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(54) Title: AN ARRANGEMENT, IN PARTICULAR A PLUG AND A METHOD FOR PRODUCTION

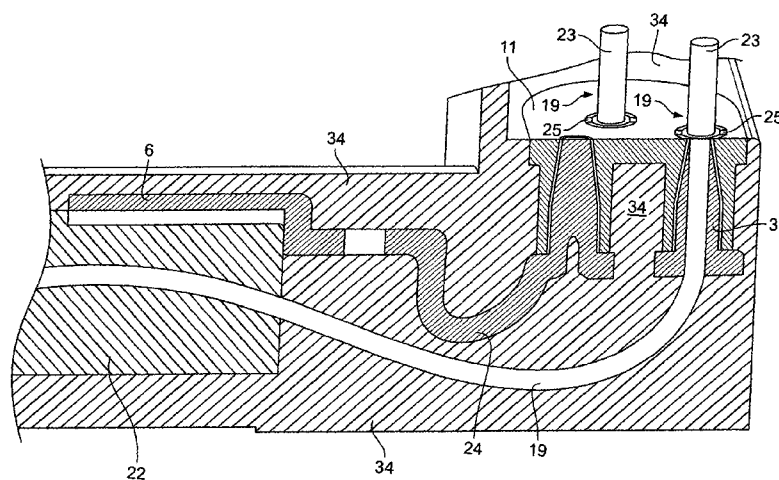


Fig. 7

(57) Abstract: The invention relates to an arrangement, in particular a plug connector with at least one electrical conductor (19), with a housing (1), which comprises a guide element (3) for at least one end piece of the conductor, wherein the conductor is passed through the guide element, wherein the housing comprises a sub-housing (11) with a feed-through (12), wherein the guide element is inserted into the feed-through, and wherein the housing comprises an injection moulding (34), which connects the guide element and the sub-housing together.

**AN ARRANGEMENT, IN PARTICULAR A PLUG AND A METHOD FOR
PRODUCTION**

- 5 The invention relates to an arrangement according to claim 1 and to a method according to claim 8 for producing an arrangement.

A very wide range of embodiments of electrical plug connectors is known from the prior art. A contact holder for a plug connector or a socket is known for example from EP 1 869 742
10 Al, wherein the contact holder comprises a base part with a protective part, such that the contact inserted into the base part is protected at least radially by the protective part and is accessible for use. On the front side the protective part comprises a sealing cap, which takes the form of an insert for injection moulding.

- 15 The object of the invention consists in providing a simply constructed arrangement with electrical wires, which arrangement may be produced inexpensively and quickly.

The object is achieved by the arrangement according to claim 1 and by the method according to claim 8 for producing the arrangement.

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Further advantageous embodiments of the invention are indicated in the dependent claims.

The arrangement according to the invention has the advantage that the arrangement is of simple construction and may be produced inexpensively. This is achieved in that an electrical
25 wire is passed via a guide element and a feed-through of a sub-housing, wherein the guide element and the sub-housing are connected together by means of a material, in particular an injection moulding material. One advantage of the invention is that the ends of the conductors are fixed precisely in position. In this way, an injection moulding process may be used to produce the arrangement. Electrical wires, in particular cables, conducting wires or cable
30 strands may be used as the conductors.

In a further embodiment the feed-through of the sub-housing has a conical cross-section, wherein the feed-through decreases in cross-section in the direction of a front of the sub-housing. This allows secure and reliable sealing of the guide element in the feed-through.
35 Depending on the embodiment selected, a harder material may for example be selected for the sub-housing than for the guide element. In this way, on the one hand a secure seal is

achieved between the electrical conductor and the feed-through and in addition a stable sub-housing is provided for the arrangement.

5 In a further embodiment the guide element takes the form of a bush and preferably has at least one slot extending in the longitudinal direction of the bush. The outer contour of the bush preferably tapers conically towards the plate. An improved seal is thus achieved between the guide element and the feed-through of the plate.

10 In a further embodiment a further guide element is arranged laterally on the guide element, which further guide element is provided to set the maximum flexure of the electrical conductor from an inlet region to the guide element. Provision of the further guide element sets a minimum bend radius for the electrical wire. This prevents damage to the electrical wire during production of the arrangement.

15 Configuring the guide element in the form of a bush provides a relatively long portion for sealing between the electrical wire and the bush. In this way, a seal is achieved in particular both for the injection moulding process for producing the arrangement and after production of the arrangement against ingress of moisture.

20 In a further embodiment a base member with a base plate is provided, from which at least one guide element projects. The base member is preferably configured such that sealing of one side of an injection mould is achieved by positioning the base member thereon. Thus, the structure of the injection mould is simplified and the injection moulding process is simplified.

25 In a further embodiment the feed-through takes the form of a bush, which projects at the bottom of the plate. In this way, a good engagement may be achieved between the guide element and the feed-through, making a secure seal possible.

30 In a further embodiment a wire with an insulating layer is used as the electrical wire, wherein the end piece of the wire, which projects from the plate, is stripped. The insulating sheath of the electrical wire may thus provide an improvement in the seal between the electrical wire and the guide element.

35 In a further embodiment the plate comprises coding elements, such that only a fixed orientation of the preassembled arrangement is possible in relation to the injection mould.

The invention is explained in greater detail below with reference to the figures, in which

Figure 1 shows a base element with a sub-housing,

5 Figure 2 shows an enlarged representation of partial cross-sections of the base element and of the sub-housing,

Figure 3 shows a preassembled arrangement in cross-section,

10 Figure 4 shows a rear view of the preassembled arrangement in perspective representation,

Figure 5 shows an injection mould,

Figure 6 shows the injection mould with inserted preassembled arrangement, and

15 Figure 7 shows a schematic representation of a finished arrangement.

Figure 1 is a perspective representation of a housing with a base element 1 with a base plate 2. Four guide elements 3 project from the top of the base plate 2. A through opening 4 is formed in each guide element 3. In the embodiment shown each guide element 3 comprises
20 two slots 5, which are introduced opposite one another in the guide element 3 in the longitudinal direction. Depending on the embodiment selected, one or both slots 5 may also be omitted. The base element 1 additionally comprises a retaining element 6 in the form of part of a bush, for cable guidance. Furthermore, the base element 1 comprises mutually opposing parallel side faces 7, 8, which extend from the retaining element 6 to a front side 9.
25 The front side 9 and parts of the side faces 7, 8 are joined to the base plate 2. At the opposing ends of the first and second side faces 7, 8 projections 10 are formed, which project downwards from the side faces 7, 8 in the opposite direction to the guide elements 3. Instead of a base plate 2, a grid structure may also be used, to which are joined the four guide elements 3.

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In the embodiment shown, a sub-housing with a plate 11 is constructed in one piece with the base element 1 via two connecting webs 26. The plate 11 and the base element 1 may be made from the same material for example using an injection moulding process 5. In the exemplary embodiment shown, the sub-housing comprises four feed-throughs 12, which pass
35 through the plate 11. In addition, coding elements 13 in the form of coding bushes of different sizes are formed on the bottom of the plate 11 on opposing sides. Instead of taking the form of a plate, the sub-housing may also take another form.

Figure 2 shows a cross-sectional representation of the sub-housing 11 and of the base element 1. In the sub-housing 11 the cross-section passes through one of the feed-throughs 12 in the plate. The feed-throughs 12 take the form of a bush, wherein the cross-section decreases from the bottom 15 towards the top of the plate 11. Preferably, the cross-section decreases conically. In the exemplary embodiment shown, the feed-through 12 takes the form of a bush 17, which is in one piece with the plate 11. The upper end of the bush 17 merges with the plate 11. In Figure 2 only one feed-through 12 is shown in cross-section, wherein the other feed-throughs 12 are configured the same way. Depending on the embodiment selected, the feed-throughs 12 may also be formed in a solid plate 11, such that the bushes 17 may be dispensed with.

In the illustration of the base element 1 the cross-section passes through a guide element 3. The guide element 3 takes the form of a bush, which has a conically tapering outer contour 27 in the exemplary embodiment shown. The external diameter of the guide element 3 is constant from the base plate 2 over a first distance 28 and decreases continuously from the first distance over a further distance from the base plate 2. Preferably a guide element 3 takes the form of a dome. The outer contour 27 of the conical portion 18 of the guide element 3 preferably corresponds substantially to the cross-section of the feed-through 12. The cross-section of the conical portion 18 is preferably somewhat larger than the cross-section of the feed-through 12. The length of the guide element 3 from the base plate 2 corresponds substantially to the length of the feed-through 12. The further guide elements 3 not shown in cross-section have the same shape as the guide element 3 shown in cross-section.

Figure 3 shows a preassembled arrangement, which may function as an electrical plug connector, with a cable 22 inserted into the retaining element 6. Electrical wires 19 of the cable 22 are passed through the openings 4 in the guide elements 3, wherein end pieces 23 of the wires 19 project out of the outlet side 21 of the guide elements 3 and out of the plate 11. In addition, the plate 11 has been slipped onto the guide elements 3. The arrangement is designated hereinafter as a plug connector. The plug connector is preassembled as follows:

To preassemble the plug connector, the plate 11 is separated from the base element 1 by breaking the connecting webs 26. An electrical wire 19 is then pushed via an inlet side 20 into the guide element 3, wherein an end piece 23 of the electrical wire 19 projects out of the outlet side 21 of the guide element 3. The opening 4 in the guide element 3 has a cylindrical cross-section, or preferably one which tapers towards the outlet side 21 of the guide element 3, in particular a conical cross-section. The electrical wire 19 has an external diameter which substantially corresponds to or is larger than the diameter of the opening 4. By pushing the electrical wire 19 into the guide element 3, the opening 4 in the guide element 3 is preferably

completely closed up. The wire 19 is then inserted into the retaining element 6. An electrical wire is inserted correspondingly into each guide element 3.

5 The plate 11 is then slipped onto the base plate 2, wherein the guide elements 3 are introduced into the feed-throughs 12. The cross-section of the feed-throughs 12 is dimensioned such that the guide elements 3 fill and seal the cross-section of the feed-throughs 12. Preferably, an inner surface of the feed-through 12 is forced onto an outer surface of a guide element 3. In this way both the feed-throughs and the openings 4 are closed. The pressure may preferably result in cold welding of the inner surface of the feed-through to the outer surface of the guide element 3.

The retaining element 6 is connected to the base plate 2 by means of a coupling piece 29. At the bottom, directed towards the electrical wires 19, the coupling piece 29 has a rounded surface as a further guide element 24 in the direction of guidance of the electrical wires 19. 15 The further guide element 24 ensures that the electrical wires 19 can assume only a fixed minimum bend radius between the retaining element 6 and the guide element 3. Excessive kinking of and damage to the electrical wires 19 is thus prevented. In the exemplary embodiment shown, the further guide element 24 takes the form of a wall surface curved towards the electrical wires 19. In this way, material savings are achieved.

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In the exemplary embodiment shown, the end piece 23 of the electrical wires 19 is stripped. The electrical conductors of the electrical wire 19 are thus freely accessible. The insulating sheath 25 of the electrical wires 19 ends at the surface of the plate 11.

25 Figure 4 shows the arrangement of Figure 3 viewed in the direction of the bottom of the base element 1. The cable 22 is clipped into the retaining element 6 for strain relief. In addition, the side walls 7, 8 of the base element 1 with the projections 10 are visible. The plate 11 comprises the various coding elements 13, 14 for example in the form of bushes, which project out of the bottom of the plate 11 and comprise through-holes. The coding elements 30 13, 14 fix the position of the plate 11 on insertion into the injection mould. Incorrect positioning of the plate 11 in the injection mould may thus be avoided.

Figure 5 is a schematic representation of part of an injection mould 30, which takes the form of a plate. The injection mould 30 comprises holes 33 for accommodating the end pieces 23. 35 In addition, first and second coding pins 31, 32 are provided, which determine correct mounting of the preassembled plug connector.

Figure 6 is a schematic representation of the preassembled arrangement with electrical wires, which may function as a preassembled plug connector. The preassembled plug connector is mounted on the injection mould 30. The end pieces, not visible, of the wires 19 passed through the plate 11 are passed through the holes, not visible, in the injection mould 30. The coding pins 31, 32 are passed respectively through the first and second coding elements 13, 14. To produce the plug connector, the injection mould illustrated in Figure 6 is inserted with the preassembled plug connector into an injection mould. The plate 11, the guide element 3 and the wires 19 are then encapsulated in a material, in particular plastics, by injection moulding. The above-described method has the advantage that the position of the end pieces 23 of the wires 19 is fixed precisely during the process of encapsulation by injection moulding. In a simpler embodiment it is possible to dispense with the guide element 3, such that the wires 19 pass directly through the feed-through 12 in the plate 11 and are then encapsulated in a material, in particular plastics, using the injection mould 30 and an appropriate injection moulding process. Use of the guide element 3 does, however, offer a secure and better seal. Use of the plate 11 has the advantage that one side of the injection mould is sealed by the plate 11 with the guide elements 3 and the wires 19. This simplifies the injection moulding process.

Figure 7 is a schematic representation of a cross-section through a finished arrangement with electrical wires 19, which may constitute a plug connector produced with the injection mould according to Figure 6. The plate 11, the guide element 3 and the wires 19 are in this case encapsulated by injection moulding together with the further guide element 24 in the material 34. The material 34 constitutes an injection moulding which holds the sub-housing 11, the guide element 3 and the wires 19 together. A mechanically stable arrangement, preferably a plug connector, is thus obtained, with which the end pieces 23 of the wires 19 are precisely oriented. The arrangement according to Figure 7 is suited for example to the end pieces 23 being inserted in openings in a printed circuit board and soldered firmly to the board by means of a soldering process. Precise orientation of the end pieces 23 allows a secure and precise soldering process. The end pieces 30 may preferably take the form of galvanised wires.

The base element 1 and the plate 11 are made of plastics for example. The insulating sheath 25 of the electrical wires 19 may also consist of plastics, for example. Depending on the embodiment selected, electrical wires without insulating sheaths 25 may also be passed through the guide element 3. In a further embodiment, a softer material may be used for the guide element 3 than for the plate 11. The security of the seal may thus be improved.

CLAIMS

1. An arrangement, in particular a plug connector with at least one electrical conductor (19), with a housing (1), which comprises a guide element (3) for at least one end piece of the conductor (19), wherein the conductor (19) is passed through the guide element (3), wherein the housing (1) comprises a sub-housing (11) with a feed-through (12), wherein the guide element (3) is inserted into the feed-through (12), and wherein the housing (1) comprises an injection moulding (34), which connects the guide element (3) and the sub-housing (11) together.

2. An arrangement according to claim 1, characterised in that the feed-through (12) has a conical cross-section and in that the cross-section of the feed-through (12) decreases in cross-section towards the top of the sub-housing (11).

3. An arrangement according to either one of claims 1 or 2, characterised in that the guide element (3) takes the form of a bush with at least one slot (5) extending in the longitudinal direction of the bush.

4. An arrangement according to any one of claims 1 to 3, characterised in that the guide element (3) exhibits a conically tapering outer contour at least in one portion (18) in the longitudinal direction.

5. An arrangement according to any one of claims 1 to 4, wherein the housing comprises a further guide element (24), wherein the further guide element (24) is designed to set the maximum flexure of the conductor (19) from an inlet region to the guide element (3).

6. An arrangement according to any one of claims 1 to 5, characterised in that the guide element (3) comprises a base plate (2), wherein at least the guide element (3) projects out of the base plate (2).

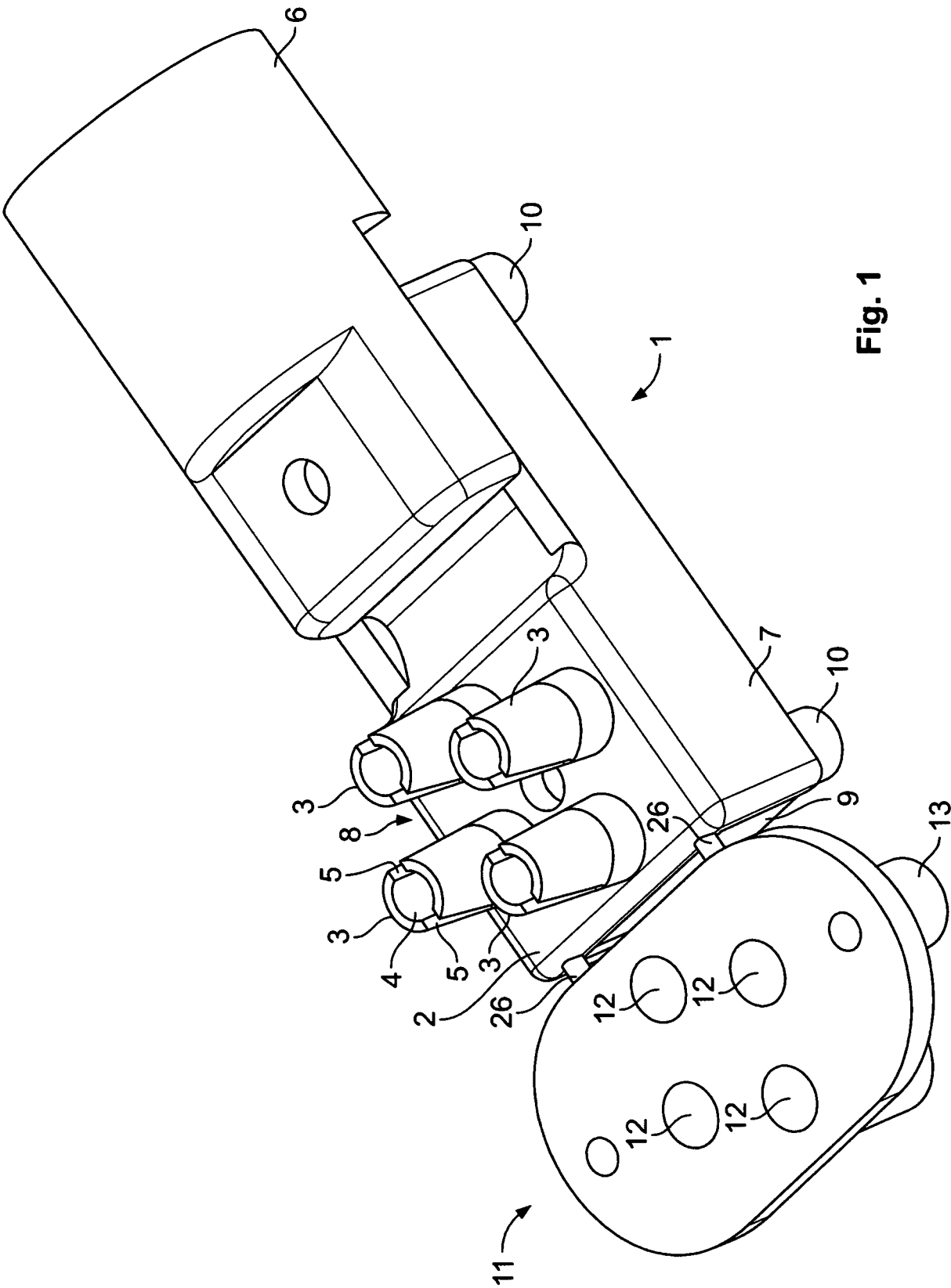
7. An arrangement according to any one of claims 1 to 6, wherein the feed-through (12) takes the form of a further bush (17), which projects out of a plate (11) at the bottom.

8. A method for producing an electrical arrangement, wherein a guide element is provided for at least one end piece of an electrical conductor, wherein an end piece of the conductor is pushed through the guide element, such that an end projects out of the guide

element, wherein a sub-housing is provided with a feed-through, wherein the guide element is inserted into the feed-through, wherein the arrangement is inserted into an injection mould, wherein the sub-housing closes off the injection mould on one side, and wherein by means of the injection mould the guide element and the sub-housing are at least partially encapsulated in and connected together by a material by injection moulding.

9. A method according to claim 8, characterised in that the conductor is inserted in such a way into the guide element that the opening in the guide element is sealed by the conductor, and in that the guide element is inserted into the feed-through in such a way that the opening in the feed-through is sealed.

10. A method according to claim 8 or claim 9, characterised in that the conductor comprises an insulating sheath, wherein the conductor is inserted into the guide element with the insulating sheath.



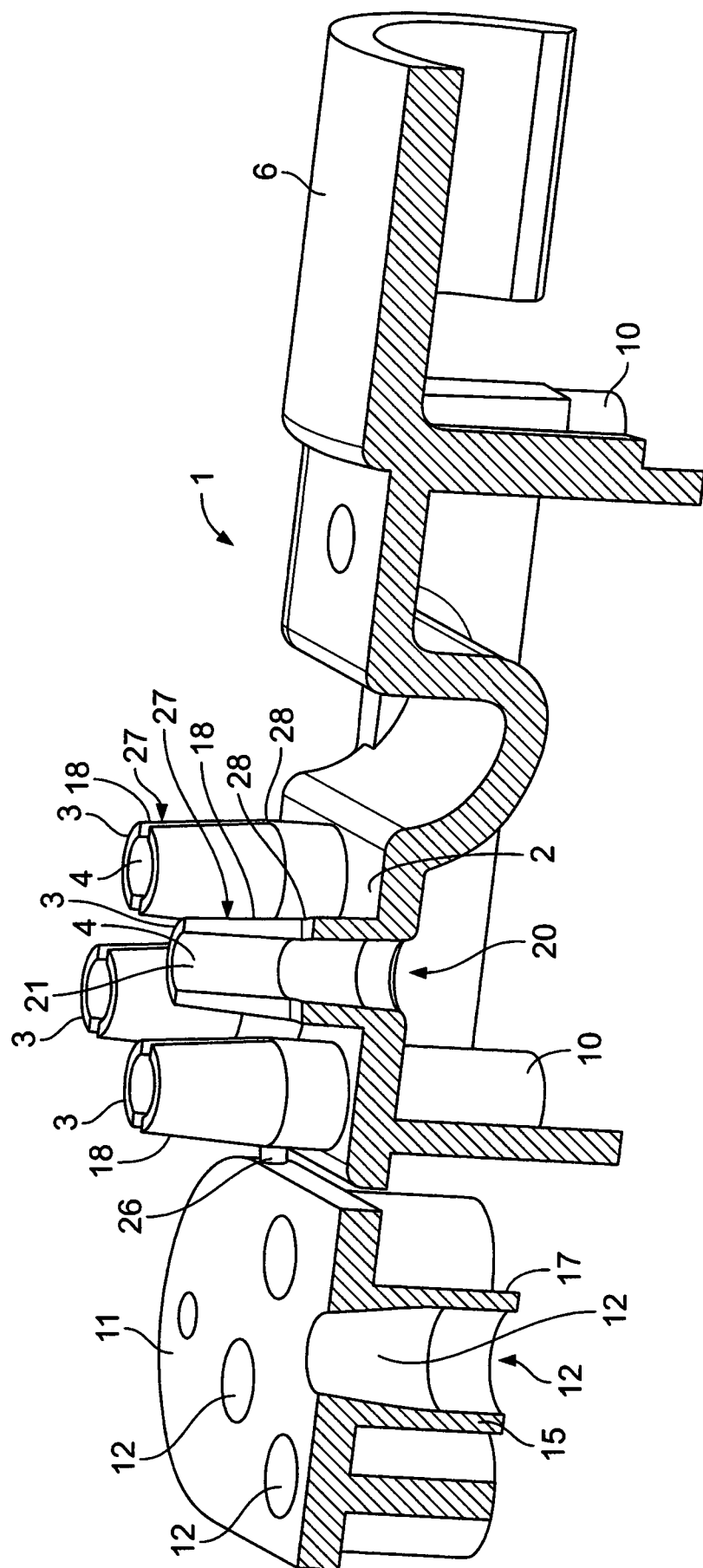


Fig. 2

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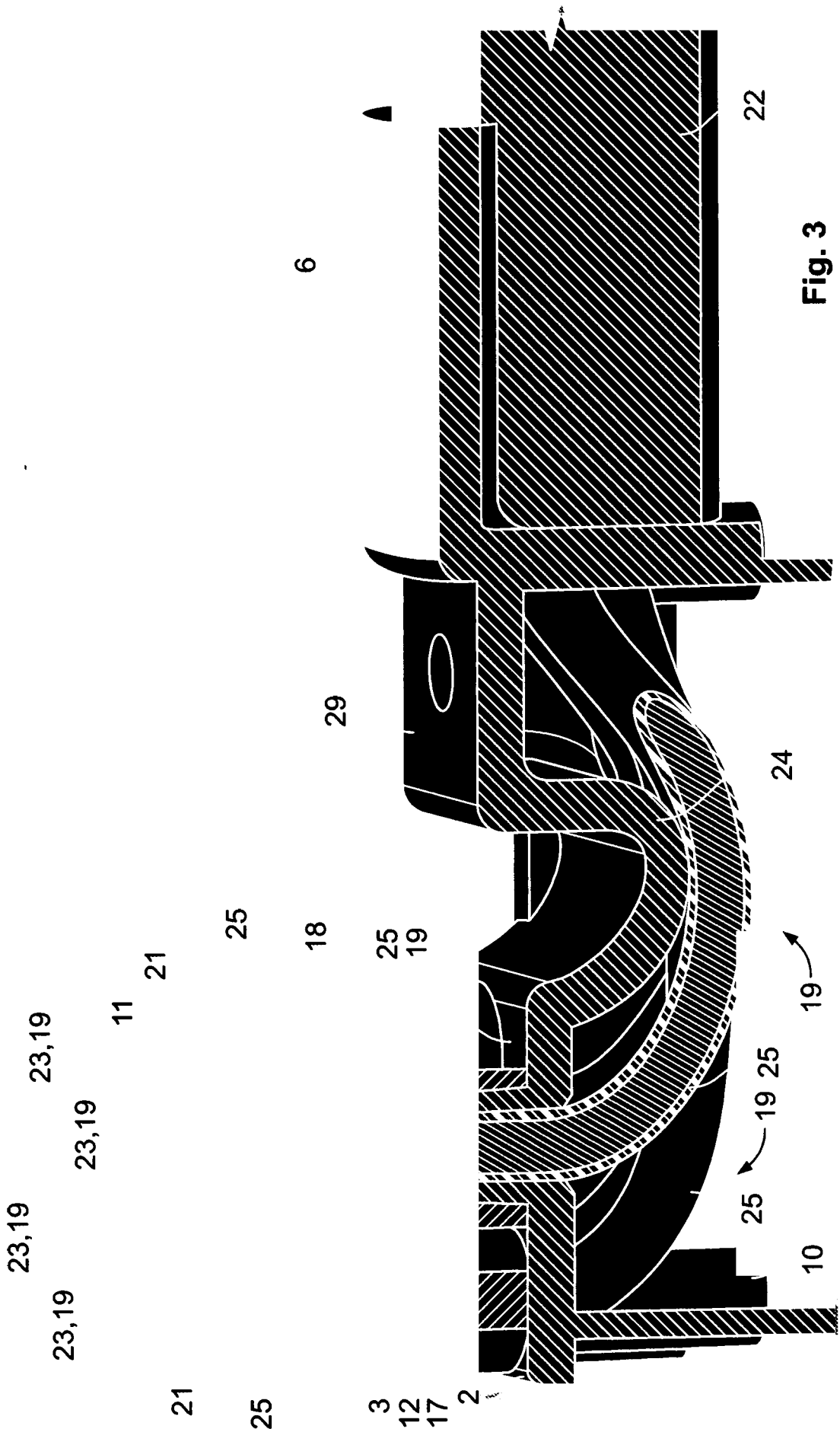


Fig. 3

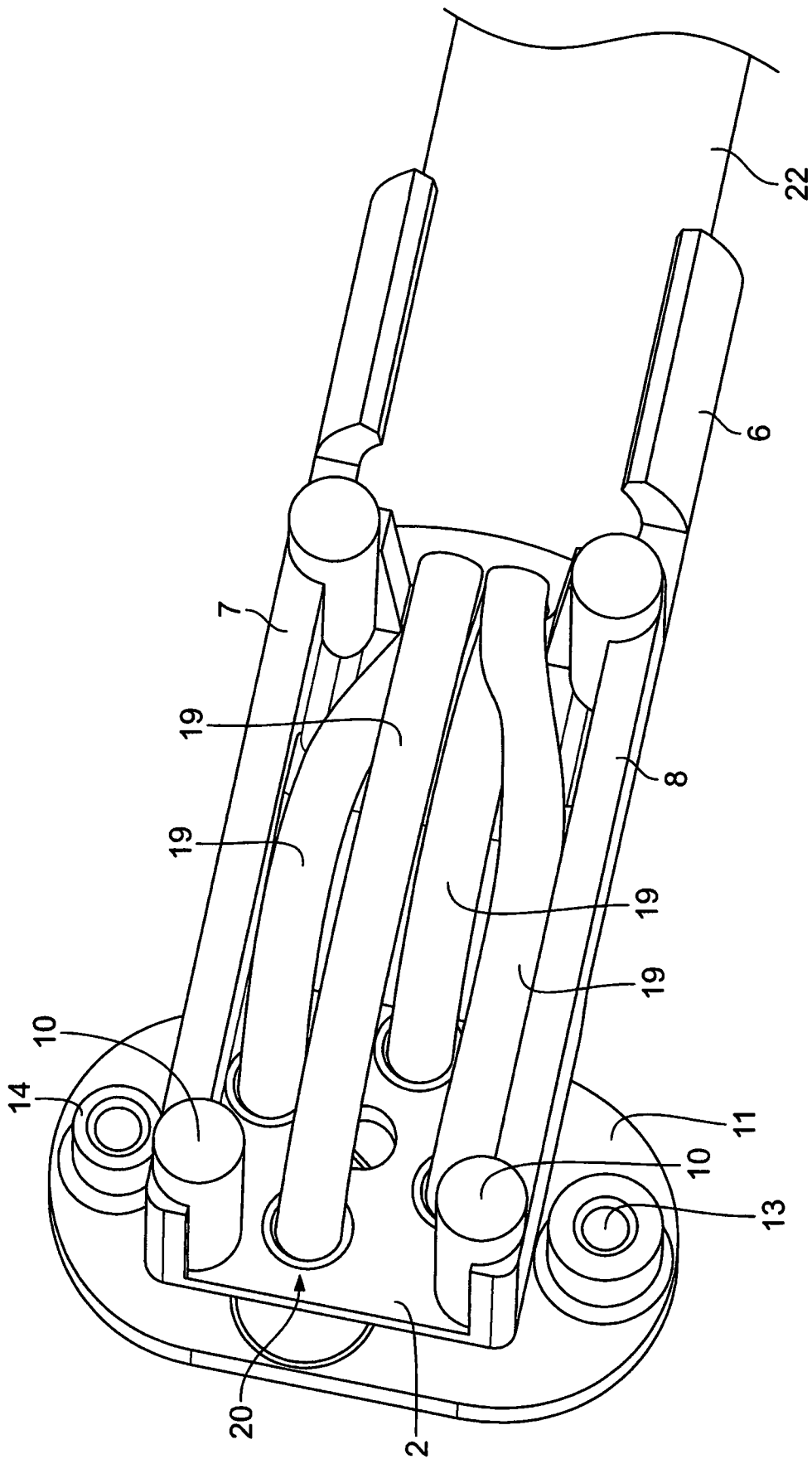


Fig. 4

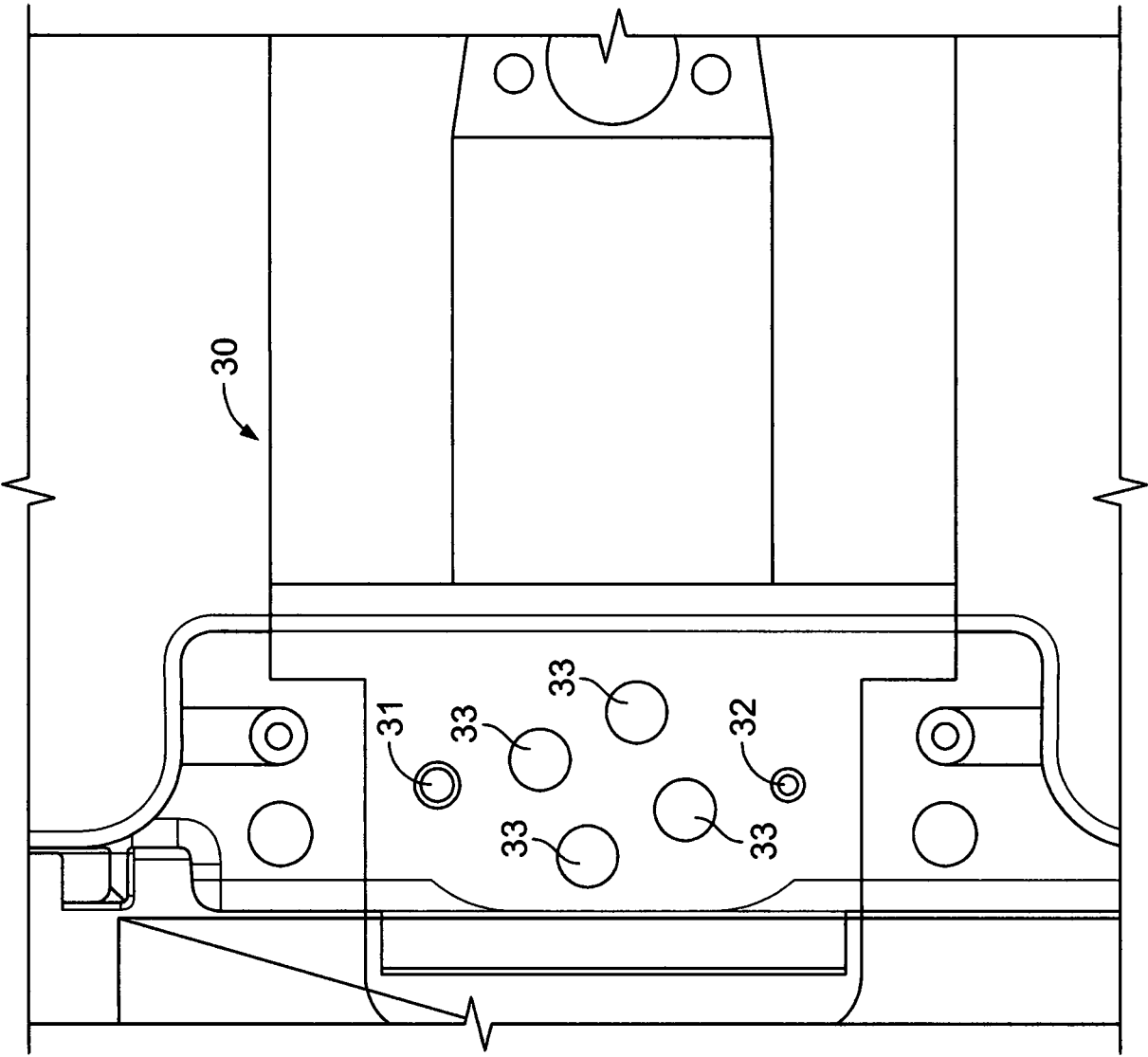


Fig. 5

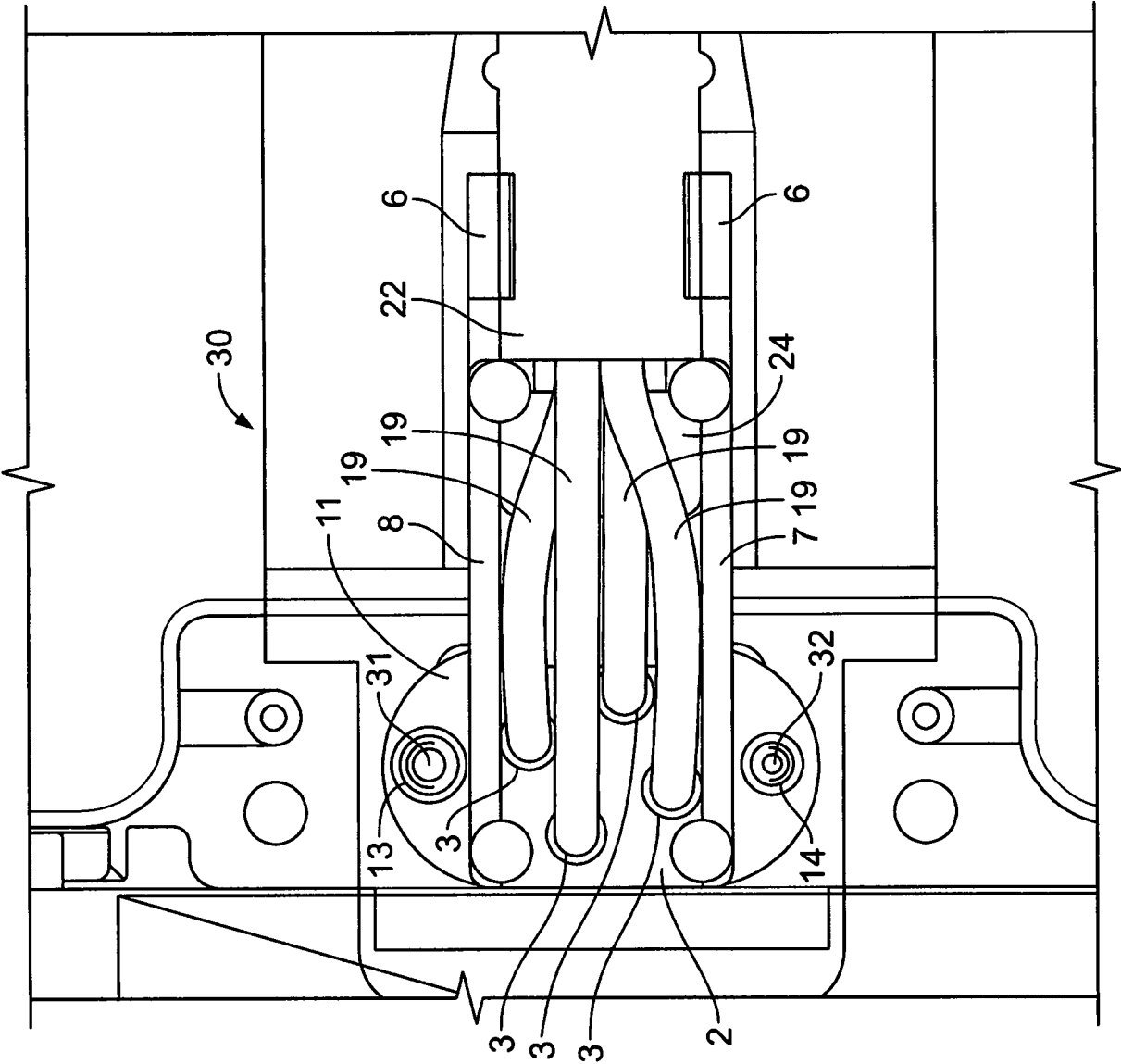


Fig. 6

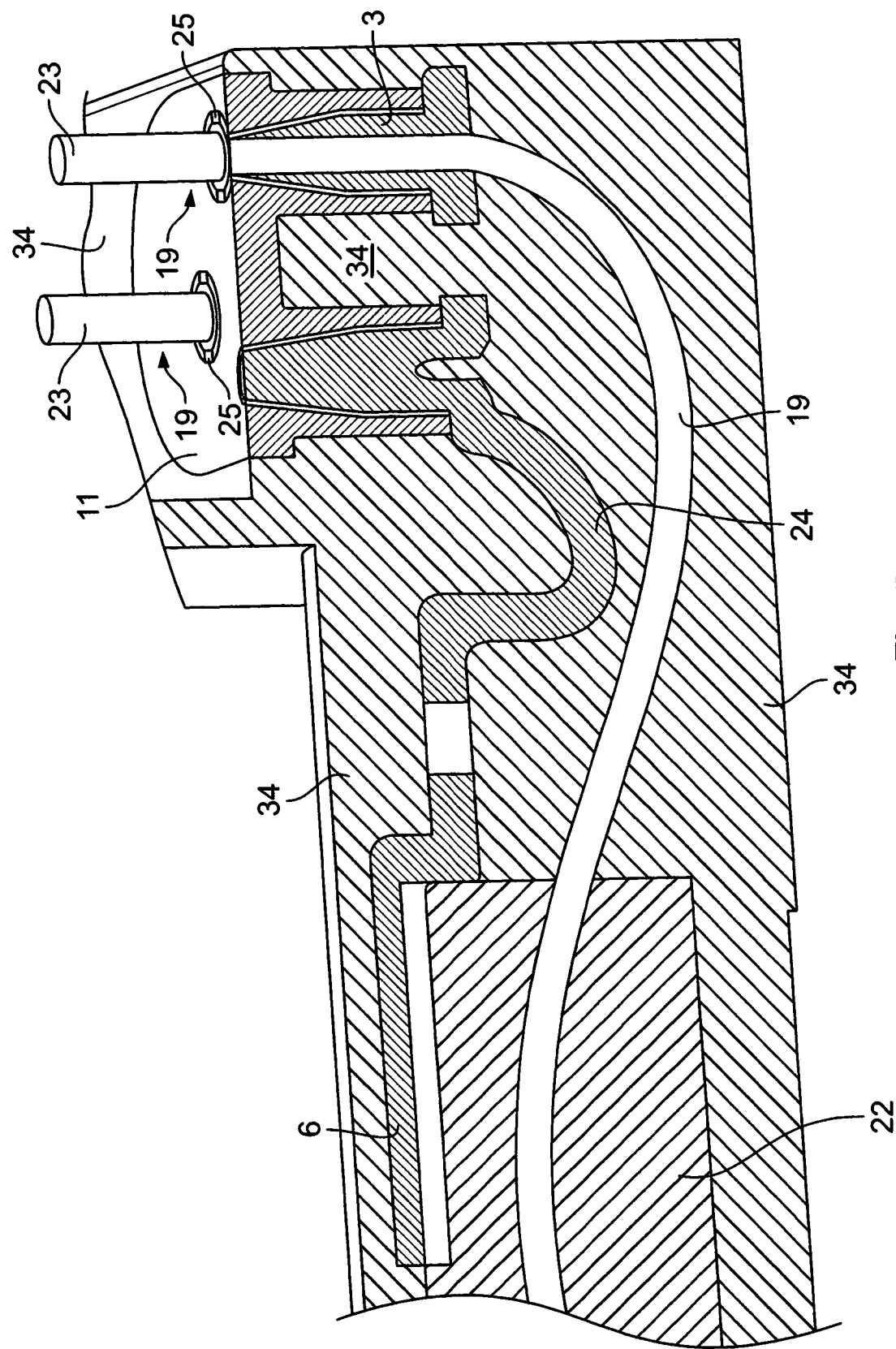


Fig. 7

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2011/06Q882

A. CLASSIFICATION OF SUBJECT MATTER
INV. H01R13/504 H01R13/52 H01R43/24
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2006/154516 AI (PADULA SANTO [US]) 13 July 2006 (2006-07-13) figures 1-6	1-4,6-10
X	----- EP 0 272 470 AI (KABELMETAL ELECTRO GMBH [DE]) 29 June 1988 (1988-06-29) figure 5 -----	1, 2



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2011/06Q882

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2006154516	AI	13-07-2006	DE 102006001310 AI	27-07-2006

EP 0272470	AI	29-06-1988	DE 3643254 AI	07-07-1988
			ES 2025617 T3	01-04-1992
