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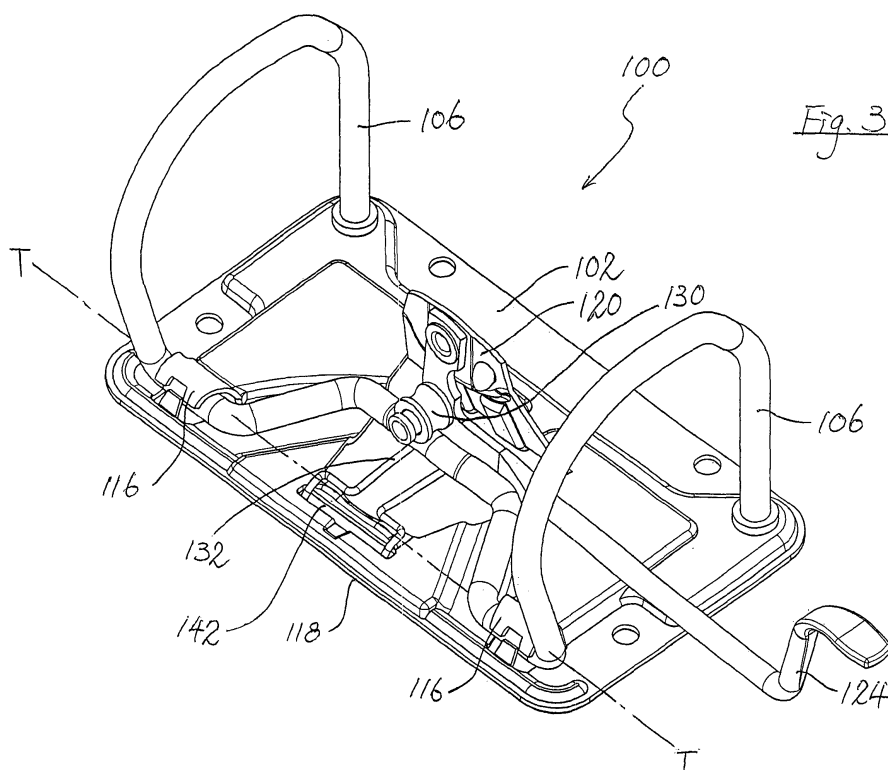
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(54) **A lever-arch type file mechanism**

(57) A lever-arch type file mechanism (100, 200, 300) is disclosed as including a base (102), two rings secured to and extending upwardly from the base (102) for engaging holes in pieces of paper, each ring including a post (106) fixed to the base (102) and an arch (112) movable relative to the base (102) and the post (106), a lever (124) operable to pivot the arches (112) about an axis

(T-T) and relative to the posts (106) between a ring-closed configuration and a ring-open configuration, an intervening part (114) joining the arches (112), and a resilient bent wire (132, 232, 332) abutting the intervening part (114), and during pivotal movement of the arches (112) relative to the posts (106), the resilient bent wire (132, 232, 332) is pivotable about an axis (W-W, M-M, P-P) parallel to the pivotal axis (T-T) of the arches (112).



Description

[0001] This invention relates to a lever-arch type file mechanism, in particular such a mechanism adapted to be affixed to a substrate, e.g. a cardboard, to form a device for retaining pieces of hole-punched paper.

[0002] In a conventional lever-arch type file mechanism, a one-armed lever is provided for selectively pivoting a pair of arches relative to a pair of fixed posts to open a pair of rings formed by the arches and posts, to allow pieces of hole-punched paper to be retrieved from or inserted into the file mechanism, and to close the posts and arches to form a pair of closed rings to retain the paper therein. The pair of arches are joined with each other by an intervening shaped part on which a roller attached to the lever travels during pivotal movement of the lever, to effect opening or closing of the ring pairs.

[0003] In such a conventional file mechanism, a resilient spring leaf is provided under the intervening part joining the arches for biasing the intervening part. Upon pivotal movement of the lever, the resilient spring leaf is allowed to pivot upwardly to pivot the pair of arches relative to the pair of posts to open the ring pairs. Various proposals to reduce the material for, and thus production cost of, lever-arch type file mechanisms have been made.

[0004] It is an object of the present invention to provide a lever-arch type file mechanism and a paper-retaining device in which the material and production cost are reduced, or at least to provide a useful alternative to the trade and public.

[0005] According to a first aspect of the present invention, there is provided a lever-arch type file mechanism including a base; at least two rings secured to and extending upwardly from the base for engaging holes in at least a piece of paper, each said ring including a post member fixed to said base and an arch member movable relative to said base and said post member; a lever operable to pivot said arch members about an axis and relative to said post members between a closed configuration in which said rings are closed and an open configuration in which said rings are open; and an intervening part joining said arch members; characterized in including a resilient wire abutting said intervening part, and wherein, during pivotal movement of said arch members relative to said post members, said resilient wire is pivotable about an axis substantially parallel to said pivotal axis of said arch members.

[0006] According to a second aspect of the present invention, there is provided a paper-retaining device including a lever-arch type file mechanism fixedly engaged with a substrate, said device including a base; at least two rings secured to and extending upwardly from the base for engaging holes in at least a piece of paper, each said ring including a post member fixed to said base and an arch member movable relative to said base and said post member; a lever operable to pivot said arch members about an axis and relative to said post members

between a closed configuration in which said rings are closed and an open configuration in which said rings are open; and an intervening part joining said arch members; characterized in including a resilient wire abutting said intervening part, and wherein, during pivotal movement of said arch members relative to said post members, said resilient wire is pivotable about an axis substantially parallel to said pivotal axis of said arch members.

[0007] Embodiments of the present invention will now be described, by way of examples only, with reference to the accompanying drawings, in which:

Fig. 1A is a front view of a lever-arch type file mechanism according to a first embodiment of the present invention;

Fig. 1B is a top view of the mechanism shown in Fig. 1A;

Fig. 1C is a bottom view of the mechanism shown in Fig. 1A;

Fig. 1D is a left side view of the mechanism shown in Fig. 1A;

Fig. 1E is a right side view of the mechanism shown in Fig. 1A;

Fig. 2 is an exploded view of the mechanism shown in Fig. 1A;

Fig. 3 is a top perspective view of the mechanism shown in Fig. 1A in a ring-closed configuration;

Fig. 4 is a bottom perspective view of the mechanism shown in Fig. 3;

Fig. 5A is a front view of the mechanism shown in Fig. 3;

Fig. 5B is a left side view of the mechanism shown in Fig. 5A;

Fig. 5C is a rear view of the mechanism shown in Fig. 5A;

Fig. 5D is a right side view of the mechanism shown in Fig. 5A;

Fig. 6A is a front view of the mechanism shown in Fig. 3 in a ring-open configuration;

Fig. 6B is a top view of the mechanism shown in Fig. 6A;

Fig. 6C is a left side view of the mechanism shown in Fig. 6A;

Fig. 6D is a right side view of the mechanism shown in Fig. 6A;

Fig. 7 is a top perspective view of the mechanism shown in Fig. 6A;

Fig. 8 is a bottom perspective view of the mechanism shown in Fig. 7;

Fig. 9A is a front view of the mechanism shown in Fig. 7;

Fig. 9B is a left side view of the mechanism shown in Fig. 9A;

Fig. 9C is a rear view of the mechanism shown in Fig. 9A;

Fig. 9D is a right side view of the mechanism shown in Fig. 9A;

Fig. 10A is a front view of the resilient wire of the

mechanism shown in Fig. 1A;

Fig. 10B is a side view of the resilient wire shown in Fig. 10A;

Fig. 10C is a top view of the resilient wire shown in Fig. 10A;

Fig. 1 OD is a top perspective view of the resilient wire shown in Fig. 10A;

Fig. 11A is a front view of a lever-arch type file mechanism according to a second embodiment of the present invention;

Fig. 11B is a top view of the mechanism shown in Fig. 11A;

Fig. 11C is a bottom view of the mechanism shown in Fig. 11A;

Fig. 11D is a left side view of the mechanism shown in Fig. 11A;

Fig. 11E is a right side view of the mechanism shown in Fig. 11A;

Fig. 12 is an exploded view of the mechanism shown in Fig. 11A;

Fig. 13 is a top perspective view of the mechanism shown in Fig. 11A in a ring-closed configuration;

Fig. 14A is a front view of the resilient wire of the mechanism shown in Fig. 13;

Fig. 14B is a side view of the resilient wire shown in Fig. 14A;

Fig. 14C is a top view of the resilient wire shown in Fig. 14A;

Fig. 14D is a top perspective view of the resilient wire shown in Fig. 14A;

Fig. 15A is a front view of a lever-arch type file mechanism according to a third embodiment of the present invention;

Fig. 15B is a top view of the mechanism shown in Fig. 15A;

Fig. 15C is a bottom view of the mechanism shown in Fig. 15A;

Fig. 15D is a left side view of the mechanism shown in Fig. 15A;

Fig. 15E is a right side view of the mechanism shown in Fig. 15A;

Fig. 16 is an exploded view of the mechanism shown in Fig. 15A;

Fig. 17 is a top perspective view of the mechanism shown in Fig. 15A in a ring-closed configuration;

Fig. 18A is a front view of the resilient wire of the mechanism shown in Fig. 17;

Fig. 18B is a side view of the resilient wire shown in Fig. 18A;

Fig. 18C is a top view of the resilient wire shown in Fig. 18A; and

Fig. 18D is a top perspective view of the resilient wire shown in Fig. 18A.

[0008] A lever-arch file type mechanism according to a first embodiment of the present invention is shown in Figs. 1A to 1E, and generally designated as 100. As shown more clearly in Figs. 2 to 4, the mechanism 100

includes a base 102 formed of a metal sheet. Four holes 104 are provided on the base 102 through each of which a securing element, e.g. a rivet (not shown) may be received for fixedly engaging the mechanism 100 to a substrate, e.g. a writing board or a cardboard file cover, to form a device for retaining pieces of hole-punched paper, e.g. a lever-arch file type.

[0009] Two upstanding posts 106 are fixedly engaged, each *via* a hole 108, with the base 102. The mechanism 100 includes pivotable component 110 with two arches 112 joined by a bent intervening part 114. The pivotable component 110 is engaged by two clamps 116 on the base 102 for pivotal movement about the base 102 about an axis T-T, which is parallel to a major side 118 of the base 102. In the configuration shown in Figs. 3 and 4, the posts 106 and the arches 112 of the pivotable component 110 mate with each other to form a pair of closed rings.

[0010] The base 102 has a central generally upstanding plate 120, which is integral with the base 102, and may be stamped out of the same metal sheet with which the base 102 is made. Adjacent an upper end of the plate 120 is provided with a hole 122 for pivotally engaging with a lever 124 *via* a rivet 126. The lever 124 carries, *via* a pin 128, a roller 130 for free rotation. When assembled, the roller 130 rides on and along a central portion of the intervening part 114 of the pivotable component 110.

[0011] A resilient wire 132, which may be made integrally of a metal, a metal alloy, or a plastics material, is bent symmetrically about a longitudinal axis S-S (see Fig. 10C). As can be seen more clearly in Figs. 10A to 10D, the wire 132 has a head portion 134 with two adjoining portions 136 which are non-parallel to each other. Each of the portions 136 is joined with a respective end portion 138 *via* a respective stepped portion 140.

[0012] The two end portions 138 lie on a same straight line W-W and are parallel to the head portion 134. It can be seen that there are eight turning points A1, A2, A3, A4, A5, A6, A7 and A8 along the length of the wire 132. Of these turning points, A1, A2, A7 and A8 are each of 90°, and A3, A4, A5 and A6 are less than 90°. It is possible to form the resilient wire 132 such that the turning points A1, A2, A7 and A8 are less than 90° and the turning points A3, A4, A5 and A6 are each of 90°, in which case the two adjoining portions 136 are parallel with each other.

[0013] Returning to Figs. 2 to 4, the wire 132 is engaged with the base 102 by having the two end portions 138 inserted into a slot 142 of the base 102, so that the wire 132 is pivotable relative to the base 102 about the axis W-W passing through the end portions 138. When the wire 132 is thus assembled with the base 102, the axis W-W is parallel to the axis T-T about which the pivotable component 110 is pivotable about the base 102.

[0014] When the lever 124 is pivoted upwardly from the position as shown in Figs. 5A to 5D to that as shown in Figs. 6A to 9D, the roller 130 is pivoted away and upwardly from its lowest position shown in Figs. 5A to 5D,

whereupon the resilient wire 132 pivots upwardly about the axis W-W, to act on the intervening part 114 from below, so as to cause the pivotable component 110 to pivot away from the posts 106, to open the pair of rings. In particular, the adjoining portions 136 about the intervening part 114 from below and, by reason of their resilience, bias the arches 112 away from the posts 106.

[0015] Figs. 11A to 13 show various views of a lever-arch file type mechanism according to a second embodiment of the present invention, generally designated as 200. The structure of the lever-arch file type mechanism 200 is similar to that of the lever-arch file type mechanism 100, with the main difference being the shape of a resilient wire 232.

[0016] As shown more clearly in Figs. 14A to 14D, the resilient wire 232 has a head portion 234 with an adjoining portion 236 on each side, in which the two adjoining portions 236 are non-parallel with each other. Each of the two adjoining portions 236 is joined with a respective end portion 238 via an intermediate portion 240. The end portions 238 lie on a same line M-M, which also acts as the pivotal axis when the wire 232 is installed in the mechanism 200. It can be seen that there are eight turning points along the wire 232, namely B1, B2, B3, B4, B5, B6, B7 and B8. Of these turning points, B1 and B8 are of 90°, B4 and B5 are less than 90°, and B2, B3, B6 and B7 are U-turns, i.e. of 180°. Alternatively, the resilient wire 232 may be formed such that the turning points B1 and B8 are less than 90° and the turning points B4 and B5 are each of 90°, in which case the two adjoining portions 236 are parallel with each other.

[0017] Figs. 15A to 17 show various views of a lever-arch file type mechanism according to a third embodiment of the present invention, generally designated as 300. The structure of the lever-arch file type mechanism 300 is similar to that of the lever-arch file type mechanisms 100, 200, with the main difference being the shape of the resilient wire 332.

[0018] As shown more clearly in Figs. 18A to 18D, the resilient wire 332 has a head portion 334 with an adjoining portion 336 on each side, in which the two adjoining portions 336 are parallel with each other. Each of the two adjoining portions 336 is joined with a respective end portion 338. The head portion 334 is parallel with the end portions 338, which lie along a same line P-P, which also acts the pivoting line when the wire 332 is installed in the file mechanism 300. It can be seen that there are four generally perpendicular (90°) turning points, namely C1, C2, C3, C4, along the wire 332. The resilient wire 332 may also be formed such that the turning points C1, C2, C3 and C4 are all less than 90°, in which case the adjoining portions 336 are non-parallel with each other.

[0019] It should be understood that the above only illustrates examples whereby the present invention may be carried out, and that various modifications and/or alterations may be made thereto without departing from the spirit of the invention.

[0020] It should also be understood that certain fea-

tures of the invention, which are, for clarity, described in the context of separate embodiments, may be provided in combination in a single embodiment. Conversely, various features of the invention which are, for brevity, described in the context of a single embodiment, may also be provided separately or in any appropriate sub-combinations.

10 Claims

1. A lever-arch type file mechanism including: **LONDON**

a base;
at least two rings secured to and extending upwardly from the base for engaging holes in at least a piece of paper, each said ring including a post member fixed to said base and an arch member movable relative to said base and said post member;
a lever operable to pivot said arch members about an axis and relative to said post members between a closed configuration in which said rings are closed and an open configuration in which said rings are open; and
an intervening part joining said arch members;

characterized in including a resilient wire abutting said intervening part, and wherein, during pivotal movement of said arch members relative to said post members, said resilient wire is pivotable about an axis substantially parallel to said pivotal axis of said arch members.

2. A mechanism according to Claim 1 further **characterized in that** said resilient wire biases the arch members towards said open configuration.

3. A mechanism according to Claim 1 or 2 further **characterized in that** two ends of said wire member are engaged with said base for pivotal movement.

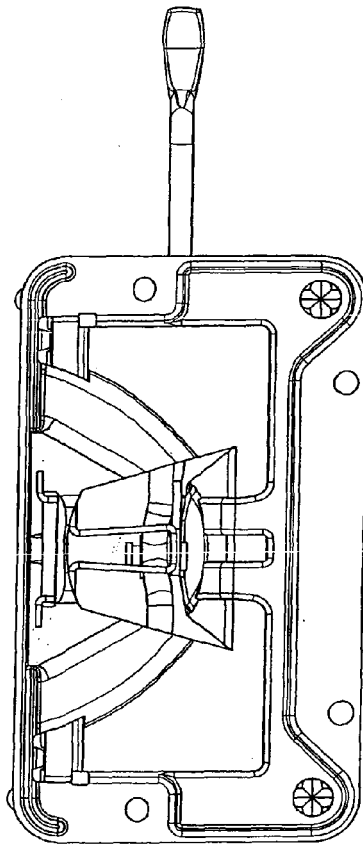
4. A mechanism according to any of the preceding claims further **characterized in that** said wire member is bent.

5. A mechanism according to Claim 4 further **characterized in that** said wire member has at least four turning points.

6. A mechanism according to Claim 5 further **characterized in that** said wire member has at least eight turning points.

7. A mechanism according to Claim 5 or 6 further **characterized in that** at least two of the turning points are of substantially 90°.

8. A mechanism according to Claim 5, 6 or 7 further **characterized in that** at least two of the turning points are less than 90°.
9. A mechanism according to Claim 5, 6, 7 or 8 further **characterized in that** at least two of the turning points are of generally 180°.
10. A paper-retaining device including a lever-arch type file mechanism fixedly engaged with a substrate, said mechanism including:
- a base;
 - at least two rings secured to and extending upwardly from the base for engaging holes in at least a piece of paper, each said ring including a post member fixed to said base and an arch member movable relative to said base and said post member;
 - a lever operable to pivot said arch members about an axis and relative to said post members between a closed configuration in which said rings are closed and an open configuration in which said rings are open; and
 - an intervening part joining said arch members;
- characterized in** including a resilient wire abutting said intervening part, and wherein, during pivotal movement of said arch members relative to said post members, said resilient wire is pivotable about an axis substantially parallel to said pivotal axis of said arch members.
11. A device according to Claim 10 further **characterized in that** said resilient wire biases the arch members towards said open configuration.
12. A device according to Claim 10 or 11 further **characterized in that** two ends of said wire member are engaged with said base for pivotal movement.
13. A device according to any one of Claims 10 to 12 further **characterized in that** said wire member is bent.
14. A device according to Claim 13 further **characterized in that** said wire member has at least four turning points.
15. A device according to Claim 14 further **characterized in that** said wire member has at least eight turning points.
16. A device according to Claim 14 or 15 further **characterized in that** at least two of the turning points are of substantially 90°.
17. A device according to Claim 14, 15 or 16 further **characterized in that** at least two of the turning points are less than 90°.
18. A device according to Claim 14, 15, 16 or 17 further **characterized in that** at least two of the turning points are of generally 180°.



100

Fig. 1C

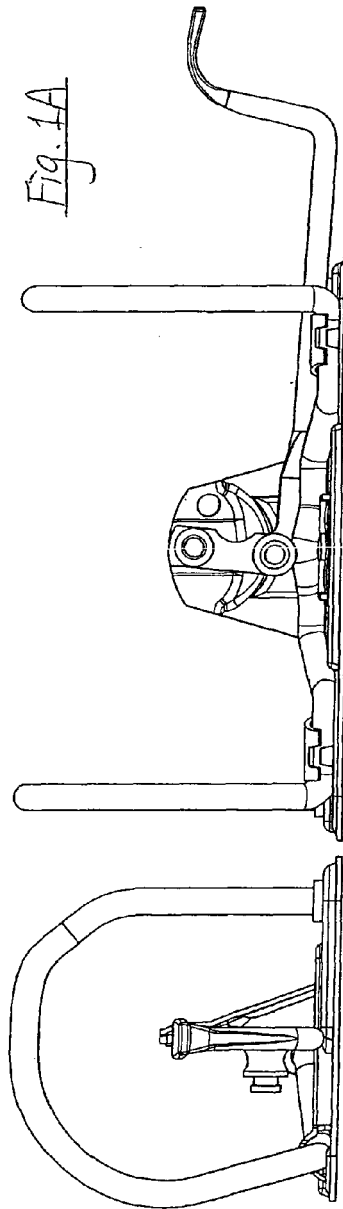


Fig. 1A

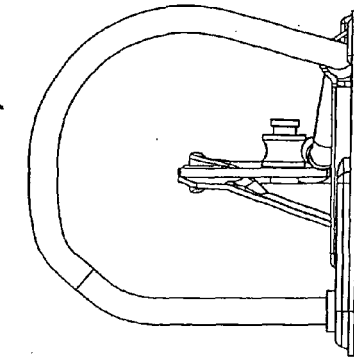


Fig. 1D

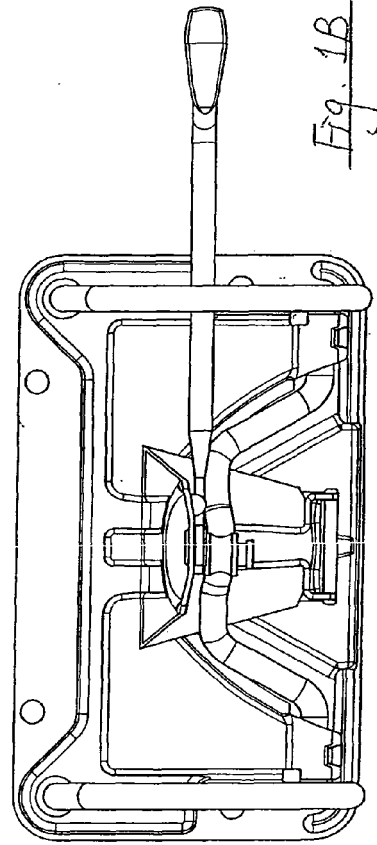
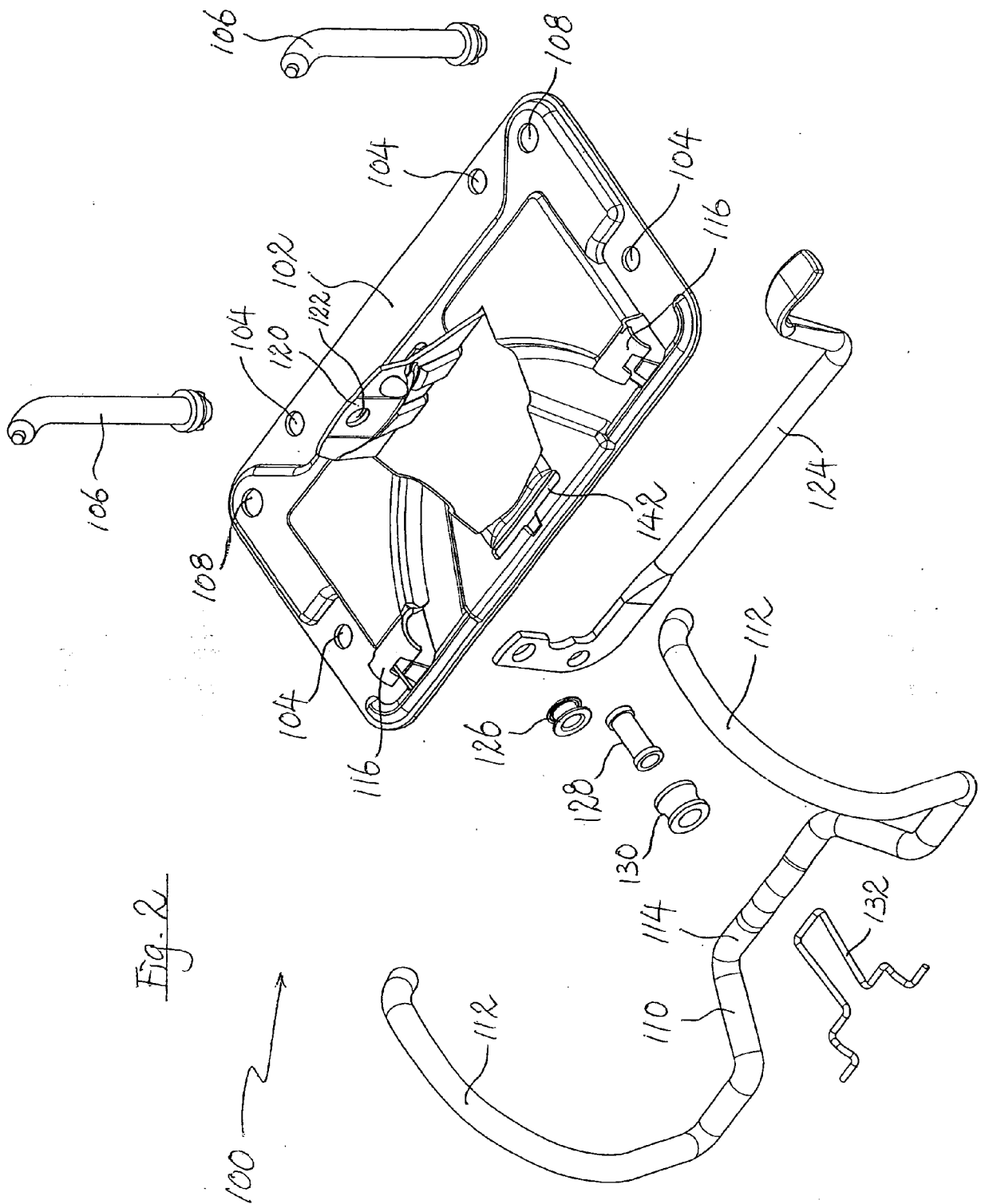
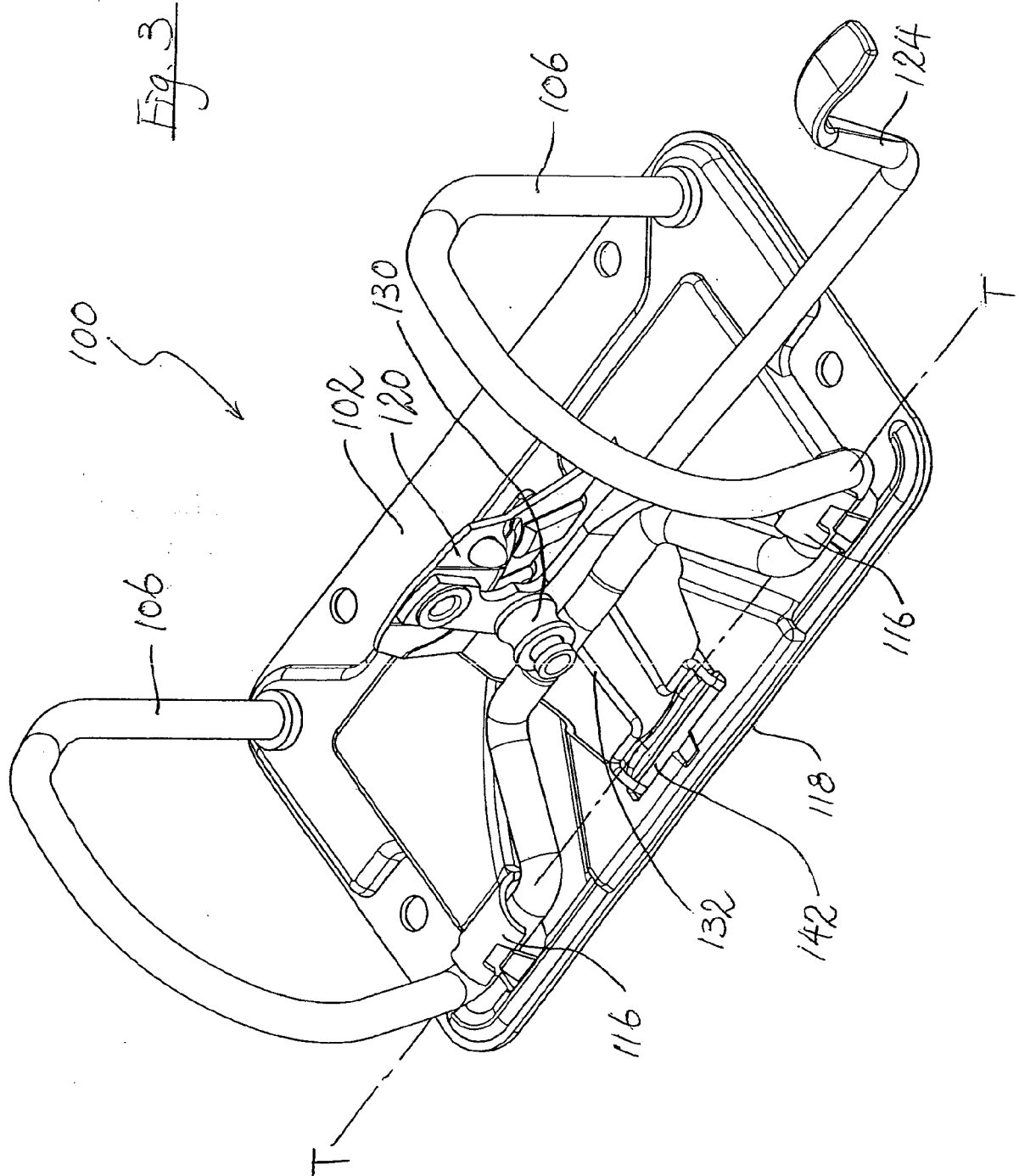


Fig. 1B

Fig. 1E

100





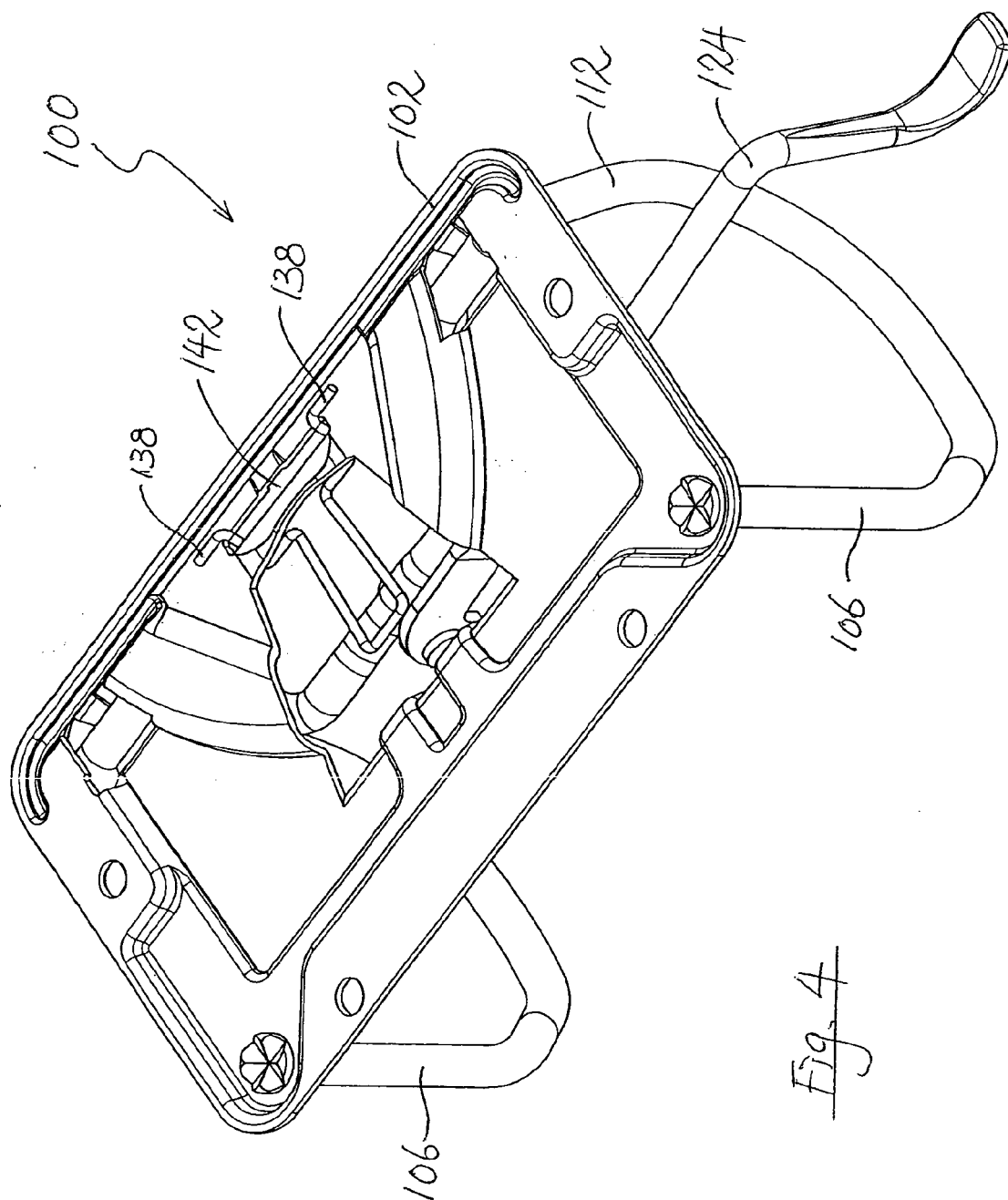


Fig. 4

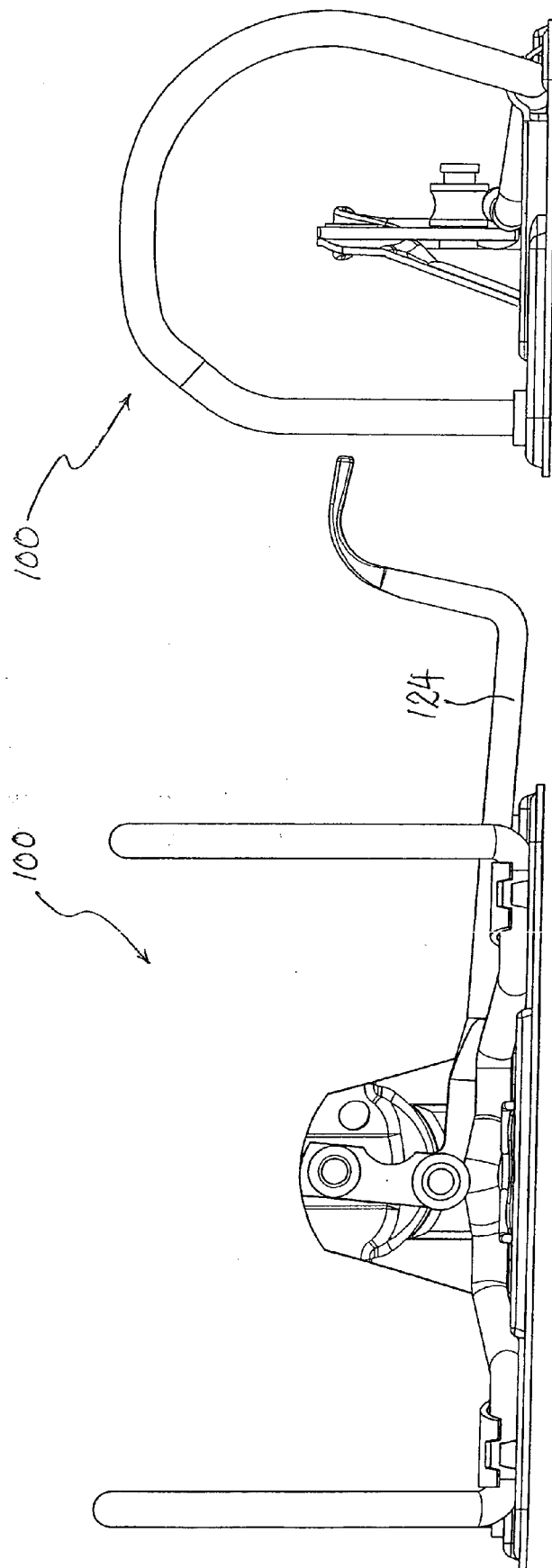


Fig. 5B

Fig. 5A

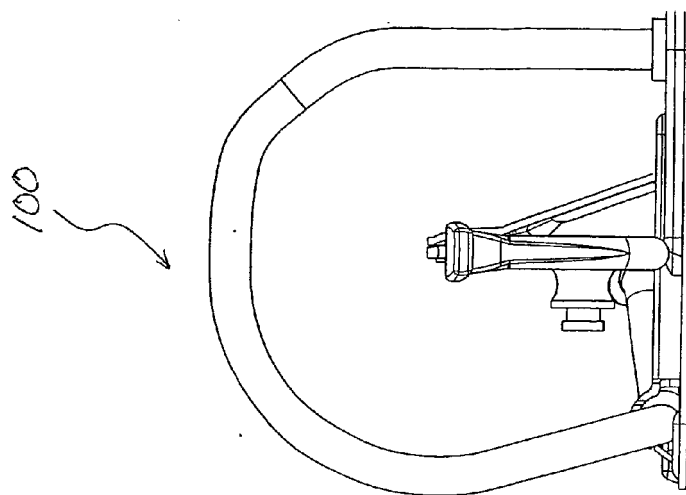


Fig. 5D

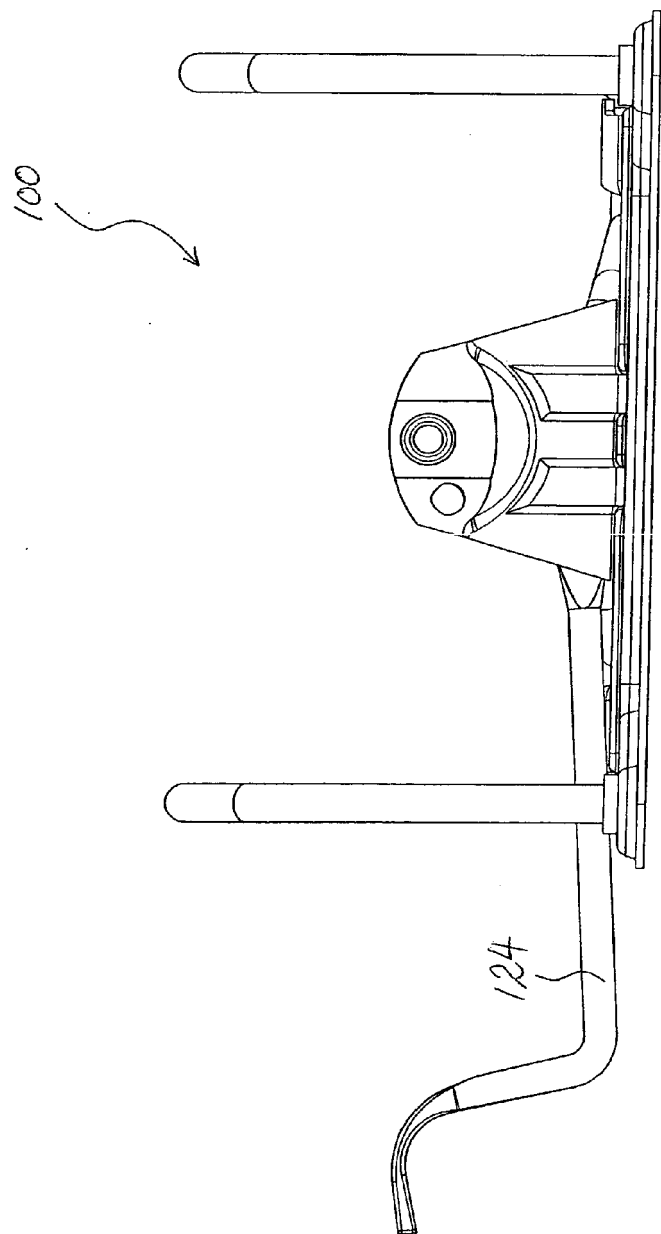
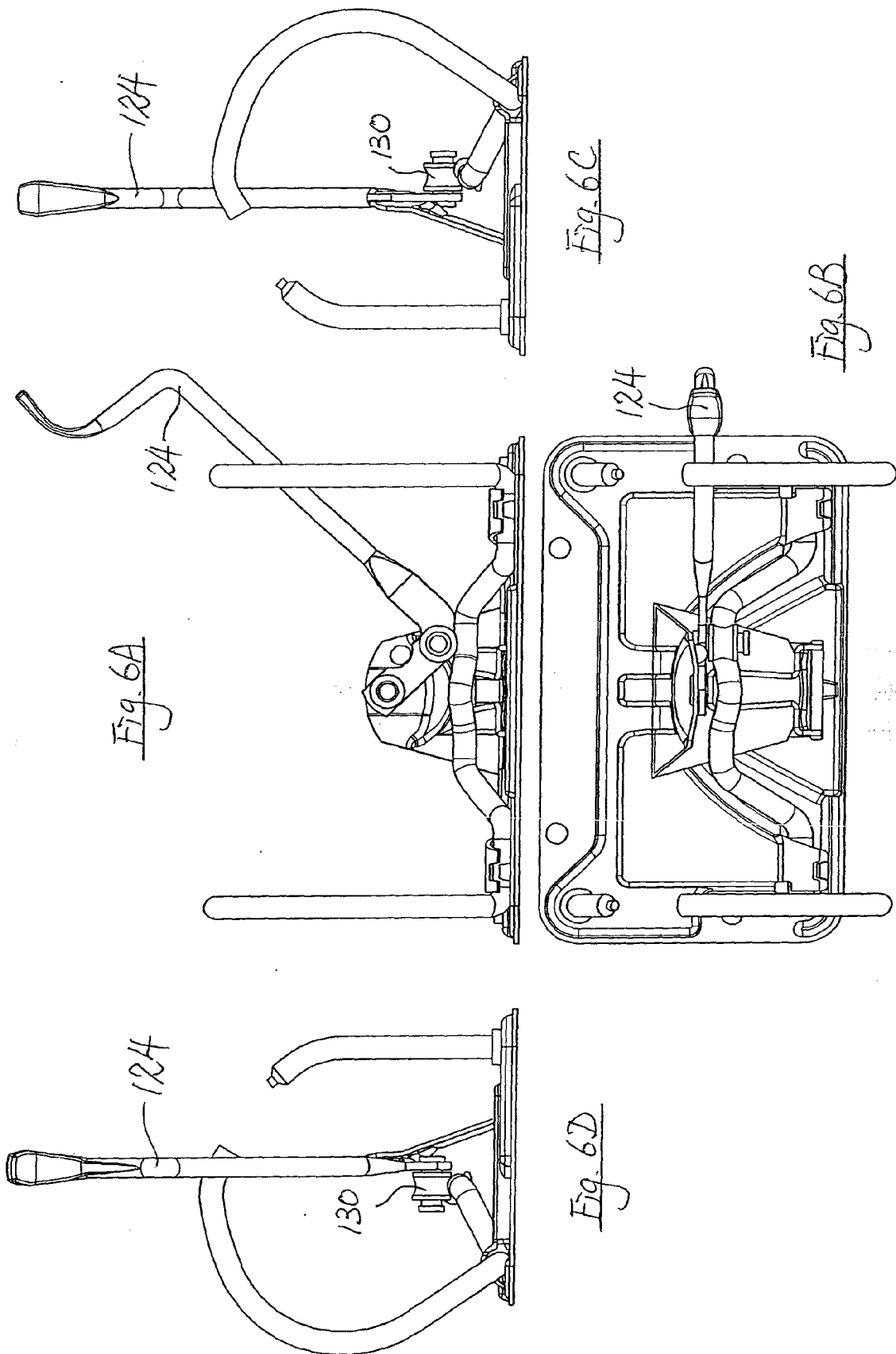


Fig. 5C



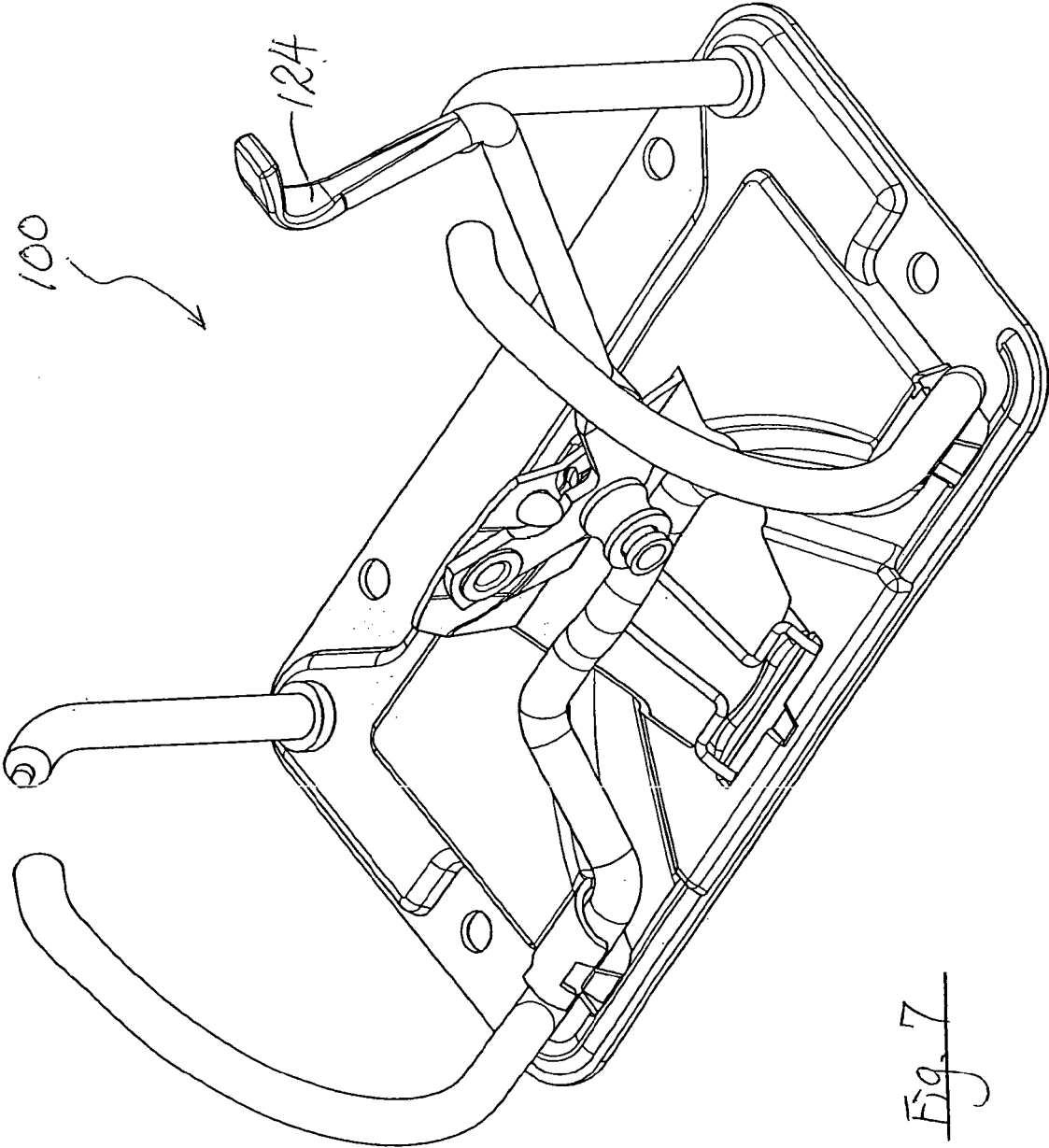
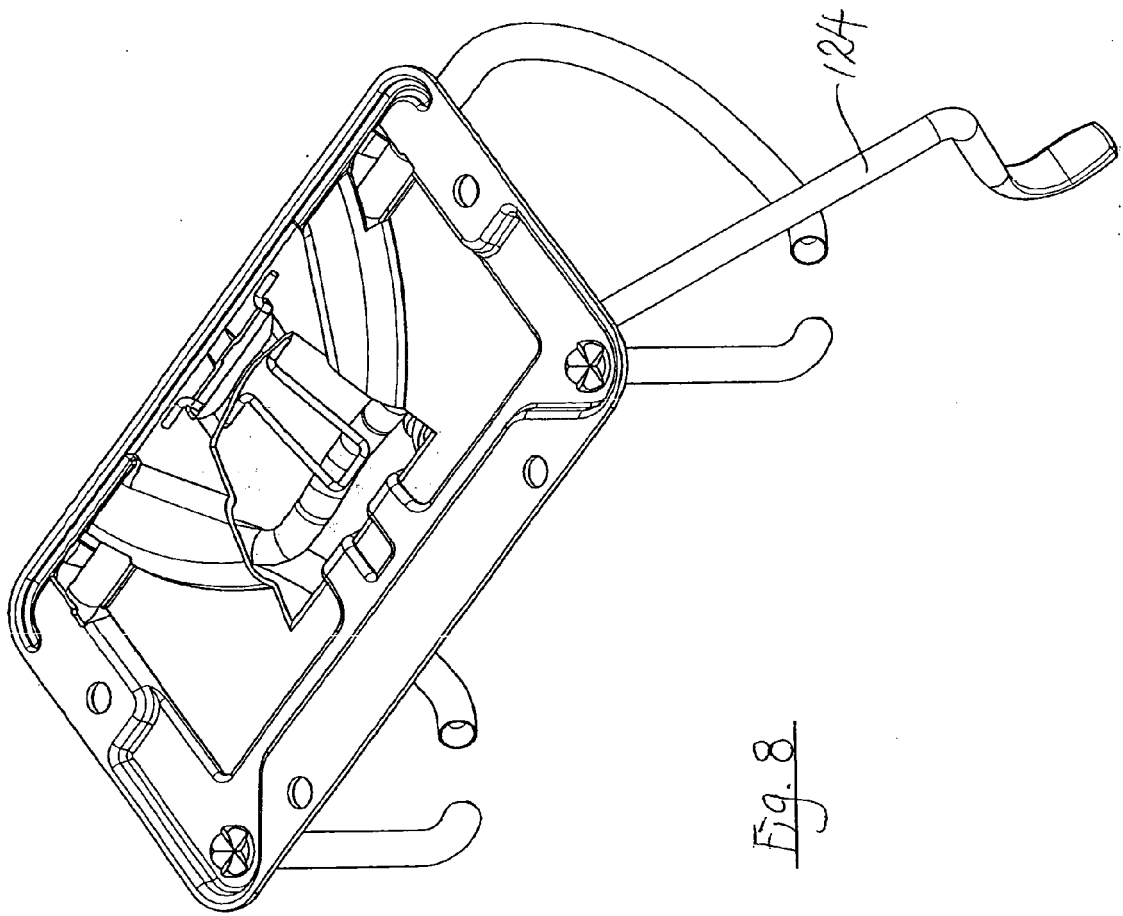


Fig. 7



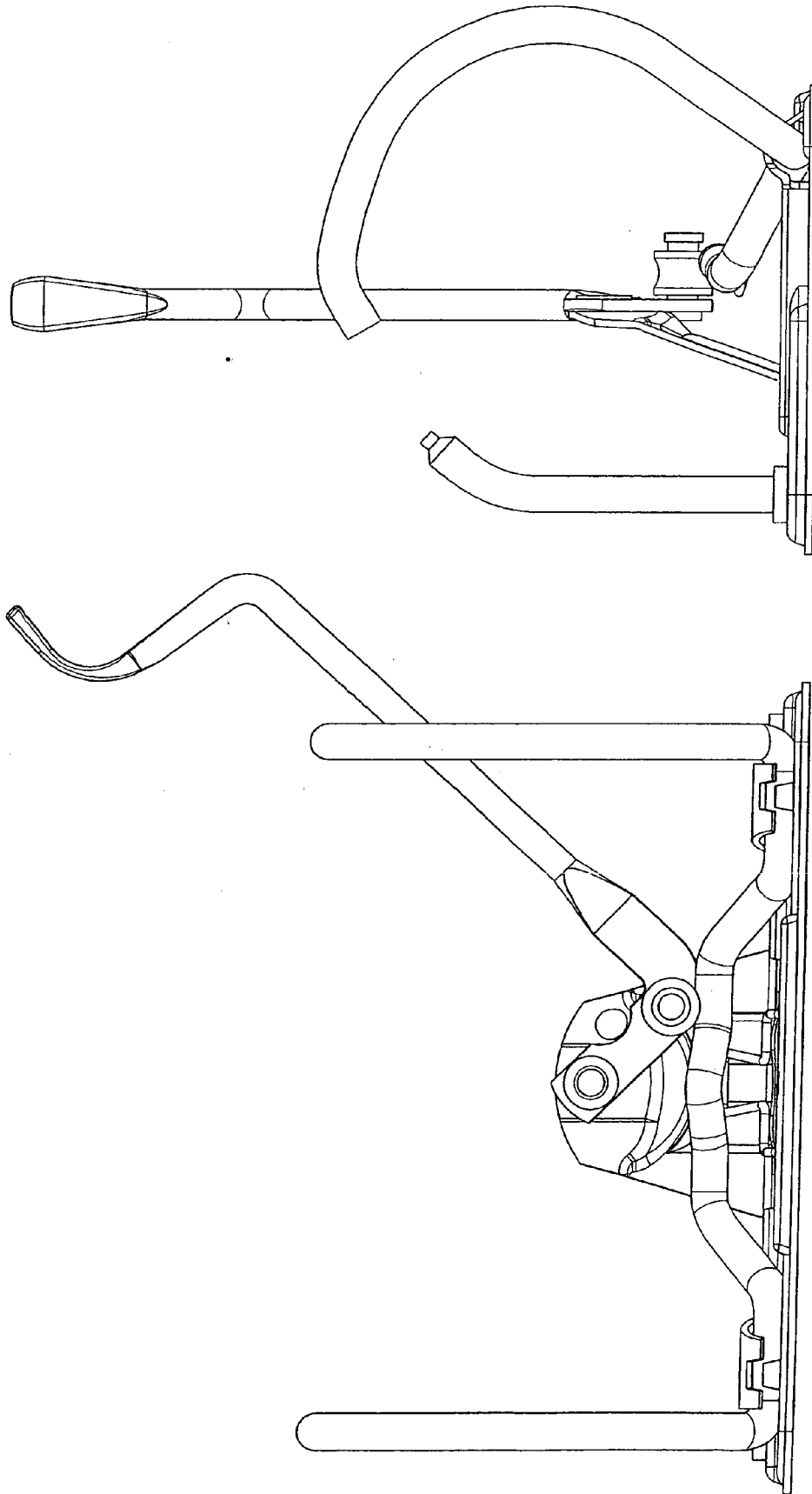


Fig. 9B

Fig. 9A

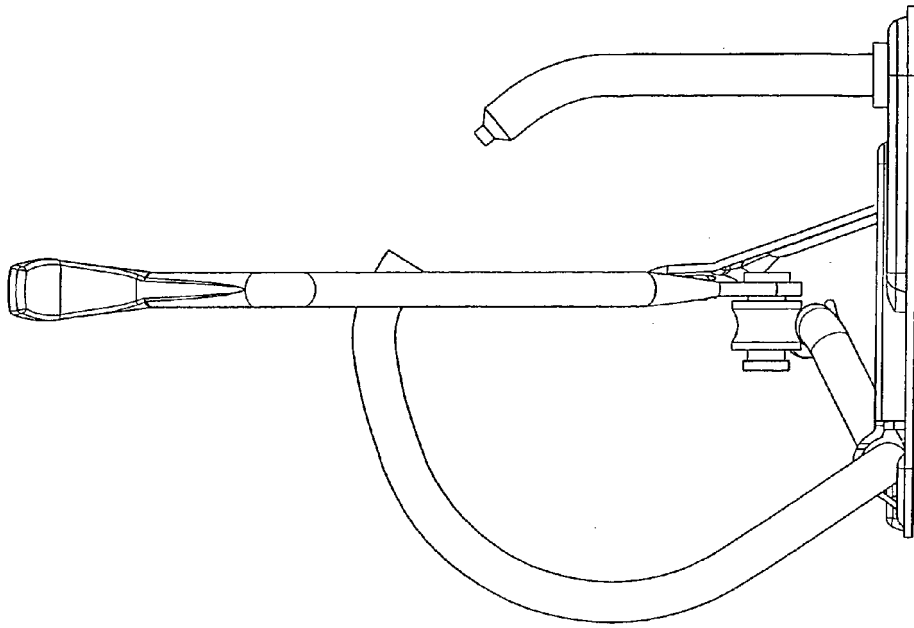


Fig. 9D

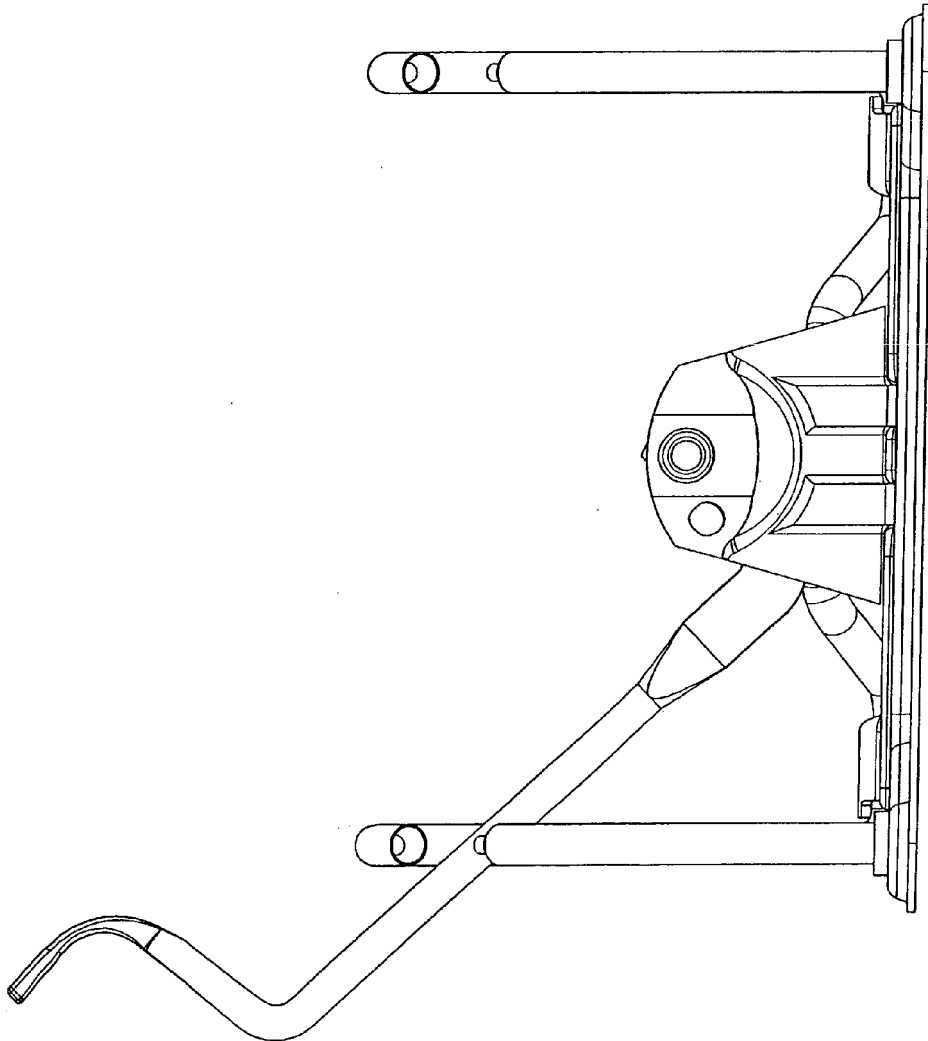
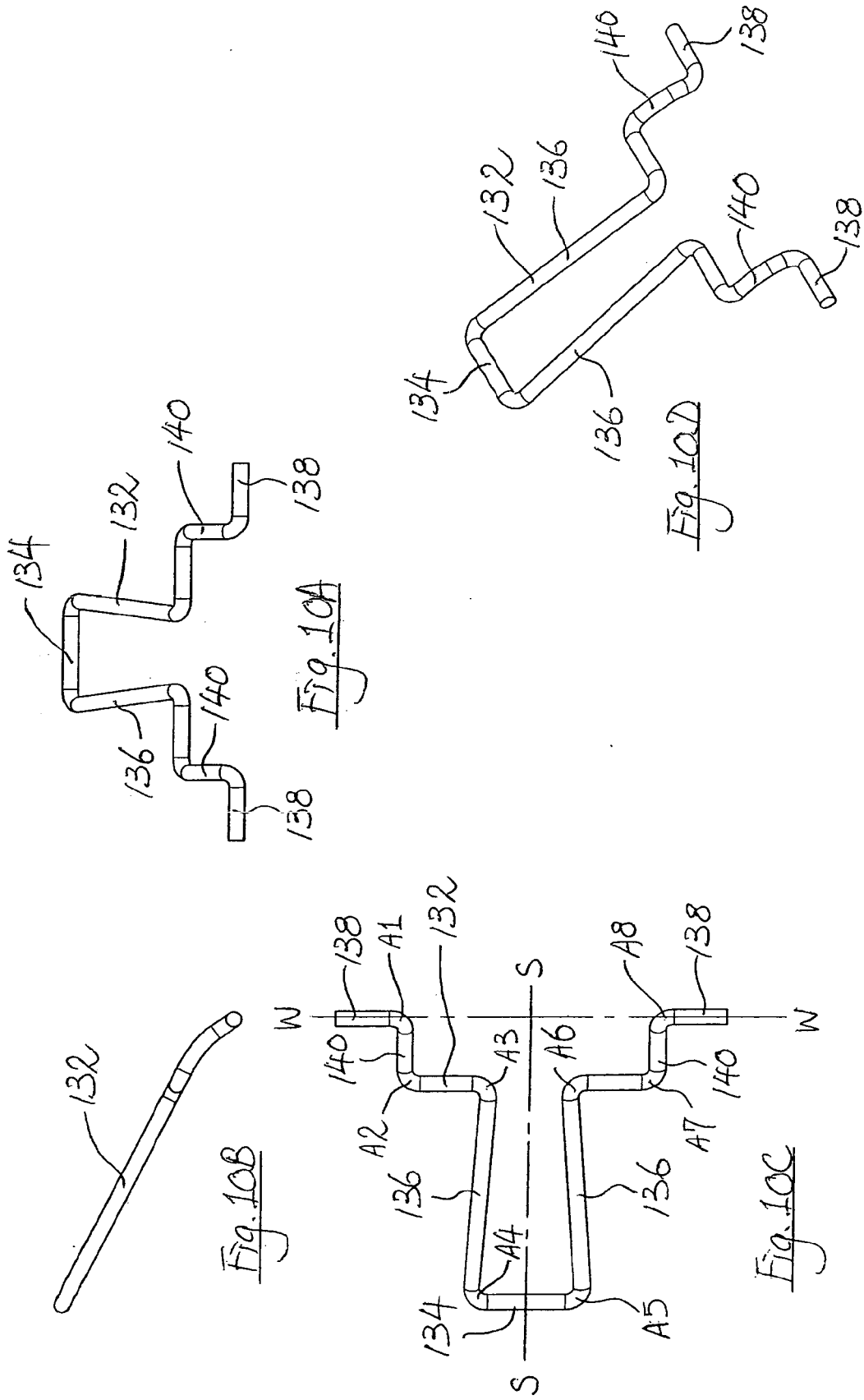
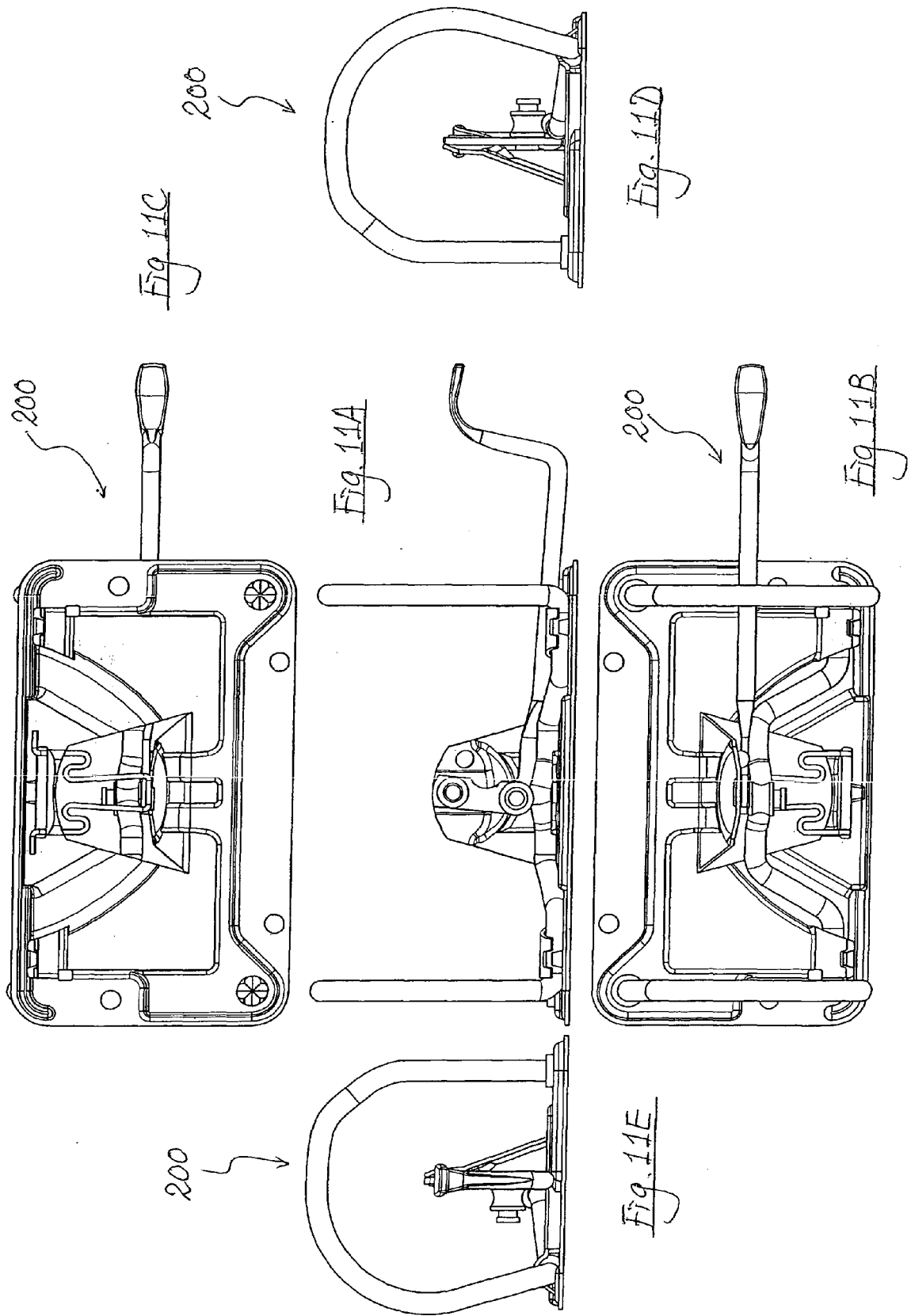


Fig. 9C





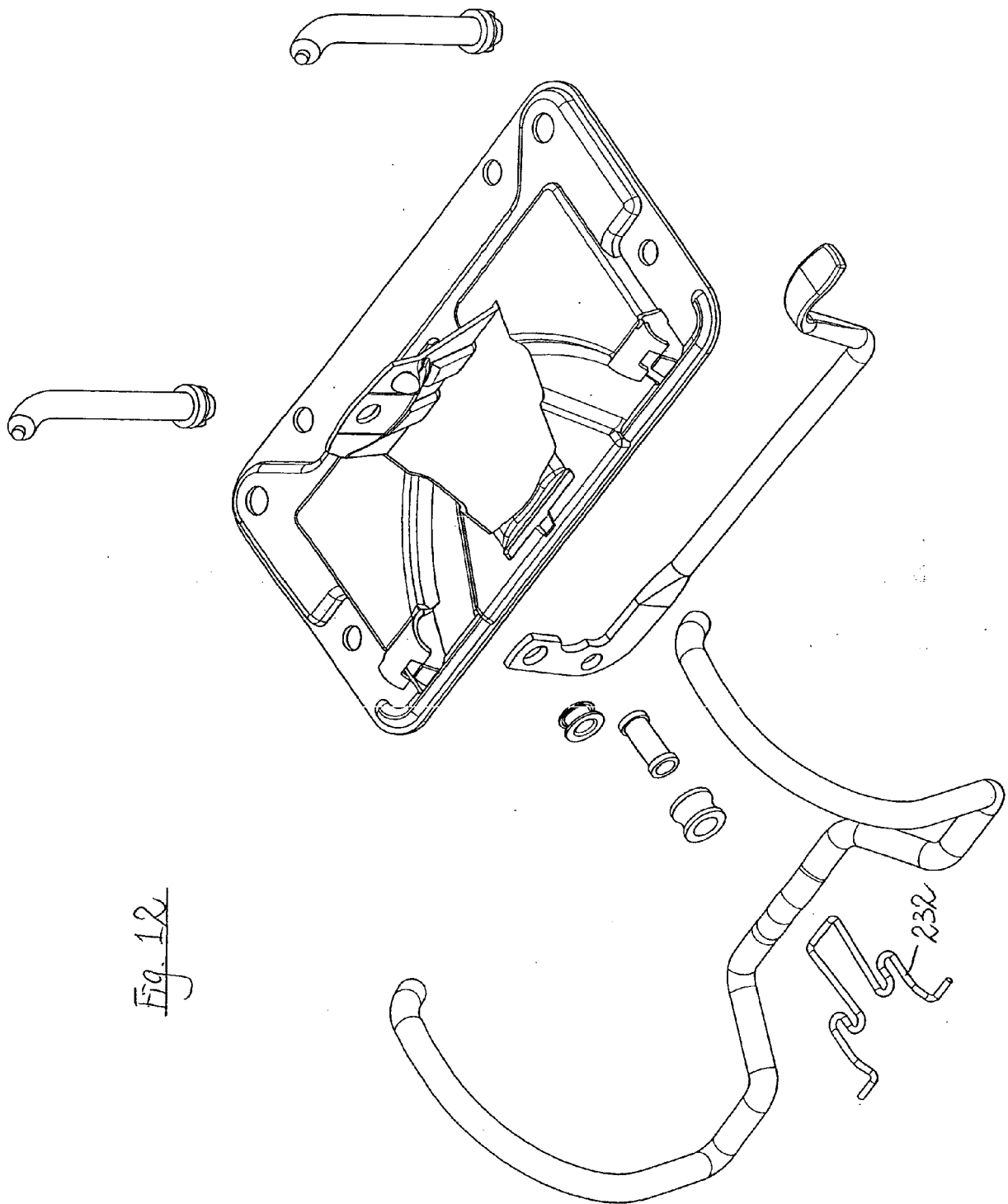
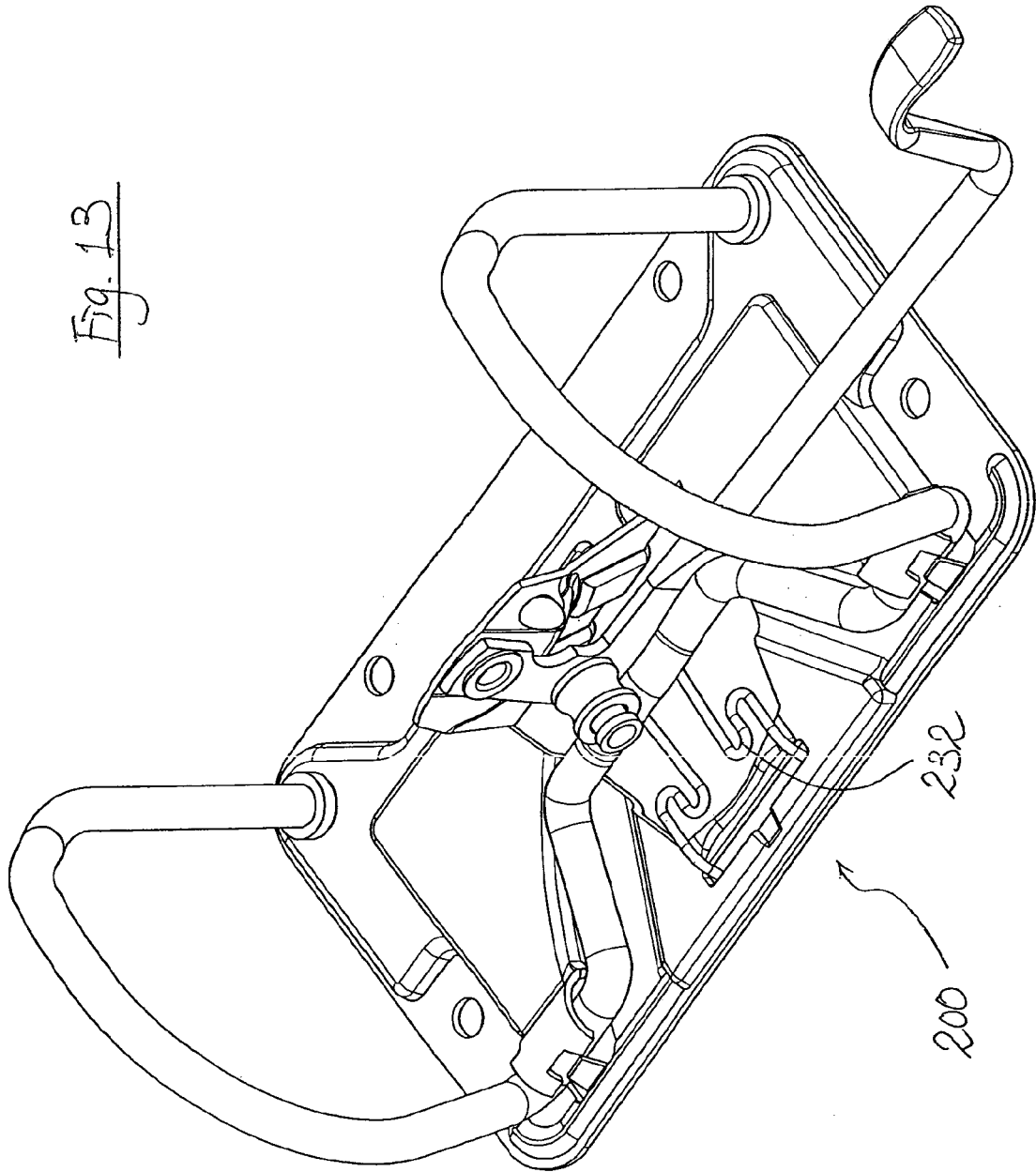
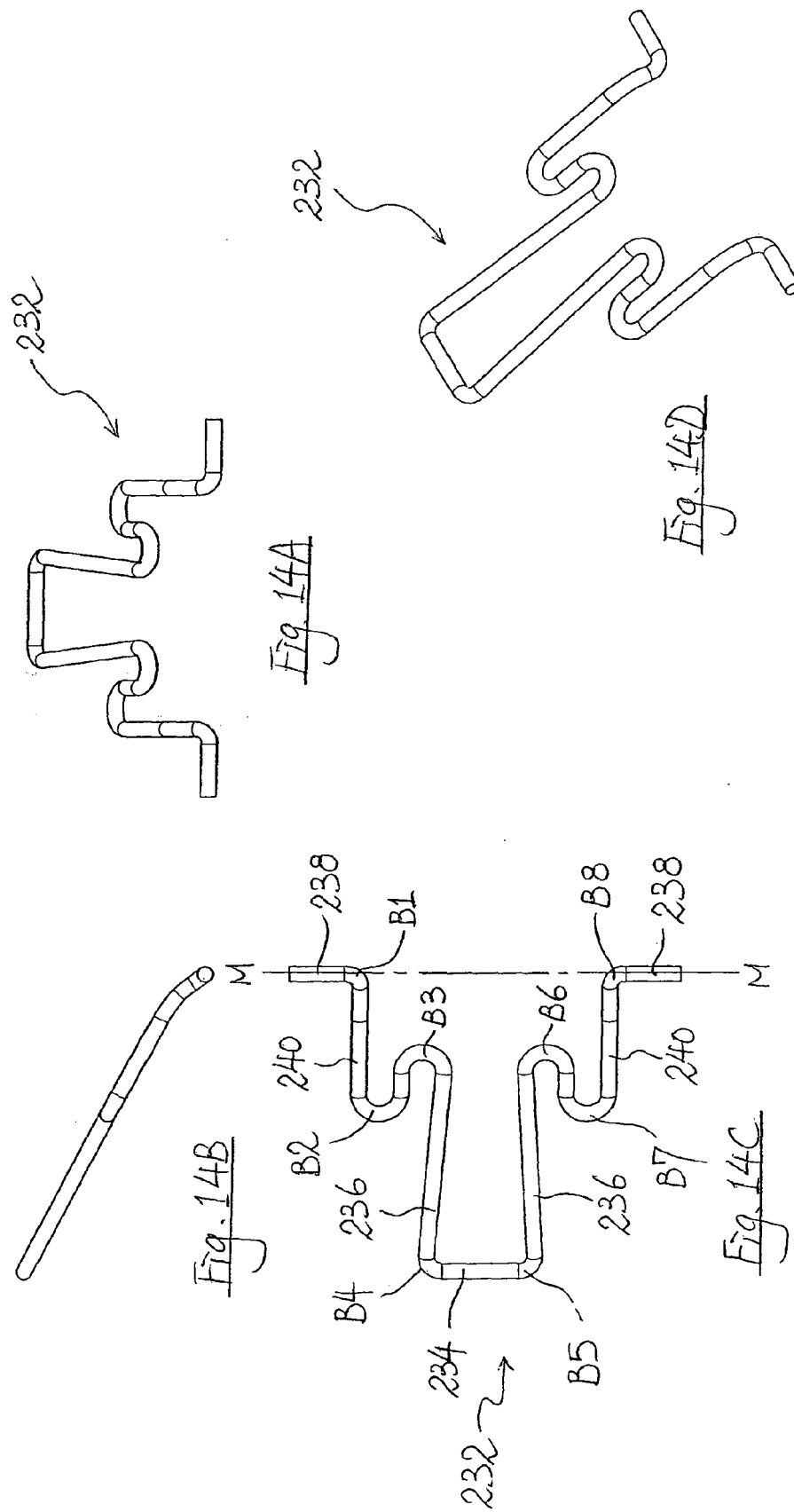
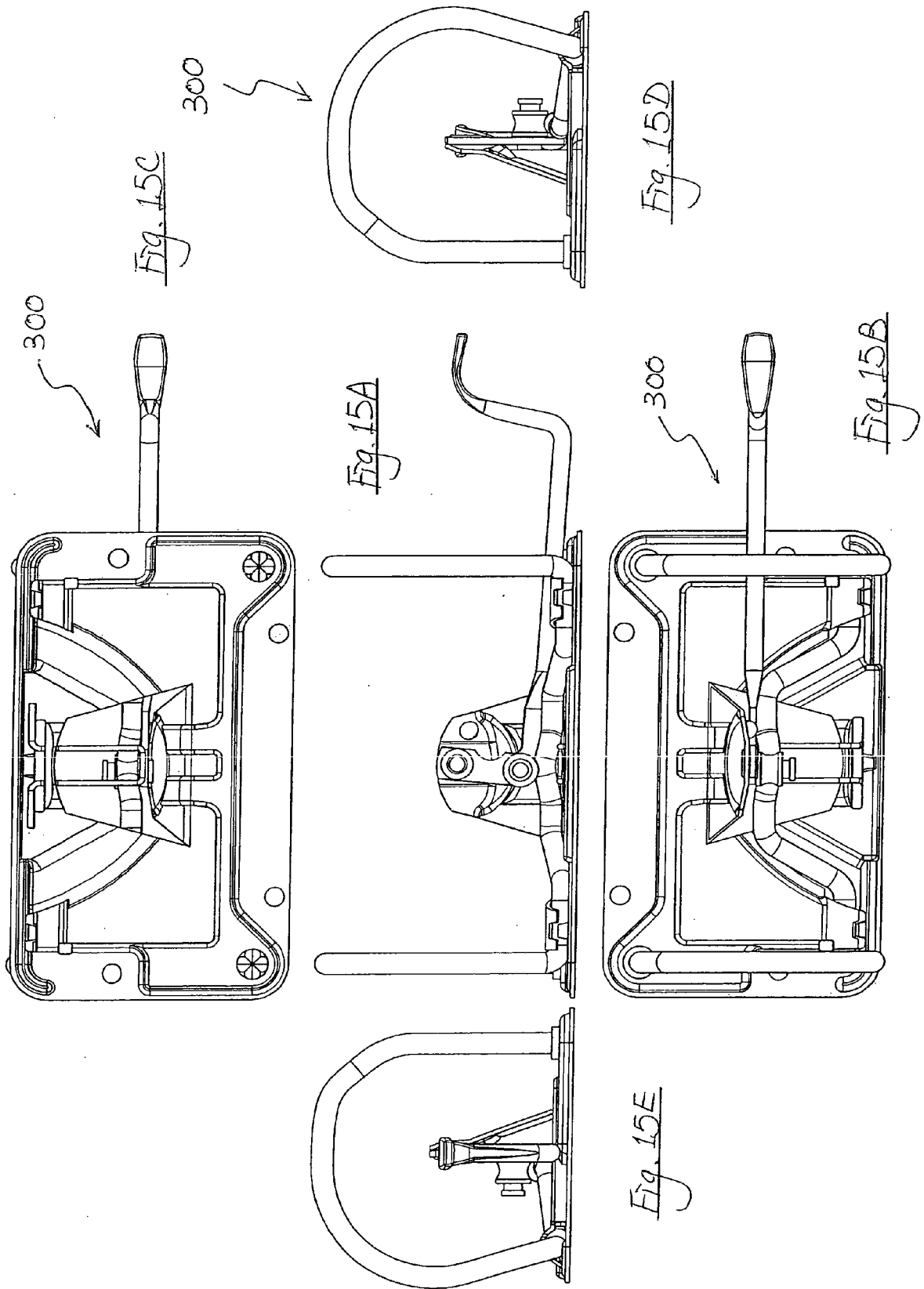


Fig. 12

Fig. 13







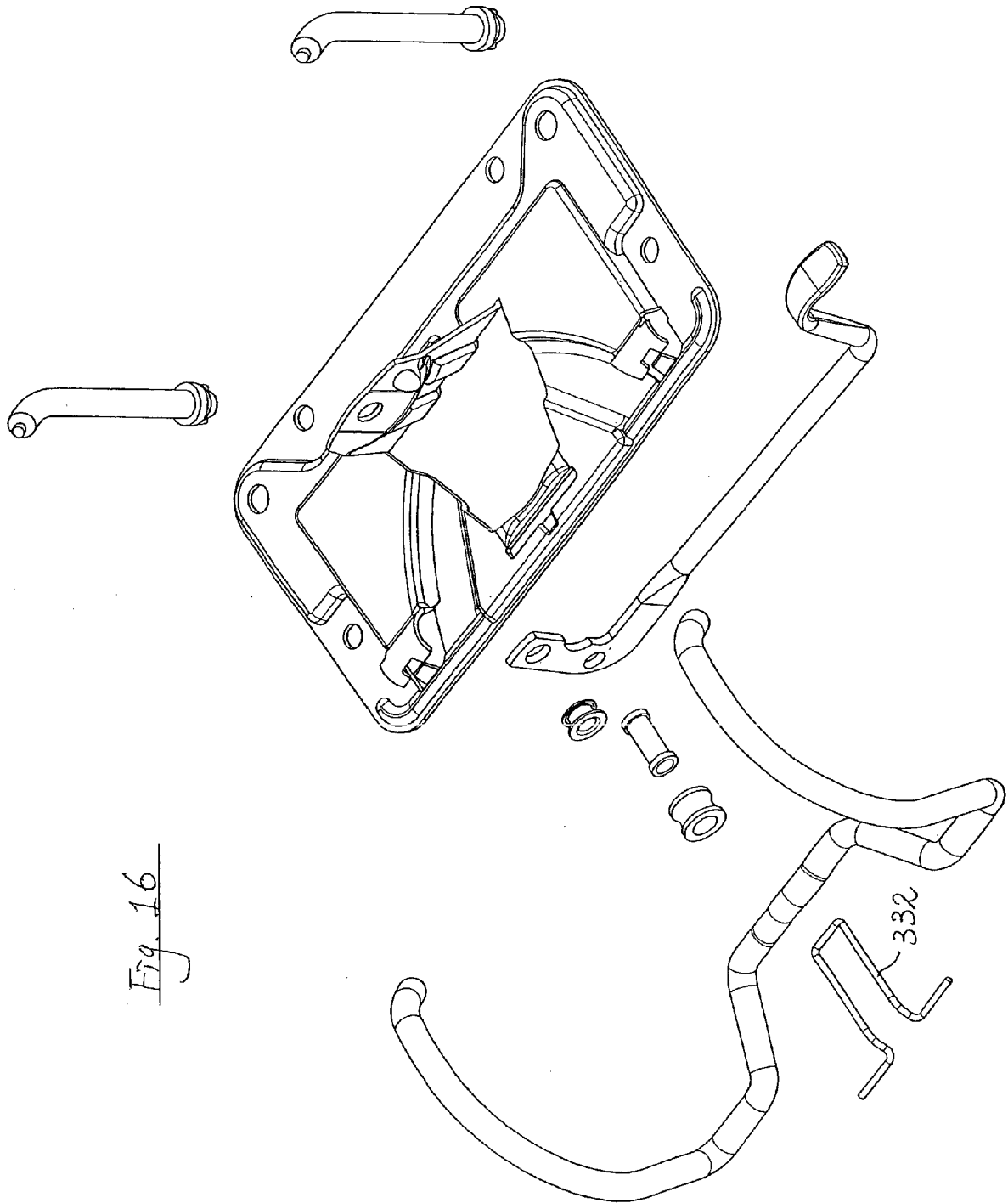
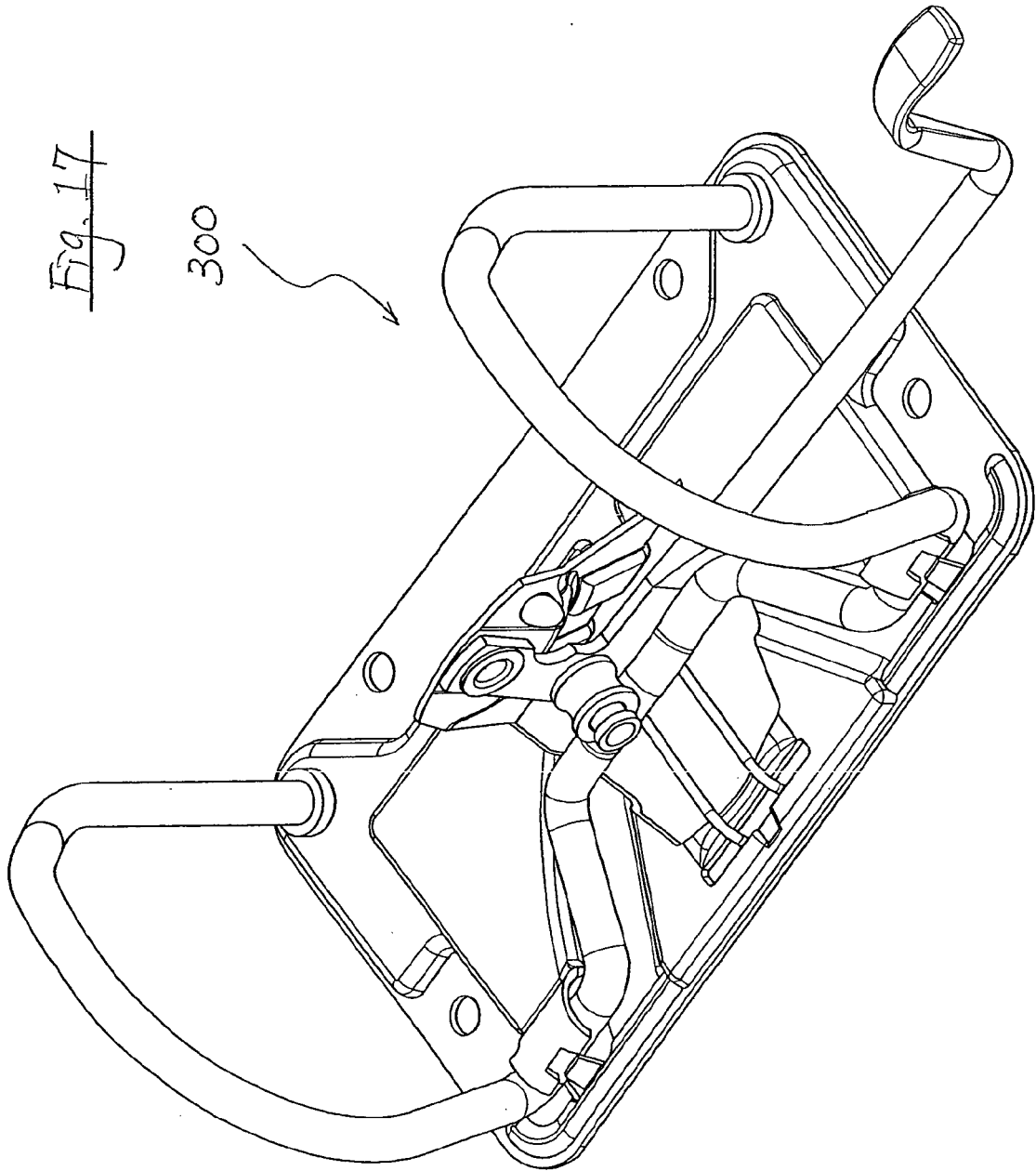


Fig. 16



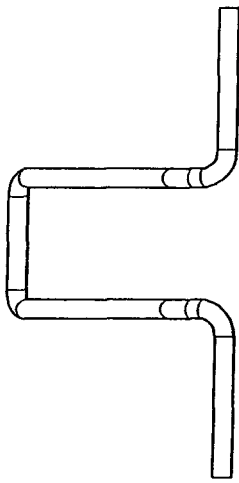


Fig. 18A

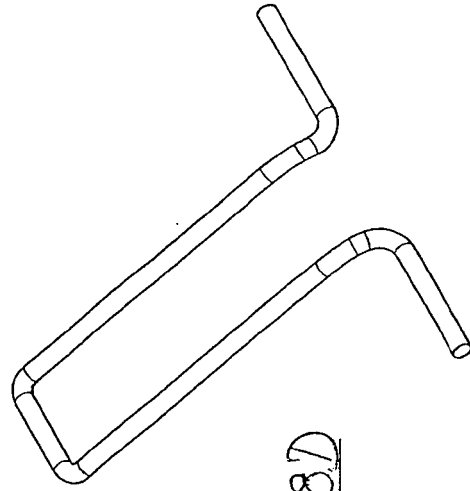


Fig. 18D

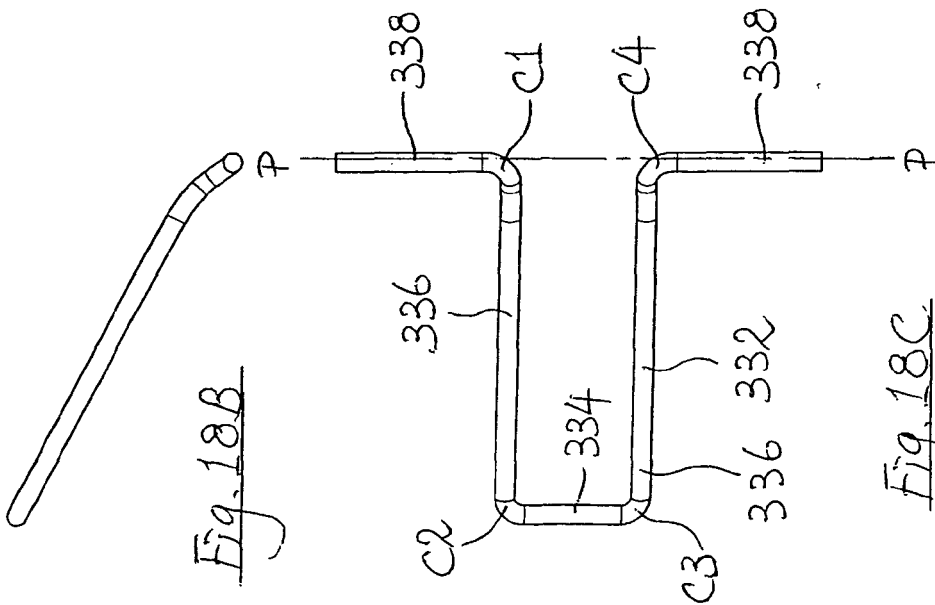


Fig. 18B

Fig. 18C



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 07 25 2350

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
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Place of search		Date of completion of the search	Examiner
The Hague		14 January 2008	Dewaele, Karl
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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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 25 2350

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14-01-2008

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