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(71) Applicant: **Nico System S.r.l.**
25025 Manerbio BS (IT)

(72) Inventor: **Sacristani, Alberto**
25025, Manerbio (Brescia) (IT)

(74) Representative: **Crippa, Paolo Ernesto et al**
Jacobacci & Partners S.p.A.
Piazza della Vittoria, 11
25122 Brescia (IT)

(54) A method for fixing a coupling flange of the connecting crosspieces between the uprights of a scaffold to the tube of the upright itself

(57) The present invention relates to a method for fixing a coupling flange (11) of the connecting crosspieces between the uprights of a scaffold to the tube (10) of the upright itself, comprising the steps of fitting said flange (11) on said tube (10) and radially deforming said tube (10) so as to obtain two locking edges or rings (20,21) suitable for clamping the flange (11) thereinbetween.

The fixing method proposed allows preventing any welding operation between the flange (11) and the upright (10).

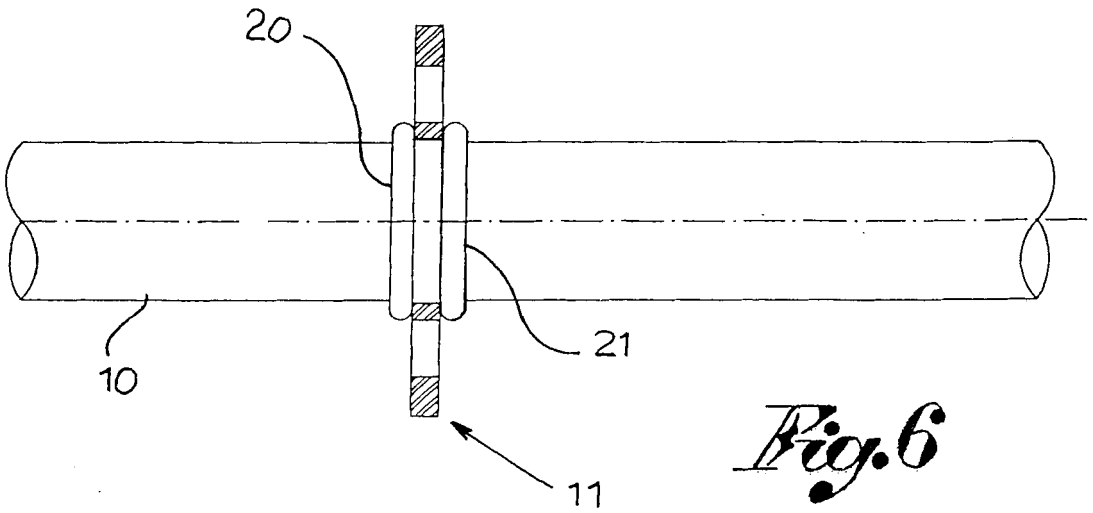

Fig.6

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Description

[0001] The object of the present invention is a method for fixing a coupling flange of the connecting crosspieces between the uprights of a scaffold to the tube of the upright itself.

[0002] As known, prefabricated scaffolds are comprised of a series of vertical uprights and horizontal crosspieces structured so as to be coupled and uncoupled to/from one another in a simple and quick manner.

[0003] In particular, the vertical uprights are comprised of a cylindrical tube of suitable length and a plurality of coupling flanges distributed along the entire tube length.

[0004] The coupling flanges exhibit a central hole to be fitted on the upright tube, and are provided with a plurality of radial through slits angularly distributed for allowing the coupling of the connecting crosspieces along different directions.

[0005] At present, the coupling flanges are fixed to the upright tube by welding. A raw flange is inserted on the tube in a predetermined position and is welded on both sides. Tube and flange are then subject to a hot galvanisation process. The welding operation, besides implying considerable consumption of electric energy, requires systems for reducing noxious smokes.

[0006] It is clear that such production process is especially burdensome for the operator and requires relatively high costs and times.

[0007] The object of the present invention is to propose a method for fixing the flange to the upright tube which is quicker to carry out and economically more advantageous.

[0008] Such object is achieved, according to claim 1, with a process which provides for the flange to be fitted on the tube and for said tube to be radially deformed so as to obtain two locking edges or rings suitable for clamping the flange thereinbetween.

[0009] In other words, the flange is held on the tube by two locking edges or rings obtained by deformation of the tube itself.

[0010] The dependent claims describe particular and preferred embodiments of the method. For example, the radial deformation of the tube is obtained by an axial compression of the tube itself.

[0011] The two locking edges or rings are advantageously obtained in a sequence, the flange being fitted on the tube after the first ring has been obtained, so as to rest thereon.

[0012] Further details and advantages of the fixing method according to the present invention will appear more clearly from the following description of a preferred embodiment thereof, made by way of an indicative non-limiting example with reference to the annexed drawings, wherein:

[0013] figure 1 shows a schematic view of a portion of tube of an upright set up for a first radial deformation;

[0014] figure 2 shows the portion of tube after the first radial deformation;

[0015] figure 3 shows the portion of tube with a flange assembled thereon;

[0016] figure 4 shows the portion of tube with flange set up for a second deformation;

[0017] figure 5 shows the end step of the second deformation;

[0018] figure 6 shows the portion of tube with the flange finally locked thereto;

[0019] figure 7 shows a plan view of a flange;

[0020] figure 8 shows an elevation view of a portion of tube after the first radial deformation in an embodiment variation of the method; and

[0021] figure 8a shows a cross section of the portion of tube of figure 8.

[0022] In said drawings, reference numerals 10 and 11 respectively indicate a portion of a tube of an upright for scaffolds and a coupling flange of the connecting crosspieces between the uprights of a scaffold suitable for being fixed to said tube.

[0023] Flange 11, which can for example be obtained by shearing or fusion, exhibits a central hole 12 for an assembly thereof to tube 10 and a plurality of radial through slits 13 angularly distributed for allowing the coupling of coupling crosspieces along different directions.

[0024] Moreover, on flange 11 there can be defined a first contact surface 14 and a second contact surface 15 parallel and opposite the first one. In use, that is, with flange 11 fixed to the vertical upright, said contact surfaces are also the top and bottom surfaces of the flange. Said contact surfaces are connected by a side surface 16 that defines the height or thickness of flange 11.

[0025] In one embodiment, the flange has a thickness of about 8 millimetres and a central hole 12 of diameter equal to about 50 mm, so as to be easily fitted on a standard tube having a diameter of about 48 mm.

[0026] In accordance with a general embodiment, the method provides for said flange 11 to be fitted on said tube 10 and for said tube to be radially deformed so as to obtain two locking edges or rings 20, 21 suitable for clamping flange 11 thereinbetween.

[0027] Radial deformation herein means a plastic deformation of the tube that causes a variation of its diameter in a localised cylindrical portion thereof.

[0028] More in detail, the radial deformation of the tube is suitable for making each locking edge or ring 20, 21 engage a respective contact surface 14, 15 of flange 11.

[0029] In accordance with a preferred embodiment, said radial deformation of the tube is obtained by axial compression of the tube itself.

[0030] Preferably, the fixing method according to the invention provides for the steps of:

[0031] - carrying out a first radial deformation of the tube so as to obtain a first locking edge or ring 20 (figures 1, 2);

[0032] - fitting flange 11 on tube 10 so that it abuts through a first contact surface 14 against said first ring 20 (figure 3);

[0033] - carrying out a second radial deformation of

the tube so as to obtain the second edge or ring 21 on the side of the second contact surface 15 of flange 11 (figures 4-6).

[0034] Advantageously, each radial deformation of the tube is obtained by locking tube 10 with a clamp 30 defining a first shoulder 31 and axially compressing the tube from an end thereof inserted in a bush or matrix 40 defining a second shoulder 41 spaced from the first one.

[0035] More in detail, to obtain the first ring 20, a portion of tube 11 is locked by clamp 30. An end of the tube is inserted in bush or matrix 40, so that between shoulders 31 and 41 of the clamp and of the bush there is a distance X corresponding to a free portion of tube subject to radially expand (figure 1).

[0036] For example, said distance X is equal to about 21 mm.

[0037] The radial deformation of the tube is obtained by approaching bush or matrix 40 to clamp 30. During such axial compression, the free portion of pipe expands radially up to forming ring 20 (figure 2). Starting from a free portion of tube with 21 mm length, a ring of thickness equal to about 7 mm can be obtained.

[0038] At that point, flange 11 is fitted on tube 10 so as to abut against the first ring 20.

[0039] To make the second ring 21, the end of tube 10 is inserted again into bush or matrix 40. The distance between this and the clamp is greater than that defined for making the first ring 20, as it must keep into account the thickness of the first ring 20 and of flange 11. In other words, distance X, required for making a second ring 21 substantially equal to the first one, must be calculated starting from the second contact surface 15 of flange 11, that is, the free surface facing bush 40, since the portion of tube free to expand is that comprised between flange 11 and the second shoulder 41 of bush 40 (figure 4).

[0040] In fact, the first ring 20 is not further compressible, and the portion of tube inside hole 12 of the flange is not radially expansible due to the presence of the flange itself (but to such extent as to occupy the central hole 12, which has a diameter slightly larger than that of the tube).

[0041] Therefore, by approaching bush 40 to clamp 30, only the portion of tube comprised between flange 11 and the second shoulder 41 is free to radially expand forming the second ring 21, substantially equal to the first one (figure 5).

[0042] Advantageously, while making the second ring 21, the force acting on bush 40 by approaching it to clamp 30 is selected so that the two locking edges or rings 20, 21 are compressed one towards the other against the respective contact surfaces of the flange so as to form an axial and angular locking of the flange to the tube.

[0043] In accordance with a preferred embodiment of the fixing method according to the invention, to angularly lock the flange in an even safer manner, a flange 11 is used which exhibits at least one slot or radial loop 16 communicating with the central hole 12, or in any case having a hole 12 which exhibits an asymmetry relative to the axis of flange 11. In the step of making the second ring 21, the portion of tube inside said hole 12 is in fact free to radially expand inside said slit or loop 16 or in any case to the extent allowed by the asymmetry of hole 12, thus obtaining an angular locking of flange 11 to tube 10.

[0044] As an alternative (or even in combination with) to the angular locking system described above, it is possible to obtain an angular locking projection 20' during the make of the first locking edge or ring 20.

[0045] More in detail, bush or matrix 40 and clamp 30 (or clamp versa) respectively exhibit at least one punch 40' and a corresponding recess 30' (dashed in figure 1) obtained in the respective shoulders 41, 31. When bush or matrix 40 is approached to clamp 30 thus making ring 20, the latter is axially deformed by punch 40'. The resulting ring in particular exhibits an axial projection 20' at each recess 30' in the clamp or bush.

[0046] Such angular locking projection 20' is then inserted in a corresponding slit 16 obtained in flange 11 when this is fitted on the tube before making the second locking ring 21.

[0047] The fixing method according to the invention therefore allows obtaining an upright for scaffolds wherein the coupling flange is fixed to the tube without any welding, avoiding all the operations this implies.

[0048] In particular, the flange can be advantageously fixed to an already galvanised tube, available on the market. A finished product is therefore obtained at the end of the process which requires no further processing.

[0049] As no welding is required, moreover, a saving is obtained in the consumption of electric energy and systems for reducing noxious smokes need not be provided.

[0050] The fixing method proposed can be carried out with simple equipment that comprises, for example, a tube locking clamp and a bush or matrix suitable for being moved relative to said clamp.

[0051] The provision of the angular locking means of the flange to the tube finally ensures that multiple flanges on the same tube are angularly aligned for proper mounting of the scaffold.

[0052] It is clear that a man skilled in the art may make several changes and adjustments to the fixing method according to the present invention in order to meet specific and incidental needs, all falling within the scope of protection of the invention as defined in the following claims.

Claims

1. A method for fixing a coupling flange of the connecting crosspieces between the uprights of a scaffold to the tube of the upright itself, **characterised in that** it comprises the steps of:

    - fitting said flange on said tube;
    - radially deforming said tube so as to obtain two locking edges or rings suitable for clamping the

flange thereinbetween.

2. A method according to claim 1, wherein the flange exhibits a first contact surface and a second contact surface parallel and opposite the first one, wherein said radial deformation of the tube is suitable for engaging each locking edge or ring with a respective contact surface of the flange.

3. A method according to claim 1 or 2, wherein said radial deformation of the tube is obtained by axial compression of the tube itself.

4. A method according to any one of the previous claims, comprising the steps of:

- carrying out a first radial deformation of the tube so as to obtain a first locking edge or ring;
- fitting the flange on the tube so that it abuts through a first contact surface against said first ring;
- carrying out a second radial deformation of the tube so as to obtain a second edge or ring on the side of the second contact surface of the flange.

5. A method according to claim 3 or 4, wherein each radial deformation of the tube is obtained by locking the tube with a clamp defining a first shoulder, inserting an end of the tube in a bush or matrix defining a second shoulder spaced from the first one so as to leave a portion of tube free between said shoulders, and approaching the bush or matrix to said clamp so that said free portion of tube radially expands forming a locking edge or ring.

6. A method according to claim 5, wherein in the step of making the second locking edge or ring, the length of the free portion of tube before the compression is calculated starting from the contact surface of the flange.

7. A method according to any one of claims 3 to 6, wherein the two locking edges or rings are compressed one towards the other against the respective contact surfaces of the flange so as to obtain an axial and angular locking of the flange to the tube.

8. A method according to any one of claims 3 to 7, wherein the flange exhibits a central hole for the passage of the tube of the upright and at least one radial slit or loop that extends from said hole, and wherein in the step of making the second locking edge or ring the portion of tube inside said hole of the flange radially expands inside said at least one slit or loop thus obtaining an angular locking of the flange to the tube.

9. A method according to any one of the previous claims, wherein the step of making the first locking edge or ring envisages obtaining at least one axial deformation or projection on said ring or edge suitable for inserting into a corresponding slit obtained in the flange.

10. An assembly of upright and flange for scaffolds, wherein the upright exhibits a tubular element on which the flange is fitted, **characterised in that** the flange is located between and locked by two locking edges or rings obtained by radial deformation of the upright tube.

11. An assembly according to claim 10, wherein the flange exhibits a central hole for the passage of the tube of the upright and at least one radial slit or loop that extends from said hole, and wherein the portion of tube inside said hole of the flange extends inside said at least one slit or loop thus obtaining an angular locking of the flange to the tube.

12. An assembly according to claim 10 or 11, wherein at least one locking edge or ring exhibits at least one axial deformation or projection that extends in a corresponding slit obtained in the flange.

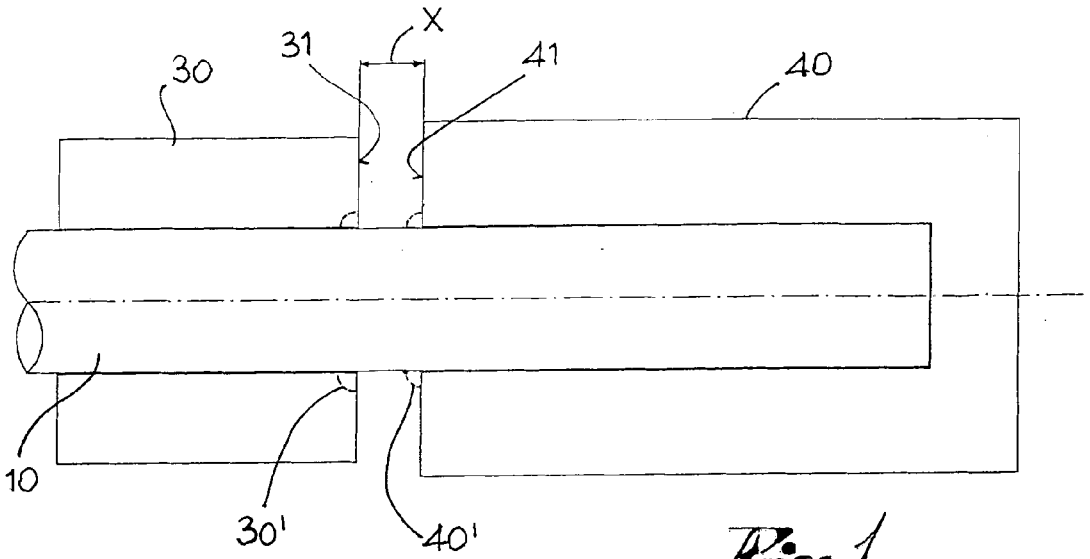

Fig.1

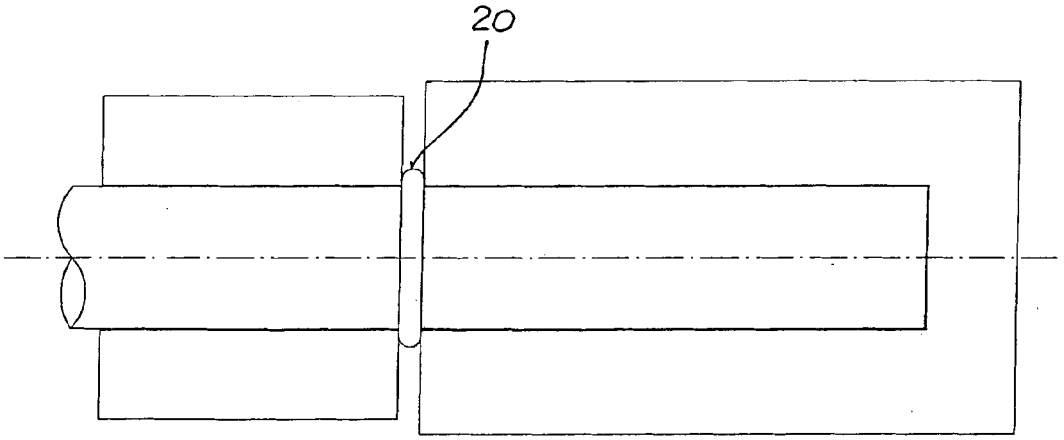

Fig.2

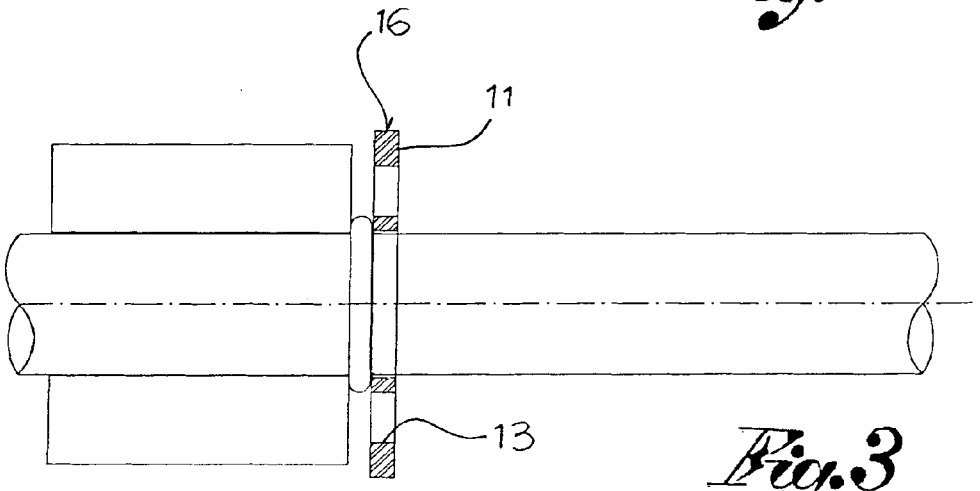

Fig.3

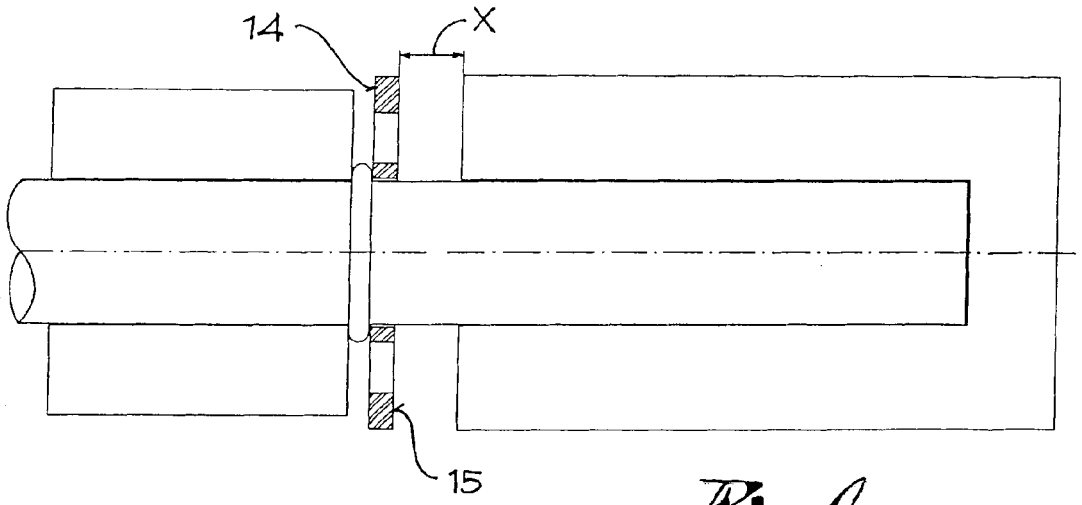

Fig. 4

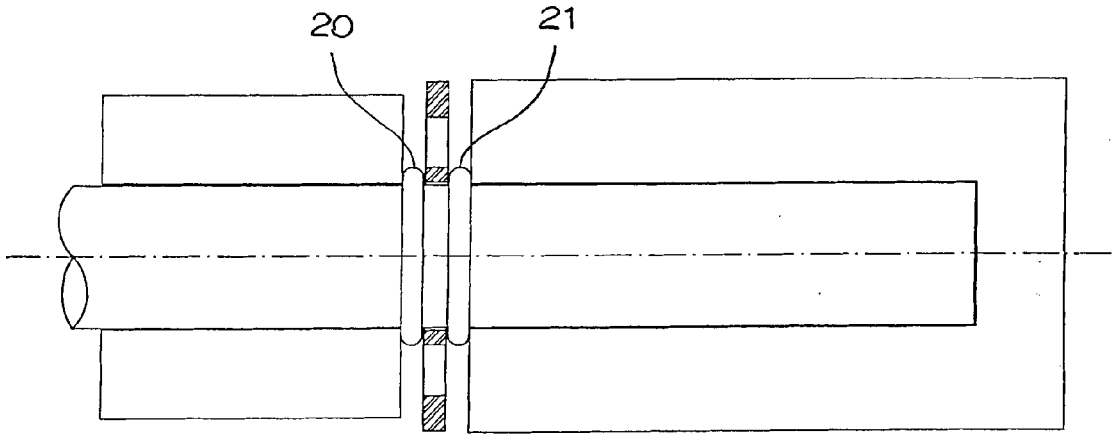

Fig. 5

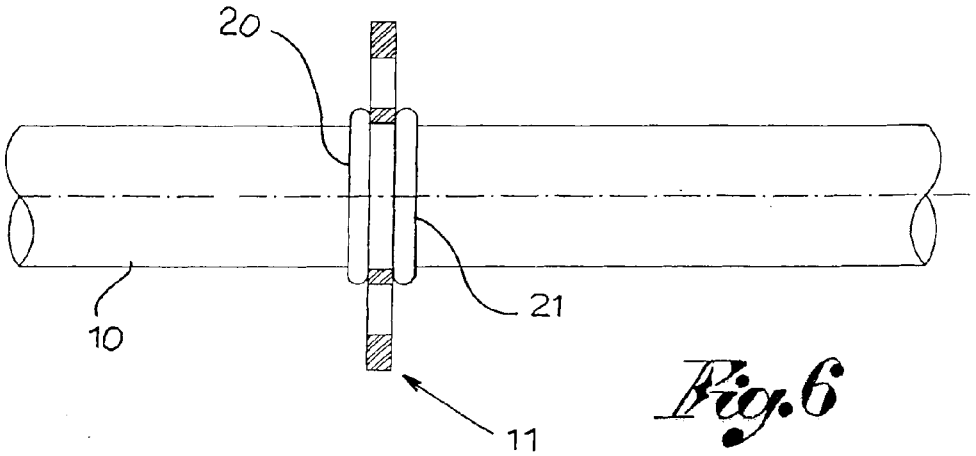

Fig. 6

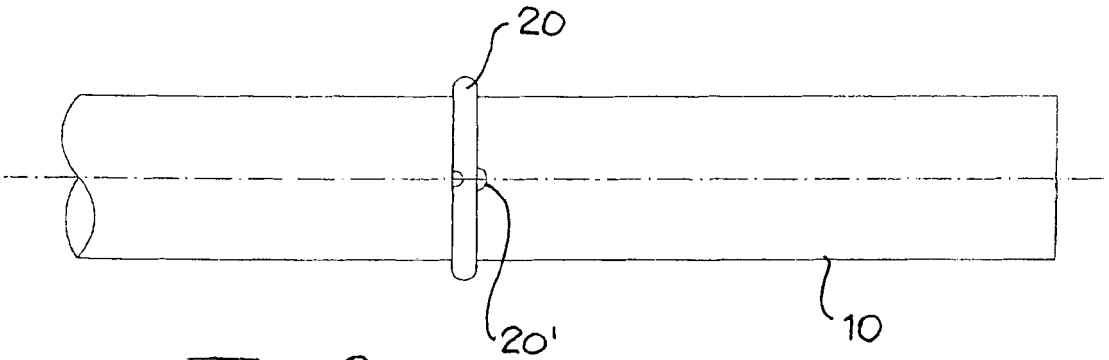

Fig. 8

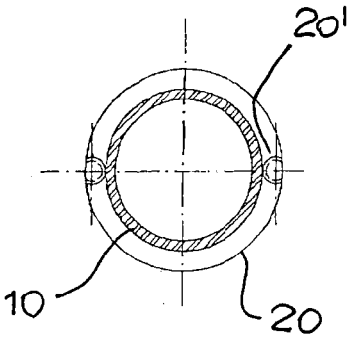

Fig. 8a

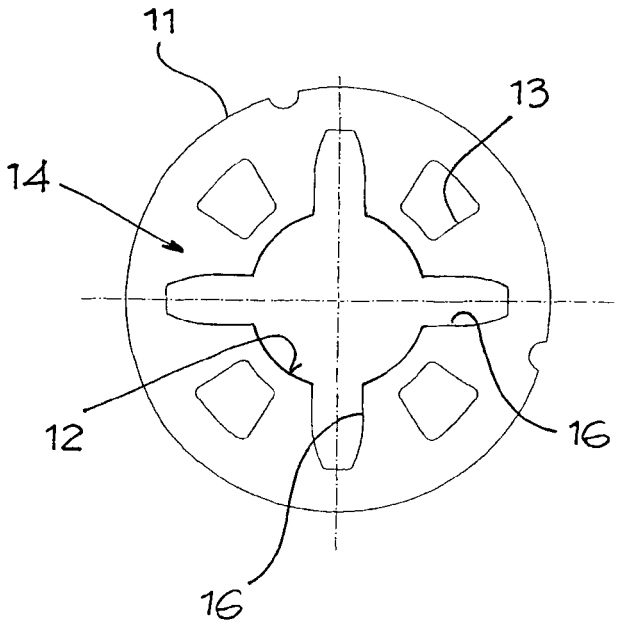

Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 06 12 4000

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	6 June 2007	Untermann, Nils

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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