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(54) CENTERING DEVICE WITH MODULAR STRUCTURE FOR CASINGS OF WELLS FOR THE PRODUCTION OF HYDROCARBONS AND CASING PROVIDED WITH SAID CENTERING DEVICE

(57) A centering device for casings of wells for the production of hydrocarbons, having a structure with modular elements composed of two head elements (2,3) that can be mutually coupled in an interlocking manner and of at least one intermediate extension element (8), also provided with parts (9,10,11,12) for interlocking coupling with the respective head elements (2,3).

The device allows the centering device with the most suitable length for the specific operating needs encountered at the site to be produced directly at the site and at the time of its use.

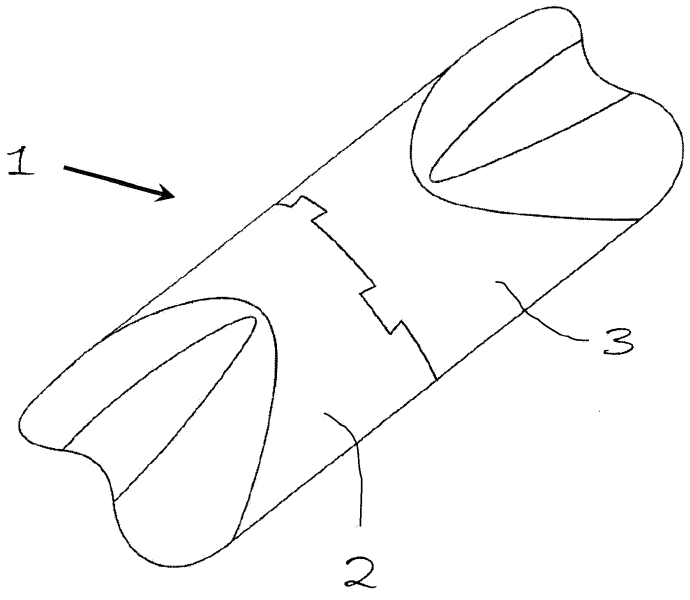

Fig.1

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Description

[0001] The present invention concerns a centering device having a modular structure, utilized for casings of wells for the production of hydrocarbons.

[0002] Wells for the extraction of hydrocarbons comprise a metal pipe, called casing, cemented to the walls of the borehole. The casing generally extends between the surface or well head area and the bottom or mineralized area (bottom).

[0003] In the oil industry, the quality of the distribution of liquid mortar obtained between the casing and the borehole is crucial to ensure containment of the pressure of the fluids imposed on the site and to avoid the undesirable migration of these fluids during the production life of the well. For this reason, the centering of the casing in a coaxial position with respect to the wellbore is an essential element to ensure optimal distribution of the mortar in the gap between the wellbore and the casing. For this purpose, it is known to install, on the outer wall of the casing, centering devices essentially consisting of slides that project from said wall.

[0004] Based on the more or less irregular profile of the well, but also according to the more or less slanted trajectory of this latter, it is often necessary to provide centering devices of different lengths, so as to optimize centering and sliding of the casing during its descent into the well. Therefore, for example, in the case of wells with a considerably slant or with a highly irregular profile, it is preferable to use centering devices that are longer than conventional devices, to ensure regular descent of the casing to the bottom of the well.

[0005] However, known centering devices are distinguished by the fact that they have a monolithic, or one piece, structure, which for this reason has a fixed size that can no longer be modified. Consequently, the size of the conventional centering device, once manufactured, cannot be modified or changed, to adapt it to the operating conditions of the well, directly at the time of installing the casing. Therefore, it is currently necessary to have the same number of centering devices as the number of different lengths required by the many different operating conditions of the well. Naturally, this involves costs both for the storage and for the manufacture of the different centering devices, added to which are costs linked to lack of use of centering devices with sizes unsuitable for use at the well site, to deterioration of the plastic or metal material of the centering devices stored in the long term and to management of the warehouse in which they are kept.

[0006] The main object of the present invention is to provide a new centering device for casings of wells for the production of hydrocarbons which, with respect to known centering devices, allows the conventional problems of cost and storage of centering devices of different length to be effectively solved.

[0007] Another object of the invention is to provide a centering device with a length that can be changed rapidly and instantly, making it immediately available for installation on the casing, according to the site requirements occurring directly at the well site.

[0008] A further object of the invention is to provide a casing provided with centering devices, the sizes of which are adapted time by time to the geometric conditions of the extraction well, directly at the time of their use.

[0009] Finally, the object of the invention is also to provide a centering device, provided with a friction element that can be replaced according to the geometry and to other formation characteristics of the well.

[0010] These and other objects are achieved with the centering device and with the casing of claims 1 and 10, respectively. Preferred embodiments of the centering device of the invention are indicated in the remaining claims.

[0011] In relation to known centering devices for casings, with the device of the invention the centering device with the most suitable length for the specific operating needs encountered at the site can be produced directly on site and at the time use. Due to this possibility, offered by the modular structure of the centering device of the invention, there is no longer the traditional need to provide, on site, centering devices already preformed with the different lengths required case by case, and therefore using only part of all those in stored in the warehouse.

[0012] The invention also solves the problem of lack of availability, at the time of use, of centering devices with sizes suitable for their use on the specific drilling site.

[0013] The device of the invention also has the advantage of allowing, directly at the time of use and at the well site, the material of its contact surface with the wall of the well or with the wall of the pre-existing casing to be selected from those most suitable for the geometric conditions of the well.

[0014] These and other objects, advantages and features are apparent from the description below of some preferred embodiments of the centering device and the casing of the present invention illustrated, by way of non-limiting examples, in the figures of the accompanying drawings, wherein:

- Figs. 1 and 2 illustrate, respectively in an assembled view and in an exploded view, a first embodiment of the centering device of the invention;
- Fig. 3 illustrates the assembly method of the device of the preceding figures;
- Figs. 4 and 5 illustrate, respectively in an exploded view and in an assembled view, a second example of embodiment of the device of the invention;
- Figs. 6 and 7 illustrate, respectively in an exploded view and in an assembled view, a third example of embodiment of the device of the invention;
- Figs. 8 and 9 illustrate a variant of the device of Figs. 1 and 2, equipped with a friction element selectable at the time of use;
- Fig. 10 illustrates a sectional view of the detail of interlocking installation of the friction element on the centering device of the invention;

- Figs. 11 and 12 illustrate a variant of the device of Figs. 8 and 9; and
- Fig. 13 illustrates an example of casing provided with the centering device of the invention.

[0015] The centering device of Figs. 1 and 2, indicated as a whole with 1, has a modular structure with two head elements, respectively 2 and 3, which can be mutually coupled at dovetail joints, respectively male 4,5 and female 6,7. As better illustrated in Fig. 3, assembly of the device 1 is obtained by coupling the two elements 2 and 3 in the direction of the arrow F, so as to engage the male parts 4 and 5 in the respective female sections 6 and 7.

[0016] In the case in which the site requires a length of the centering device, greater than the one illustrated in Figs. 1 and 2, for example for horizontal or greatly slanted wells, the modular structure of the centering device of the invention allows the head elements 2 and 3 of Fig. 1 to be integrated, rapidly and simply directly at the well site, with the intermediate extension element 8 of Figs. 4 and 5. Also in this case coupling of the aforesaid elements 2, 8 and 3, advantageously of modular type, is obtained using the dovetail joints 4,5,6,7 of the head elements 2 and 3, and the analogous joints of the intermediate extension element 8, respectively male 9 and female 10 on the head element 2 side, and male 11 and female 12 on the head element 3 side of the centering device.1.

[0017] Naturally, it is possible to further increase the length of the device of the invention, by inserting additional intermediate elements 8, such as the one indicated with 13 in Figs. 6 and 7, between the head elements 2 and 3.

[0018] These operations are facilitated by the modular structure of the device 1, so that it is possible to prepare, directly at the well site and according to the specific needs at the time, the centering device having the most suitable length, starting from the base modular components 2, 3 and 8, therefore no longer needing to have a the same number of pre-formed centering devices as the lengths required by the site.

[0019] In the embodiment illustrated in Figs. 8 and 9, the head elements 2 and 3 of the centering device of the invention have respective shaped seats 14 and 15, suitable to accommodate the corresponding portions of a friction element 16, or the outermost part of the centering device, which is the part destined to come into rubbing contact with the walls of the well or with the walls of a pre-existing casing.

[0020] Also in this case the friction element 16 is inserted in a specific seat obtained in the outer wall of the body of the centering device. Finally, an adhesive, a forced coupling and the like can be used to secure the aforesaid element 16 in its seat in the body of the centering device (Fig. 10). In this way, it is possible to easily change the friction element equipped on the centering device, choosing from those most suitable for the conditions of the well and replacing it directly at the time of use.

[0021] In the variant with only one intermediate extension element 8, as illustrated in Fig. 11, the device of the invention is integrated with two friction elements 16 and 17. In particular, the friction element 16 is housed in the seat 14 of the head element 2 and in the seat 18 of the extension element 8 of the centering device of the invention. The friction element 17 is instead positioned interlocking with the seat 15 of the head element 3 and with the seat 19 of the same intermediate element 8.

[0022] Advantageously, the aforesaid intermediate element 8 has two distinct seats 18 and 19, separated from each other by a diaphragm 20 for housing the different friction elements 16 and 17.

[0023] Due to this embodiment it is possible to choose, directly at the well site and at the time of assembly of the centering device of the invention, not only its length, but also the type of friction element 16 and 17, based on need and on the conditions of the well at the time.

[0024] In its operating mode, the centering device of the invention is installed on the outer surface of the casing 21 of Fig. 13, housed in the gap 22 that separates the outer surface of the casing 21 from the wall 23 of the well.

[0025] The invention, as described above and illustrated in the figures of the accompanying drawings, can be modified to produce variants that however do not depart from the scope of the claims below. Therefore, for example, the number of the intermediate extension elements 8 could be greater than those illustrated and there could be different versions of the joints used for coupling, both to one another and to the head elements 2 and 3, and also to the friction elements 16 and 17. Moreover, the diaphragm 20 that separates the seats 18 and 19 of the intermediate element 18 of Fig. 11 could be omitted.

Claims

1. Centering device for casings of wells for the production of hydrocarbons, **characterized by** having a structure with modular elements, mutually assembled to form said device.

2. Device according to claim 1, **characterized by** comprising two head elements (2, 3) mutually coupled in an interlocking manner.

3. Device according to claim 2, **characterized in that** said head elements (2,3) are provided with dovetail joints, respectively with male parts (5,4) and respectively with female parts (7,6).

4. Device according to claim 2, **characterized in that** it further comprises at least one intermediate extension element (8).

5. Device according to claim 4, **characterized in that** the aforesaid intermediate extension element (8) is provided with parts (9,10,11,12) for interlocking cou-

pling with the respective head elements (2,3).

6. Device according to claim 1, **characterized in that** said modular elements further comprise one or more friction elements (16,17) assembled on the said elements (2,3,8).

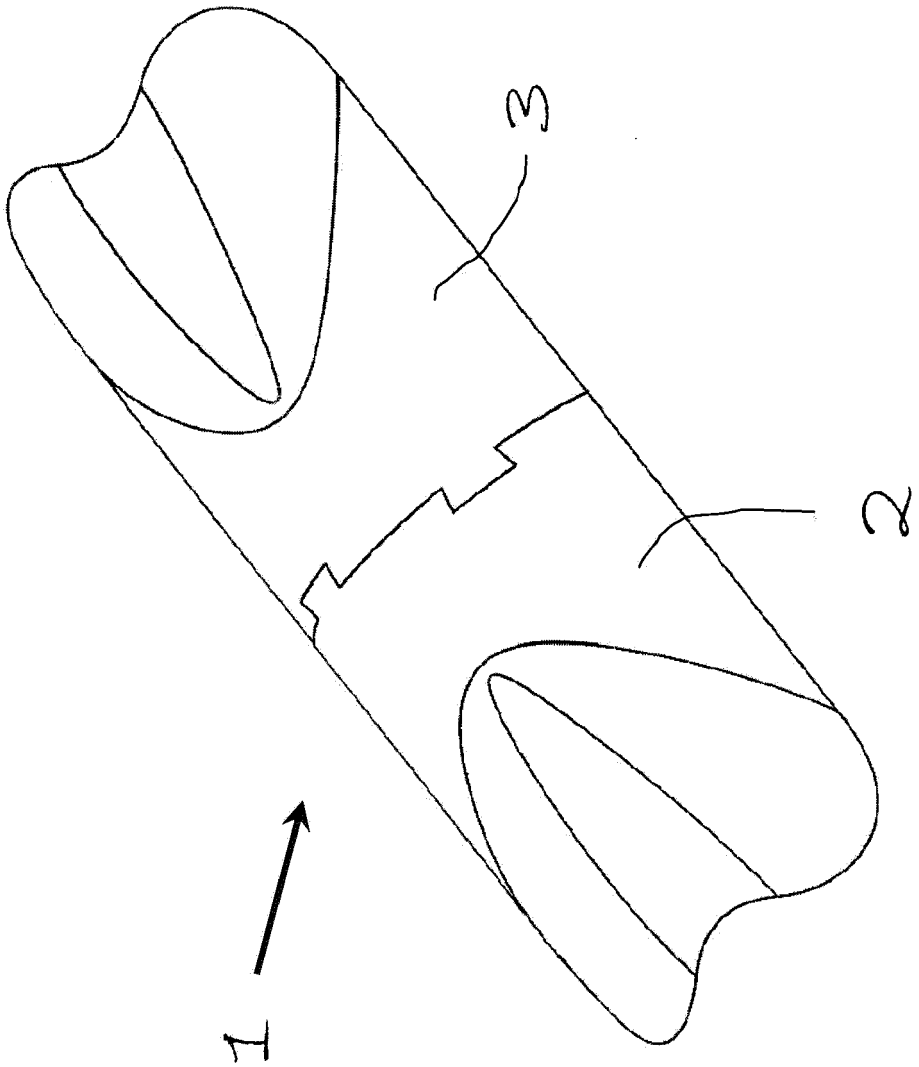
7. Device according to claim 6, **characterized in that** said head elements (2,3) are provided with respective seats (14,15) for coupling with said friction element (16).

8. Device according to claim 7, **characterized in that** said intermediate element (8) is provided with seats (18, 19) for engaging with the aforesaid friction elements (16, 17).

9. Device according to claim 8, **characterized in that** said seats (18, 19) are mutually separated by a diaphragm (20).

10. Casings of wells for the production of hydrocarbons, **characterized by** being provided with the centering device according to one or more of the preceding claims.

Fig.1



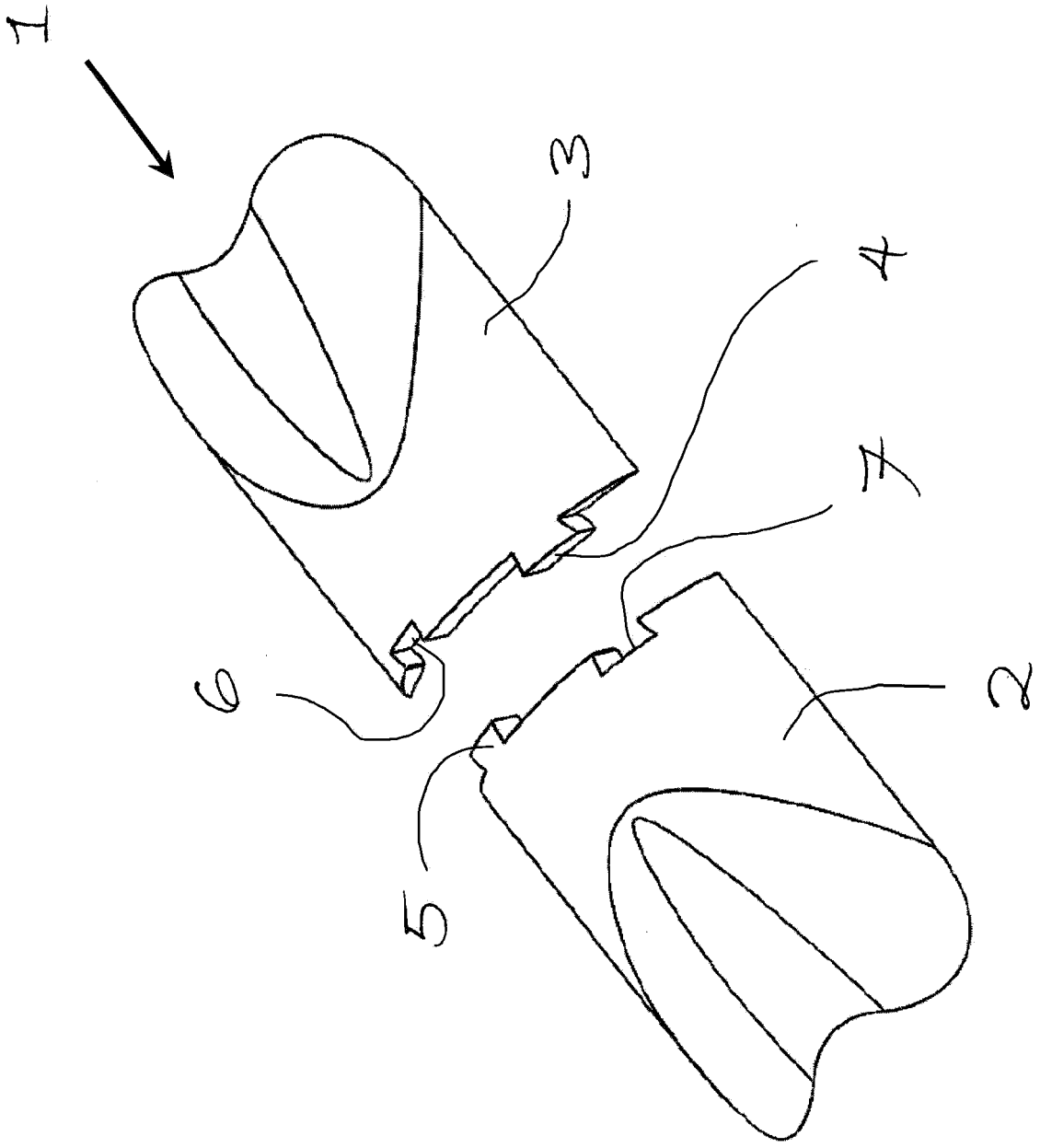
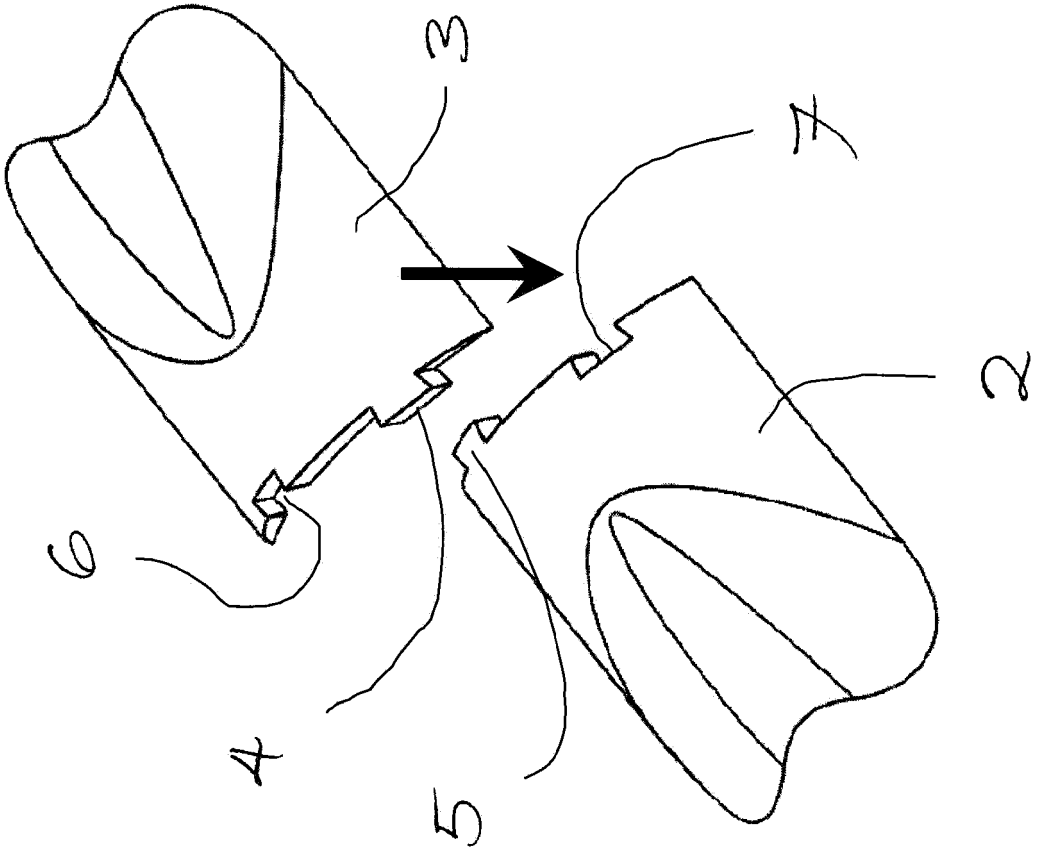


Fig.2

Fig.3



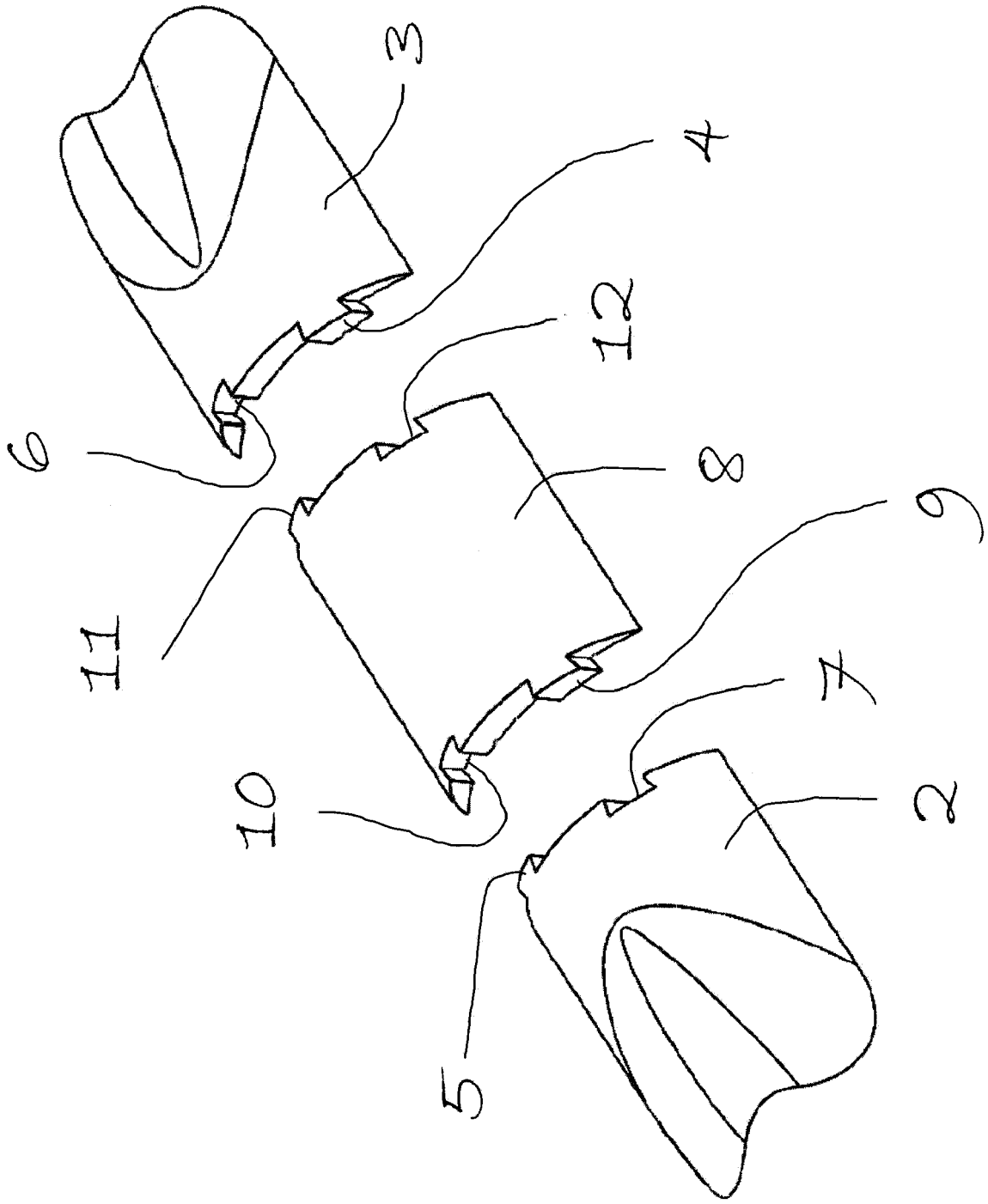
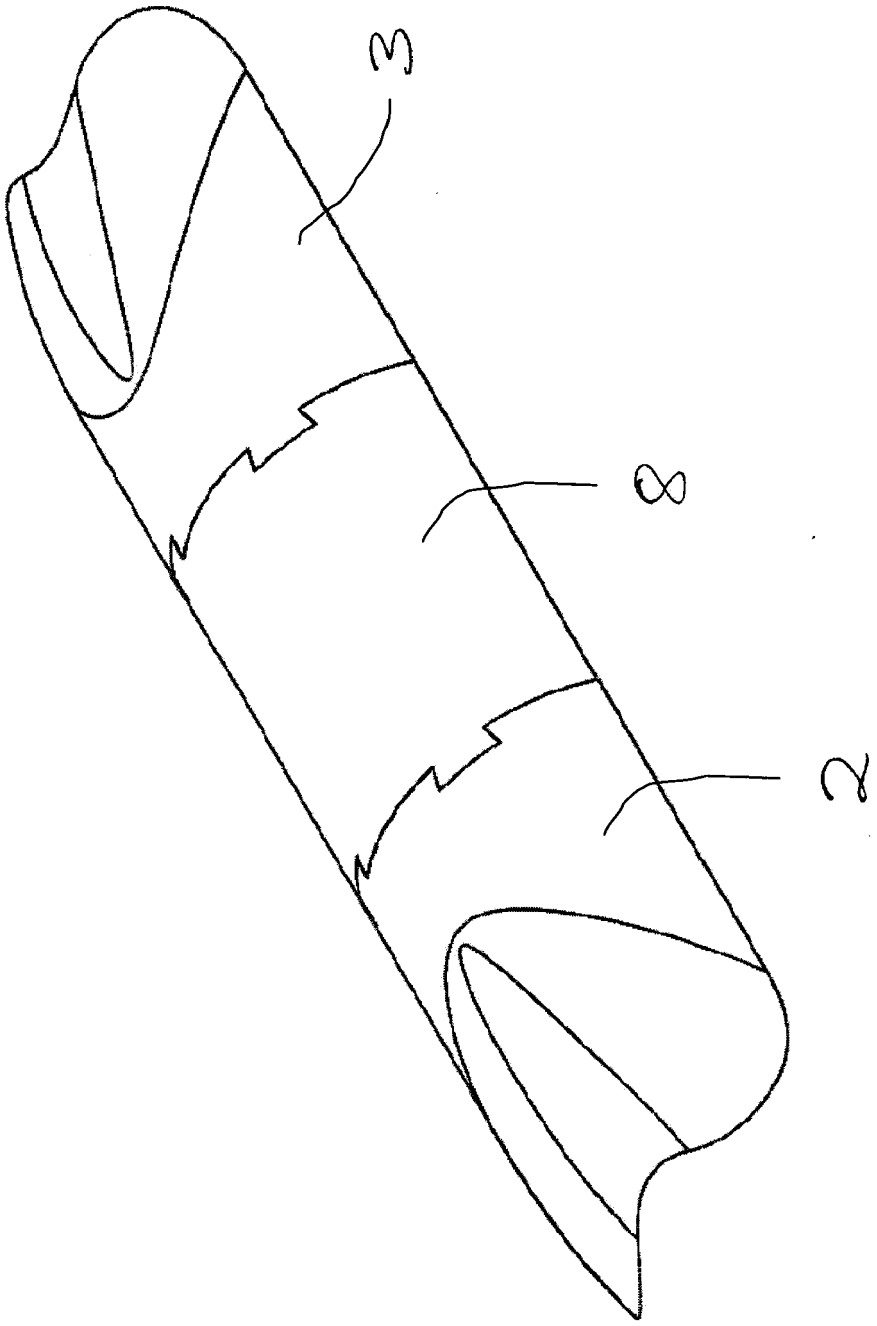


Fig.4

Fig.5



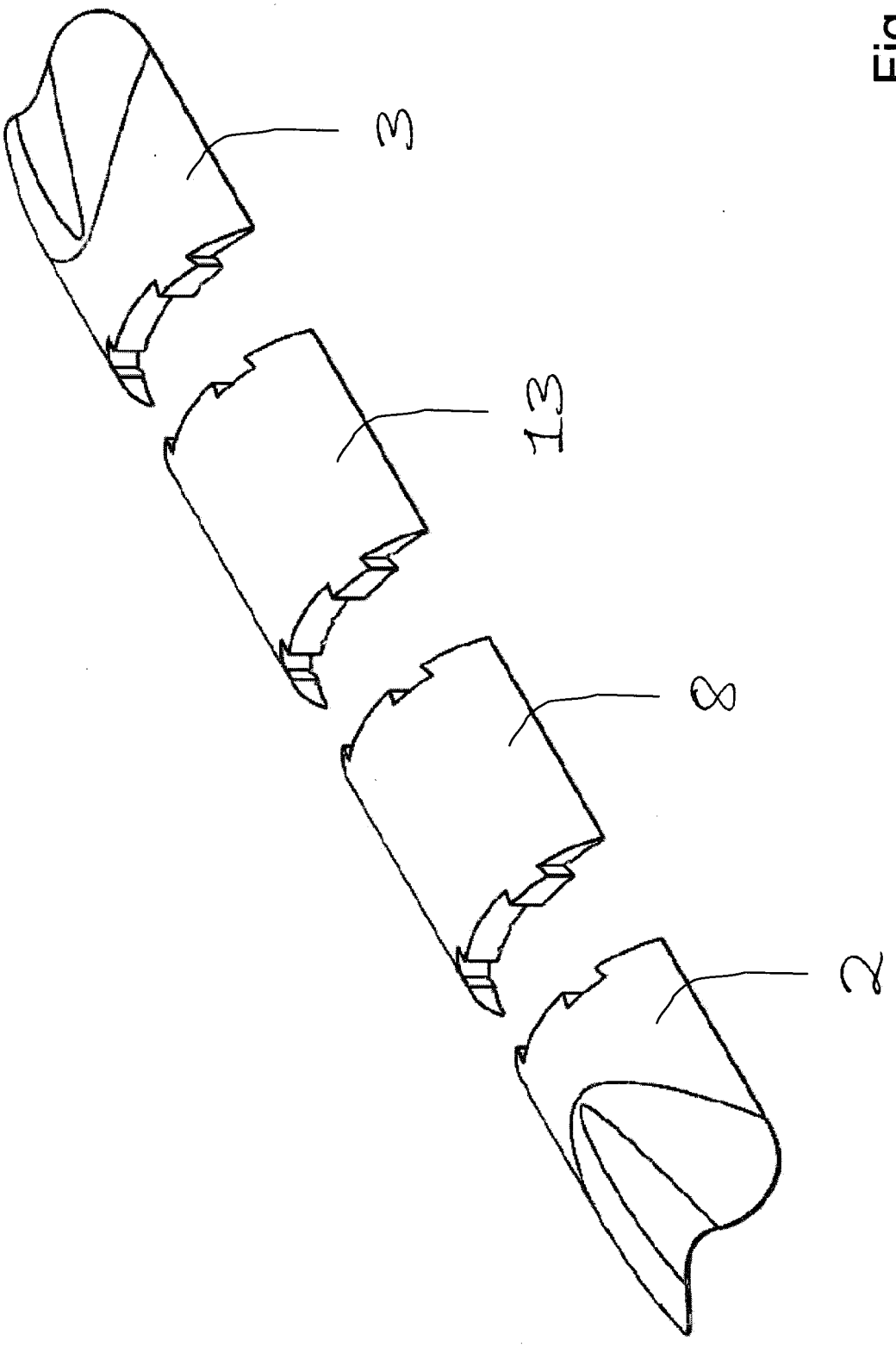


Fig.6

Fig.7

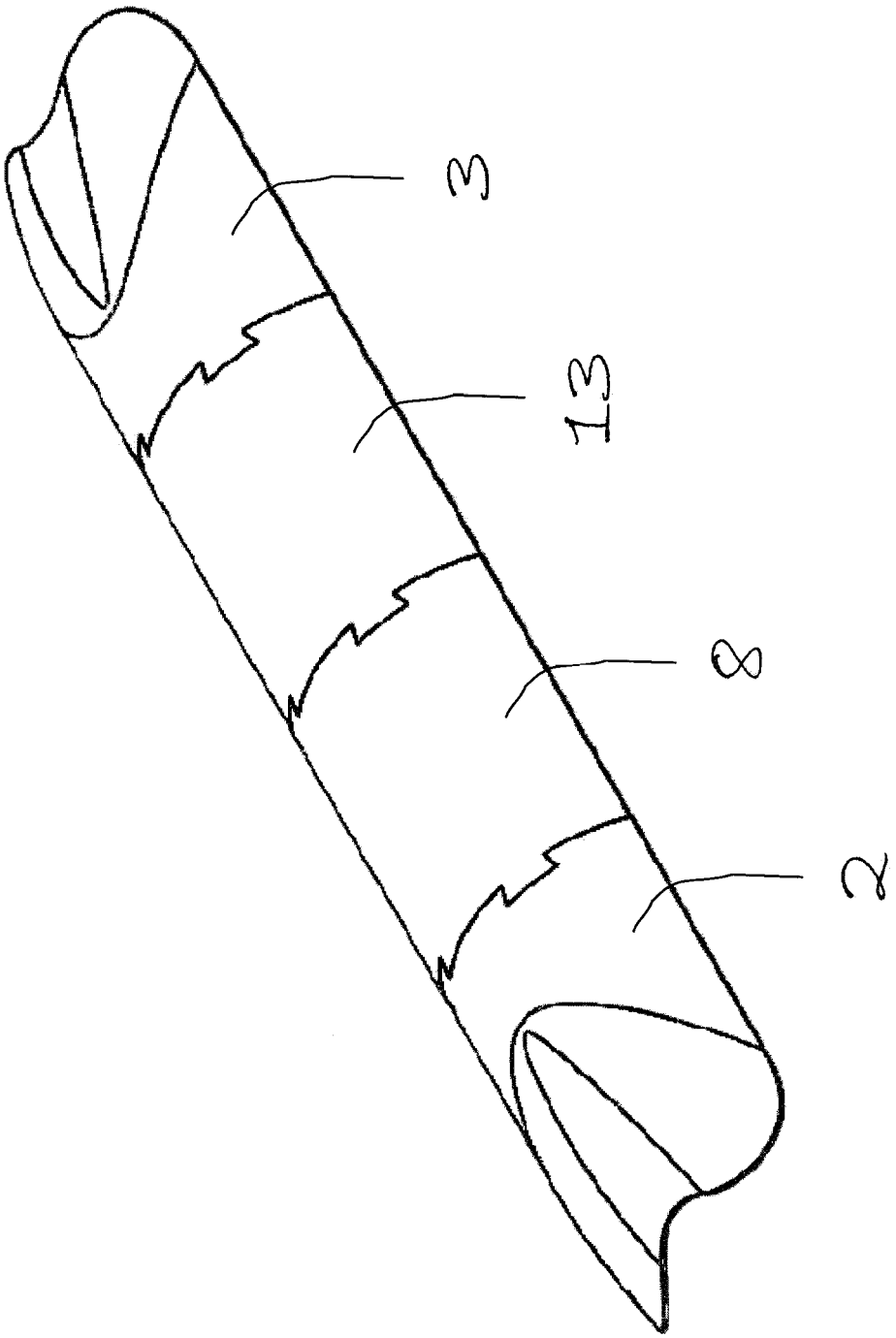


Fig.8

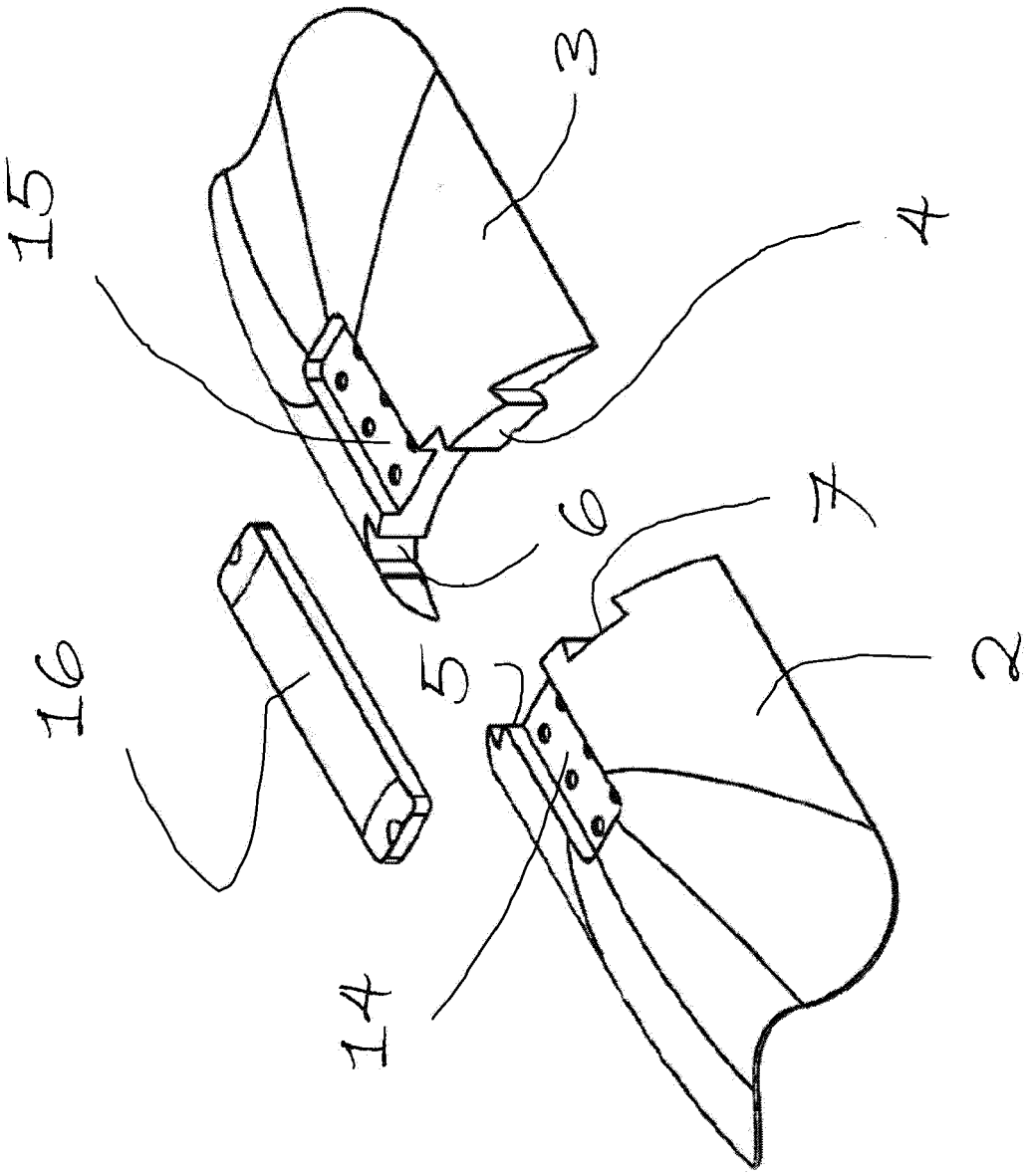


Fig.9

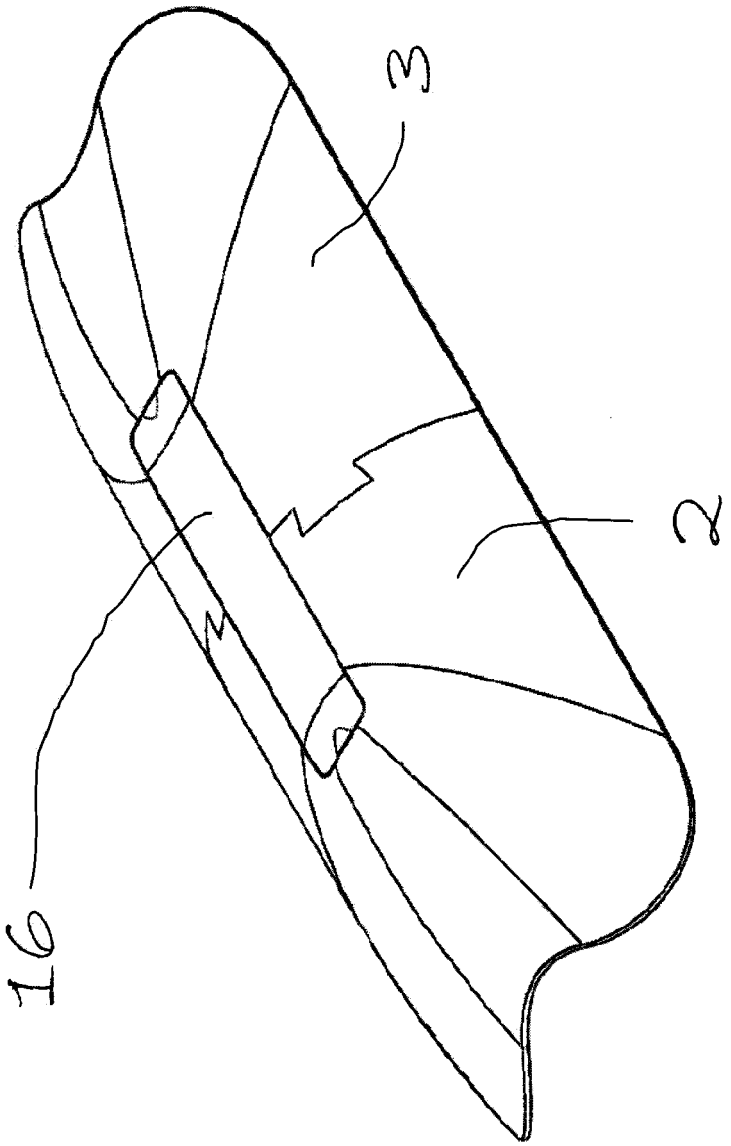
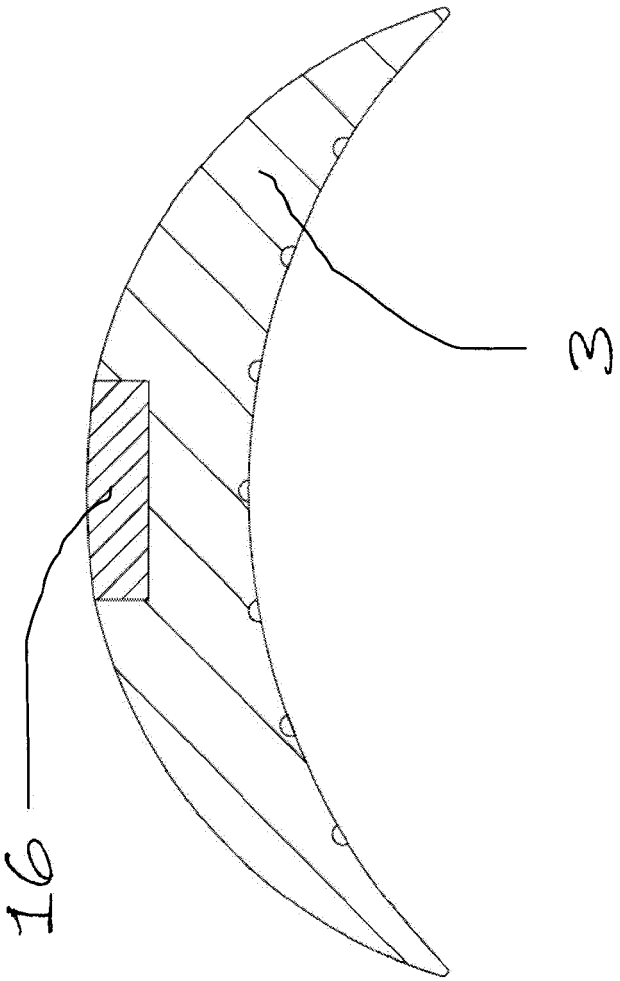


Fig.10



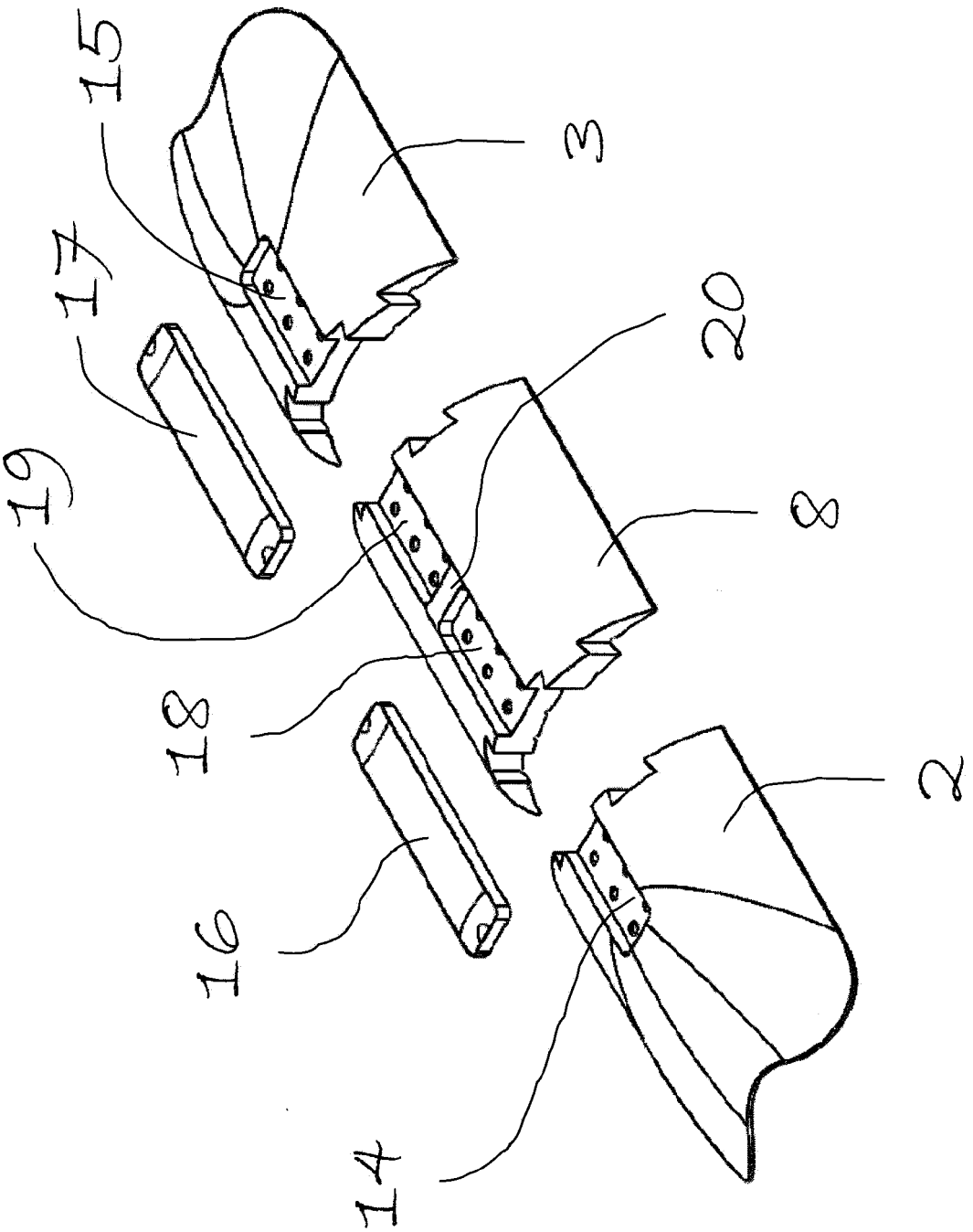
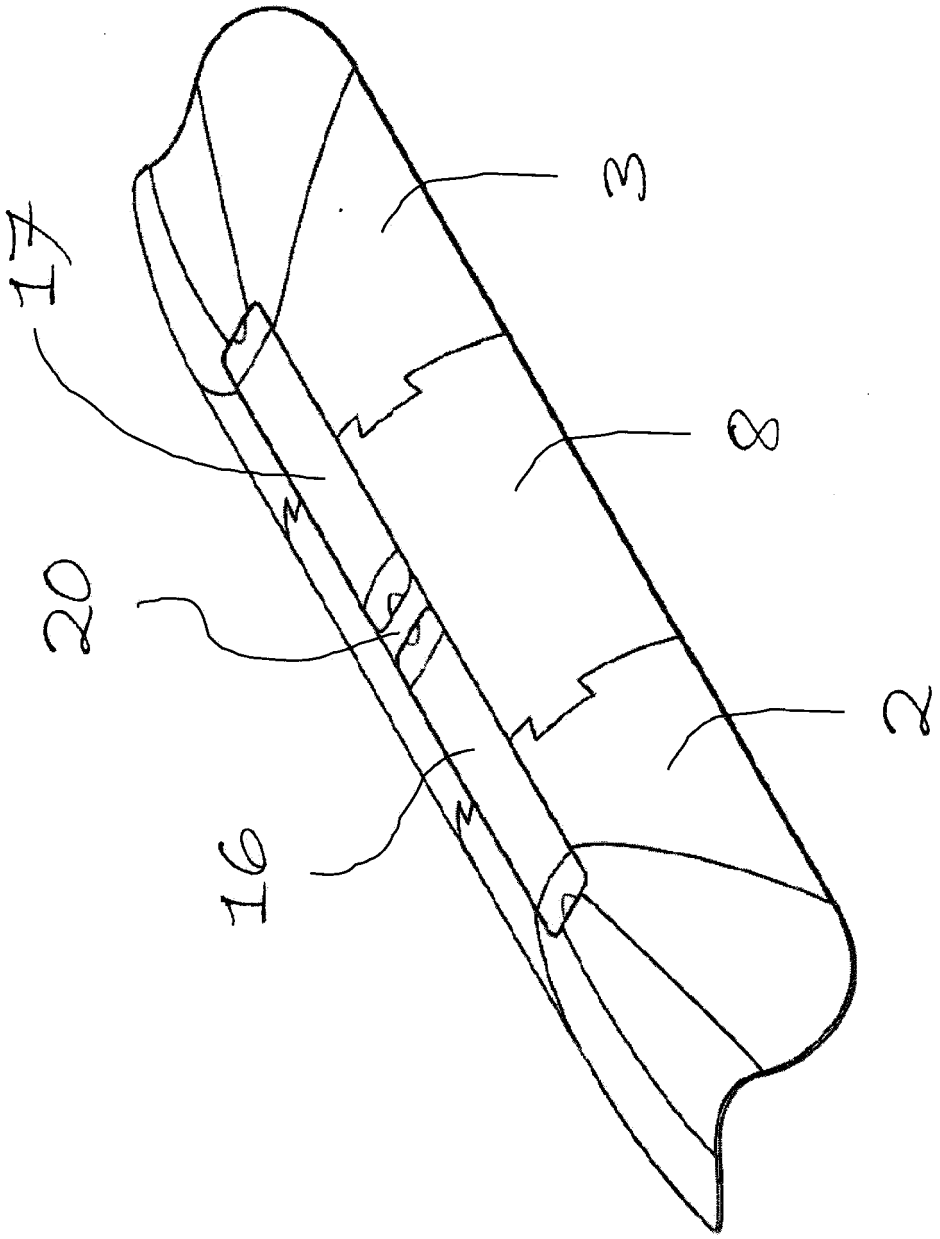


Fig.11

Fig.12



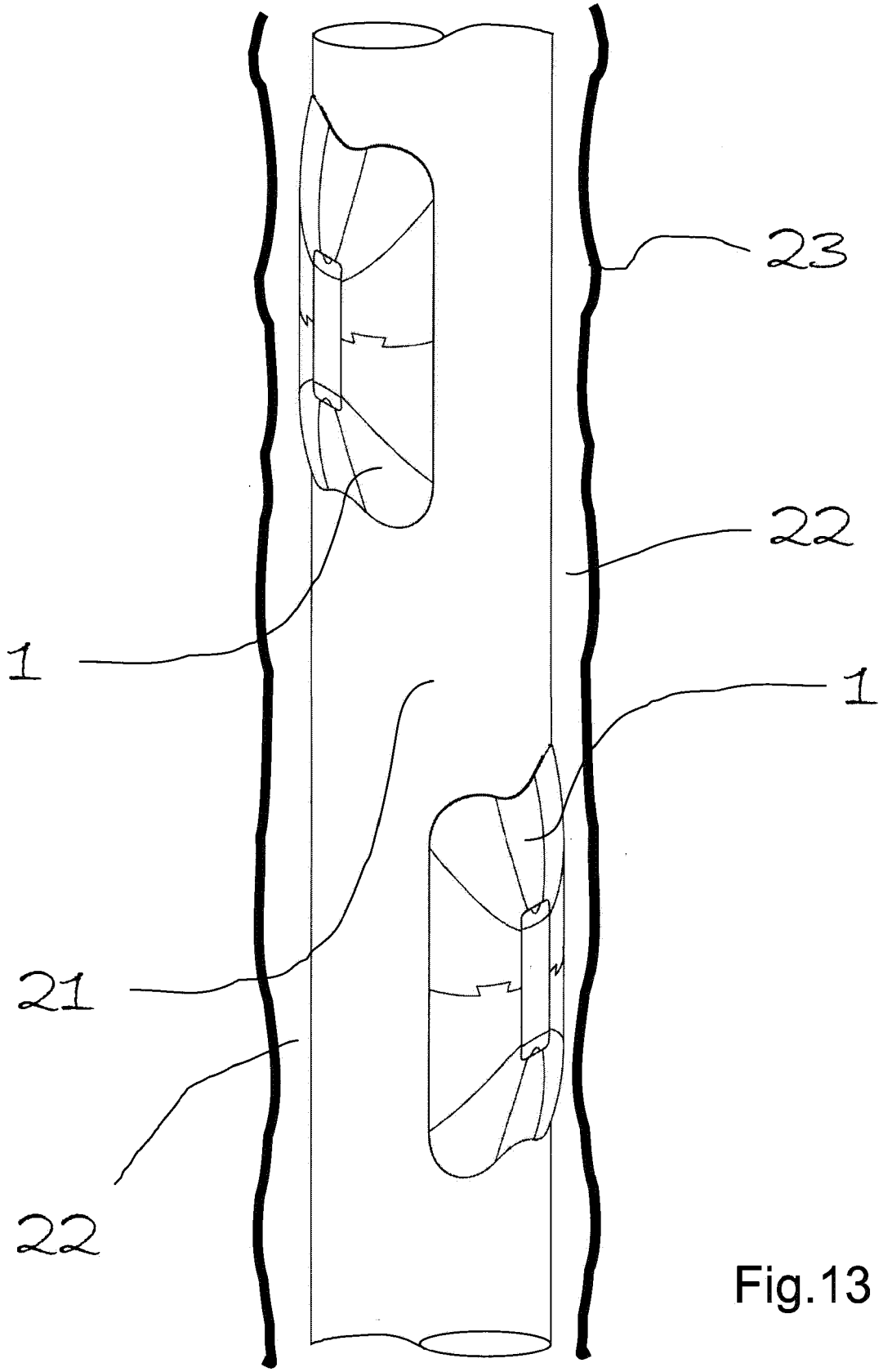


Fig.13

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EUROPEAN SEARCH REPORT

Application Number
EP 16 19 0933

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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	16 January 2017	Bellingacci, F

CATEGORY OF CITED DOCUMENTS

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