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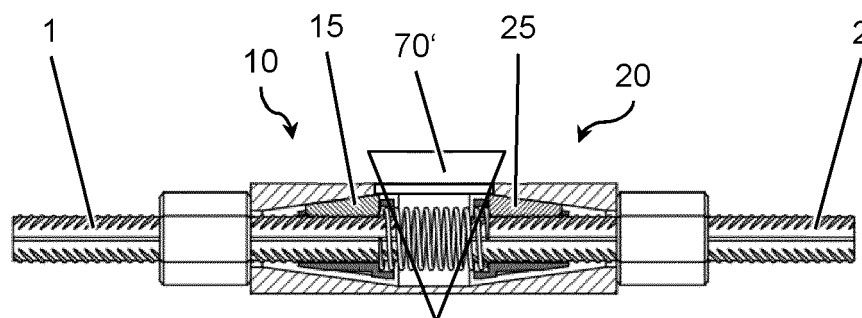
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(54) **REBAR COUPLER WITH BIAS PUSHER**

(57) Rebar coupler arrangement comprising a rebar coupler, which comprises a first socket for receiving a first rebar and a second socket for receiving a second rebar, wherein the first socket comprises a first sleeve and a first locking element that is arranged within the first sleeve, wherein the first sleeve has first wedge surface for wedging the first locking element against the first rebar, wherein the second socket comprises a second

sleeve and a second locking element that is arranged within the second sleeve, wherein the second sleeve has second wedge surface for wedging the second locking element against the second rebar. The rebar coupler arrangement further comprises a pusher for pushing the first rebar arranged within the first sleeve and the second rebar arranged within the second sleeve away from one another.

Fig. 3



Description

[0001] The invention relates to a rebar coupler arrangement according to the preamble of claim 1. An arrangement of this type comprises a rebar coupler, which comprises a first socket for receiving a first rebar and a second socket for receiving a second rebar, wherein the first socket comprises a first sleeve and at least one first locking element that is, at least partly, arranged within the first sleeve, wherein the first sleeve has first wedge surface, which tapers towards a mouth of the first sleeve, for wedging the first locking element against the first rebar when the first rebar is arranged within the first sleeve, wherein the second socket comprises a second sleeve and at least one second locking element that is, at least partly, arranged within the second sleeve, wherein the second sleeve has second wedge surface, which tapers towards a mouth of the second sleeve, for wedging the second locking element against the second rebar when the second rebar is arranged within the second sleeve.

[0002] KR102202667 B1 discloses a rebar coupler arrangement comprising fixing nuts that are each provided with tapering bores. When tightened, the taper of the respective fixing nuts wedges fixing elements against rebar received in the respective channels.

[0003] EP3783235 A1, EP3783234 A1 and EP3783233 A1 disclose quick acting threaded rod connectors, which are intended to catch a threaded rod when the threaded rod is axially inserted into the connectors. The connectors each comprise a broken ring-shaped locking element that is wedged against the threaded rod by a tapering wedge surface.

[0004] European patent application with filing number 21187659.4 describes quick acting threaded rod connectors which are each able to receive different size threaded rods.

[0005] It is an object of the invention to provide a rebar coupler arrangement and a method of using it which, at low manufacturing and handling effort, provide particularly good performance, in particular in seismic conditions.

[0006] This object is achieved by a rebar coupler arrangement according to claim 1. Dependent claims refer to preferred embodiments of the invention.

[0007] According to the invention, the rebar coupler arrangement further comprises a pusher for, preferably simultaneously, pushing the first rebar arranged within the first sleeve and the second rebar arranged within the second sleeve away from one another. The pusher is intended to impart pushing action on the respective rebar, i.e. to pressurize them.

[0008] A first basic idea of the invention might be seen in providing a pusher, which is configured to pushingly act both against the first rebar arranged within the first sleeve and against the second rebar arranged within the second sleeve, so as to push both rebar away from one another. When this pusher is activated, the first lock mechanism provided by the first locking element and the

first wedge surface, and the second lock mechanism provided by the second locking element and the second wedge surface are activated, thereby absorbing any slack of the respective lock mechanisms. Accordingly, pre-tension can be provided in order to counteract slip and displacement of the locking mechanisms.

[0009] The first sleeve and/or the second sleeve preferably comprise a metal material. The first sleeve and the second sleeve are connected, so as to connect the first rebar received within the first sleeve to the second rebar received in the second sleeve.

[0010] The first wedge surface faces the first locking element. The first wedge surface tapers towards the mouth of the first socket, which means that the first wedge surface converges with the axis of the first sleeve as it approaches the mouth of the first sleeve. The mouth of the first sleeve surrounds an insertion opening for inserting the first rebar into the first sleeve. The first wedge element can have any suitable design. For example, it can have a wedge shape or a ball shape, or it can be continuous-ring-shaped or broken-ring-shaped. The first socket might also have a plurality of first locking elements, which might be interconnected or separate. The first wedge element preferably consists of a metal material. The first wedge element can be embedded in a cage, in particular a plastic material cage, for positioning the first wedge element. A cage can be particularly advantageous if there are provided a plurality of first wedge elements. The first wedge element may be provided with an internal screw thread that is intended to mate with the external screw thread of the first rebar. Alternatively or additionally, the first wedge element may be provided with a roughened surface for engaging the first rebar. The first wedge element might be configured for receiving rebar of different sizes, for example by configuring it with a surface roughness in analogy to that described in European patent application with filing number 21187659.4.

[0011] The second wedge surface faces the second locking element. The second wedge surface tapers towards the mouth of the second socket, which means that the second wedge surface converges with the axis of the second sleeve as it approaches the mouth of the second sleeve. The mouth of the second sleeve surrounds an insertion opening for inserting the second rebar into the second sleeve. The second wedge element can have any suitable design. For example, it can have a wedge shape or a ball shape, or it can be continuous-ring-shaped or broken-ring-shaped. The second socket might also have a plurality of second locking elements, which might be interconnected or separate. The second wedge element preferably consists of a metal material. The second wedge element can be embedded in a cage, in particular a plastic material cage, for positioning the second wedge element. A cage can be particularly advantageous if there are provided a plurality of second wedge elements. The second wedge element may be provided with an internal screw thread that is intended to mate with the

external screw thread of the second rebar. Alternatively or additionally, the second wedge element may be provided with a roughened surface for engaging the second rebar. The second wedge element might be configured for receiving rebars of different sizes, for example by configuring it with a surface roughness in analogy to that described in European patent application with filing number 21187659.4.

[0012] The first rebar and/or the second rebar can be considered to be parts of the rebar coupler arrangement. Alternatively, the rebar coupler arrangement and the rebars can be considered to be separate parts.

[0013] The pusher might be provided with an element that gives feedback to the installer when intended pretensioning of the locking mechanisms is achieved (for example a torque limiting nut feature).

[0014] Preferentially, the pusher can be a wedge. In this case, pushing the first rebar arranged within the first sleeve and the second rebar arranged within the second sleeve away from one another can preferentially be effected by linear displacement of the pusher.

[0015] Alternatively, the pusher can be an eccentric. In this case, pushing the first rebar arranged within the first sleeve and the second rebar arranged within the second sleeve away from one another can preferentially be effected by rotation of the pusher.

[0016] Advantageously, at least parts of the pusher are arranged within the first sleeve and within the second sleeve. This can give a particularly compact arrangement.

[0017] The pusher is preferentially configured for directly abutting against the first rebar arranged within the first sleeve, in particular against an end face of this first rebar, and/or for directly abutting against the second rebar arranged within the second sleeve, in particular against an end face of this second rebar. This can further improve operation and/or simplify design.

[0018] The invention also relates to a method of using a described rebar coupler arrangement, in which:

- the first rebar is plugged into the first socket, so that the first locking element engages the first rebar,
- the second rebar is plugged into the second socket, so that the second locking element engages the second rebar, and
- the first rebar plugged into the first socket and the second rebar plugged into the second socket are pushed away from one another by means of the pusher.

[0019] Features that are described here in connection with the rebar coupler arrangement can also be used in connection with the method, and features that are described here in connection with the method can also be used in connection with the rebar coupler arrangement.

[0020] The invention is explained in greater detail below with reference to preferred exemplary embodiments, which are depicted schematically in the accompanying

drawings. Individual features of the exemplary embodiments presented below can be implemented either individually or in any combination within the scope of the present invention.

[0021] A first embodiment of a rebar coupler arrangement comprising a rebar coupler 9 is shown in figures 1 to 3, wherein figures 1 to 3 illustrate subsequent stages of a method for using said arrangement.

[0022] The rebar coupler 9 is intended to connect a first rebar 1 to a second rebar 2, and comprises a first socket 10 for receiving an end of the first rebar 1 and a second socket 20 for receiving an end of the second rebar 2, wherein the first socket 10 and the second socket 20 open into opposite directions.

[0023] The first socket 10 comprises a first sleeve 11, and the second socket 20 comprises a second sleeve 21, wherein the first sleeve 11 and the second sleeve 21 are interconnected. In the present embodiment, the first sleeve 11 and the second sleeve 21 are directly interconnected. However, direct interconnected is an example only, and the first sleeve 11 could also be one piece with the second sleeve 21, or the first sleeve 11 and the second sleeve 21 could be indirectly interconnected, for example by means of a pipe coupler, preferentially a threaded pipe coupler.

[0024] The first sleeve 11 has a first bore 19, and the second sleeve 21 has a second bore 29. The first bore 19 and the second bore 29 are arranged in co-axial relationship. In the present embodiment, the first bore 19 and the second bore 29 merge into one another and form a through hole. However, this is an example only, and the first bore 19 and the second bore 29 could also be blind holes each. In the present embodiment, the first sleeve 11 and/or the second sleeve 21 have generally circular cylindrical outline. This, however, is an example only, and other shapes are also possible.

[0025] The first sleeve 11 has a mouth 18 and the second sleeve 21 has a mouth 28. The mouth 18 is an open face of the first sleeve 11, which opens into the first bore 19, and the mouth 28 is an open face of the second sleeve 21, which opens into the second bore 29.

[0026] The first socket 10 further comprises a first locking element 15, which is arranged within the first sleeve 11, namely within the first bore 19. In the present embodiment, the first locking element 15 is, by way of example, a wedge arranged in a cage. In analogy, the second socket 20 comprises a second locking element 25, which is arranged within the second sleeve 21, namely within the second bore 29. In the present embodiment, the second locking element 25 is, by way of example, a wedge arranged in a cage.

[0027] The first sleeve 11 has a first wedge surface 17, which faces the first bore 19, and which tapers towards the mouth 18 of the first sleeve 11. The first wedge surface 17 is angled with respect to the axis of the first bore 19, so as to wedge the first locking element 15 towards the first rebar 1 when plugged into the first sleeve 11 as the first rebar 1 is pulled out of the first sleeve 11. In the

present embodiment, the first wedge surface 17 is frustoconical, which is, however, an example only.

[0028] The second sleeve 21 has second wedge surface 27, which faces the second bore 29, and which tapers towards the mouth 28 of the second sleeve 21. The second wedge surface 27 is angled with respect to the axis of the second bore 29, so as to wedge the second locking element 25 towards the second rebar 2 when plugged into the second sleeve 21 as the second rebar 2 is pulled out of the second sleeve 21. In the present embodiment, the second wedge surface 27 is frustoconical, which is, however, an example only.

[0029] The first wedge surface 17 of the first sleeve 11 and the second wedge surface 27 of the second sleeve 21, respectively, taper into opposite directions.

[0030] A spring 90 is arranged between the first locking element 15 and the second locking element 25, which biases the first locking element 15 towards the mouth 18 of the first sleeve 11 and the second locking element 25 towards the mouth 28 of the second sleeve 21.

[0031] In the shown embodiment, a first rebar nut 50 is arranged on the first rebar 1 and a second a second locking nut 60 is arranged on the second rebar 2. However, this is purely optional, and either one of these nuts or both nuts can also be omitted.

[0032] The rebar coupler arrangement further comprises a pusher 70', which is a triangular wedge in the present embodiment. The triangular wedge pusher 70' is intended to be inserted into the first sleeve 1 and into the second sleeve 21, so that the triangular wedge pusher 70' extends into the first bore 19 and into the second bore 29, for wedging the first rebar 1 arranged within the first bore 19 and the second rebar 2 arranged within the second bore 29 away from one another. The rebar coupler 9 has a lateral access opening 77', which extends into the first socket 10 and into the second socket 20, for inserting the triangular wedge pusher 70' into the rebar coupler 9.

[0033] When used as intended, an end of the first rebar 1 is plugged into the first sleeve 11, thereby causing engagement of the first rebar 1 by the first locking element 15, and an end of the second rebar 2 is plugged into the second sleeve 21, thereby causing engagement of the second rebar 2 by the second locking element 25, resulting in the configuration shown in figure 2. The triangular wedge pusher 70' is then pushed into the rebar coupler 9, so that the triangular wedge pusher 70' abuts against the first rebar 1 and the second rebar 2 (wherein abutment is preferentially against respective end faces of the respective rebars 1 and 2), and pushes these rebars 1, 2 away from one another, so that any slack of the first locking element 15 and of the second locking element 25, respectively, is reduced or eliminated, leading to the configuration shown in figure 3.

[0034] Another, second embodiment of a rebar coupler arrangement is shown in figures 4 to 7, wherein figures 4 to 6 illustrate subsequent stages of a method for using said arrangement, and wherein figure 7 is a detail top view of the pusher 70".

[0035] The only differences between the rebar coupler arrangements of the first and the second embodiments, respectively, is the configuration of the respective pushers and of the respective access holes. Therefore, for the sake of brevity, only these differing features are discussed below, and reference is made to the description above for the remaining features.

[0036] According to the second embodiment, the pusher 70" is an eccentric, in particular an elliptic eccentric, which is arranged within the rebar coupler 9, so as to extend into the first bore 19 and into the second bore 29. When used as intended, an end of the first rebar 1 is plugged into the first sleeve 11, thereby causing engagement of the first rebar 1 by the first locking element 15, and an end of the second rebar 2 is plugged into the second sleeve 21, thereby causing engagement of the second rebar 2 by the second locking element 25, resulting in the configuration shown in figure 5. The eccentric pusher 70" is then rotated within the rebar coupler 9, so that the eccentric pusher 70" abuts against the first rebar 1 and the second rebar 2 (wherein abutment is preferentially against respective end faces of the respective rebars 1 and 2), and pushes these rebars 1, 2 away from one another, so that any slack of the first locking element 15 and of the second locking element 25, respectively, is reduced or eliminated, leading to the configuration shown in figure 6.

[0037] Rotation of the eccentric pusher 70" might be effected by means of a tool inserted through the access opening 77". The pusher 70" might have a drive 79" for engaging this tool, as for example shown in figure 7.

Claims

1. Rebar coupler arrangement comprising

a rebar coupler (9), which comprises a first socket (10) for receiving a first rebar (1) and a second socket (20) for receiving a second rebar (2), wherein the first socket (10) comprises a first sleeve (11) and at least one first locking element (15) that is, at least partly, arranged within the first sleeve (11), wherein the first sleeve (11) has first wedge surface (17), which tapers towards a mouth (18) of the first sleeve (11), for wedging the first locking element (15) against the first rebar (1) when the first rebar (1) is arranged within the first sleeve (11), wherein the second socket (20) comprises a second sleeve (21) and at least one second locking element (25) that is, at least partly, arranged within the second sleeve (21), wherein the second sleeve (21) has second wedge surface (27), which tapers towards a mouth (28) of the second sleeve (21), for wedging the second locking element (25) against the second rebar (2) when the second rebar (2) is arranged within the sec-

ond sleeve (21),

characterized in that

the rebar coupler arrangement further comprises a pusher (70) for pushing the first rebar (1) arranged within the first sleeve (11) and the second rebar (2) arranged within the second sleeve (21) away from one another. 5

2. Rebar coupler arrangement according to claim 1, **characterized in that** 10
the pusher (70') is a wedge.

3. Rebar coupler arrangement according to claim 1, **characterized in that** 15
the pusher (70") is an eccentric.

4. Rebar coupler arrangement according to any of the proceeding claims, **characterized in that** 20
at least parts of the pusher (70) are arranged within the first sleeve (11) and within the second sleeve (21).

5. Rebar coupler arrangement according to any of the proceeding claims, **characterized in that** 25
the pusher (70) is configured for directly abutting against the first rebar (1) arranged within the first sleeve (11) and for directly abutting against the second rebar (2) arranged within the second sleeve (21).

6. Method of using a rebar coupler arrangement according to any of the preceding claims, **characterized in that** 30

- the first rebar (1) is plugged into the first socket (10), so that the first locking element (15) engages the first rebar (1), 35
- the second rebar (2) is plugged into the second socket (20), so that the second locking element (25) engages the second rebar (2), and
- the first rebar (1) plugged into the first socket (10) and the second rebar (2) plugged into the second socket (20) are pushed away from one another by means of the pusher (70). 40

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Fig. 1

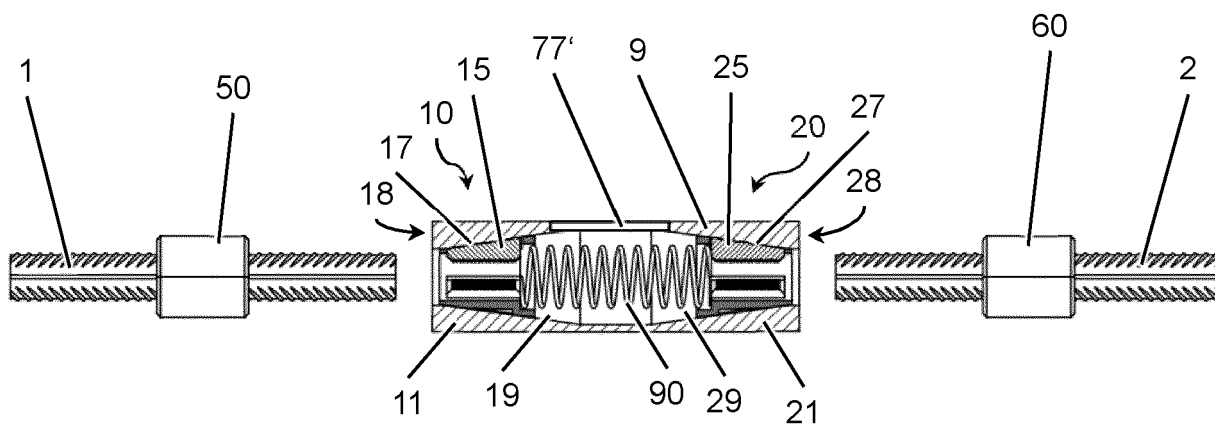


Fig. 2

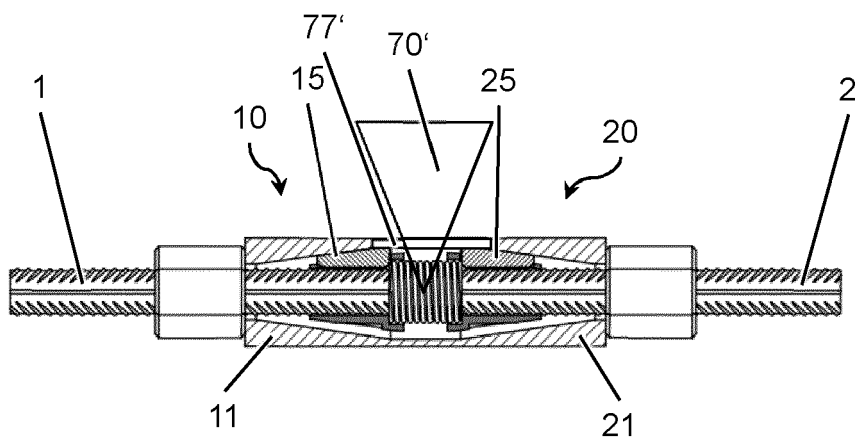


Fig. 3

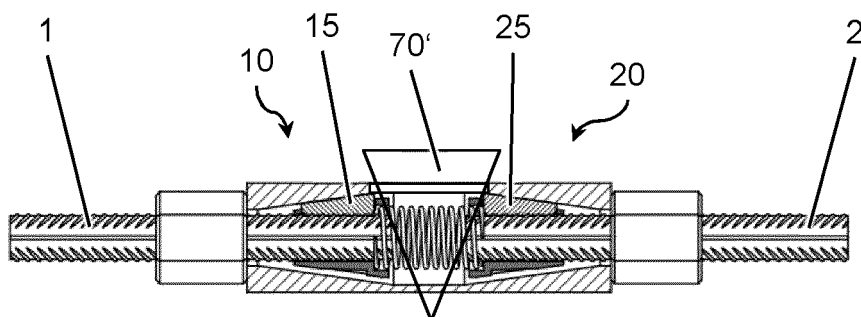


Fig. 4

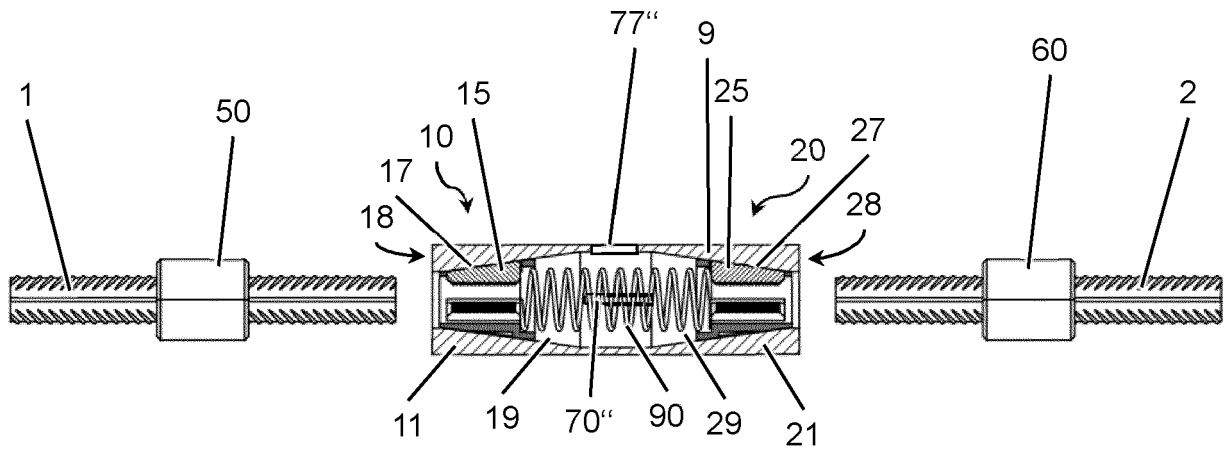


Fig. 5

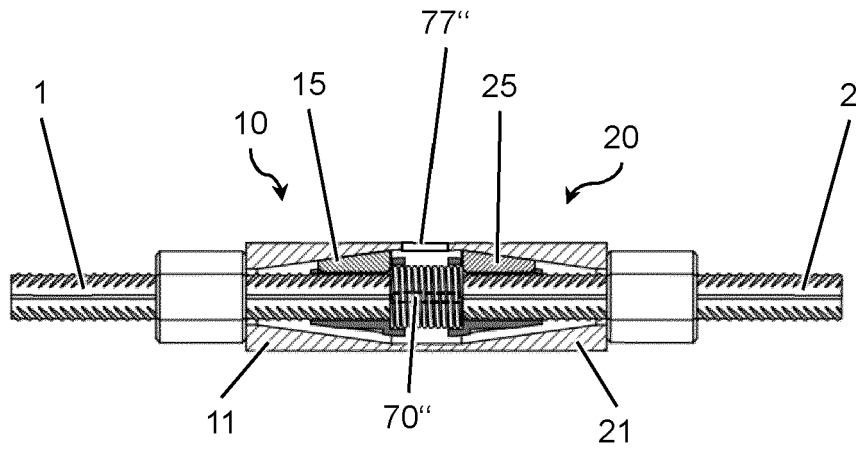


Fig. 6

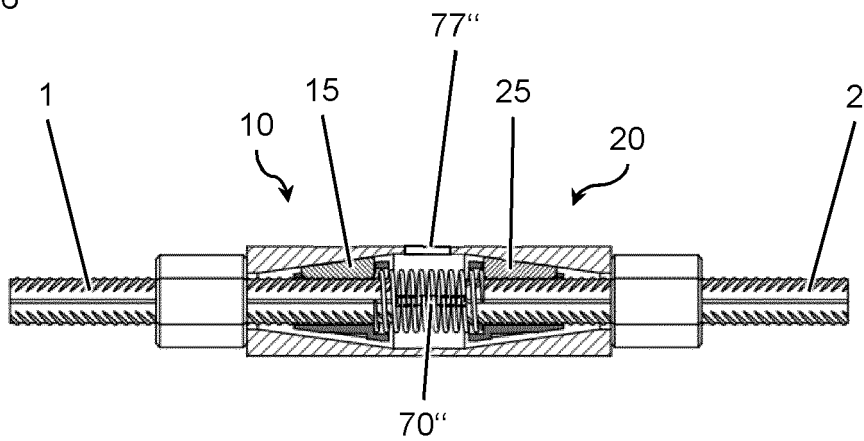
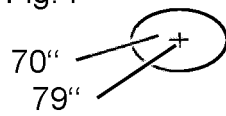


Fig. 7





EUROPEAN SEARCH REPORT

Application Number

EP 21 20 7742

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 12 May 2022	Examiner Righetti, Roberto
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			

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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