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(54) Method of, and machine for making a spiral decorative element of metal

(57) A method of making a so called pine-cone spiral decorative element of metal, which is formed from a plurality of bars (1), generally four or eight in number, having circular or polygonal cross-section, cut in desired length, comprises steps of bending each bar (1), whose end sections (3,3) remain straight; welding at both their ends (5,5)

the end sections (3,3) of the bars (1), which are placed side by side and angularly spaced so that the bars look like meridians of an unfinished product (4) formed according to a rotation body; and mutual rotation of the one welded ends (5) of the bars to the other ends (5) thereof by a desired angle. Further, a machine for embodying the method of the invention is disclosed.

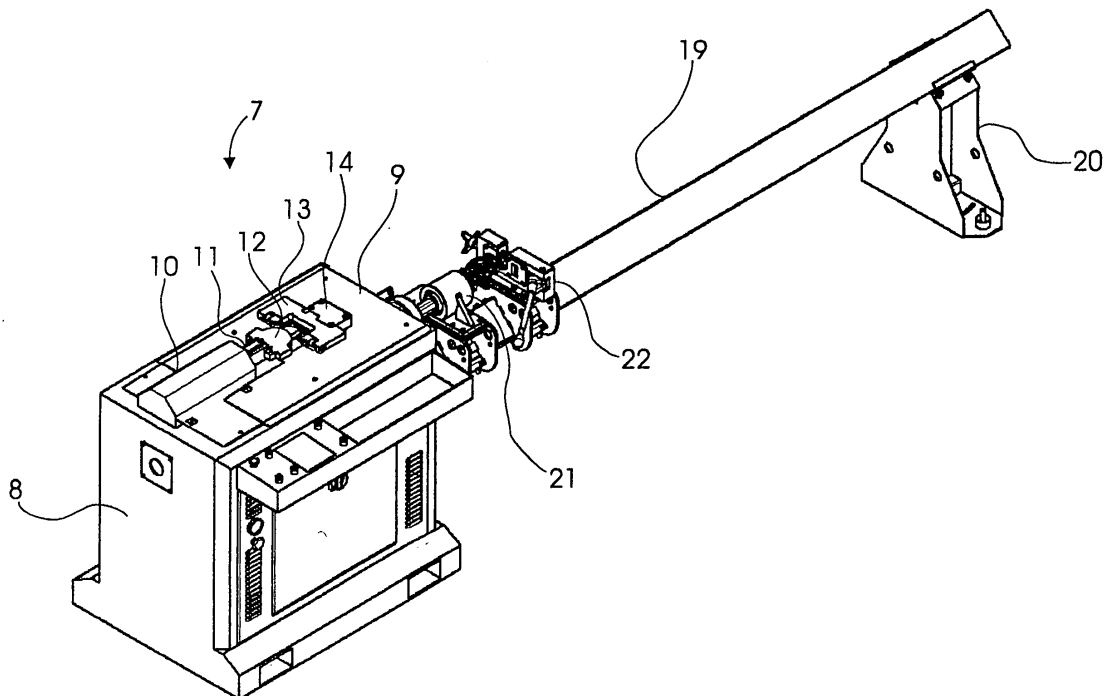


Fig.7

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Description

[0001] The present invention relates to a method of making a spiral decorative element of metal, and a machine therefor.

[0002] In particular, such decorative elements, which are called pine-cones or baskets, are obtained from a plurality of bars, that are generally four or eight in number, circular or polygonal in their cross-section, in a desired length. A method of making the so-called pine-cones is known e.g. by U.S. Pat. No. 5,676,013. According to that patent, straight bars are welded together at their opposite ends and axially cold twisted by turning them through a first angle. Then, the bars are axially twisted by turning them in the opposite direction through a second angle smaller than the first one, and axially compressing them at the same time or, preferably, after being turned. This method is performed by a machine, which comprises a couple of hydraulic cylinders having rods that are provided with clamping means to clamp the ends of the bars and are able to rotate in virtue of respective electric motors.

[0003] U.S. Pat. No. 6,009,738 discloses a manual or powered apparatus for cold forming a pine-cone. That apparatus uses opposite location means for the location of welded ends of straight bars, the one location means being fixed to a plate and the other location means being mounted at the end of a shaft which is connected to a crank or powered. The crankshaft can be coupled to an externally threaded coaxial shaft, so that both location means can travel, when the crankshaft rotates, to axially compress the bars that have been twisted when the crankshaft has been freely rotating. U.S. Pat. No. 6,009,738 claims the fixed location of a welded end of bars in the one direction and the movement of the same welded end in the opposite direction.

[0004] In both methods above mentioned the pine-cone swells when the bars are extended while they are twisted in one direction and in the other one, and they are curved by subsequent axial compression.

[0005] An automatic swelling formation of such a kind, on one hand, damages quality and constant reproducibility of an end product, especially if the several bars come from a different raw material. On the other hand, such an automatic formation allows the pine-cones to be made always with the same either essentially spherical or almost cylindrical conformation.

[0006] The present invention aims to overcome these drawbacks by separating a bar bending step for the pine-cone swelling from the twisting step, in which the bars are given a spiral pattern.

[0007] Therefore, in a first aspect of the invention there is provided a method of making a so called pine-cone spiral decorative element of metal according to claim 1.

[0008] According to a second aspect of the invention there is provided machine for making a so called pine-cone spiral decorative element of metal according to claim 6.

[0009] The present invention will be described with reference to its preferred embodiment in connection with the accompanying drawings.

5 Figure 1 is a top plan view of a bar formed in a horizontal press by a method according to the invention; Figure 2 is an end view of an unfinished product to make a decorative element by the method according to the invention;

10 Figure 3 shows in a side view the unfinished product in Figure 2;

Figure 4 is an end view of a product obtained by the method according to the invention;

15 Figure 5 shows in a side view the product in Figure 4;

Figure 6 shows in a perspective view a die and a counter-die for forming a bar;

Figure 7 shows in a perspective view a machine to make decorative elements according to the present invention;

20 Figure 8 shows in an enlarged view a detail in Figure 7;

Figure 9 shows in a perspective view a screw device of the machine in Figure 7;

25 Figures 10 to 12 are a side view, an end view and a perspective view respectively, of an alternate of unfinished product to make a decorative element by the method according to the invention; and

30 Figures 13 to 15 are a side view, an end view and a perspective view respectively, of a product obtained by the method according to the invention embodied to the alternate of unfinished product in Figures 10 to 12.

35 **[0010]** With reference to the drawings, Figures 1 to 5 are views showing a first form of unfinished product and a first end product in the method according to the present invention. In Figure 1 there is shown in a plan view a bar 1, which has a desired length and is formed with an arched middle section 2 and straight end sections 3, 3 from a polygonal straight bar, in particular a square bar. This bar 1 is obtained in a horizontal press as described below, in which the bar 1 is arranged, with a point contact, in a diamond relationship with the press.

40 **[0011]** In Figures 2 and 3, which are an end view and a side view respectively, there is shown an unfinished product 4, which is obtained by welding four arched bars 1 at its free ends 5, 5. The bars 1 may also be eight in number as well as quite different in length. Bars 1 are placed with their end sections 3, 3 side by side and 90 degrees angularly spaced so that bars 1 look like meridians of a rotation body.

50 **[0012]** In a subsequent working step, welded ends 5, 5 of the bars 1 in the unfinished product 4 are twisted with a resulting mutual rotation of the one welded bar ends 5 to the other welded bar ends 5 by a desired angle. The end product obtained is indicated as 6 in Figures 4 and 5, which are an end view and a side view respectively, thereof.

[0013] If, in the method according to the present invention, a mutual rotation is performed only in a direction with a result that the one ends 5 approach the other ends 5, a pine-cone with a cylinder-shaped central portion is obtained. If the mutual rotation is performed by a multiple of 90 degrees, a parallel relationship, except for the spring-back depending on the material, is obtained for the faces of the bars that have been twisted.

[0014] If, in the method according to the present invention, a mutual rotation is performed first in a direction and then in the other one, with a result that the one ends approach the other ends, a pine-cone with a sphere-shaped central portion is obtained.

[0015] Preferably, the second rotation extends by an angle smaller than the first rotation and is offset to the same by a multiple of 90 degrees, always except for the spring-back depending on the material.

[0016] A machine according to the present invention for making the so called pine-cones spiral decorative elements of metal according to the invention is a composite machine shown in a perspective view in Figure 7, in which the machine is generally designated as 7. The machine body, denoted by 8, is generally that one of a twisting machine having on the top a free surface 9 on which a horizontal press 10 is mounted.

[0017] The horizontal press 10 is essentially a hydraulic cylinder, whose rod 11 holds a die 12. A counter-die 13 is placed on the free surface 9. The counter-die 13 is retained against a support plate 14 which is fixed to the free surface 9 of the machine body 8 by suitable threaded couplings 15.

[0018] The die 12, the counter-die 13 and the support plate 14 are better seen in the perspective view of Figure 6. In order to make easy and more accurate bend a bar 1, triangular grooves 18 designed to receive opposite edges of the bar 1 are provided in the die 12 and in the corner portions 16, 17 of the counter-die. In fact, the bar 1 is placed in a diamond arrangement, as clearly shown in Figure 6.

[0019] This arrangement allows different size bars to be housed between die and counter-die. Further, by using a die and counter-die having a suitable height, a plurality of bars can be bent at the same time, thus reducing the machining time.

[0020] An elongated prismatic bench 19, sustained near its free end by a pedestal 20, is mounted in the front side of the twisting machine body 8. A screw device 21 and a vise 22, best shown in the enlarged perspective view of the Figure 8, are mounted in a displaceable and releasable way on the bench 19.

[0021] The screw device 21 is shown in Figure 9, which is a separated perspective view thereof. A cylindrical body 25, which is internally threaded for the coupling to a counter screw thread 26 of a screw 27, is mounted on a fixing member 23 to the bench 19 by a supporting member 24. A mandrel 29 is connected to the screw 27 by pins 28. The mandrel 29 has on one hand a square end 30 for fitting in a drive (not shown) of the twisting machine,

and, on the other hand, an equally square seating 31 as a housing of the one welded bar ends 5 of the unfinished product 4.

[0022] The vise 22, which is known and then not described in more detail, is designed to clamp the other welded bar ends 5. The end product 6 obtained according to the above method from the unfinished product in Figures 2 and 3 is shown in Figures 4 and 5.

[0023] Referring to Figures 10 to 12, that are a side view, an end view and a perspective view, respectively, there is shown a second form of unfinished product, i. e. an alternate of that one shown in Figures 2 and 3. In this alternate bars 33 are obtained from a circular straight bar, which is cut in desired lengths, and formed by a horizontal press, as previously described, into a heart-shaped profile ending with straight sections. Such a heart-shaped profile is obtained by means of die and counter-die having corresponding form, which are not shown in detail, but of the kind of those ones shown in Figure 6.

[0024] An unfinished product 34 is obtained by welding eight heart-shaped bars 33 at their free ends 32, 32. Then, welded ends 32, 32 of the bars 33 in the unfinished product 34 are twisted with a resulting mutual rotation of the one welded bar ends 32 to the other welded bar ends 32 by a desired angle. The second end product obtained by the method according to the present invention is indicated as 35 in Figures 13, 14 and 15, which are a side view, an end view and a perspective view respectively, thereof.

[0025] As above described, by making a so called "pre-form" in a horizontal press as that one shown in Figure 7, an end product having any pine-cone shape can be obtained by suitable die and counter-die configuration. This cannot be obtained by the prior art methods, in which the pine-cone shape is automatic and cannot be generally modified, as an unfinished product does not exist before twisting.

[0026] The preceding description has to be intended as not limiting, and other modifications and alternates can be made without departing from the protection scope of the accompanying claims.

Claims

1. A method of making a so called pine-cone spiral decorative element of metal, which is formed from a plurality of bars (1), generally four or eight in number, having circular or polygonal cross-section, cut in desired length, **characterized by** comprising steps of:

- bending each bar (1), whose end sections (3, 3) remain straight;
- welding at both their ends (5, 5) the end sections (3, 3) of the bars (1), which are placed side by side and angularly spaced so that the bars (1) look like meridians of an unfinished product

(4) formed according to a rotation body;
 - mutual rotation of the one welded ends (5) of the bars (1) to the other welded ends (5) thereof by a desired angle.

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2. A method according to claim 1, **characterized in that** such a mutual rotation is performed in only a direction, with a result that the one welded ends (5) approach the other welded ends (5).

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3. A method according to claim 2, **characterized in that** such a rotation is performed by a multiple of 90 degrees, except for a spring-back depending on the material.

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4. A method according to claim 1, **characterized in that** such a mutual rotation comprises a first rotation in a direction, followed by a second rotation in a direction opposite to the first one, with a result that the one welded ends (5) approach the other welded ends (5).

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5. A method according to claim 4, **characterized in that** said second rotation extends by an angle smaller than the first rotation and is offset to the same by a multiple of 90 degrees, except for a spring-back depending on the material.

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6. A machine for making a so called pine-cone spiral decorative element of metal, **characterized in that** the machine is a composite machine comprising:

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- a horizontal press (10) provided with a die (12) and a counter-die (13) to obtain on a bar (1) a bend (2) with straight end sections (3, 3); and
 - a twisting machine, having a body (8) provided with a free upper surface (9) adapted to sustain the horizontal press (10), body (8) from which an elongated prismatic bench (19) extends, on which there are mounted in a displaceable and releasable way a screw device (21), which is connected, on one hand, by a mandrel (29) to a drive of the twisting machine, and, on its other hand, is provided of a housing (31) to house the one welded ends (5) of end sections (3) of bars (1), and a vise (22), designed to clamp the other welded ends (5) of end sections (3) of bars (1).

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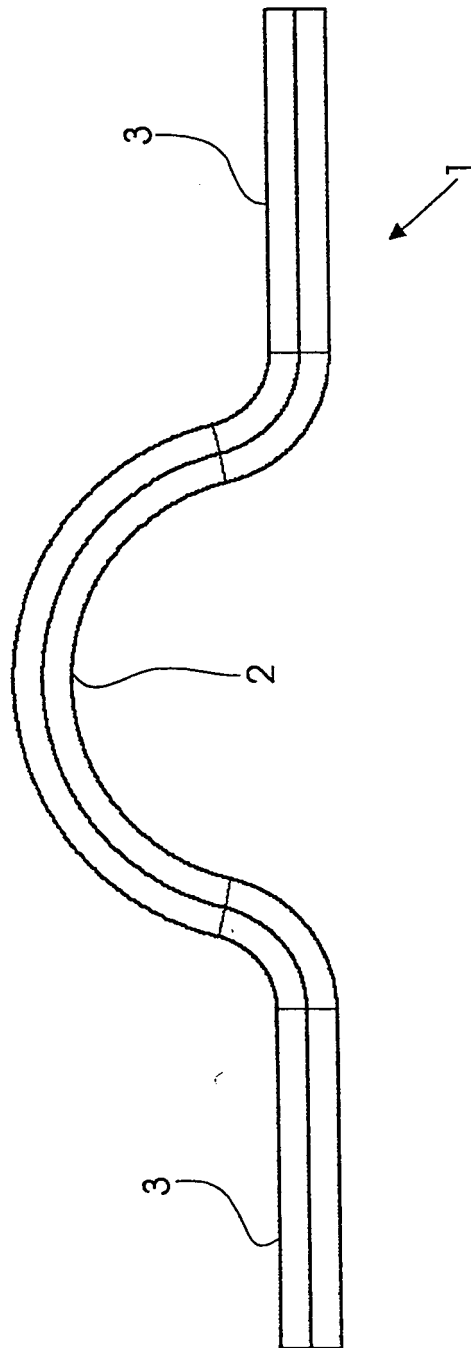


Fig. 1

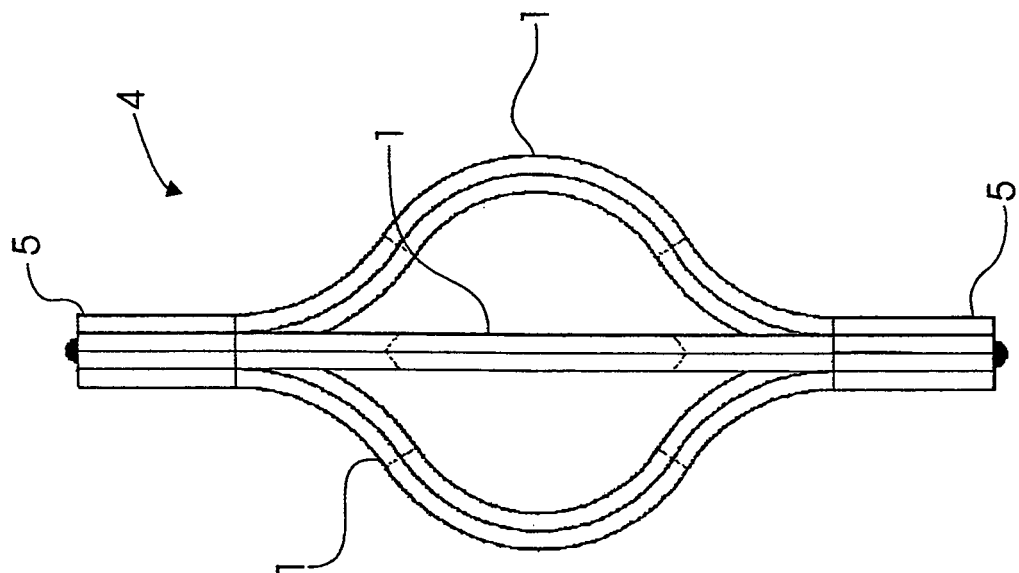


Fig. 3

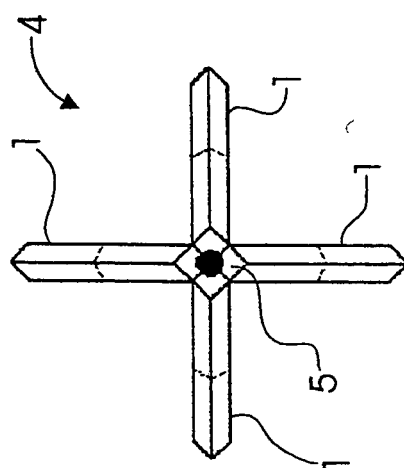


Fig. 2

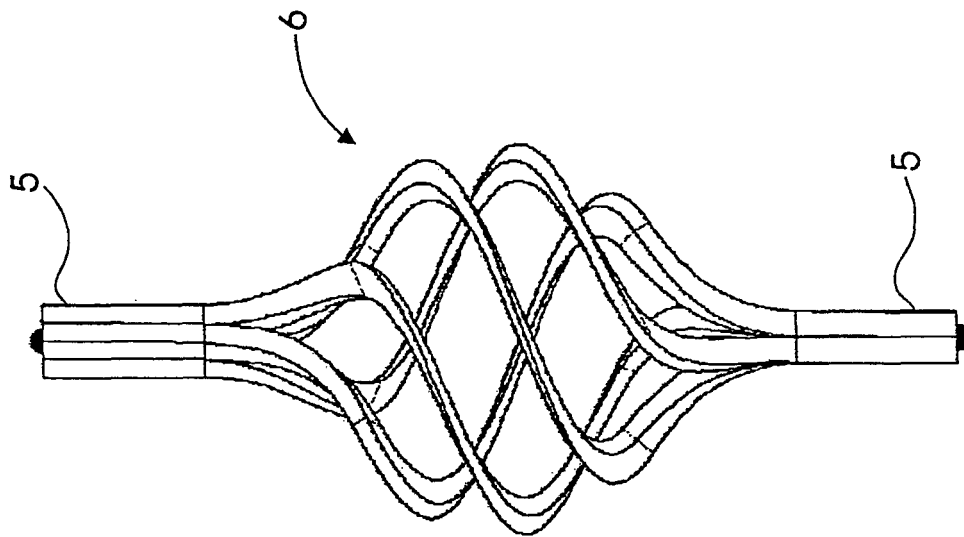


Fig. 5

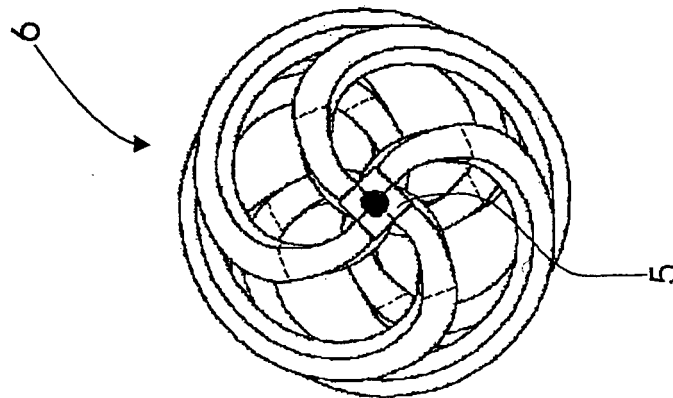


Fig. 4

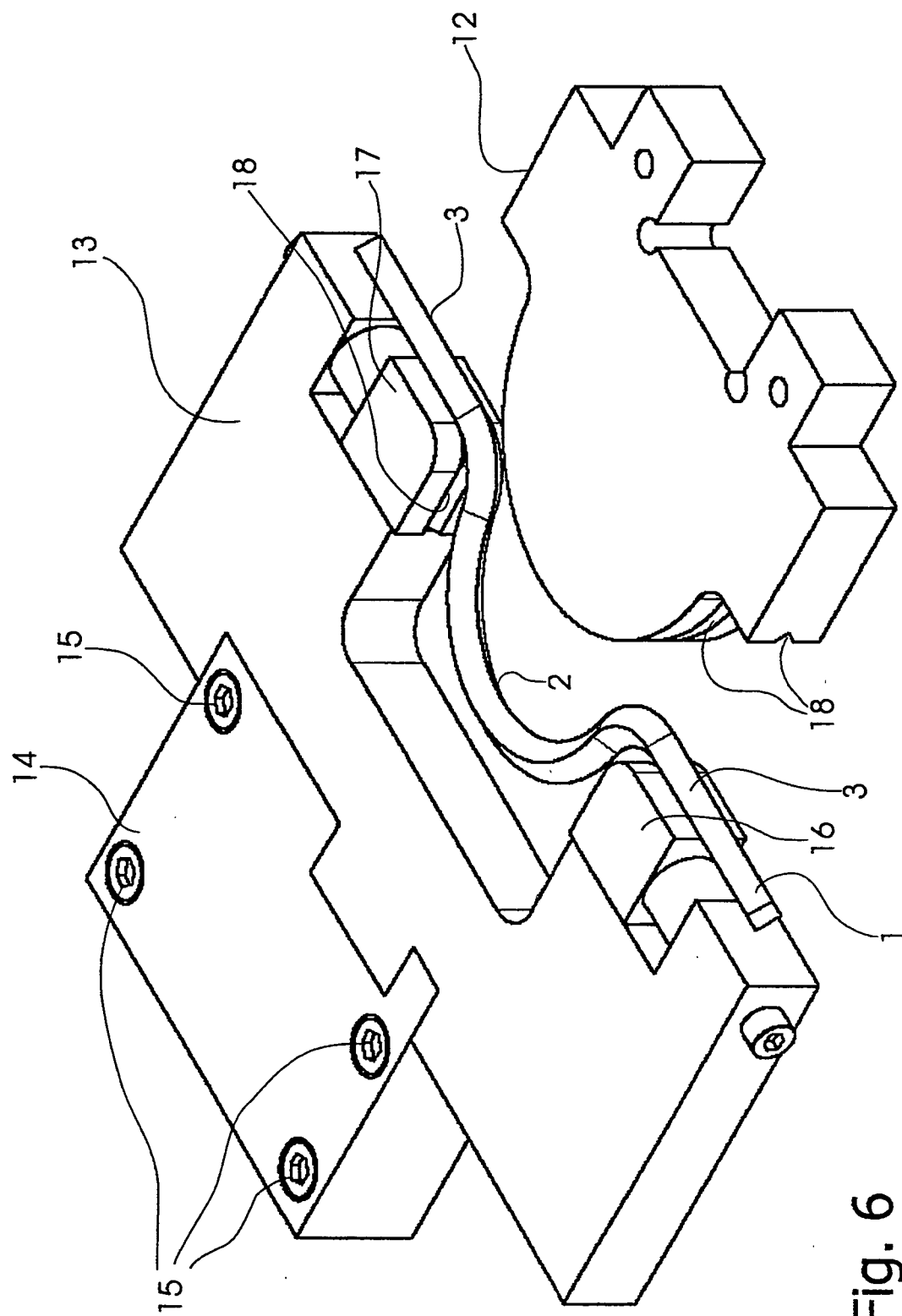


Fig. 6

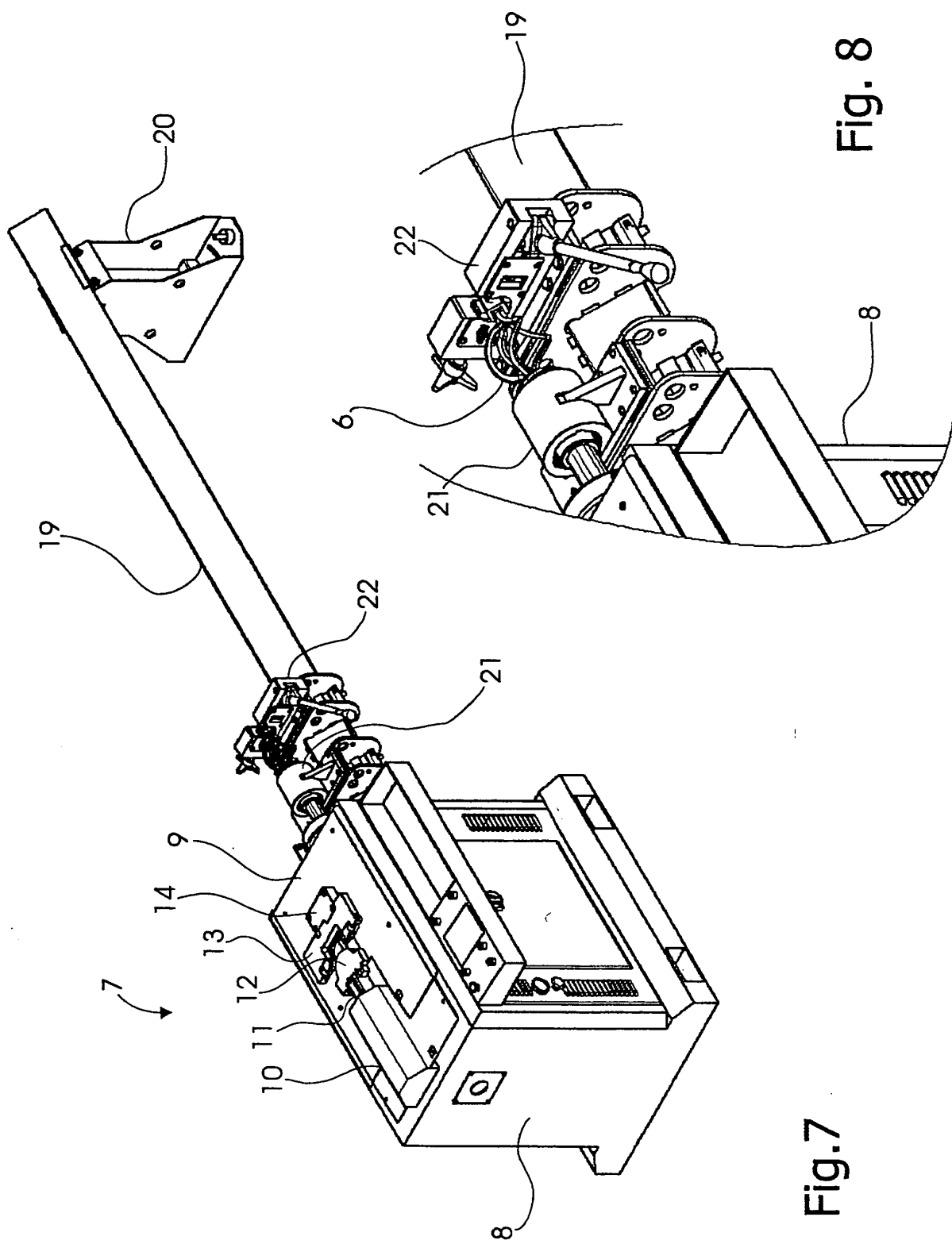


Fig.7

Fig. 8

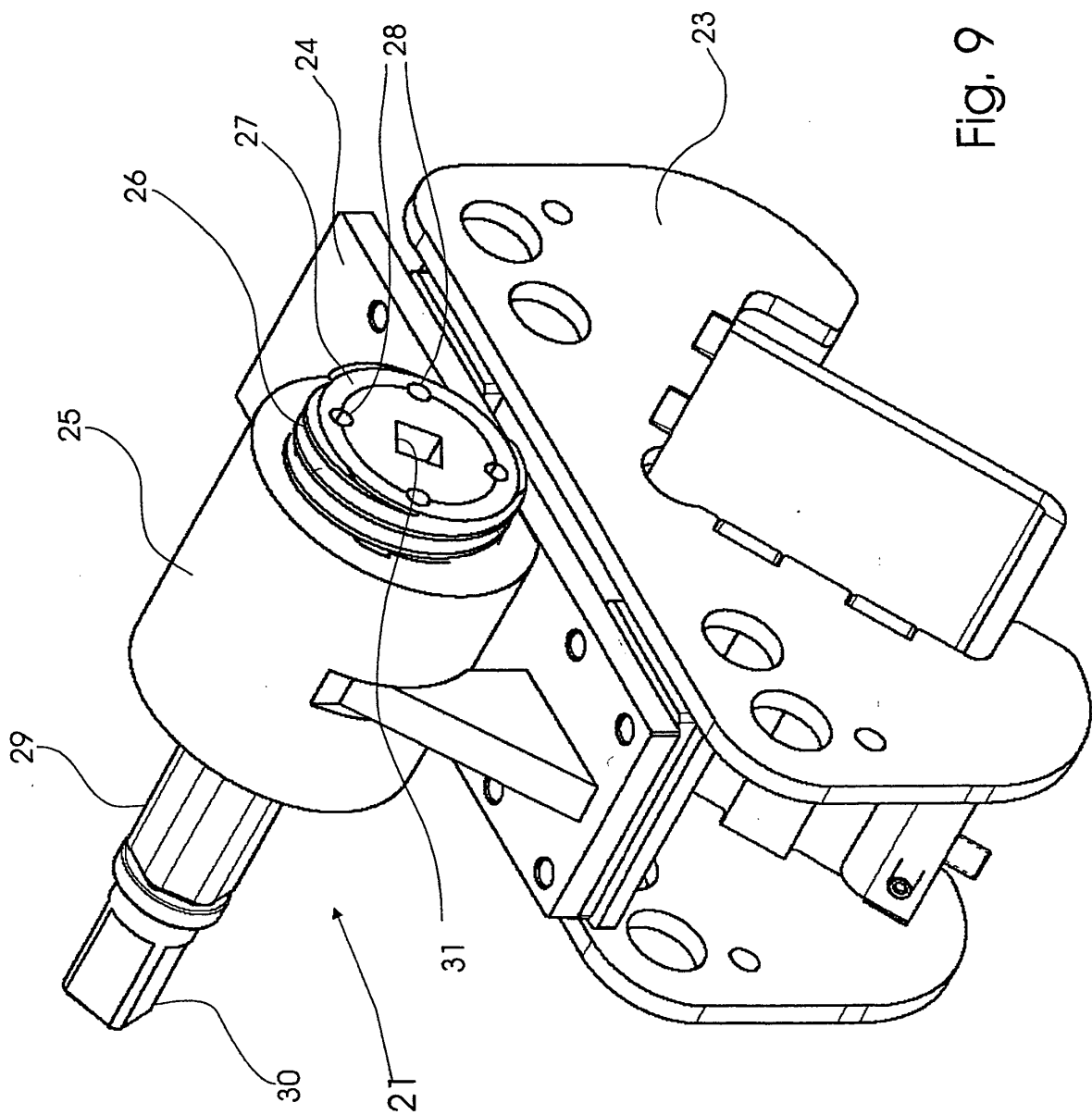


Fig. 9

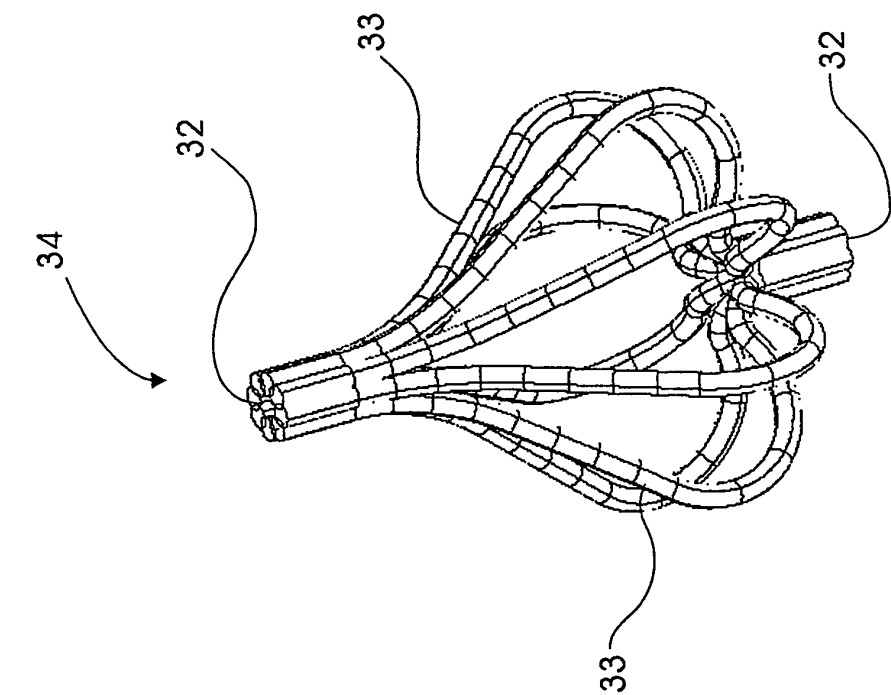


Fig. 10

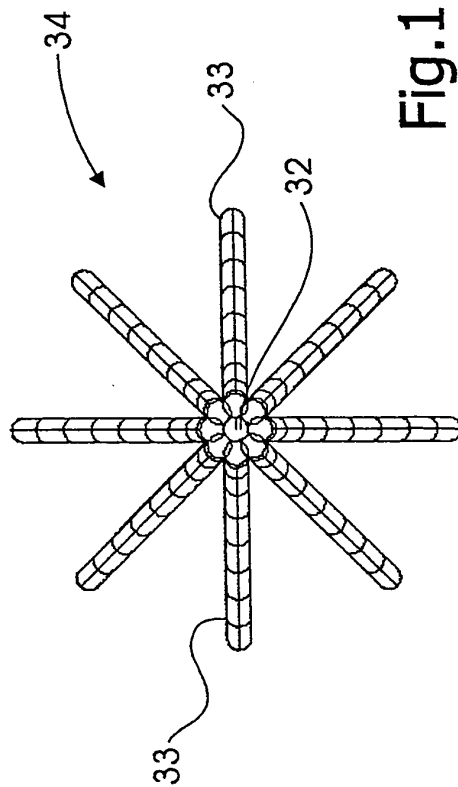


Fig.11

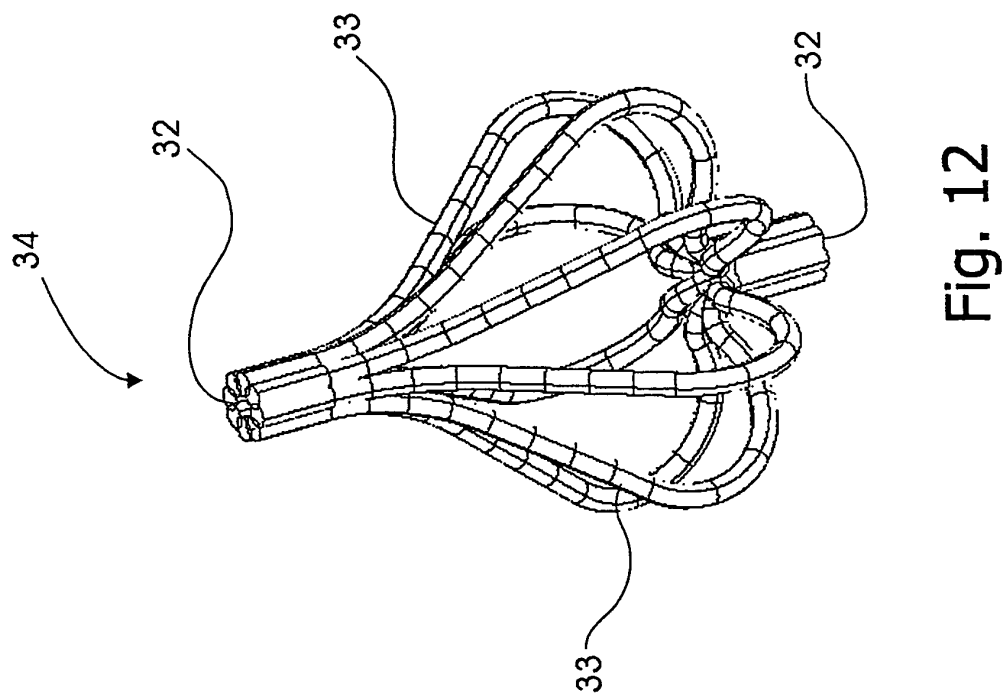
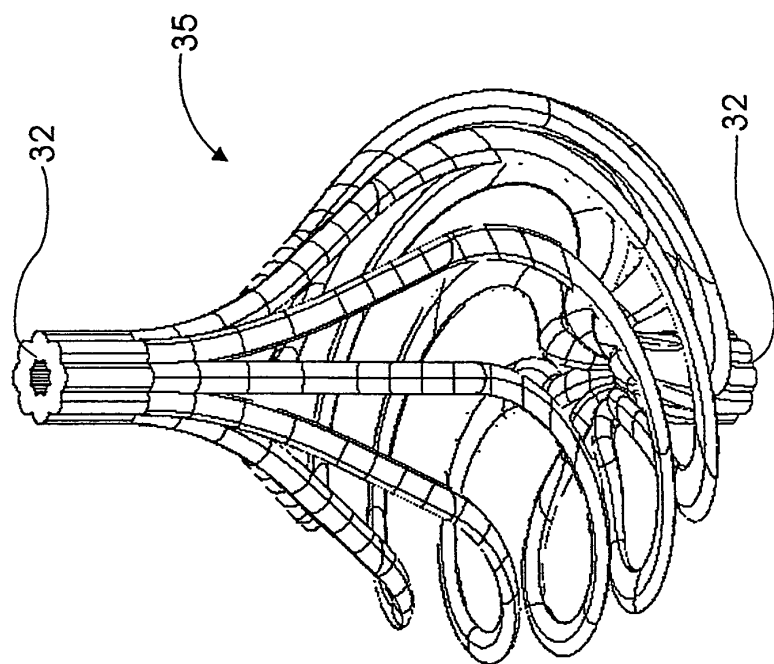
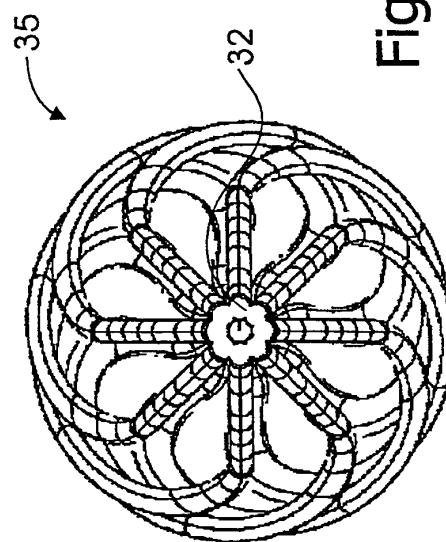
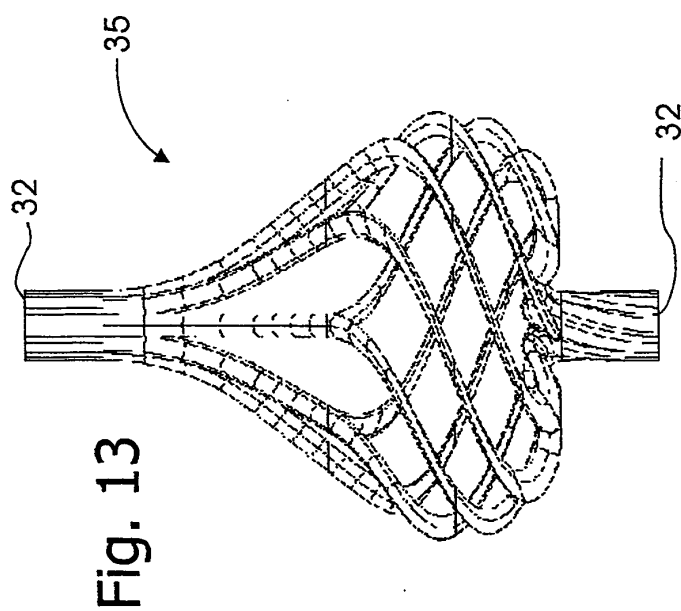


Fig. 12





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 05 42 5507

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A,D	US 6 009 738 A (BEECHER ET AL) 4 January 2000 (2000-01-04) * the whole document *	1-6	
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 9 November 2005	Examiner Vinci, V
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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