patentet: **2021-09-08**
- (86) Europæisk ansøgning nr.: **18382460.6**
- (86) Europæisk indleveringsdag: **2018-06-22**
- (87) Den europæiske ansøgnings publiceringsdag: **2020-01-01**
- (84) Designerede stater: **AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR**
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- (54) Benævnelse: **LODRET FORSKALLING**
- (56) Fremdragne publikationer:
WO-A1-2016/026812
WO-A1-2017/216355
WO-A1-2018/137728
US-B2- 9 803 383

DESCRIPTION

TECHNICAL FIELD

[0001] The present invention relates to vertical formworks.

PRIOR ART

[0002] The use of vertical formworks for building vertical structures, such as walls for example, is known.

[0003] A vertical formwork comprises a front formwork panel and a rear formwork panel arranged facing one another. Both formwork panels are fixed to one another by means of a tie rod, a front anchor fixed to the front formwork panel and to a first end of the tie rod, and a rear anchor fixed to the rear formwork panel and to a second end of the tie rod.

[0004] WO2016/026812A1 describes a vertical formwork configured for being adjusted from one face, i.e., a vertical formwork which is fixed by a single operator from the side of the front formwork panel.

[0005] The front anchor described in WO2016/026812A1 comprises a nut configured for being screwed onto a first end of the tie rod, and a sleeve configured for being introduced in a through housing of the front formwork panel. Said sleeve has a truncated cone shaped through hole configured to be crossed by the tie rod, and which allows the tie rod to swivel inside the sleeve. The front formwork panel further comprises fixing means configured for fixing the sleeve to the front formwork panel.

[0006] The vertical formwork further comprises a spacing tube crossed by the tie rod, and which is arranged between both formwork panels in the final assembly position. The spacing tube comprises a conical-shaped sealing element at each of its ends which prevents the concrete from leaking into the sleeve once the concrete has been poured between both formwork panels.

[0007] The vertical formwork described in WO2016/026812A1 allows the adjusting thereof from a face, for which purpose the operator positions himself facing the front formwork panel and introduces the threaded tie rod through the through housing of said front formwork panel. The spacing tube comprising a conical-shaped sealing element at each of its ends, the sleeve and the nut, are arranged in that order on the tie rod. The operator introduces all the elements and fixes the sleeve to the front formwork panel by means of using the fixing means. The operator then screws the tie rod onto the rear anchor, and finally screws the nut of the front anchor on to fix the tie rod to the front formwork panel. The sleeve acts as a stop element of

the spacing tube in the final assembly position.

[0008] WO2017216355A1 describes an anchor for a vertical formwork. The vertical formwork comprises two formwork panels facing one another, and the anchor is suitable for being fixed to one of the formwork panels. The anchor comprises a housing for receiving a part of a tie rod which is threaded at its two end sections and fixes the two formwork panels, and sealing means configured for sealing the anchor with respect to the formwork panel in which it is fixed, and with respect to the tie rod housed in the housing of the anchor. The sealing means comprise a sealing element which is arranged at one end of the anchor and which is configured for sealing, when the anchor is fixed to the respective formwork panel, both the anchor with respect to the formwork panel in which it is fixed and the anchor with respect to the tie rod housed in the housing of the anchor. The sealing element comprises a sealing ring which comprises an outer wall configured to be supported against the formwork panel, and an end ring configured to be supported against the tie rod housed in the anchor, such that the anchor is sealed with respect to the tie rod.

[0009] US9803383B2 describes a formwork anchor with an anchor rod and a first formwork anchor receptacle as well as with a second formwork anchor receptacle. Both formwork anchor receptacles comprise a cylindrical section with an opening for insertion of the anchor rod, as well as a spherical section which has a convex-curved outer surface. The anchor rod is threaded at its end sections. The first formwork anchor receptacle can be attached to a first end of the anchor rod and the second formwork anchor receptacle can be attached to a second end of the anchor rod. The second formwork anchor receptacle has an internal thread in at least a section of the opening, which has a pitch other than that of an internal thread of the first formwork anchor receptacle.

DISCLOSURE OF THE INVENTION

[0010] The object of the invention is to provide a vertical formwork as defined in the claims. The vertical formwork of the invention comprises at least a front formwork panel and a rear formwork panel arranged facing one another, a threaded tie rod which is fixed to both formwork panels in a final assembly position of the vertical formwork, a front anchor which fixes the tie rod to the front formwork panel in the final assembly position, and a rear anchor which fixes the tie rod to the rear formwork panel in the final assembly position.

[0011] The front anchor of the vertical formwork of the invention comprises a nut configured for being screwed onto a first end of the tie rod, and a stop element crossed by the tie rod, the stop element being a tube configured for swiveling in a through housing of the front formwork panel together with the tie rod during assembly and indirectly abutting with the front formwork panel when it reaches a final assembly position corresponding to the final assembly position of the vertical formwork, such that the stop element cannot move beyond its final assembly position.

[0012] The vertical formwork of the invention comprises a spacing tube crossed by the tie rod which is arranged between both formwork panels in the final assembly position, and an intermediate bushing crossed by the tie rod and which is arranged between the stop element and the spacing tube. The intermediate bushing comprises at one end a section which is housed in the spacing tube, and a perimetral ring after said section, the spacing tube being supported on a supporting surface of said perimetral ring and the other end of the intermediate bushing being supported on the stop element. The intermediate bushing has a maximum outer diameter equal to or less than the outer diameter of the stop element and is substantially cylindrical along its entire length. The stop element is arranged between the spacing tube and the nut, the stop element acting as a stop of the spacing tube when it is arranged in its final assembly position. The vertical formwork of the invention is configured for being assembled by means of introducing the tie rod, together with the spacing tube and the stop element, through the through housing of the front formwork panel so as to fix the second end of the tie rod to the rear anchor previously placed in the rear formwork panel, the front anchor then being fixed to the front formwork panel, where the tie rod can swivel in the housing during assembly.

[0013] The process of adjusting the formwork from one face is improved by means of the vertical formwork of the invention, making the assembly of the formwork simpler. In the vertical formwork described in WO2016/026812A1, the stop element is a sleeve that has to be fixed to the front formwork panel. In the vertical formwork of the invention, since the stop element is a tube indirectly abutting with the front formwork panel when it reaches the final assembly position, it is not necessary to fix the stop element to the front formwork panel, whereby that step is dispensed with during assembly. Furthermore, the front formwork panel of the vertical formwork of the invention is simpler than the front formwork panel of the vertical formwork of WO2016/026812A1, given that the front formwork panel does not comprise fixing means for fixing the stop element to the front formwork panel.

[0014] These and other advantages and features of the invention will become evident in view of the drawings and the detailed description of the invention.

DESCRIPTION OF THE DRAWINGS

[0015]

Figure 1 shows a perspective view of an embodiment of the vertical formwork according to the invention seen from the side of the operator.

Figure 2 shows a perspective view of an embodiment of the vertical formwork of Figure 1 from the side opposite the operator.

Figure 3 shows a perspective section view of the vertical formwork of Figure 1.

Figure 4 shows a section view of the front anchor of the vertical formwork of Figure 1.

Figure 5 shows a detail of the front anchor of the vertical formwork of Figure 1.

Figure 6 shows a perspective view of the front anchor of the vertical formwork of Figure 1.

Figure 7 shows a perspective section view of the front anchor of the vertical formwork of Figure 1.

Figure 8 shows part of the front anchor of a second embodiment of the vertical formwork according to the invention.

Figure 9 shows a perspective section view of the part of the front anchor of Figure 8.

Figure 10 shows the front anchor of the second embodiment of the vertical formwork according to the invention.

Figure 11 shows a section view of the part of the front anchor of a third embodiment of the vertical formwork according to the invention.

Figure 12 shows the part of the front anchor of Figure 11.

DETAILED DISCLOSURE OF THE INVENTION

[0016] Figures 1 to 7 show a first embodiment of the vertical formwork 1 according to the invention.

[0017] As shown in Figures 1 to 3, the vertical formwork 1 comprises at least a front formwork panel 2 and a rear formwork panel 3 arranged facing one another, a threaded tie rod 6 which is fixed to both formwork panels 2 and 3 in a final assembly position of the vertical formwork 1, a spacing tube 7 crossed by the tie rod 6 which is arranged between both formwork panels 2 and 3 in the final assembly position, and anchors 4 and 5 which fix the tie rod 6 to formwork panels 2 and 3, respectively, in the final assembly position. Therefore, in the final assembly position the vertical formwork 1 is assembled and prepared for the concrete to be poured between both formwork panels 2 and 3.

[0018] In the vertical formwork 1 of the invention, as is the case in this first embodiment, both formwork panels can be identical. Each of said formwork panels 2 and 3 comprises a structure 20 and 30, a board 21 and 31 fixed to said structure 20 and 30, and a housing 22 and 32 going through said structure 20 and 30 and said board 21 and 31. Preferably, the board 21 and 31 is made of wood and the structure 20 and 30 and the housing 22 and 32 are metallic. For the sake of clarity, the formwork panels 2 and 3 are only partially depicted in the drawings.

[0019] The vertical formwork 1 of the invention is a vertical formwork configured for being adjusted from one face, i.e., the tie rod 6 is fixed from one side of the formwork. In systems of

this type, one of the anchors is fixed to one of the formwork panels before positioning the formwork panels 2 and 3 facing one another. Once the formwork panels 2 and 3 have been positioned, the operator positions himself facing the other formwork panel and fixes the other anchor to the other formwork panel. To understand this patent document, the front part shall be considered the part where the operator fixing the tie rod 6 positions himself. Therefore, front formwork panel 2 shall be referred to as the formwork panel arranged on the operator side and rear formwork panel 3 shall be referred to as the formwork panel opposite the front formwork panel 2. Likewise, front anchor 4 shall be referred to as the anchor fixed to the front formwork panel 2, and rear anchor 5 shall be referred to as the anchor fixed to the rear formwork panel 3. Furthermore, inner face 23 and 33 of the formwork panel 2 and 3 shall be considered the face suitable for being arranged in contact with the concrete, and outer face 24 and 34 of the formwork panel 2 and 3 shall be considered the face opposite the inner face 23 and 33.

[0020] The tie rods that have conventionally been the most widely used in conventional vertical formworks adjusted from two faces have been Dywidag® 15 ties and Dywidag® 20 ties, with one or the other being selected depending on the maximum tensile load the vertical formwork has to withstand. A vertical formwork for being adjusted from two faces comprises two formwork panels arranged facing and fixed to one another by means of a tie rod (usually a Dywidag® 15 tie or a Dywidag® 20 tie), the tie rod being fixed to the formwork panels by means of an anchor fixed to the respective formwork panel. A spacing tube generally made of plastic is arranged between the formwork panels so as to enable removing the tie rod once the concrete has cured. In vertical formworks of this type, there has to be an operator on each side of the formwork to enable assembling the formwork. The vertical formwork 1 of the invention is configured for being adjusted from one face and fixing the front and rear formwork panels 2 and 3 by means of a tie rod 6, preferably a Dywidag® 15 threaded tie or a Dywidag® 20 threaded tie.

[0021] In this embodiment, the front formwork panel 2, shown in detail in Figure 4, comprises a through hole extending from the outer face 24 to the inner face 23. The housing 22 of the front formwork panel 2 is arranged in said hole. Part of the front anchor 4 is housed in the housing 22. The housing 22 has an entry opening 221 which is arranged at the same level as the outer face 24 of the front formwork panel 2 and an exit opening 222 which is arranged at the same level as the inner face 23 of the front formwork panel 2, the diameter of the exit opening 222 being smaller than the diameter of the entry opening 221. The configuration of the rear formwork panel 3 is the same as the configuration of the front formwork panel 2.

[0022] In other embodiments, each formwork panel may comprise a plurality of holes, depending on the dimensions of the formwork panel, a housing and a respective anchor being arranged in each of them, such that two facing formwork panels can be fixed to one another through a plurality of tie rods fixed to said anchors.

[0023] The front anchor 4 of the vertical formwork 1 of the invention comprises a nut 8 configured for being screwed onto a first end of the tie rod 6, and a stop element 10 crossed

by the tie rod 6 and which is arranged between the spacing tube 7 and the nut 8, the stop element 10 acting as a stop of the spacing tube 7 when it is arranged in a final assembly position corresponding to the final assembly position of the vertical formwork 1, as can be observed in Figures 4 and 5.

[0024] The vertical formwork 1 of the invention is configured for being assembled by means of introducing the tie rod 6, together with the spacing tube 7 and the stop element 10, through a housing 22 of the front formwork panel 2 so as to fix the second end of the tie rod 6 to the rear anchor 5 previously placed in the rear formwork panel 3, the front anchor 4 then being fixed to the front formwork panel 2, where the tie rod 6 can swivel in the housing 22 during assembly.

[0025] The tie rod 6 of the vertical formwork 1 of this embodiment can swivel during assembly of the vertical formwork 1, which allows the tie rod 6 to not necessarily be positioned in a manner that is completely perpendicular to both formwork panels 2 and 3 once it has been fixed to both formwork panels 2 and 3, but rather it can take a certain angle of inclination with respect to said perpendicular. This allows enabling the tie rod 6 to be readily fixed to both formwork panels 2 and 3 even when the exit opening 222 of the housing 22 of the front formwork panel 2 is not arranged completely aligned with the exit opening 322 of the housing 32 of the rear formwork panel 3 forming a 90° angle with respect to the inner faces 23 and 33 of the formwork panels 2 and 3.

[0026] As can be observed in the drawings, the stop element 10 of the front anchor 4 of the vertical formwork 1 of the invention is a tube which swivels in the housing 22 together with the tie rod 6 during assembly, i.e., the tie rod 6 is housed in the stop element 10 with little clearance. The stop element 10 abuts indirectly with the front formwork panel 2 when it reaches the final assembly position, such that the stop element 10 cannot move beyond its final assembly position. Since the stop element 10 is a tube indirectly abutting with the front formwork panel when it is arranged in the final assembly position, it is not necessary to fix the stop element 10 to the front formwork panel 2, whereby that step is dispensed with during assembly.

[0027] The vertical formwork 1 of this embodiment comprises an intermediate bushing 9 crossed by the tie rod 6 and which is arranged between the stop element 10 and the spacing tube 7. Figure 5 shows the intermediate bushing 9, comprising at one end a section 9a which is housed in the spacing tube 7 and a perimetral ring 9b after said section 9a, the spacing tube 7 being supported on a supporting surface of said perimetral ring 9b. The other end of the intermediate bushing 9 is supported on the stop element 10.

[0028] In the vertical formwork 1, the intermediate bushing 9 has a maximum outer diameter equal to or less than the outer diameter of the stop element 10, said intermediate bushing 9 being substantially cylindrical along its entire length.

[0029] In the vertical formwork 1 of this embodiment, the stop element 10 comprises a sealing

gasket 11 at its end adjacent to the spacing tube 7. As described above, the housing 22 of the front formwork panel 2 comprises an exit opening 222. The sealing gasket 11 comprises a contour 11a configured for sealing said exit opening 222 in the final assembly position. Furthermore, the sealing gasket 11 preferably comprises an annular portion 11b configured for sealing the spacing tube 7.

[0030] The sealing means of vertical formworks are elements that degrade with use, and for that reason they usually have to be changed. The fact that the sealing gasket 11 is arranged in the front anchor 4 and not in the front formwork panel 2 makes replacement thereof easier, given that the front anchor 4 is more manageable than the front formwork panel 2 in terms of both dimensions and weight. Furthermore, deterioration of the sealing gasket 11 due to abrasion when cleaning the front formwork panel 2 with wire brushes to remove concrete residues that may be left after use of the front formwork panel 2 is prevented. Not arranging the sealing gasket 11 in the front formwork panel 2 makes it easier to assemble the vertical formwork 1, improving visibility of the rear formwork panel 3 through the exit opening 222 of the housing 22. During the assembly process, when the tie rod 6 is introduced through the front formwork panel in order to fix it to the rear formwork panel 3, the sealing gasket 11 has not yet been introduced in the front formwork panel 2, therefore there is no sealing element arranged in the exit opening 222 that reduces visibility through same.

[0031] Furthermore, using the sealing gasket 11 prevents using sealing cones arranged on both sides of the spacing tube 7. In vertical formworks using a standard Dywidag® 15 or Dywidag® 20 tie, a sealing cone was conventionally arranged on each side of the spacing tube located between both formwork panels. Said sealing cones prevented concrete from filtering into the front and rear anchors. In the vertical formwork 1 of the invention, the sealing function is carried out solely by the sealing gasket 11, thereby preventing the use of any other sealing means. In the vertical formwork 1 of the invention, both the attachment existing between the spacing tube 7 and said sealing gasket 11 as well as the attachment existing between the housing 22 and the sealing gasket 11 are successfully sealed with a single sealing gasket 11 so that there are no concrete leakages.

[0032] In the vertical formwork 1 of the invention, the sealing quality obtained by means of using the sealing element 11 is higher than the sealing quality obtained in the vertical formworks of the state of the art. This is possible because the sealing element 11, the stop element 10, and the tie rod 6 are aligned with one another, allowing the sealing element 11 to be positioned with the same angle of inclination as the tie rod 6 with respect to the inner face 23 of the front formwork panel 2, even still thereby assuring a good seal due to the adaptability of said sealing element 11 to the exit opening 222 of the housing 22.

[0033] In the vertical formwork 1 of this embodiment, the front anchor 4 comprises a dome plate 15 configured for fixing the tie rod 6 to the front formwork panel 2, the dome plate 15 comprising a through hole 16 delimited by a curved supporting surface 17, and the nut 8 comprising a curved complementary surface 18 configured for cooperating with the supporting surface 17 of the dome plate 15 like a ball and socket joint.

[0034] The vertical formwork 1 of the present invention is preferably configured for using a standard dome plate and nut assembly. Likewise, the vertical formwork 1 of the present invention is preferably configured for using a standard Dywidag® 15 or Dywidag® 20 threaded tie. The vertical formwork 1 of the invention is a vertical formwork configured for being adjusted from one face, where the tie rod 6 can swivel during assembly of the vertical formwork 1, and it uses both a standard dome plate and nut assembly, as well as a standard threaded tie, both of which are well-known in the prior art.

[0035] In the vertical formwork 1 of this embodiment, the stop element 10 is attached to the nut 8 of the front anchor 4, as can be observed in Figure 7. More specifically, in this embodiment the stop element 10 comprises an inner thread and the nut 8 comprises an outer thread, both being attached by means of threading, where the attachment can be reinforced by means of an adhesive.

[0036] In this embodiment, the outer diameter of the stop element 10 is greater than the inner diameter of the through hole 16 of the dome plate 15. The fact that the outer diameter of the stop element 10 is greater than the inner diameter of the through hole 16 of the dome plate 15, along with the fact that the stop element 10 is attached to the nut 8, allows the assembly formed by the nut 8 and the stop element 10 to not be released from the dome plate 15 and therefore enables being handled like a single element, which minimizes the number of elements to be dealt with during assembly of the vertical formwork 1, at the same time making said assembly easier.

[0037] In an alternative embodiment with respect to this embodiment 1, which is not shown in the drawings, the nut 8 of the front anchor 4 and the stop element 10 are a single piece.

[0038] In the vertical formwork 1 according to the invention, the stop element 10 abuts indirectly with the front formwork panel 2 when it reaches the final assembly position, such that the stop element 10 cannot move beyond its final assembly position. In the embodiment of the vertical formwork 1 shown in Figures 1 to 7, in the final assembly position the stop element 10 abuts with the front formwork panel 2 through the dome plate 15. During assembly of the vertical formwork 1, the tie rod 6, together with the spacing tube 7 and the stop element 10, is introduced through the through housing 22 of the front formwork panel 2 so as to fix the second end of the tie rod 6 to the rear anchor 5 previously placed in the rear formwork panel 3, the front anchor 4 then being fixed to the front formwork panel 2 by means of the nut 8. Once the front anchor 4 has been fixed, the final assembly position is reached, in which position the sealing gasket 11 is arranged in the exit opening 222 of the housing 22, and the stop element 10 is arranged in the housing 22, where the stop element 10 cannot go beyond the exit opening 222 of the housing 22 as this is prevented by the nut 8, attached to the stop element 10 itself, and abutting with the dome plate 15, which in turn abuts with the outer face 24 of the front formwork panel 2 in the final assembly position.

[0039] Figures 8 to 10 show a second embodiment of the vertical formwork 1 according to the

invention. Many of the features of this second embodiment coincide with the features of the first embodiment, so they will not be explained again. In the vertical formwork 1 of the second embodiment, the stop element 10 is attached to a stop plate 14 at its end adjacent to the nut 8 of the front anchor 4. The stop plate 14 is configured for being supported on the front formwork panel 2 in the final assembly position. The stop plate 14 is attached to the stop element 10 preferably in a swiveling manner.

[0040] In the vertical formwork 1 of the second embodiment, the stop plate 14 comprises a through hole 19 configured to be crossed by the tie rod 6 and a curved supporting surface 20 surrounding the through hole 19. The stop element 10 comprises a contact surface 21 at its end adjacent to the nut 8 configured for cooperating with the supporting surface 20 of the stop plate 14 like a ball and socket joint.

[0041] In this second embodiment of the invention, the supporting surface 20 and the contact surface 21 have a truncated cone shape. In order for both surfaces to cooperate, the angle of inclination of the contact surface 21 with respect to the surface of the stop plate 14 will be greater than the angle of inclination of the supporting surface 20 with respect to the surface of the stop plate 14. In an alternative embodiment, the supporting surface 20 and the contact surface 21 can have a spherical shape. In another alternative embodiment, the supporting surface 20 can have a truncated cone shape, and the contact surface 21 can have a spherical shape. Likewise, in another alternative embodiment, the supporting surface 20 can have a spherical shape, and the contact surface 21 can have a truncated cone shape. In order for both surfaces to cooperate with one another like a ball and socket joint, any of the four configurations described above for both surfaces is possible.

[0042] In the vertical formwork 1 of the second embodiment, the stop plate 14 comprises a housing bushing 220 that is crossed by the stop element 10 and which delimits, together with the stop plate 14, a cavity in which the widened section of the stop element 10 is confined.

[0043] In the vertical formwork 1 of the second embodiment, the stop element 10 abuts with the front formwork panel 2 in the final assembly position through the stop plate 14. During assembly of the vertical formwork 1, the tie rod 6, together with the spacing tube 7 and the stop element 10, is introduced through the through housing 22 of the front formwork panel 2 so as to fix the second end of the tie rod 6 to the rear anchor 5 previously placed in the rear formwork panel 3, the front anchor 4 then being fixed to the front formwork panel 2 by means of the nut 8. Once the front anchor 4 has been fixed, the final assembly position is reached, in which position the sealing gasket 11 is arranged in the exit opening 222 of the housing 22, and the stop element 10 is arranged in the housing 21, where the stop element 10 cannot go beyond the exit opening 222 of the housing 22 as this is prevented by the stop plate 14, attached in a swiveling manner to the stop element 10 itself, abutting with the outer face 24 of the front formwork panel 2 in the final assembly position. In said final assembly position, the nut 8 abuts with the dome plate 15, which in turn fixes the stop plate 14 against the outer face 24 of the front formwork panel 2.

[0044] Figures 11 and 12 show a third embodiment of the vertical formwork 1 according to the invention. Many of the features of this third embodiment coincide with the features of the first embodiment, so they will not be explained again. In the vertical formwork 1 of the third embodiment, the stop element 10 is attached to a first stop 23 in the form of a radial extension and to a second stop 24 comprising a prestressed flange 25, the housing 22 comprising respective holes 26 and 27 in which the first stop 23 and the second stop 24 are housed during assembly.

[0045] The prestressed flange 25 is attached to the stop element 10 by means of a pin 28, where the prestressed flange 25 can rotate with respect to the pin 28. The prestressed flange 25 has a first standby position shown in Figure 11, in which a spring 30 tenses said prestressed flange 25 so that the prestressed flange 25 remains in said standby position.

[0046] During the introduction of the stop element 10 in the housing 22, the prestressed flange 25 abuts with the contour of the entry opening 221 and leaves its standby position, tensing the spring 30, and rotating with respect to the pin 28, moving away from the exit opening 222 of the housing 22, thereby allowing the stop element 10 to be introduced in the housing 22. Once the first stop 23 in the form of a radial extension is housed in the hole 26, the prestressed flange 25 reaches the corresponding hole 27, the prestressed flange 25 returning to its standby position. When the prestressed flange 25 reaches its standby position, it is inserted into the hole 27, where said prestressed flange 25 cannot rotate beyond its standby position due to a projection 29 of the stop element 10, abutting against same during its rotating movement.

[0047] In the final assembly position, when the concrete is poured between both formwork panels, the concrete exerts pressure on the sealing gasket 11. However, the sealing gasket does not move as a result of said pressure because the first stop 23 and the second stop 24 of the stop element 10 abut with the edges of said holes 26 and 27, thereby preventing movement of the stop element 10.

[0048] In the vertical formwork 1 of the third embodiment, the stop element 10 abuts with the front formwork panel 2 in the final assembly position through the first stop 23 and the second stop 24, which prevent the stop element 10 from going beyond the exit opening 222 of the housing 22 once they are housed in the holes 26 and 27.

[0049] In the first embodiment, as shown in Figures 1 to 3 the rear anchor 5 of the vertical formwork 1 comprises a stop element 10' in which a second end of the tie rod 6 is introduced, the stop element 10' acting as a stop of the spacing tube 7 in the final assembly position. The rear anchor 5 further comprises an intermediate bushing 9' crossed by the tie rod 6 and which is arranged between the stop element 10' and the spacing tube 7. The intermediate bushing 9' comprises at one end a section 9a' which is housed in the spacing tube 7. The intermediate bushing 9' also comprises a perimetral ring 9b' after said section 9a', the spacing tube 7 being supported on a supporting surface of said perimetral ring 9b'. The other end of the intermediate bushing 9' is supported on the stop element 10'.

[0050] The assembly of the vertical formwork of this embodiment is simpler than the assembly of vertical formworks performed using a standard Dywidag® 15 or Dywidag® 20 tie, which are known in the prior art. In vertical formworks known in the prior art, the use of sealing cones on each side of the spacing tube made it easier for the tie rod to run into the rebar when the tie rod goes through the space between the two formwork panels given that the diameter of the tie rod was larger at those points where the sealing cones were arranged. However, as described above, in the vertical formwork 1 of the invention it is not necessary to use sealing cones on each side of the spacing tube 7, which makes it easier for the tie rod 6 to go through the rebar. The use of the intermediate bushing 9' in the vertical formwork 1 of the invention likewise allows the tie rod 6 to readily go through the rebar given that, as can be observed in Figure 3, the substantially cylindrical shape and the dimensions thereof do not increase the diameter of the tie rod 6 at the point where the intermediate bushing 9' is arranged.

REFERENCES CITED IN THE DESCRIPTION

Cited references

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LODRET FORSKALLING**PATENTKRAV**

1. Lodret forskalling, der omfatter mindst
 - ét forreste forskallingspanel (2) og ét bageste forskallingspanel (3), der er anbragt, således at de vender mod hinanden,
 - en gevindstang (6), der er fastgjort til begge forskallingspaneler (2, 3) i den endelige samlingsposition af den lodrette forskalling (1),
 - et forreste anker (4), der fastgør forbindelsesstangen (6) til det forreste forskallingspanel (2) i den endelige samlingsposition, og
 - et bageste anker (5), der fastgør forbindelsesstangen (6) til det bageste forskallingspanel (3) i den endelige samlingsposition,

hvor det forreste anker (4) omfatter

- en møtrik (8), der er konfigureret til at blive skruet fast på en første ende af forbindelsesstangen (6), og
- et stopelement (10), der krydses af forbindelsesstangen (6), idet stopelementet (10) er et rør, der er konfigureret til at dreje i et gennemgående hus (22) på det forreste forskallingspanel (2) sammen med forbindelsesstangen (6) under montering og indirekte støder op til det forreste forskallingspanel (2), når det når en endelig samlingsposition svarende til den endelige samlingsposition for den lodrette forskalling (1), således at stopelementet (10) ikke kan bevæge sig ud over dets endelige samlingsposition,

kendetegnet ved, at den lodrette forskalling omfatter et afstandsør (7), der krydses af forbindelsesstangen (6), der er anbragt mellem begge forskallingspaneler (2, 3) i den endelige samlingsposition, og en mellembøsning (9), der krydses af forbindelsesstangen (6), og som er anbragt mellem stopelementet (10) og afstandsørret (7), hvor mellembøsningen (9) i den ene ende omfatter en sektion (9a), der er anbragt i afstandsørret (7), mellembøsning (9), der også omfatter en perimetrisk ring (9b) efter sektionen (9a), hvor afstandsørret (7) understøttes på en understøtningsflade på den perimetriske ring (9b) og den anden ende af mellembøsningen (9) er understøttet på stopelementet (10), mellembøsningen (9) har en maksimal ydre diameter svarende til eller mindre end stopelementets (10) ydre diameter og er i det væsentlige cylindrisk i hele sin længde, stopelementet (10) er anbragt mellem afstandsørret (7) og møtrikken (8), idet stopelementet (10) fungerer

som et stop for afstandsørret (7), når det er anbragt i dets endelige samlingsposition, og den lodrette forskalling (1) er konfigureret til at blive samlet ved at indføre forbindelsesstangen (6) sammen med afstandsørret (7) og stopelementet (10) gennem det gennemgående hus (22) på det forreste forskallingspanel (2) for at fastgøre den anden ende af forbindelsesstangen (6) til det bageste anker (5), der tidligere var placeret i det bageste forskallingspanel (3), hvor det forreste anker (4) derefter fastgøres til det forreste forskallingspanel (2), hvor forbindelsesstangen (6) kan svinge i huset (22) under samling.

2. Lodret forskalling ifølge krav 1, hvor stopelementet (10) omfatter en tætningspakning (11) ved dets ende ved siden af afstandsørret (7), hvor huset (22) på det forreste forskallingspanel (2) omfatter en udgangsåbning (222), og hvor tætningspakningen (11) omfatter en kontur (11a), der er konfigureret til at tætnes udgangsåbningen (222) i den endelige samlingsposition, idet tætningspakningen (11) fortrinsvis omfatter en ringformet del (11b), der er konfigureret til at tætnes afstandsørret (7).
3. Lodret forskalling ifølge et hvilket som helst af de foregående krav, hvor det forreste anker (4) omfatter en kuppelplade (15), der er konfigureret til at fastgøre forbindelsesstangen (6) til det forreste forskallingspanel (2), idet kuppelpladen (15) omfatter et gennemgående hul (16), der er afgrænset af en buet støtteflade (17), og møtrikken (8) omfatter en buet komplementær overflade (18), der er konfigureret til at samarbejde med kuppelpladens (15) støtteflade (17) som en kugleleds- og muffesamling.
4. Lodret forskalling ifølge krav 3, hvor stopelementets (10) ydre diameter er større end den indre diameter af det gennemgående hul (16) på kuppelpladen (15).
5. Lodret forskalling ifølge et hvilket som helst af de foregående krav, hvor stopelementet (10) er fastgjort til møtrikken (8) på det forreste anker (4).
6. Lodret forskalling ifølge krav 5, hvor stopelementet (10) er fastgjort til møtrikken (8) på det forreste anker (4) ved hjælp af gevind og/eller klæbemiddel.
7. Lodret forskalling ifølge krav 5, hvor møtrikken (8) på det forreste anker (4) og stopelementet (10) er et enkelt stykke.

8. Lodret forskalling ifølge et hvilket som helst af kravene 1 til 3, hvor stopelementet (10) er fastgjort til en stopplade (14) ved dets ende ved siden af møtrikken (8) på det forreste anker (4), idet stoppladen (14) er konfigureret til at blive understøttet på det forreste forskallingspanel (2) i den endelige samlingsposition.
9. Lodret forskalling ifølge krav 8, hvor stoppladen (14) er fastgjort til stopelementet (10) på en drejelig måde.
10. Lodret forskalling ifølge krav 9, hvor stoppladen (14) omfatter et gennemgående hul (19), der er konfigureret til at blive krydset af forbindelsesstangen (6), og en buet støtteflade (20), der omgiver det gennemgående hul (19), idet stopelementet (10) omfatter en kontakthflade (21) ved dets ende ved siden af møtrikken (8), der er konfigureret til at samarbejde med støttefladen (20) på stoppladen (14) som en kugleleds- og muffesamling.
11. Lodret forskalling ifølge krav 10, hvor stoppladen (14) omfatter en husbøsning (220), der krydses af stopelementet (10), og som sammen med stoppladen (14) afgrænser et hulrum, hvor den udvidede sektion af stopelementet (10) er begrænset.
12. Lodret forskalling ifølge et hvilket som helst af kravene 1 til 3, hvor stopelementet (10) er fastgjort til et første stop (23) i form af en radial forlængelse og til et andet stop (24), der omfatter en forspændt flange (25), idet huset (22) omfatter respektive huller (26, 27), hvor det første stop (23) og det andet stop (24) anbringes under samlingen.
13. Lodret forskalling ifølge et hvilket som helst af de foregående krav, hvor det bageste anker (5) omfatter:
 - et stopelement (10'), i hvilket en anden ende af forbindelsesstangen (6) indføres, idet stopelementet (10') fungerer som et stop for afstandsrøret (7) i den endelige samlingsposition, og
 - en mellembøsning (9'), der krydses af forbindelsesstangen (6), og som er anbragt mellem stopelementet (10') og afstandsrøret (7), hvor mellembøsningen (9') ved dets ene ende omfatter en sektion (9a'), der er anbragt i afstandsrøret (7), hvor mellembøsningen (9') også omfatter en perimetrisk ring (9b') efter sektionen (9a'), hvor afstandsrøret (7) understøttes

på en understøtningsflade for den perimetriske ring (9b'), og den anden ende af mellembøsningen (9') understøttes på stopelementet (10').

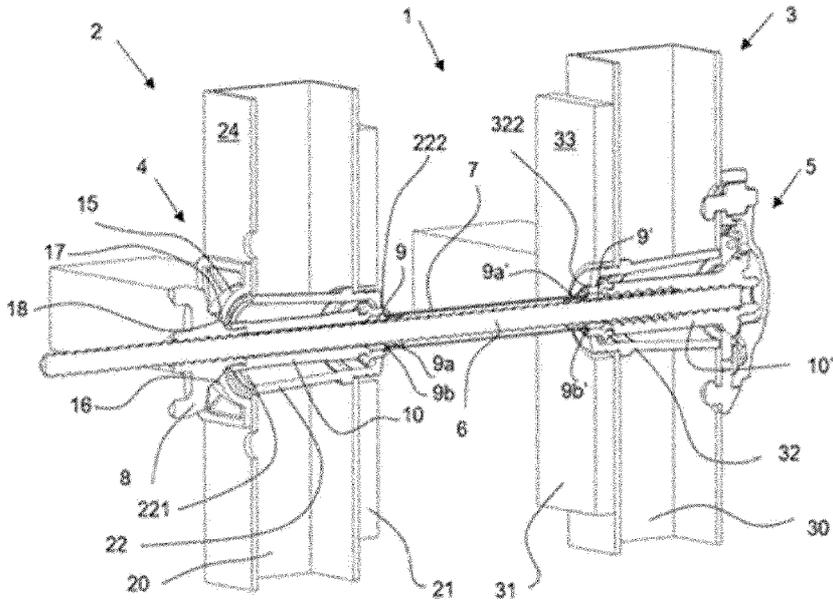


FIG. 3

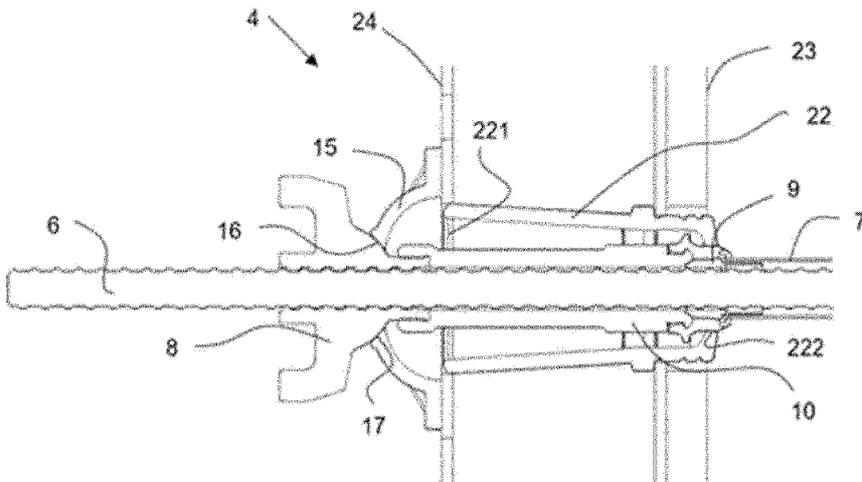


FIG. 4

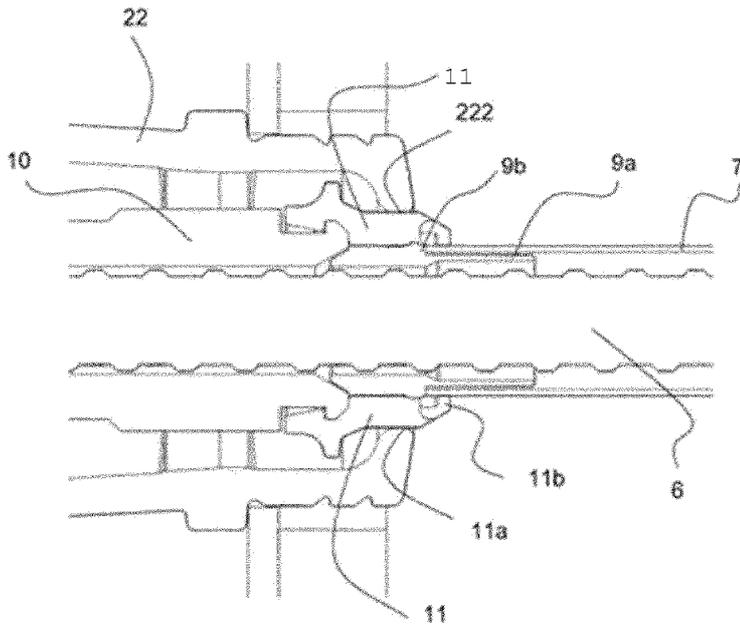


FIG. 5

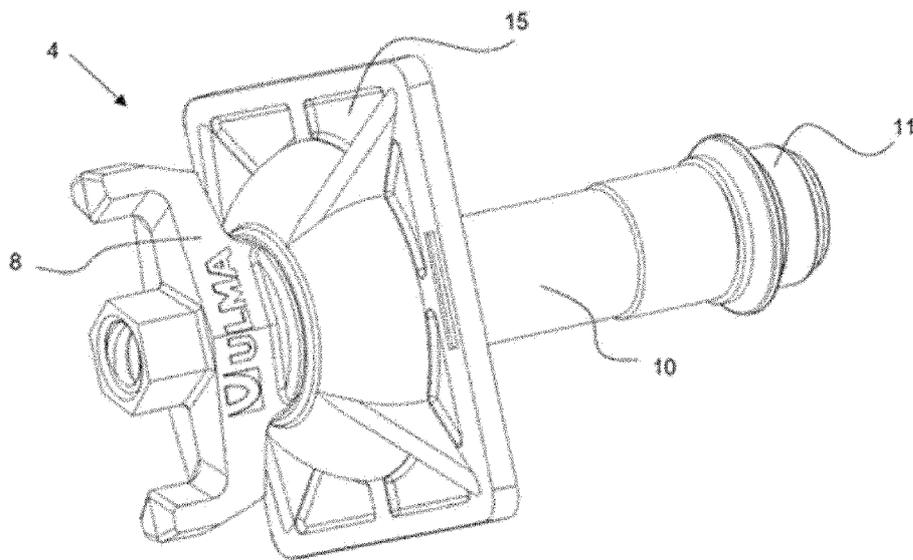


FIG. 6

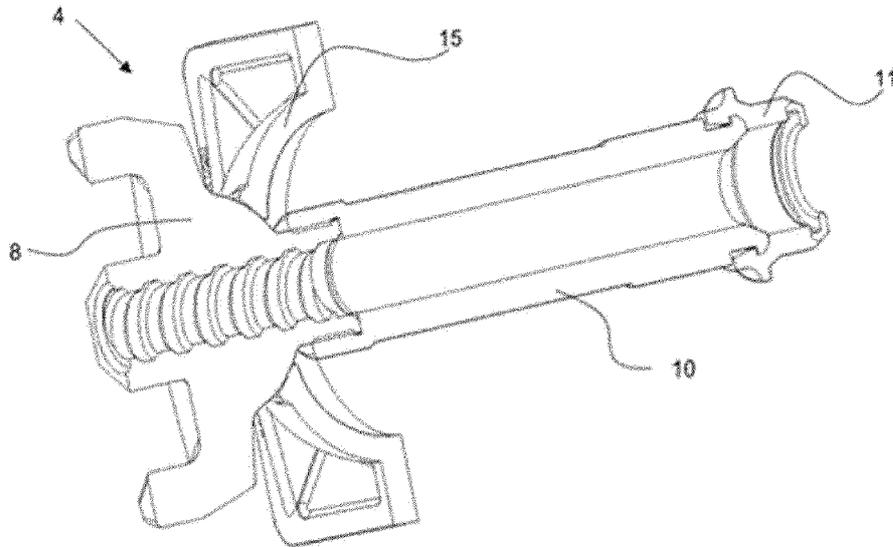


FIG. 7

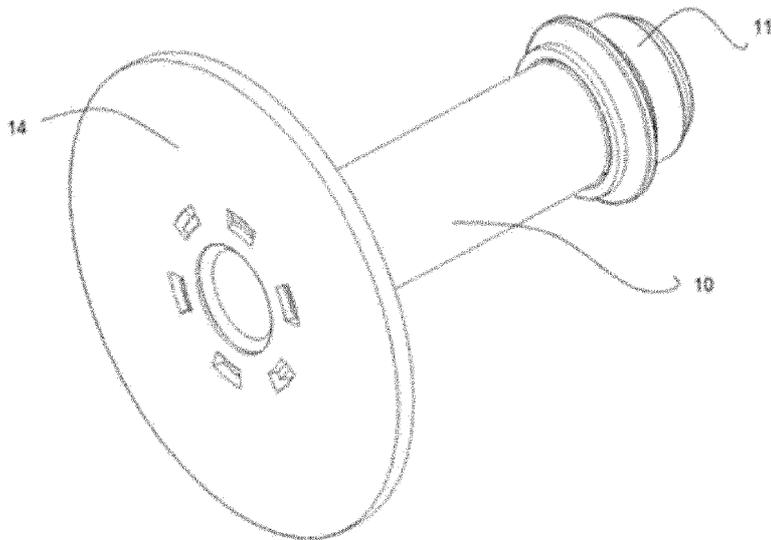


FIG. 8

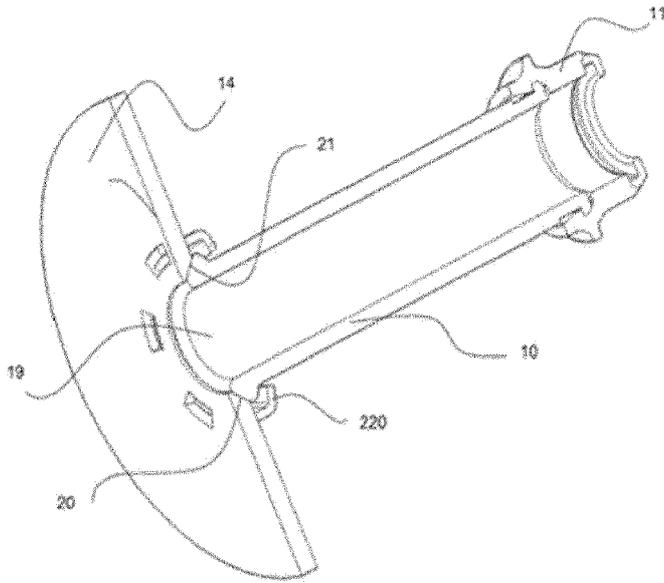


FIG. 9

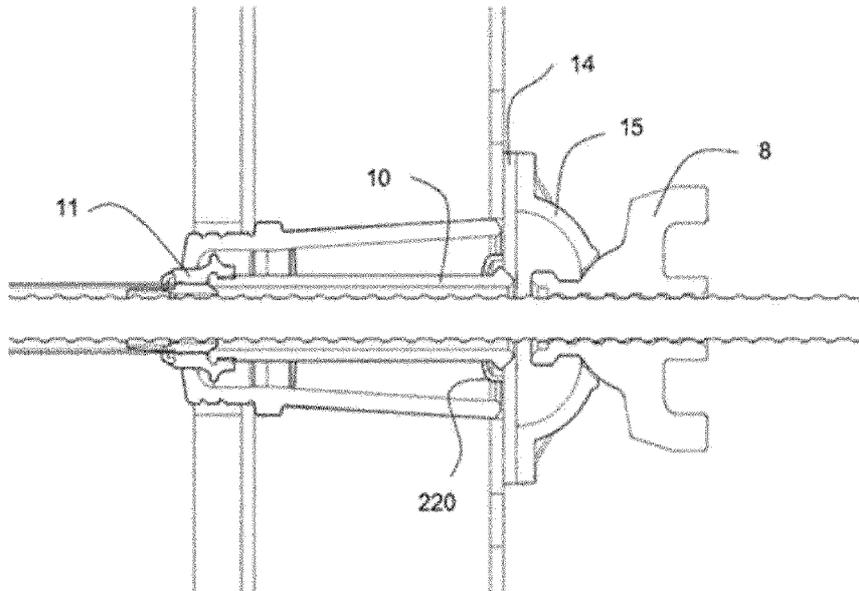


FIG. 10

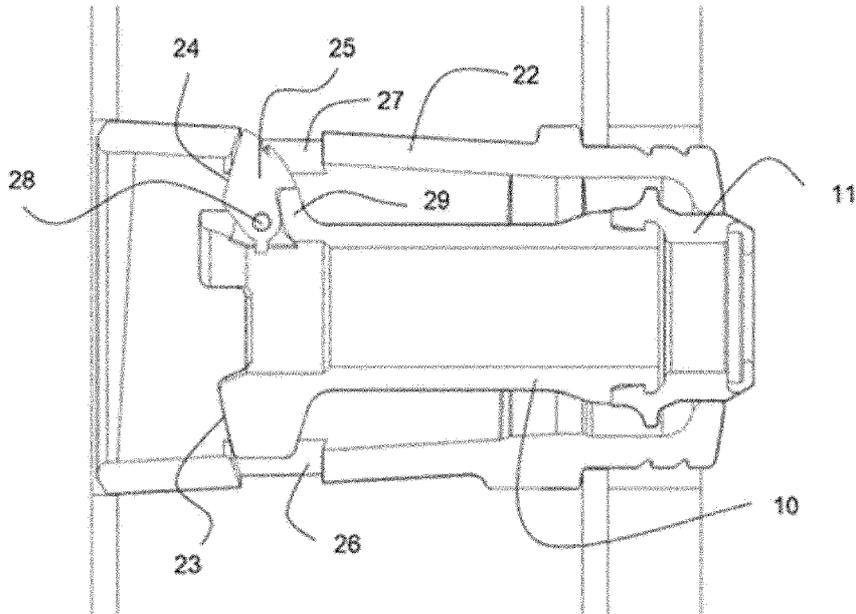


FIG. 11

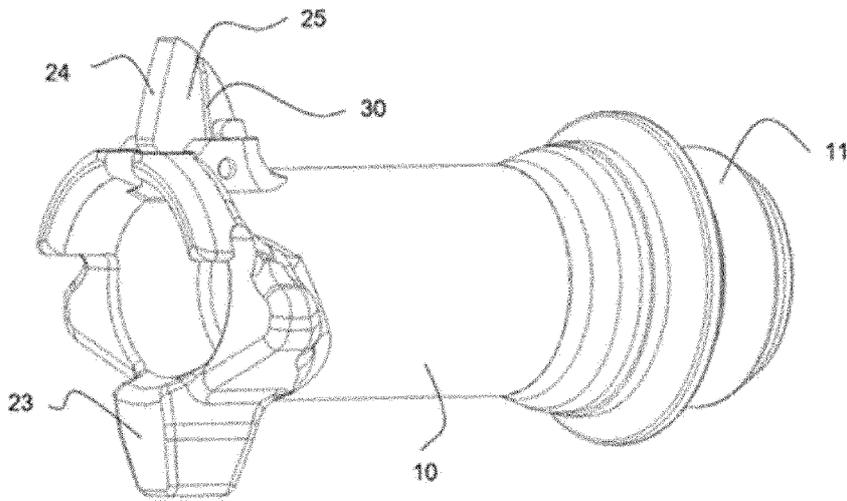


FIG. 12