(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 062 742 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
27.05.2009 Bulletin 2009/22

(51) Int Cl.:
B42F 13/24 *(2006.01)*

(21) Application number: **09001138.8**

(22) Date of filing: **21.11.2007**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC MT NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK RS

(62) Document number(s) of the earlier application(s) in accordance with Art. 76 EPC:
07254534.6 / 2 062 741

(71) Applicant: **World Wide Stationery Manufacturing Co. Ltd.**
Hong Kong (HK)

(72) Inventor: **Cheng, Kei**
Shatin, New Territories (HK)

(74) Representative: **Reeve, Anna Elizabeth**
Marks & Clerk LLP
90 Long Acre
London
WC2E 9RA (GB)

Remarks:
This application was filed on 28 01 2009 as a divisional application to the application mentioned under INID code 62.

(54) A lever-arch type file mechanism

(57) A lever-arch type file mechanism (100, 200, 300, 400) is disclosed as including a base (102, 202, 302, 402), two rings secured to and extending upwardly from the base, each ring including a post (104, 204, 304, 404) fixed to the base and an arch movable (106, 206, 306, 406) relative to the post between a ring-closed configuration in which the rings are closed and a ring-open configuration in which the rings are open, and a control assembly (116, 216, 316, 416) operable to move the rings between the ring-closed configuration and the ring-open configuration, the control assembly including a lever (118, 218, 318, 418) movable between a first position and a second position, and when the rings are in the ring-open configuration, the lever is movable from the first position to the second position to move the rings to the ring-closed configuration, and when the rings are in the ring-closed configuration, the lever is movable from the first position to the second position to move the rings to the ring-open configuration. The control assembly also includes a wheel (120, 220, 320, 420), and when the rings are in the ring-open configuration, the wheel is rotatable in a direction to move the rings to the ring-closed configuration, and when the rings are in the ring-closed configuration, the wheel is rotatable in the same direction to move the rings to the ring-open configuration. A lever-arch type file is also disclosed as including such a lever-arch type file mechanism (100, 200, 300, 400) fixedly secured to a cover.

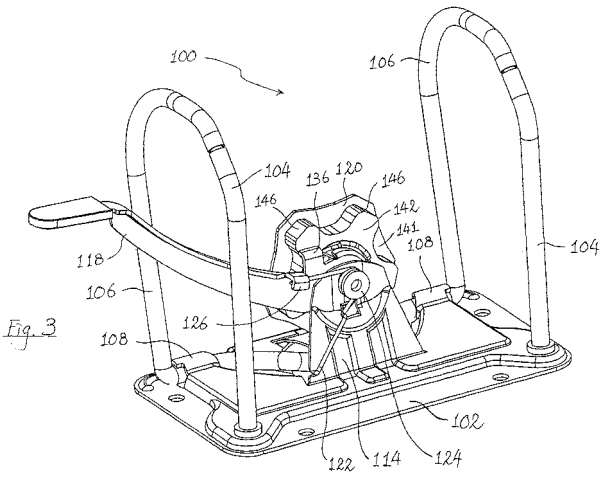


Fig. 3

EP 2 062 742 A1

Description

[0001] This invention relates to a lever-arch type file mechanism and a lever-arch type file including such a mechanism.

[0002] Lever-arch type file mechanisms have been available for a long time. In a conventional lever-arch type file mechanism, a one-armed lever is pivotable to pivot a pair of arches away from a pair of fixed 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 by an intervening cranked portion on which a roller attached to the lever travels during pivotal movement of the lever, to effect opening and closing of the ring pairs. In operating such a conventional file mechanism, the lever is pivoted downwardly to close the ring pairs formed by the posts and arches and pivoted upwardly to open the rings.

[0003] Such a conventional file mechanism is not convenient in use, in that the lever has to be moved in different directions to effect opening and subsequent closing of the rings, and the rings may only be opened by moving the lever from its ring-closed position in one single direction. In addition, when opening and closing the ring pairs, the roller will rub against an upwardly protruding portion of the intervening part, thus causing erosion of the roller, which is usually made of a plastics material. Such may affect the performance of the lever-arch type file mechanism or shorten its useful life.

[0004] It is thus an object of the present invention to provide a lever-arch type file mechanism and a lever-arch type file in which the aforesaid shortcomings are mitigated, or at least to provide a useful alternative to the 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 said 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 post member between a ring-closed configuration in which said rings are closed and a ring-open configuration in which said rings are open; and control means operable to move said rings between said ring-closed configuration and said ring-open configuration; and wherein said control means includes at least a lever member; characterized in that said control means further includes a rotatable member, wherein when said rings are in said ring-open configuration, said rotatable member is rotatable in a direction to move said rings to said ring-closed configuration, and that when said rings are in said ring-closed configuration, said rotatable member is rotatable in said direction to move said rings to said ring-open configuration.

[0006] According to a second aspect of the present invention, there is provided a lever-arch type file including a lever-arch type file mechanism fixedly secured to a substrate, said lever-arch type file mechanism including a base; at least two rings secured to and extending upwardly from said 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 post member between a ring-closed configuration in which said rings are closed and a ring-open configuration in which said rings are open; and control means operable to move said rings between said ring-closed configuration and said ring-open configuration; and wherein said control means includes at least a lever member; characterized in that said control means further includes a rotatable member, wherein when said rings are in said ring-open configuration, said rotatable member is rotatable in a direction to move said rings to said ring-closed configuration, and that when said rings are in said ring-closed configuration, said rotatable member is rotatable in said direction to move said rings to said ring-open configuration.

[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 bottom view of a lever-arch type file mechanism according to a first embodiment of the present invention, in a ring-closed configuration;

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

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

Fig. 1D is a right side view of the mechanism shown in Fig. 1B;

Fig. 1E is a left side view of the mechanism shown in Fig. 1B;

Fig. 2A is a rear view of the mechanism shown in Fig. 1B;

Fig. 2B is an enlarged view of the mechanism shown in Fig. 1D;

Fig. 3 is a rear perspective view of the mechanism shown in Fig. 1B;

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

Fig. 5 is a bottom perspective view of the mechanism shown in Fig. 3;

Fig. 6A is a front view of a control assembly of the mechanism shown in Fig. 4;

Fig. 6B is a left side view of the control assembly shown in Fig. 6A;

Fig. 6C is a rear view of the control assembly shown in Fig. 6A;

Fig. 6D is a top view of the control assembly shown in Fig. 6A;

Fig. 6E is a perspective exploded view of the control assembly shown in Fig. 6A;

Fig. 7A is a bottom view of the mechanism shown in Fig. 1A in a ring-open configuration, with the lever in a lower position;

Fig. 7B is a front view of the mechanism shown in

Fig. 7A;
Fig. 7C is a top view of the mechanism shown in Fig. 7A;
Fig. 7D is a right side view of the mechanism shown in Fig. 7B;
Fig. 7E is a left side view of the mechanism shown in Fig. 7B;
Fig. 8A is a rear view of the mechanism shown in Fig. 7B;
Fig. 8B is an enlarged view of the mechanism shown in Fig. 7D;
Fig. 9 is a rear perspective view of the mechanism shown in Fig. 7B;
Fig. 10 is a front perspective view of the mechanism shown in Fig. 9;
Fig. 11 is a bottom perspective view of the mechanism shown in Fig. 10;
Fig. 12A is a bottom view of the mechanism shown in Fig. 7A in a ring-open configuration, with the lever in an upper position;
Fig. 12B is a front view of the mechanism shown in Fig. 12A;
Fig. 12C is a top view of the mechanism shown in Fig. 12A;
Fig. 12D is a right side view of the mechanism shown in Fig. 12B;
Fig. 12E is a left side view of the mechanism shown in Fig. 12B;
Fig. 13A is a rear view of the mechanism shown in Fig. 12B;
Fig. 13B is an enlarged view of the mechanism shown in Fig. 12D;
Fig. 14 is a rear perspective view of the mechanism shown in Fig. 12B;
Fig. 15 is a front perspective view of the mechanism shown in Fig. 12B;
Fig. 16 is a bottom perspective view of the mechanism shown in Fig. 15;
Figs. 17A and 17B are views showing engagement between the inner spring and the ratchet gear of the control assembly of the mechanism shown in Fig. 1A;
Fig. 18A is a bottom view of a lever-arch type file mechanism according to a second embodiment of the present invention, in a ring-closed configuration;
Fig. 18B is a front view of the mechanism shown in Fig. 18A;
Fig. 18C is a top view of the mechanism shown in Fig. 18A;
Fig. 18D is a right side view of the mechanism shown in Fig. 18A;
Fig. 18E is a left side view of the mechanism shown in Fig. 18A;
Fig. 19A is a rear view of the mechanism shown in Fig. 18A;
Fig. 19B is an enlarged view of the mechanism shown in Fig. 18D;
Fig. 20 is a rear perspective view of the mechanism shown in Fig. 18A;
Fig. 21 is a front perspective view of the mechanism shown in Fig. 20;
Fig. 22 is a bottom perspective view of the mechanism shown in Fig. 21;
Fig. 23A is a front view of a control assembly of the mechanism shown in Fig. 21;
Fig. 23B is a left side view of the control assembly shown in Fig. 23A;
Fig. 23C is a rear view of the control assembly shown in Fig. 23A;
Fig. 23D is a top view of the control assembly shown in Fig. 23A;
Fig. 23E is a perspective exploded view of the control assembly shown in Fig. 23A;
Fig. 24A is a bottom view of the mechanism shown in Fig. 18A, in a ring-open configuration, with the lever in a lower position;
Fig. 24B is a front view of the mechanism shown in Fig. 24A;
Fig. 24C is a top view of the mechanism shown in Fig. 24A;
Fig. 24D is a right side view of the mechanism shown in Fig. 24B;
Fig. 24E is a left side view of the mechanism shown in Fig. 24B;
Fig. 25A is a rear view of the mechanism shown in Fig. 24B;
Fig. 25B is an enlarged view of the mechanism shown in Fig. 24D;
Fig. 26 is a top perspective view of the mechanism shown in Fig. 24B;
Fig. 27 is a rear perspective view of the mechanism shown in Fig. 26;
Fig. 28 is a bottom perspective view of the mechanism shown in Fig. 26;
Fig. 29A is a bottom view of the mechanism shown in Fig. 24A, in a ring-open configuration, with the lever in an upper position;
Fig. 29B is a front view of the mechanism shown in Fig. 29A;
Fig. 29C is a top view of the mechanism shown in Fig. 29A;
Fig. 29D is a right side view of the mechanism shown in Fig. 29B;
Fig. 29E is a left side view of the mechanism shown in Fig. 29B;
Fig. 30A is a rear view of the mechanism shown in Fig. 29B;
Fig. 30B is an enlarged view of the mechanism shown in Fig. 29D;
Fig. 31 is a rear perspective view of the mechanism shown in Fig. 29A;
Fig. 32 is front perspective view of the mechanism shown in Fig. 31;
Fig. 33 is a bottom perspective view of the mechanism shown in Fig. 32;
Fig. 34A is a bottom view of a lever-arch type file mechanism according to a third embodiment of the

present invention, in a ring-closed configuration;
Fig. 34B is a front view of the mechanism shown in Fig. 34A;
Fig. 34C is a top view of the mechanism shown in Fig. 34A;
Fig. 34D is a right side view of the mechanism shown in Fig. 34B;
Fig. 34E is a left side view of the mechanism shown in Fig. 34B;
Fig. 35A is a rear view of the mechanism shown in Fig. 34B;
Fig. 35B is an enlarged view of the mechanism shown in Fig. 34D;
Fig. 36 is a front perspective view of the mechanism shown in Fig. 34B;
Fig. 37 is a rear perspective view of the mechanism shown in Fig. 36;
Fig. 38 is a right perspective view of the mechanism shown in Fig. 36;
Fig. 39A is a front view of a control assembly of the mechanism shown in Fig. 36;
Fig. 39B is a left side view of the control assembly shown in Fig. 39A;
Fig. 39C is a rear view of the control assembly shown in Fig. 39A;
Fig. 39D is a top view of the control assembly shown in Fig. 39A;
Fig. 39E is a rear perspective view of the control assembly shown in Fig. 39A;
Fig. 39F is a front perspective view of the control assembly shown in Fig. 39A;
Fig. 40 is an exploded view of the control assembly shown in Fig. 39A;
Fig. 41A is a bottom view of the mechanism shown in Fig. 34A in a ring-open configuration, with the lever in a lower position;
Fig. 41B is a front view of the mechanism shown in Fig. 41A;
Fig. 41C is a top view of the mechanism shown in Fig. 41A;
Fig. 41D is a right side view of the mechanism shown in Fig. 41B;
Fig. 41E is a left side view of the mechanism shown in Fig. 41B;
Fig. 42A is a rear view of the mechanism shown in Fig. 41B;
Fig. 42B is an enlarged view of the mechanism shown in Fig. 41 D;
Fig. 43 is a left perspective view of the mechanism shown in Fig. 41A;
Fig. 44 is a rear perspective view of the mechanism shown in Fig. 41B;
Fig. 45 is a front perspective view of the mechanism shown in Fig. 41B;
Fig. 46 is a front perspective view of the mechanism shown in Fig. 41A in a ring-open configuration, with the lever in an upper position;
Fig. 47 is a rear perspective view of the mechanism shown in Fig. 46;
Fig. 48 is a left perspective view of the mechanism shown in Fig. 47;
Fig. 49 is a rear view of the mechanism shown in Fig. 42A, showing return movement of the lever;
Figs. 50A to 50C show operation of an alternative connecting arrangement between the lever and the claw of the control assembly shown in Fig. 39A;
Fig. 51A is a bottom view of a lever-arch type file mechanism according to a fourth embodiment of the present invention, in a ring-open configuration;
Fig. 51B is a front view of the mechanism shown in Fig. 51A;
Fig. 51C is a top view of the mechanism shown in Fig. 51A;
Fig. 51D is a right side view of the mechanism shown in Fig. 51B;
Fig. 51E is a left side view of the mechanism shown in Fig. 51B;
Fig. 52 is a front perspective view of the mechanism shown in Fig. 51B;
Fig. 53 is a rear perspective view of the mechanism shown in Fig. 52;
Fig. 54A is a bottom view of the mechanism shown in Fig. 51A in a ring-closed configuration, with the lever in a lower position;
Fig. 54B is a front view of the mechanism shown in Fig. 54A;
Fig. 54C is a top view of the mechanism shown in Fig. 54A;
Fig. 54D is a right side view of the mechanism shown in Fig. 54B;
Fig. 54E is a left side view of the mechanism shown in Fig. 54B;
Fig. 55A is a rear view of the mechanism shown in Fig. 54B;
Fig. 55B is an enlarged view of the mechanism shown in Fig. 54D;
Fig. 56 is a rear perspective view of the mechanism shown in Fig. 54B;
Fig. 57 is a front perspective view of the mechanism shown in Fig. 56;
Fig. 58A is a bottom view of the mechanism shown in Fig. 54A in a ring-closed configuration, with the lever in an upper position;
Fig. 58B is a front view of the mechanism shown in Fig. 58A;
Fig. 58C is a bop view of the mechanism shown in Fig. 58A;
Fig. 58D is a right side view of the mechanism shown in Fig. 58B;
Fig. 58E is a left side view of the mechanism shown in Fig. 58B;
Fig. 59A is a rear view of the mechanism shown in Fig. 58B;
Fig. 59B is an enlarged view of the mechanism shown in Fig. 58D;
Fig. 60 is a front perspective view of the mechanism

shown in Fig. 58B;
Fig. 61 is a rear perspective view of the mechanism shown in Fig. 60;
Fig. 62A is a front view of the control assembly of the mechanism shown in Fig. 60;
Fig. 62B is a left side view of the control assembly shown in Fig. 62A;
Fig. 62C is a rear view of the control assembly shown in Fig. 62A;
Fig. 62D is a top view of the control assembly shown in Fig. 62A;
Fig. 62E is a front perspective view of the control assembly shown in Fig. 62A;
Figs. 63A to 63C show movement of the claw and ratchet gear arrangement of the control assembly of the mechanism shown in Fig. 60 upon downward pivoting movement of the lever; and
Figs. 64A to 64C show movement of the claw and ratchet gear arrangement of the control assembly of the mechanism shown in Fig. 60 upon upward pivoting movement of the lever.

[0008] Figs. 1A to 5 show a lever-arch type file mechanism according to a first embodiment of the present invention, generally designated as 100. The mechanism 100 includes a base 102, which may be made of a metal sheet. Two posts 104 are fixedly secured to the base 102, and two arches 106 are engaged by a pair of clamps 108 close to the base 102 whereby the arches 106 are pivotable relative to the base 102 and the posts 104 about an axis T-T. The arches 106 are joined with each other *via* a cranked portion 110 which is fixed and integrally formed with the arches 106 for simultaneous movement. By way of such an arrangement, the cranked portion 110 may be caused to pivot to bring about simultaneous pivotal movement of the arches 106 between a first position in which free ends of the arches 106 mate with free ends of the posts 104 (as shown in Figs. 1A to 5) to form two rings extending upwardly from the base 102 ("ring-closed configuration") for retaining pieces of hole-punched paper, and a second position in which the free ends of the arches 106 are out of engagement with the free ends of the posts 104, thus opening the two rings ("ring-open configuration") to allow pieces of hole-punched paper to be retrieved from or inserted into the posts 104 and/or the arches 106.

[0009] Beneath the cranked portion 110 is a leaf spring 112 which acts upwardly on the cranked portion 110 from below. By way of such an arrangement, the leaf spring 112 biases the arches 106, *via* the cranked portion 110, to pivot away from the posts 104, i.e. to the ring-open configuration. A metal plate 114 extends generally upwardly from the base 102. The plate 114 is formed integrally with the base 102, and may, for example, be punched out from the same piece of metal sheet with which the base 102 is made.

[0010] The lever-arch type file mechanism 100 includes a control assembly, generally designated as 116, as shown in Figs. 6A to 6E. The control assembly 116 includes a lever 118 connected with a wheel 120 *via* a claw and ratchet gear arrangement. The wheel 120 may be made of metal or plastics. The lever 118 has an operating arm 118a, at a free end of which is fixed, e.g. by moulding, with a cushion 118b, which may be made of a softer material, e.g. plastics, for providing further comfort in use.

[0011] A torsion spring 122 is engaged with the lever 118 *via* a rivet 124. It can be seen in Figs. 2A to 3 that a lower arm of the torsion spring 122 is engaged with the plate 114 and an upper arm of the torsion spring 122 is engaged with a hook 126 of the lever 118, which extends to one lateral side of the lever 118. By way of such an arrangement, the lever 118 is biased by the torsion spring 122 away from the base 102 towards an upper position, as shown in Figs. 1A to 5.

[0012] The wheel 120 is fixedly secured, by two pins 128, with a ratchet gear 130 for simultaneous movement. The wheel 120, together the ratchet gear 130 and the pins 128, are engaged with the lever 118 *via* a torsion spring 132 and a rivet 134. When the control assembly 116 is installed to the lever-arch type file mechanism 100, an upper arm of the torsion spring 132 is engaged with a hook 136 of the lever 118, which extends to another lateral side of the lever 118. A lower arm of the torsion spring 132 is fixed relative to the plate 114. For example, a small plate may be stamped from the plate 114 and be bent generally perpendicularly towards the claw and ratchet gear arrangement. A small hole may be drilled through the small plate through which the lower end of the torsion spring 132 may be fixedly received. The upper arm of the torsion spring 132 acts as the "claw" in this claw and ratchet gear arrangement. The upper arm of the torsion spring 132 is normally engaged with a straight edge 138 of a tooth 140 of the ratchet gear 130. By way of such an arrangement, the wheel 120, ratchet gear 130, pins 128, rivet 134, the upper arm of the torsion spring 132, the lever 118, the upper arm of the torsion spring 122 and the rivet 124 are all pivotable or rotatable about a common axis P-P. The straight edge 138 of the tooth 140 of the ratchet gear 130 is parallel to the axis P-P, although it should be understood that the edge 138 may be tilted relative to the axis P-P.

[0013] The wheel 120 includes a cover plate 141 and on a major surface of the cover plate 141 facing the claw and ratchet gear arrangement is fixed with a cam 142 having an undulating peripheral cam surface 144 with five protruding portions 146 and five recessed portions 148 alternately and equi-angularly disposed relative to one another.

[0014] In the ring-closed configuration as shown in Figs. 1A to 5, one of the protruding portions 146 bears on and acts on an upwardly protruding portion of the cranked portion 110. When the lever 118 is pivoted downwardly away from the normal stable upper position as shown in Figs. 1A to 5, i.e. in the direction indicated by the arrow A in Fig. 2A, because of the engagement of

the upper arm of the torsion spring 132 with a straight edge 138 of a tooth 140 of the ratchet gear 130, the ratchet gear 130 will be brought into simultaneous rotational movement about the axis P-P in the same direction as the direction of downward pivoting movement of the lever 118.

[0015] When the lever 118 is moved, against the biasing force of the torsion spring 122, to the lower position as shown in Figs. 7A to 11, the wheel 120 with the cam 142 is brought to a position in which a recessed portion 148 of the cam surface 144 faces the upwardly protruding portion of the cranked portion 110, thus allowing the leaf spring 112 to pivot upwardly to pivot the arches 106 away from the posts 104, thus opening the ring pairs, again as shown in Figs. 7A to 11. The distance between the lower position of the lever 118 and the base 102 is shorter than the distance between the upper position of the lever 118 and the base 102. Each downward pivoting movement of the lever 118 causes the cam 142 to rotate through 36°.

[0016] The lever 118 is in an unstable position when it occupies this lower position. When the downwardly acting force (e.g. exerted by a user) is released, the lever 118 will return to its upper normal stable position as shown in Figs. 12A to 16. Such a upward return movement of the lever 118 will not change the configuration of the ring-pairs. In particular, when the lever 118 returns from its lower position as shown in Figs. 7A to 11 to its upper position as shown in Figs. 12A to 16, the ring pairs remain in a ring-open configuration.

[0017] During the upward return pivoting movement of the lever 118, which is brought about by the return action of the torsion spring 122, the upper arm of the torsion spring 132 slides along a slanted edge 150 of an adjacent tooth 140 of the ratchet gear 130 until it engages with a straight edge 138 of a neighbouring tooth 140. As there is no consequential movement of the wheel 120 (and thus the cam 142) relative to the cranked portion 110, there is no pivoting movement of the arches 106 relative to the posts 104, thus not resulting in any change in the configuration of the ring pairs.

[0018] Fig. 17A shows the engagement between the upper arm of the torsion spring 132 with the ratchet gear 130 when the lever 118 is in its lower position, and Fig. 17B shows the engagement between the upper arm of the torsion spring 132 with the ratchet gear 130 when the lever 118 is in its upper position.

[0019] When the mechanism 100 is in the configuration as shown in Figs. 12A to 16, the lever 118 may again be pivoted downwardly to the lower position to bring about simultaneous rotational movement of the wheel 120 (including the cover plate 141 and the cam 142) in the same direction as that of the downward movement of the lever 118, to bring a neighbouring protruding portion 146 of the cam 142 into engagement with the upwardly extending portion of the cranked portion 110, thus pivoting the arches 106 into mating engagement with the posts 104, thereby closing the ring pairs.

[0020] When the lever 118 is thus in its lower position, it may be allowed to return, under the biasing force of the torsion spring 122, to its upper position. During this upward pivoting movement of the lever 118 in the direction opposite to the arrow A in Fig. 2A, the upper arm of the torsion spring 132 slides along a slanted edge 150 of an adjacent tooth 140 of the ratchet gear 130 until it engages with a transverse straight edge 138 of a neighbouring tooth 140. The mechanism 100 thus resumes its ring-closed configuration as shown in Figs. 1A to 5. Again, the upward return movement of the lever 118 does not bring about any change in the configuration of the ring pairs.

[0021] It can be seen from the foregoing that the mechanism 100 of the present invention possesses at least the following distinctive features:

a. the ring pairs change its configuration, whether from the ring-closed configuration to the ring-open configuration or from the ring-open configuration to the ring-closed configuration, only upon pivotal movement of the lever 118 in one direction, which, in the present illustrated case, is the downward pivoting movement of the lever 118 from its upper position to its lower position;

b. there is no change in the configuration of the ring pairs upon upward return pivoting movement of the lever 118 from its lower position to its normal stable upper position;

c. upon downward pivotal movement of the lever 118 from the upper position to the lower position, the wheel 120 only rotates in a same direction, to move the ring pairs from the ring-closed configuration to the ring-open configuration and from the ring-open configuration to the ring-closed configuration;

d. when the mechanism 100 is in its ring-closed configuration, a first protruding portion 146 of the cam 142 is in contact with, abuts and acts on an upwardly protruding portion of the cranked portion 110, and when the mechanism 100 is moved through a ring-open configuration to resume the ring-closed configuration, it is a second protruding portion 146 of the cam 142 which is in contact with, abuts and acts on the upwardly protruding portion of the cranked portion 110, and so on. With such an arrangement, the working life of the mechanism 100 may be extended, because the rubbing against with the upwardly protruding portion of the cranked portion 110 is shared equally among the plurality of protruding portions 146;

e. when the mechanism 100 is in its ring-open configuration and the lever 118 is in its upper position (as shown in Figs. 12A to 16), sufficient clearance is allowed for hole-punched paper to be inserted into, or removed from, the posts 104 and the arches 106; and

f. the control assembly 116 converts the rotational movement of the wheel 120 into an up-and-down movement of the leaf spring 112.

[0022] In the mechanism 100 discussed above, the ring pairs only change its configuration, whether from the ring-closed configuration to the ring-open configuration or from the ring-open configuration to the ring-closed configuration, upon downward pivoting movement of the lever 118 from its upper position to its lower position. It should however be understood that, with the direction of the teeth 140 of the ratchet gear 130 oppositely oriented, and with the torsion springs 122, 132 suitably re-positioned, the lever 118 may be biased towards a lower position, and the ring pairs only change its configuration upon upward pivoting movement of the lever 118 from its lower position to its upper position.

[0023] Figs. 18A to 22 show various views of a lever-arch type file mechanism according to a second embodiment of the present invention, generally designated as 200. The mechanism 200 is structurally very similar to the mechanism 100 discussed above. A lever 218 of a control assembly 216 is pivotable from its upper position as shown in Figs. 18A to 22 downwardly (i.e. in the direction indicated by the arrow B in Fig. 19A) towards a base 202 to change the mechanism 200 from a ring-closed configuration (in which a pair of posts 204 are in a mating relationship with a pair of arches 206 to form a pair of closed rings) to a ring-open configuration (in which the posts 204 are pivoted out of engagement with the arches 206), as shown in Figs. 24A to 28.

[0024] The control assembly 216 includes, in addition to the lever 218, a wheel 220 operatively associated with the lever 218 *via* a claw and ratchet gear arrangement. The wheel 220 includes a cover plate 241 fixedly engaged (e.g. by being integrally formed) with a cam 242. A ratchet gear 230 of the claw and ratchet gear arrangement is fixedly secured to the wheel 220 for simultaneous movement by two pins 228. A torsion spring 232, which constitutes the "claw" in the claw and ratchet gear arrangement, is carried by a rivet 234 between the lever 218 and the ratchet gear 230. The cam 242 has an undulating cam surface 244 with five protruding portions 246 and five recessed portions 248 alternately and equiangularly disposed relative to one another. Another torsion spring 222 is engaged with the lever 218 by a rivet 224. The wheel 220, ratchet gear 230, rivet 234, the upper arm of the torsion spring 232, lever 218, the upper arm of the torsion spring 222, and rivet 224 are all pivotable or rotatable about a common axis R-R.

[0025] It can be seen by comparing Fig. 6E with Fig. 23E that a major difference between the control assembly 116 of the mechanism 100 and the control assembly 216 of the mechanism 200 is that the lower arm of the torsion spring 222 is shorter than that of the torsion spring 122. In the mechanism 100, the lower arm of the torsion spring 122 is engaged with the plate 114 close to the base 102. However, in the case of the mechanism 200, and as can be seen in Figs. 19A and 20, the lower arm of the torsion spring 222 is engaged with a plate 214 further away from the base 202.

[0026] When the mechanism 200 is in the ring-open configuration and the lever 218 is in its lower position, as shown in Figs. 24A to 28, if the downward force acting on the lever 218 is released, the lever 218 will return to its stable upper position under the upward biasing force of an upper arm of the torsion spring 222, while not changing the configuration of the ring pairs, as shown in Figs. 29A to 33.

[0027] The lever 218 may then be pivoted downward once again to close the ring pairs. When the downward force acting on the lever 218 is released, the lever 218 will return to its stable upper position under the upward biasing force of the upper arm of the torsion spring 222, while not changing the configuration of the ring pairs. The mechanism 200 will then resume its configuration as shown in Figs. 18A to 22.

[0028] A lever-arch type file mechanism according to a third embodiment of the present invention is shown in Figs. 34A to 38, and generally designated as 300. Figs. 34A to 38 show the mechanism 300 in its ring-closed configuration. Similar to the mechanisms 100, 200 discussed above, the mechanism 300 includes a base 302, which may be made of a metal sheet. Two posts 304 are fixedly secured to the base 302, and two arches 306 are engaged with the base 302 for relative pivotal movement. The arches 306 are joined with each other *via* a cranked portion 310 which is fixed and integrally formed with the arches 306 for simultaneous movement. By way of such an arrangement, the cranked portion 310 may be caused to pivot to bring about simultaneous pivotal movement of the arches 306 between a first position in which free ends of the arches 306 mate with free ends of the posts 304 (as shown in Figs. 34A to 38) to form two rings extending upwardly from the base 302 ("ring-closed configuration") for retaining pieces of hole-punched paper, and a second position in which free ends of the arches 306 are out of engagement with free ends of the posts 304, thus opening the two rings ("ring-open configuration") to allow pieces of hole-punched paper to be retrieved from or inserted into the posts 304 and/or the arches 306.

[0029] Beneath the cranked portion 310 is a leaf spring 312 which acts upwardly on the cranked portion 310 from below. By way of such an arrangement, the leaf spring 312 biases the arches 306, *via* the cranked portion 310, away from the posts 304, i.e. to the ring-open configuration. A metal plate 314 extends generally upwardly from the base 302. The plate 314 is formed integrally with the base 302, and may, for example, be punched out from the same piece of metal sheet with which the base 302 is made.

[0030] The lever-arch type file mechanism 300 includes a control assembly, generally designated as 316, as shown in Figs. 39A to 40. The control assembly 316 includes a lever 318 linked with a wheel 320 *via* a claw and ratchet gear arrangement. The wheel 320 includes a cover plate 341 and a cam 342 fixedly engaged with each other, e.g. by being formed integrally with each other of a single plastic piece. For clarity purposes, the cover

plate 341 is shown in dotted lines only in Figs. 34B, 35A, and 39A, and are not shown in Figs. 34C-34E, 35B, 36, 38 and 39B-39F.

[0031] As shown in Figs. 39A to 40, in the control assembly 316, the wheel 320 (including the cover plate 341 and the cam 342) is fixedly engaged (e.g. by being formed integrally) with a ratchet gear 330. The lever 318 is engaged with the ratchet gear 330 *via* a rivet 334. A claw 352 is engaged, with a torsion spring 332, with the lever 318 *via* a rivet 354, so that the claw 352 is pivotable about the lever 318 about an axis S-S. When duly assembled, the torsion spring 332 biases the claw 352 towards the teeth 340 of the gear 330, as shown in Figs. 39C and 39E, in which the free end of the claw 352 is in engagement with a tooth 340 of the gear 330. A torsion spring 322 is engaged with the lever 318 *via* a rivet 324. By way of such arrangement, the wheel 320 (together with the cam 342 and the ratchet 330), the lever 318 and an upper arm 356 of the torsion spring 322 are rotatable or pivotable about a common axis M-M.

[0032] As shown in Figs. 35A, 37 and 38, the lower arm of the torsion spring 322 is fixedly engaged with the plate 314 of the mechanism 300, and the upper arm 356 of the torsion spring 322 is engaged with the lever 318. The torsion spring 322 thus biases the lever 318 towards the upper position as shown in Figs. 34A to 38.

[0033] The cam 342 has a peripheral undulating cam surface 344 with six protruding portions 346 and six recessed portions 348 alternately and equi-angularly disposed relative to one another. When the mechanism 300 is in the ring-closed configuration as shown in Figs. 34A to 38, one of the protruding portions 346 engages and acts on an upwardly protruding portion of the cranked portion 310, thus maintaining the arches 306 in a mating relationship with the posts 304.

[0034] When the lever 318 of the mechanism 300 pivots downwardly in the position indicated by the arrow C as shown in Fig. 35A, the claw 352 is brought downwardly about the axis M-M. Because of the engagement between the claw 352 and a tooth 340 of the ratchet gear 330, downward movement of the claw 352 will cause the ratchet 330 (and thus the cam 342 and the cover plate 341) to rotate about the axis M-M in the same direction as the lever 318. Each downward pivoting movement of the lever 318 causes the cam 342 to rotate through 30°.

[0035] When the wheel 320 is thus rotated, and the lever 318 is in a lower position, as shown in Figs. 41A to 45, one of the recessed portions 348 faces the upwardly protruding portion of the cranked portion 310 (as shown in Fig. 41B and 45, in which the cover plate 341 is removed for clarity purposes). The leaf spring 312 may thus pivot upwardly to pivot the cranked portion 310, thus pivoting the arches 306 away from the posts 304, thereby opening the rings.

[0036] When the downward force acting on the lever 318 is released, because of the upward biasing force exerted by the upper arm 356 of the torsion spring 322, the lever 318 will return to the upper position, without thereby changing the configuration of the mechanism 300, until the claw 352 engages with a neighbouring tooth 340 of the gear 330, as shown in Figs. 46 to 48.

[0037] Fig. 49 shows the lever 318 during its movement from its lower position (LP), through an intermediate position (IP), to its upper position (UP). When the lever 318 is in its lower position (LP), the claw 352 engages a tooth 340 of the gear 330. During its upward return movement, the claw 352 slides along an outer side of a neighbouring tooth 340 of the gear 330, through its intermediate position (IP), until the lever 318 reaches its upper position (UP), in which the claw 352 engages the neighbouring tooth 340 of the gear 330. During such a movement, the wheel 320 (and thus the gear 330) does not exhibit any rotational movement relative to the base 302, and thus there is no change in the configuration of the ring pairs.

[0038] When the mechanism 300 is in the configuration as shown in Figs. 46 to 48, the lever 318 may again be pivoted downwardly to rotate the cam 342 to act on the cranked portion 310 to pivot the arches 306 back to a mating relationship with the posts 304 to close the rings. The lever 318 may then be released to allow it to return to its upper position without changing the configuration of the rings.

[0039] In the mechanism 300, a torsion spring 332 is disposed between the claw 352 and the lever 318 to provide the necessary pre-load. As an alternative, and as shown in Figs. 50A to 50C, the lever 318 may instead be linked with the claw 352 *via* an extension spring 358, which also serves the purpose of biasing the claw 352 towards the gear 330.

[0040] A lever-arch type file mechanism according to a fourth embodiment of the present invention is shown in Figs. 51A to 53, generally designated as 400, in a ring-open configuration with a lever 418 in an upper position.

[0041] The structure of the mechanism 400 is similar to the mechanisms 100, 200, 300 discussed above, with the main difference residing in the construction of a control assembly 416 (see Figs. 62A to 62E) for operating the opening and closing of a pair of rings formed of two posts 404 and two arches 406.

[0042] As shown more clearly in Figs. 62A to 62E, the lever 418 is engaged with a ratchet gear 430 of a claw and ratchet gear arrangement *via* links 460, 462, such that the lever 418 is pivotable relative to the link 460, and the link 460 is pivotable relative to the link 462. The link 462 is also pivotally engaged with a claw 452, which is biased by an extension spring 458 towards teeth 440 of the gear 430. The link 462 is fixedly secured with the gear 430, which is in turn fixedly secured or integrally formed with a wheel 420 with a cam 442. The cam 442 has four protruding portions 446 and four recessed portions 448 alternately and equi-angularly disposed relative to one another.

[0043] When the mechanism 400 is in the ring-open configuration as shown in Figs. 51A to 53, an upwardly protruding portion of a cranked portion 410 is received

within one of the recessed portions 448 of the cam 442. By reason of the upward biasing force of a leaf spring 412, the arches 406 joined by the cranked portion 410 are pivoted away from the posts 404 (which are fixed to a base 402), thus maintaining the mechanism 400 in its ring-open configuration.

[0044] When the lever 418 is pivoted downwardly (as indicated by the arrow D in Fig. 54B) about an axis F-F (see Fig. 56) to the lower position as shown in Figs. 54A to 57, because of the engagement between the claw 452 and the gear 430, the gear 430 and the cam 442 are caused to rotate in the direction of the arrow E in Fig. 54B, which is opposite to the pivoting direction of the lever 418. This brings one of the protruding portions 446 of the cam 442 into engagement with the upwardly protruding portion of the cranked portion 410, thus pivoting the arches 406 towards the posts 404 until they are in a mating engagement with each other, to thereby close the ring pairs.

[0045] The lever 418 is also engaged with a torsion spring 422 which biases the lever 418 towards the upper position. Thus, when the force acting on the lever 418 by a user is released, the lever 418 will return, under the biasing force of the torsion spring 422, back to the upper normal stable position, as shown in Figs. 58A to 61, without changing the configuration of the ring pairs. Because of the biasing force of extension spring 458, the claw 452 will slide along an outer curved surface of the gear 430 until it engages with a neighbouring tooth 440, as shown in Figs. 58B and 60.

[0046] As shown clearly in Figs. 63A to 63C, when the lever 418 is pivoted downwardly from its upper position (as shown in Fig. 63A), through an intermediate position (as shown in Fig. 63B) to its lower position (as shown in Fig. 63C), the gear 430, and thus the cam 442, is caused to rotate through 45°. When the lever 418 is then released, it will return to its upper position (as shown in Figs. 64A to 64C), and the claw 452 will move from the tooth 440 with which it is then currently engaged, to a neighbouring tooth 440 for engagement.

[0047] It can be seen that the lever 418 is pivotable about the fixed axis F-F, and the link 462, the gear 430, the cam 442 and the wheel 420 are pivotable about a fixed axis G-G (see Fig. 53) above and parallel to the axis F-F. The claw 452 is pivotable about an axis H-H (see Fig. 62E) which is also parallel to the axis F-F, but is movable upon movement of the lever 418.

[0048] When the mechanism 400 is in the ring-closed configuration as shown in Figs. 58A to 61, one may pivot the lever 418 from its normal upper stable position downwardly (in the direction indicated by the arrow D in Fig. 54B) to move a next recessed portion 448 of the cam 442 to face the upwardly protruding portion of the cranked portion 410, thus allowing the arches 406 to pivot away from the posts 404, to thereby open the ring pairs. When the downward force acting on the lever 418 is released, the lever 418 will return, under the upward biasing force of the spring 422, to its upper stable normal position, without changing the configuration of the mechanism 400.

[0049] Each of the mechanisms 100, 200, 300 and 400 discussed above may be fixedly secured, e.g. by rivets or the like, with a substrate, e.g. a cover, which may be made of cardboard, plastics or the like, to form a lever-arch type file.

[0050] 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.

[0051] It should also be understood that certain features 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.

Claims

1. A lever-arch type file mechanism (100, 200, 300, 400) including:

   a base (102, 202, 302, 400);
   at least two rings secured to and extending upwardly from said base for engaging holes in at least a piece of paper, each said ring including a post member (104, 204, 304, 404) fixed to said base and an arch member (106, 206, 306, 406) movable relative to said post member between a ring-closed configuration in which said rings are closed and a ring-open configuration in which said rings are open; and
   control means (116, 216, 316, 416) operable to move said rings between said ring-closed configuration and said ring-open configuration; and
   wherein said control means includes at least a lever member (118, 218, 318, 418);

   characterized in that said control means further includes a rotatable member (120, 220, 320, 420), wherein when said rings are in said ring-open configuration, said rotatable member is rotatable in a direction to move said rings to said ring-closed configuration, and that when said rings are in said ring-closed configuration, said rotatable member is rotatable in said direction to move said rings to said ring-open configuration.

2. A mechanism according to Claim 1 further **characterized in that** said rotatable member is engaged with a shaped portion (110, 310, 410) joining said arch members.

3. A mechanism according to Claim 2 further **characterized in that** said rotatable member includes a plurality of protruding portions (146, 246, 346, 446) each engageable with said shaped portion to pivot said arch members relative to said post members to move said rings to said ring-closed configuration.

4. A mechanism according to Claim 2 or 3 further **characterized in that** said rotatable member includes a plurality of recessed portions (148, 248, 348, 448) each engageable with said shaped portion to allow said arch members to pivot relative to said post members to move said rings to said ring-open configuration.

5. A mechanism according to Claim 4 further **characterized in that** said rotatable member includes a series of alternating recessed portions and protrusion portions.

6. A mechanism according to Claim 3, 4 or 5 further **characterized in that** said rotatable member includes from four to six protruding portions.

7. A mechanism according to any one of Claims 3 to 6 further **characterized in that** said rotatable member includes from four to six recessed portions.

8. A mechanism according to any one of Claims 3 to 7 further **characterized in that** said lever member and said rotatable member are pivotable about a same axis (P-P, R-R, M-M).

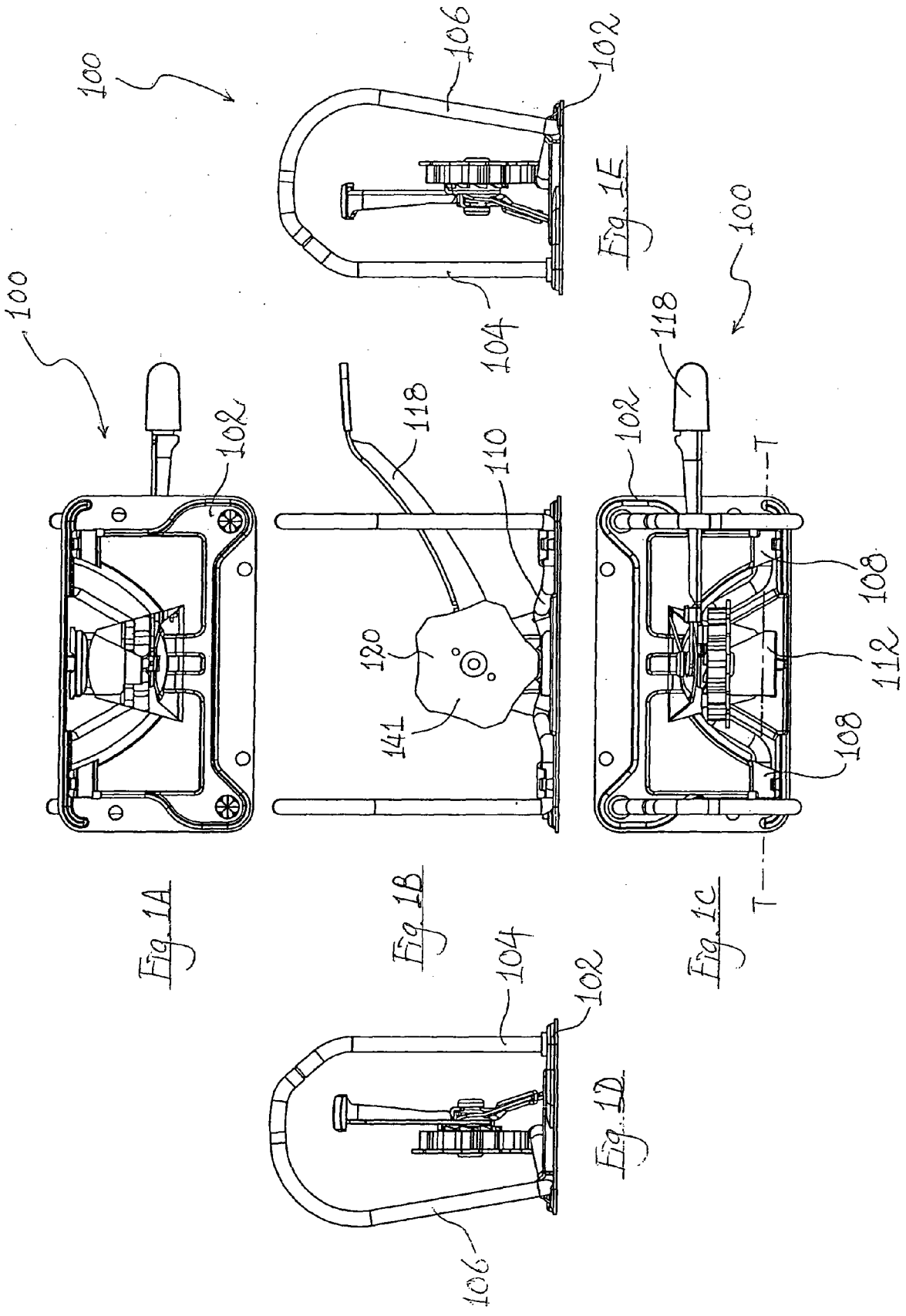
9. A mechanism according to any one of Claims 3 to 7 further **characterized in that** each of said lever member and said rotatable member is pivotable about a respective fixed axis (F-F, G-G).

10. A mechanism according to any of the preceding claims further **characterized in that** said lever member and said rotatable member are operatively associated with each other *via* a claw and ratchet gear arrangement.

11. A mechanism according to Claim 10 further **characterized in that** a claw member of said claw and ratchet gear arrangement is pivotably connected with said lever member.

12. A mechanism according to Claim 9, 10 or 11 further **characterized in that** a ratchet gear (130, 230, 330, 430) of said claw and ratchet gear arrangement is fixedly engaged with said rotatable member for simultaneous movement.

13. A lever-arch type file including a lever-arch type file mechanism (100, 200, 300, 400) according to any of the preceding claims fixedly secured to a substrate.


100
102
Fig. 1A
100
118
110
120
141
Fig. 1B
100
118
102
T
108
112
108
T
Fig. 1C
106
102
104
Fig. 1D
106
102
104
Fig. 1E

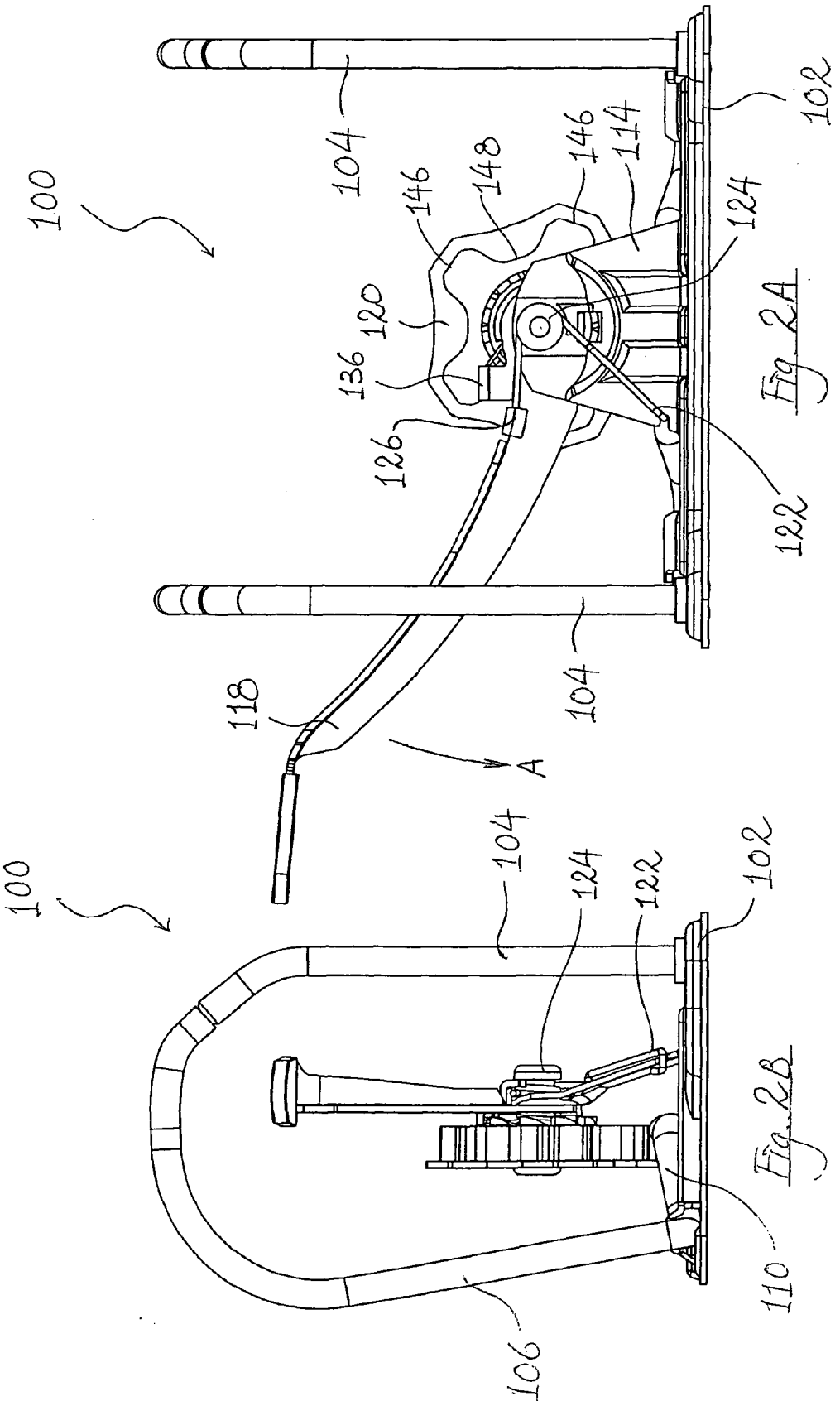

100
104
102
146
114
148
146
124
120
136
126
122
118
A
104
100
104
124
122
102
110
106

Fig. 2A

Fig. 2B

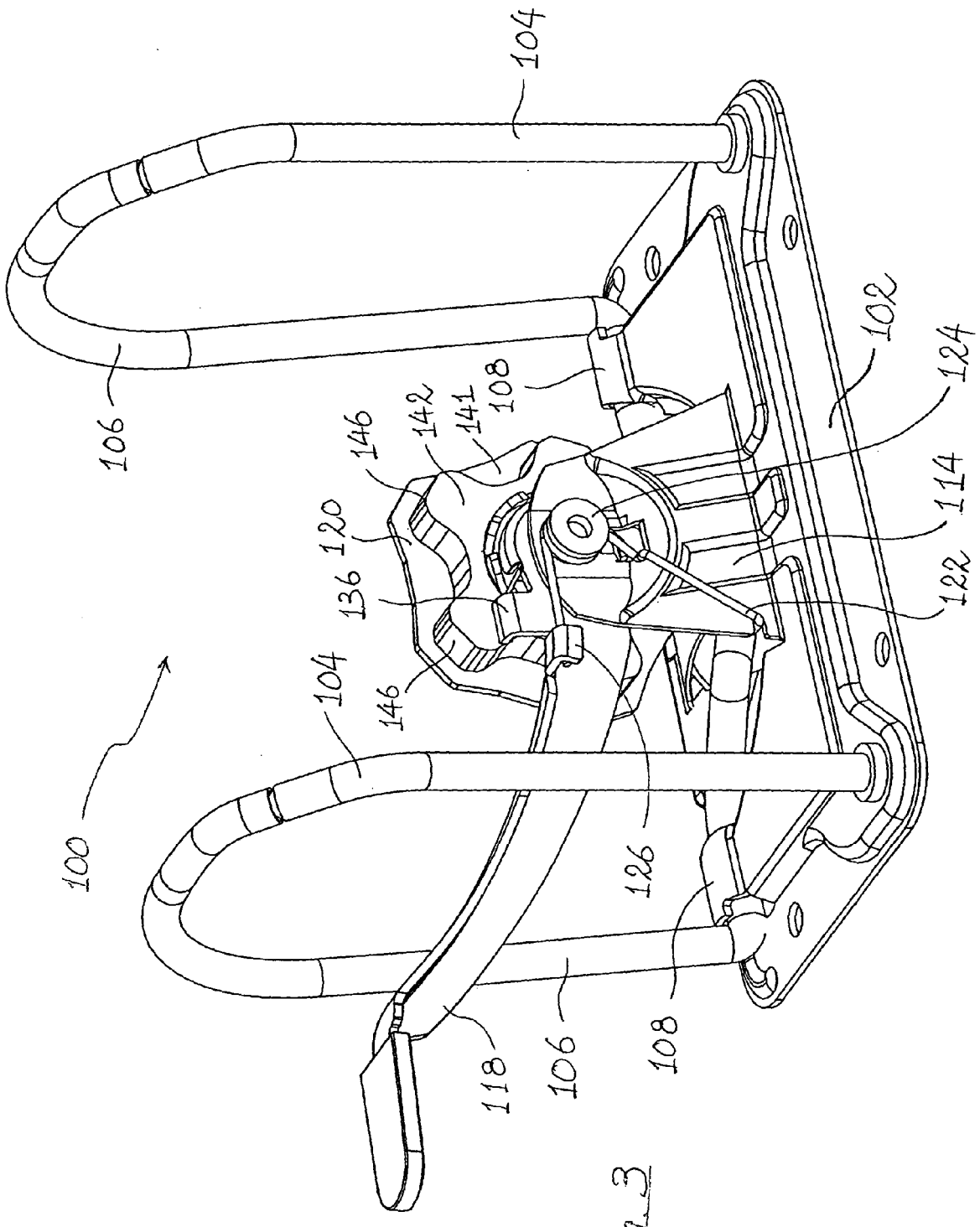

104
106
108
141
142
146
120
136
102
124
114
122
104
146
100
126
118
106
108

Fig 3

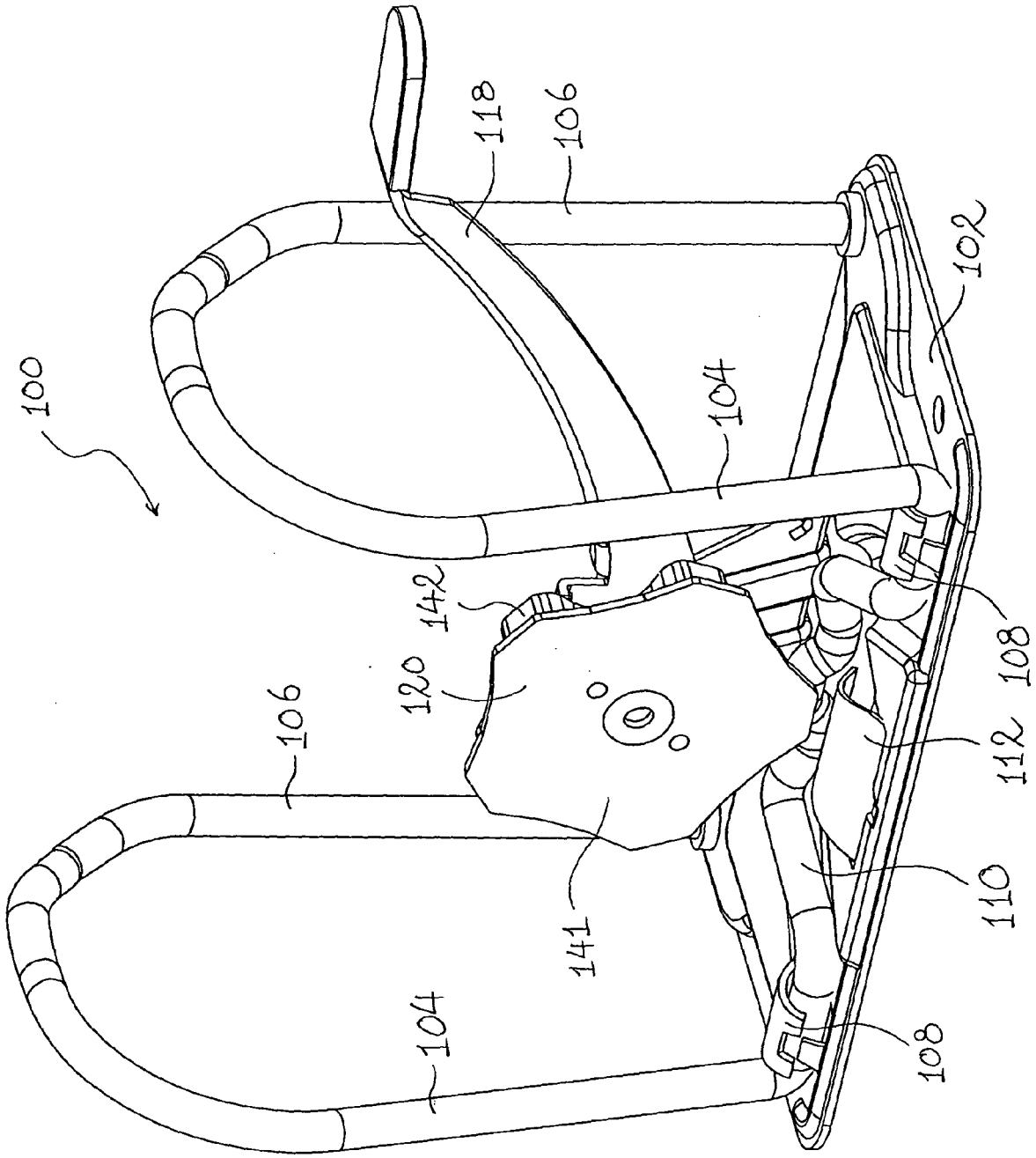


Fig. 4

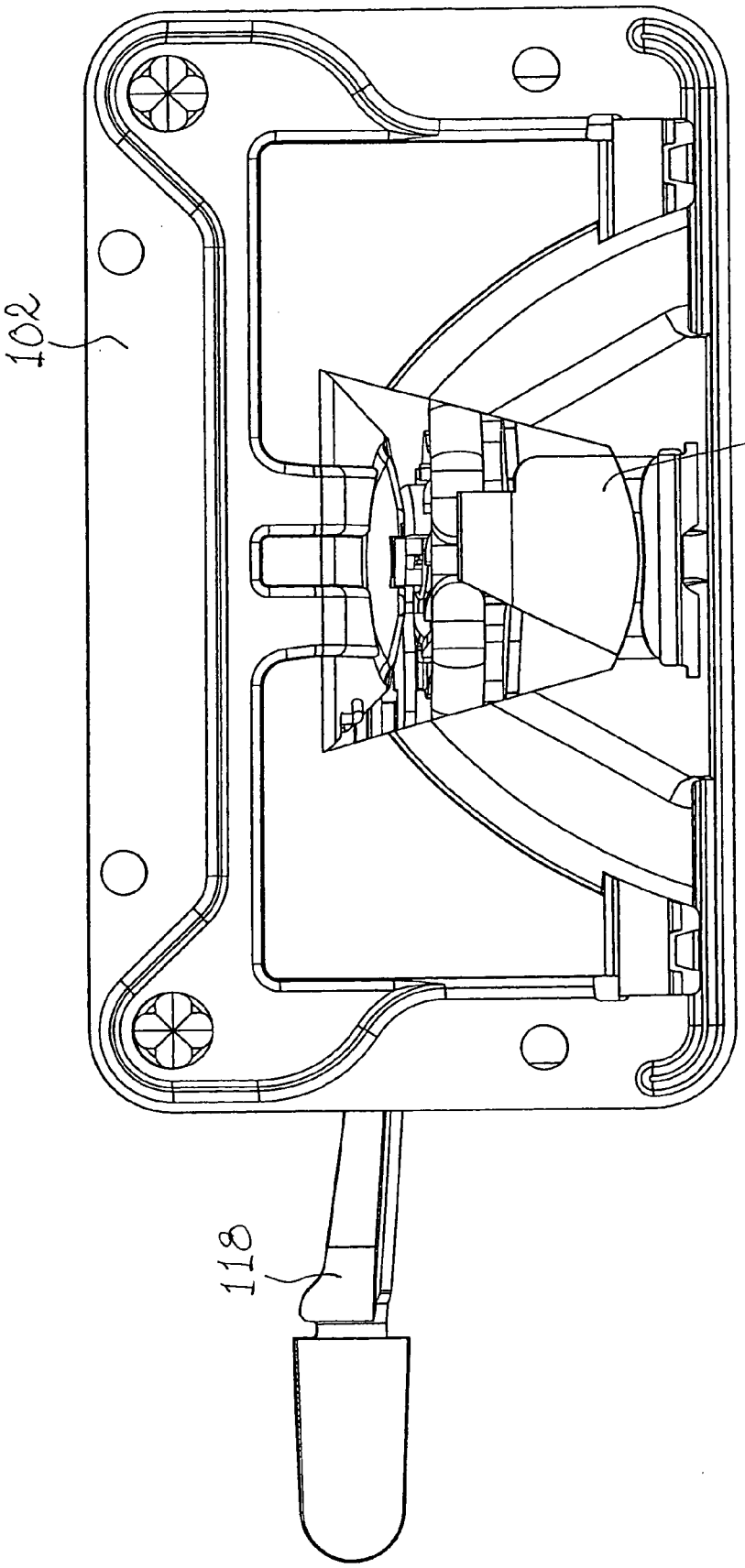
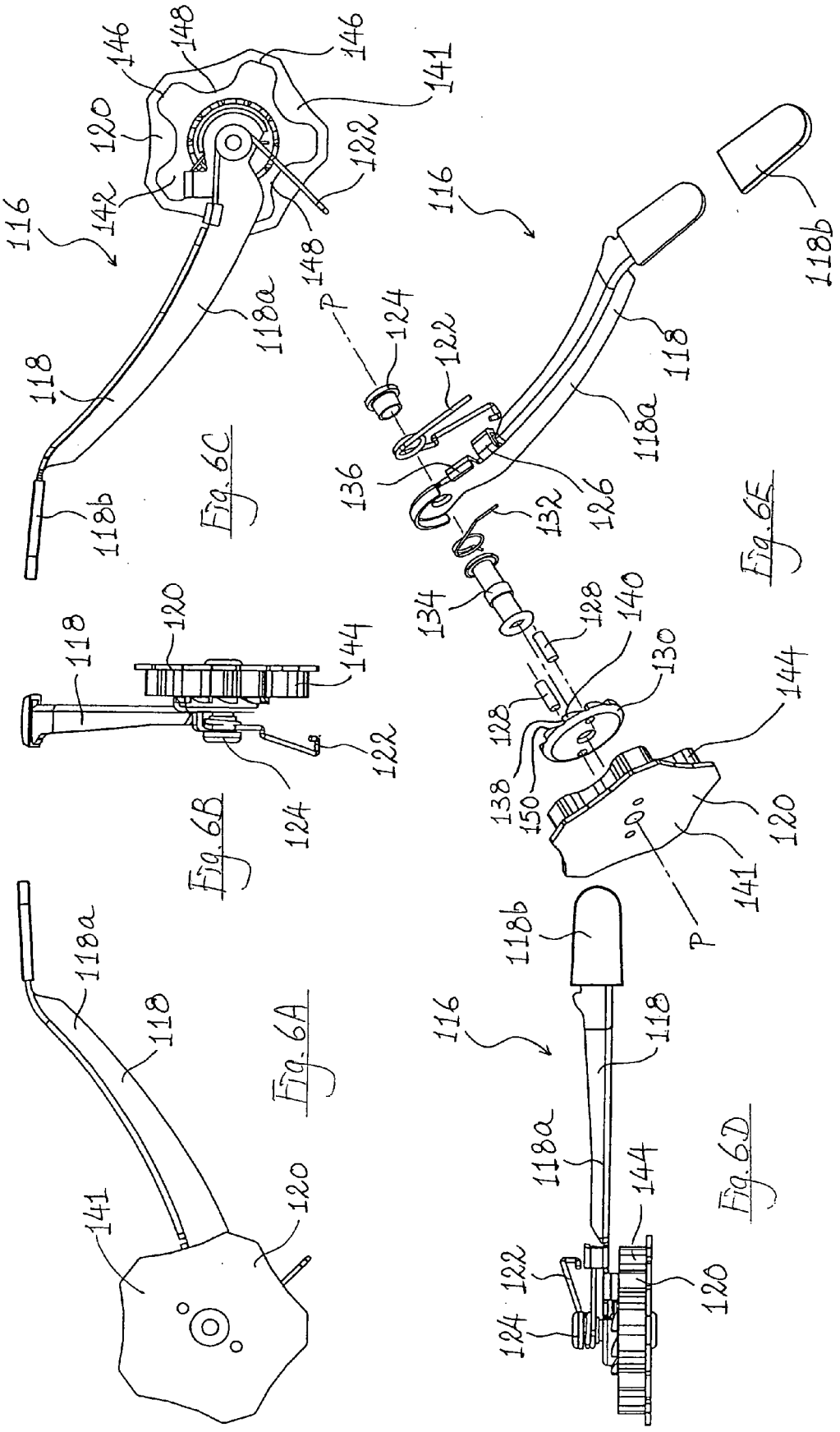


Fig. 5


116
118
118a
118b
120
122
124
126
128
130
132
134
136
138
140
141
142
144
146
148
150
P
Fig. 6A
Fig. 6B
Fig. 6C
Fig. 6D
Fig. 6E

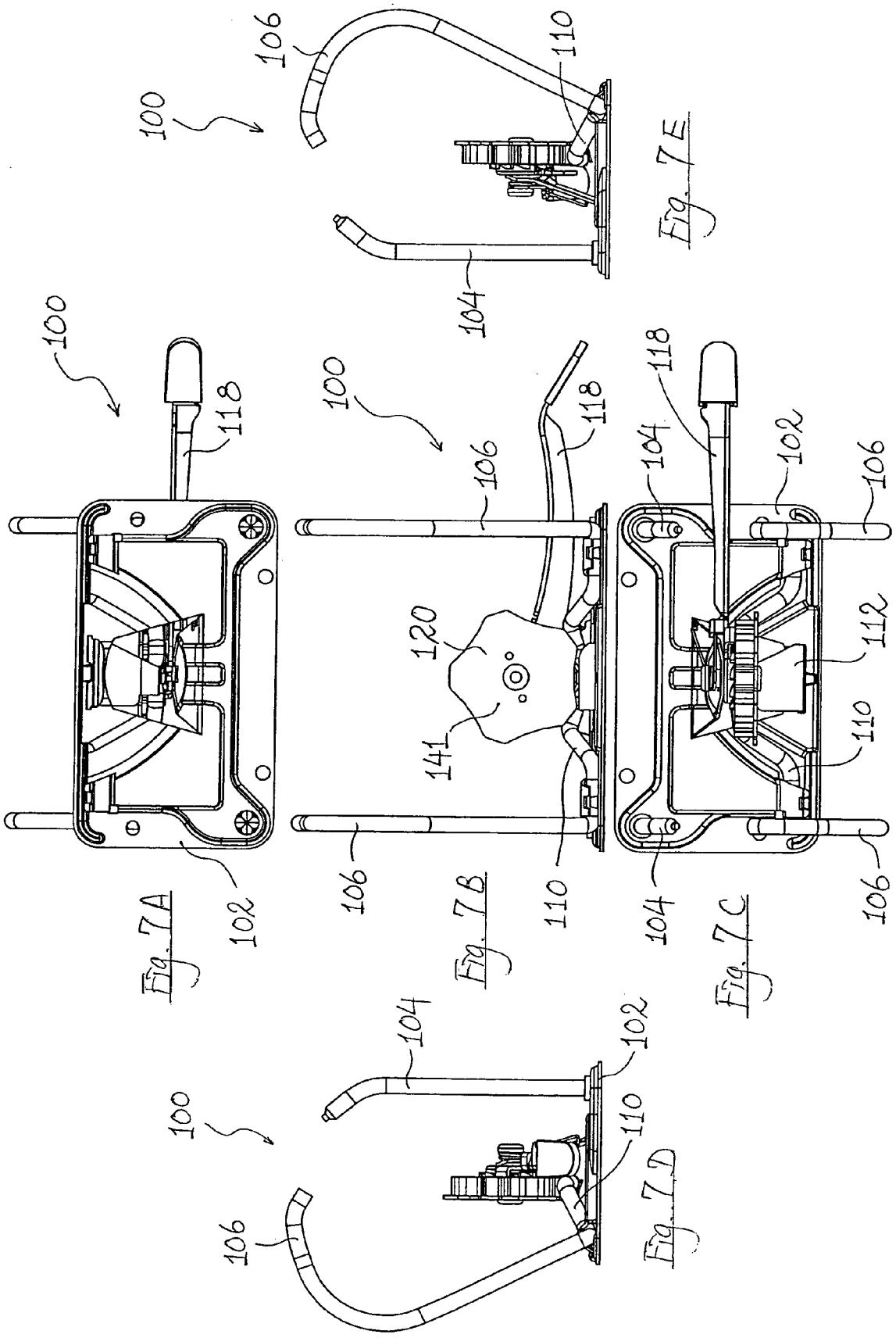


Fig. 7A

Fig. 7B

Fig. 7C

Fig. 7D

Fig. 7E

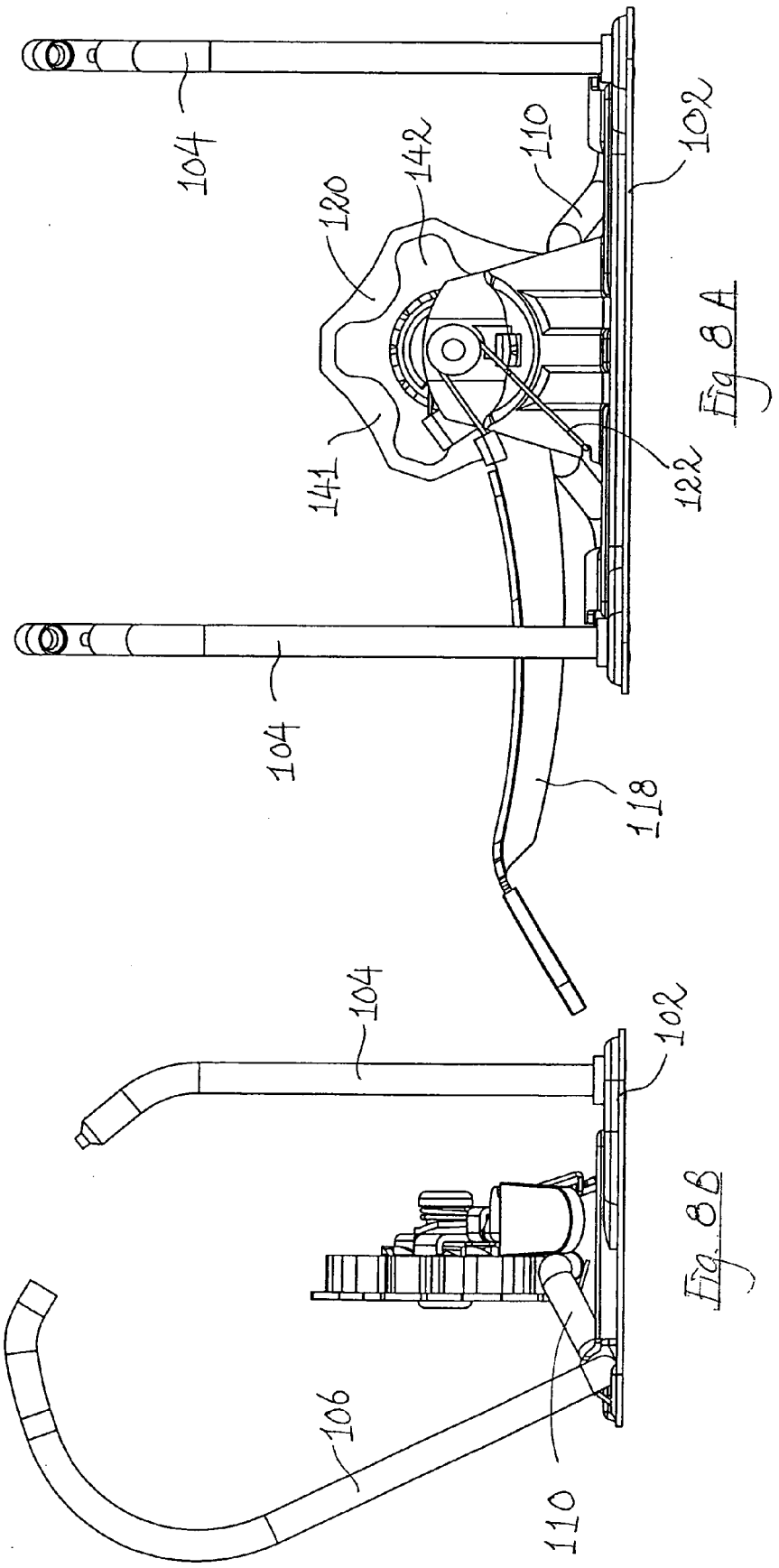


Fig. 8A

Fig. 8B

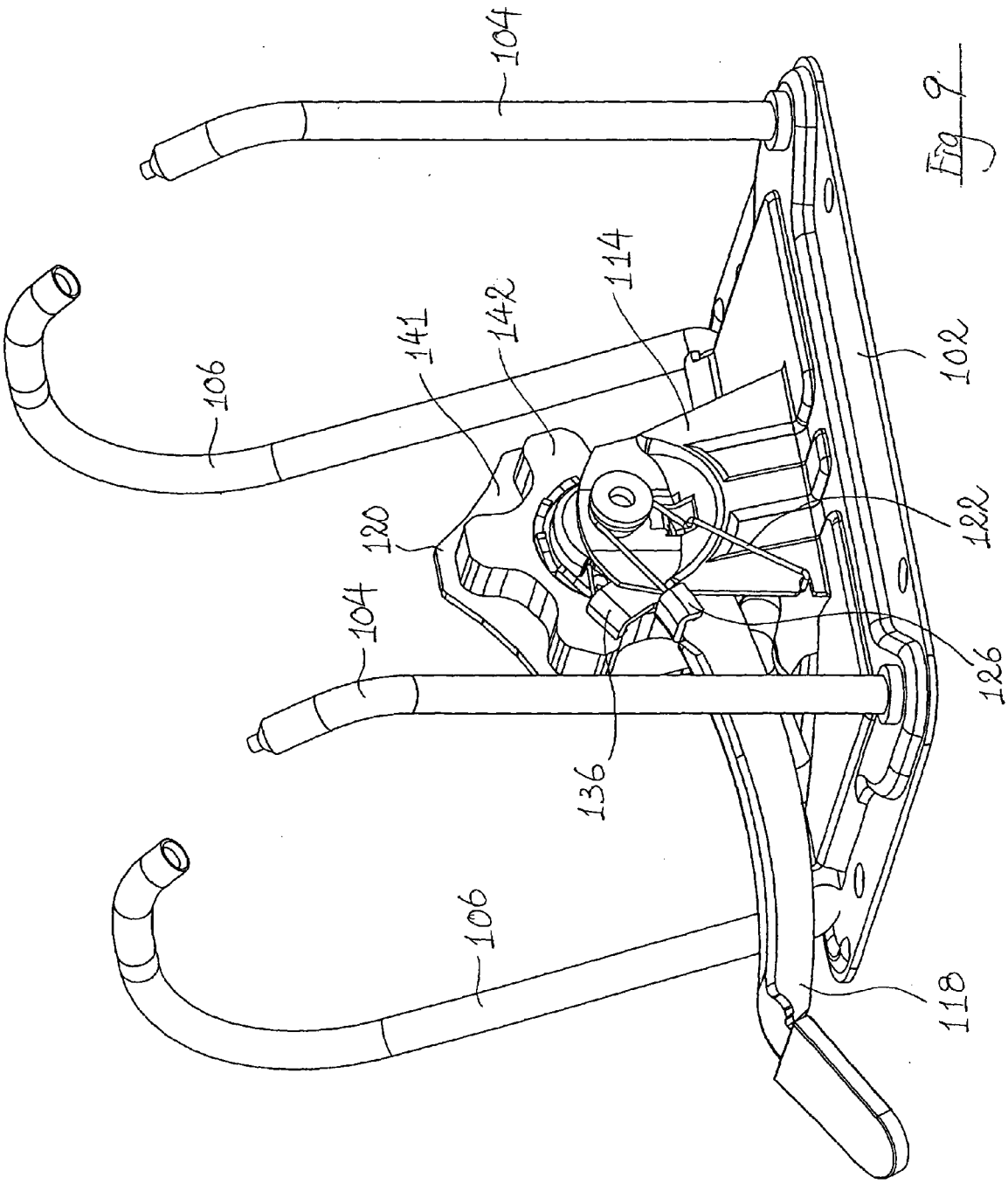


Fig 9

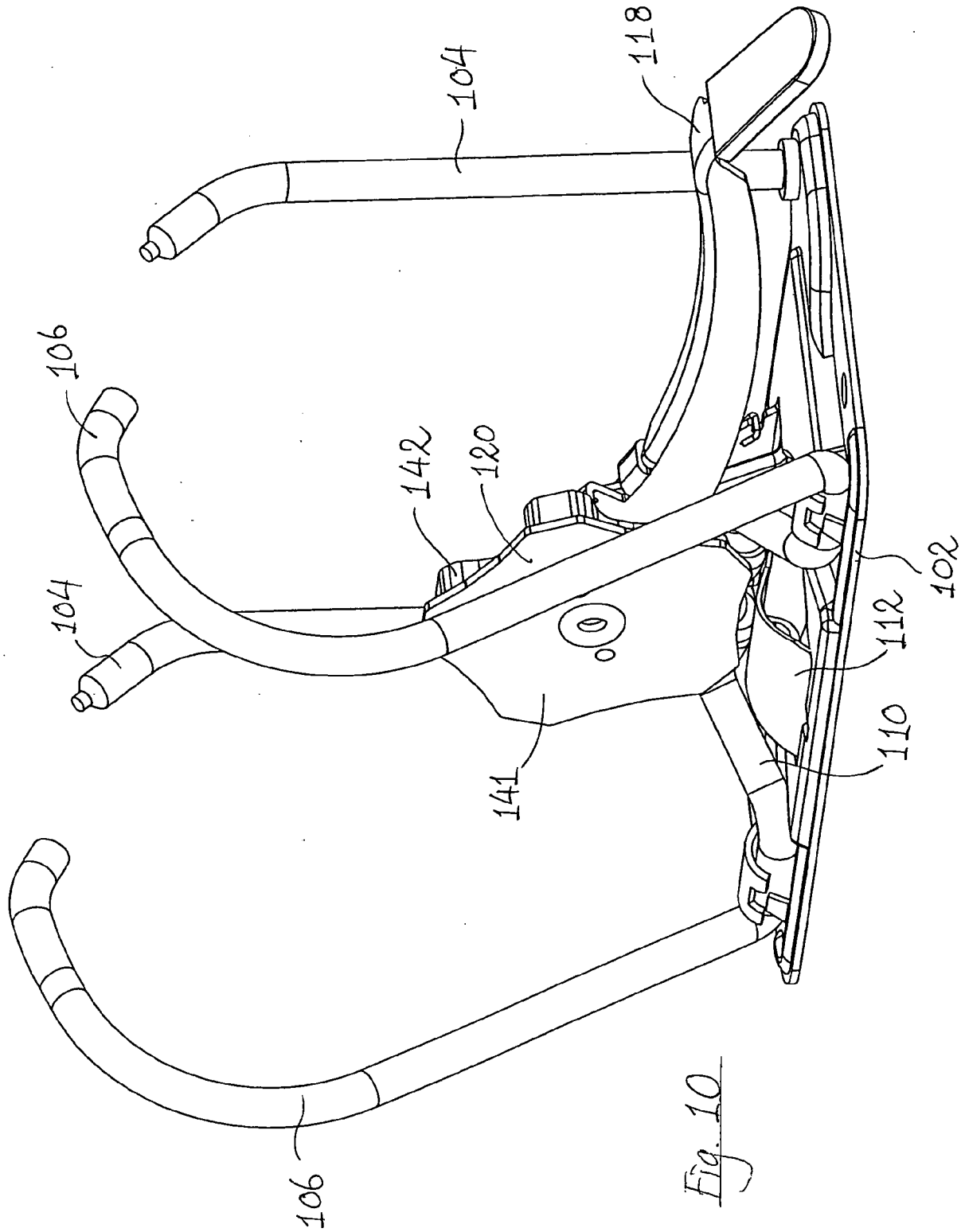


Fig. 10

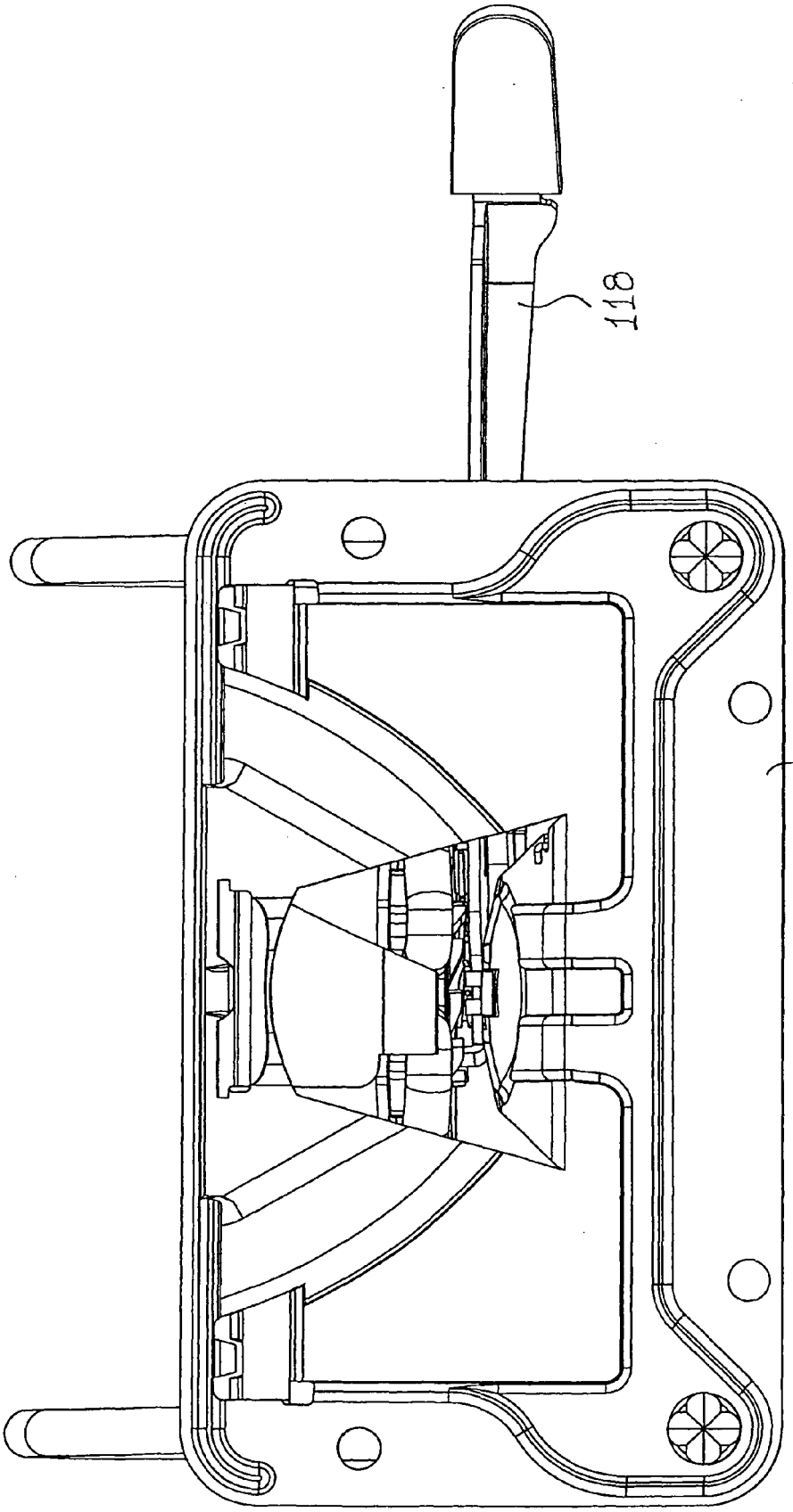


Fig. 11

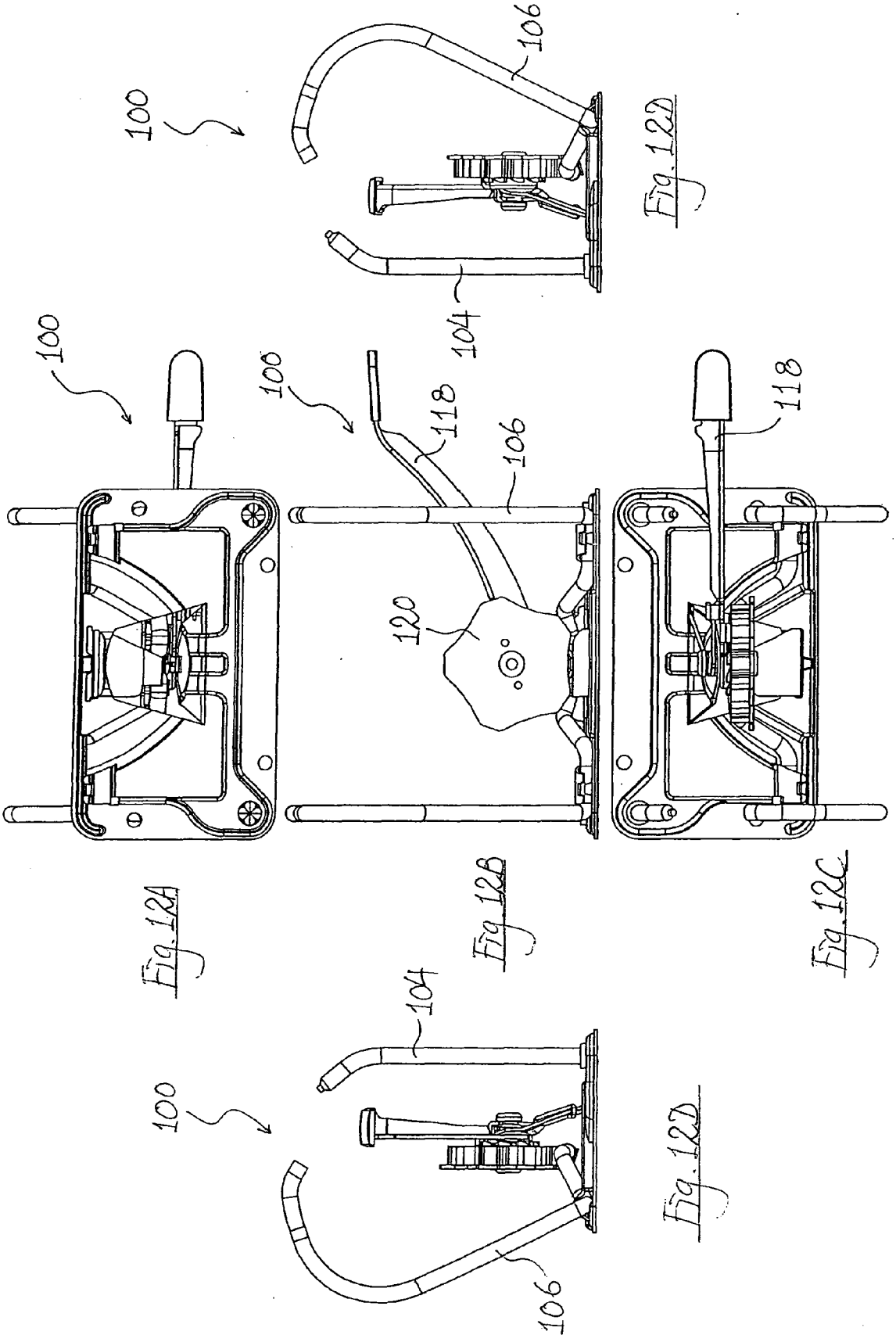


Fig. 12A

Fig. 12B

Fig. 12C

Fig. 12D

Fig. 12E

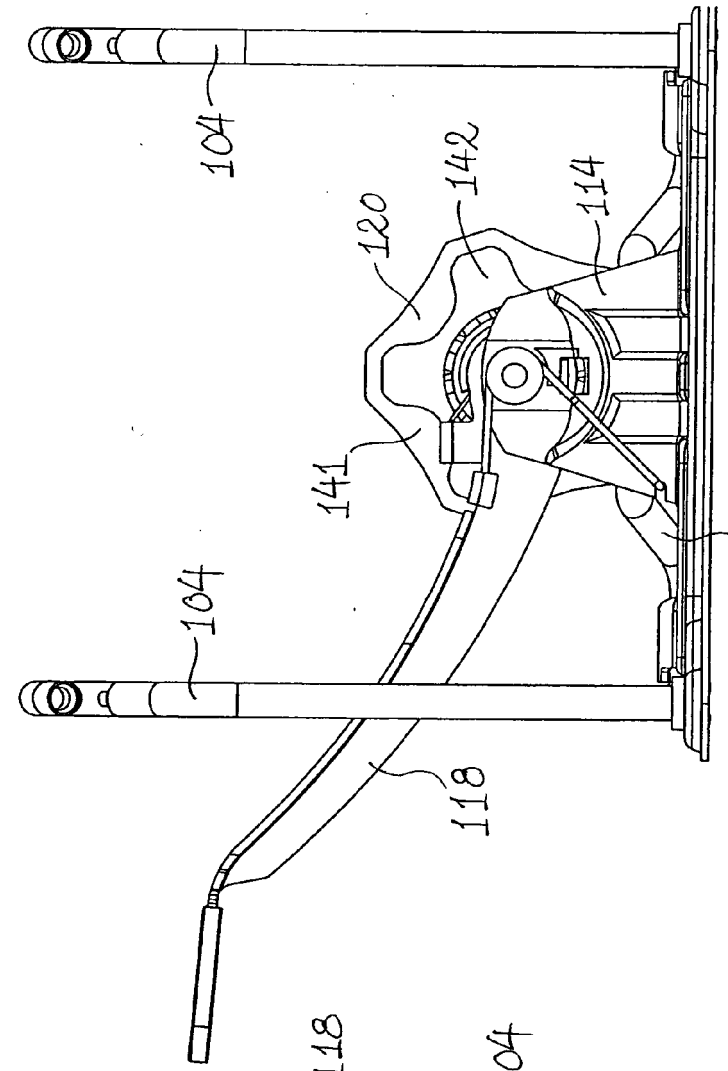


Fig. 13A

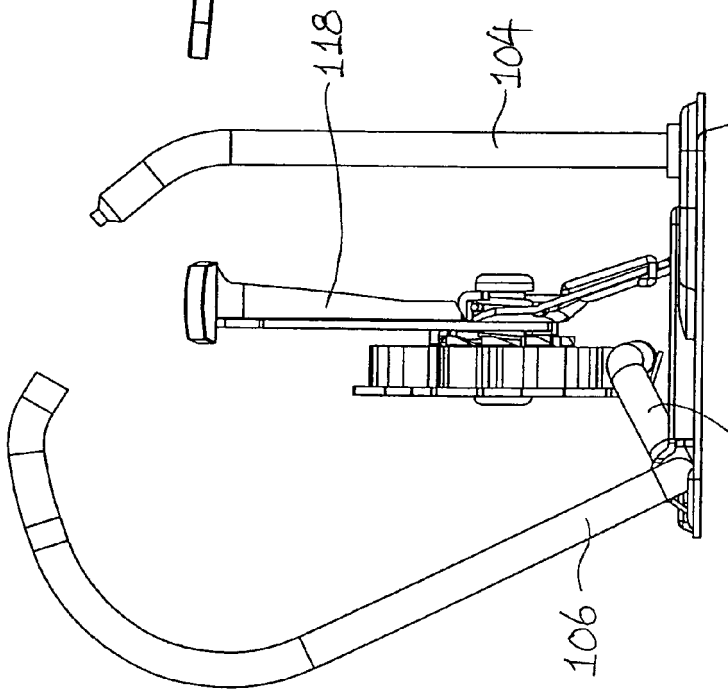
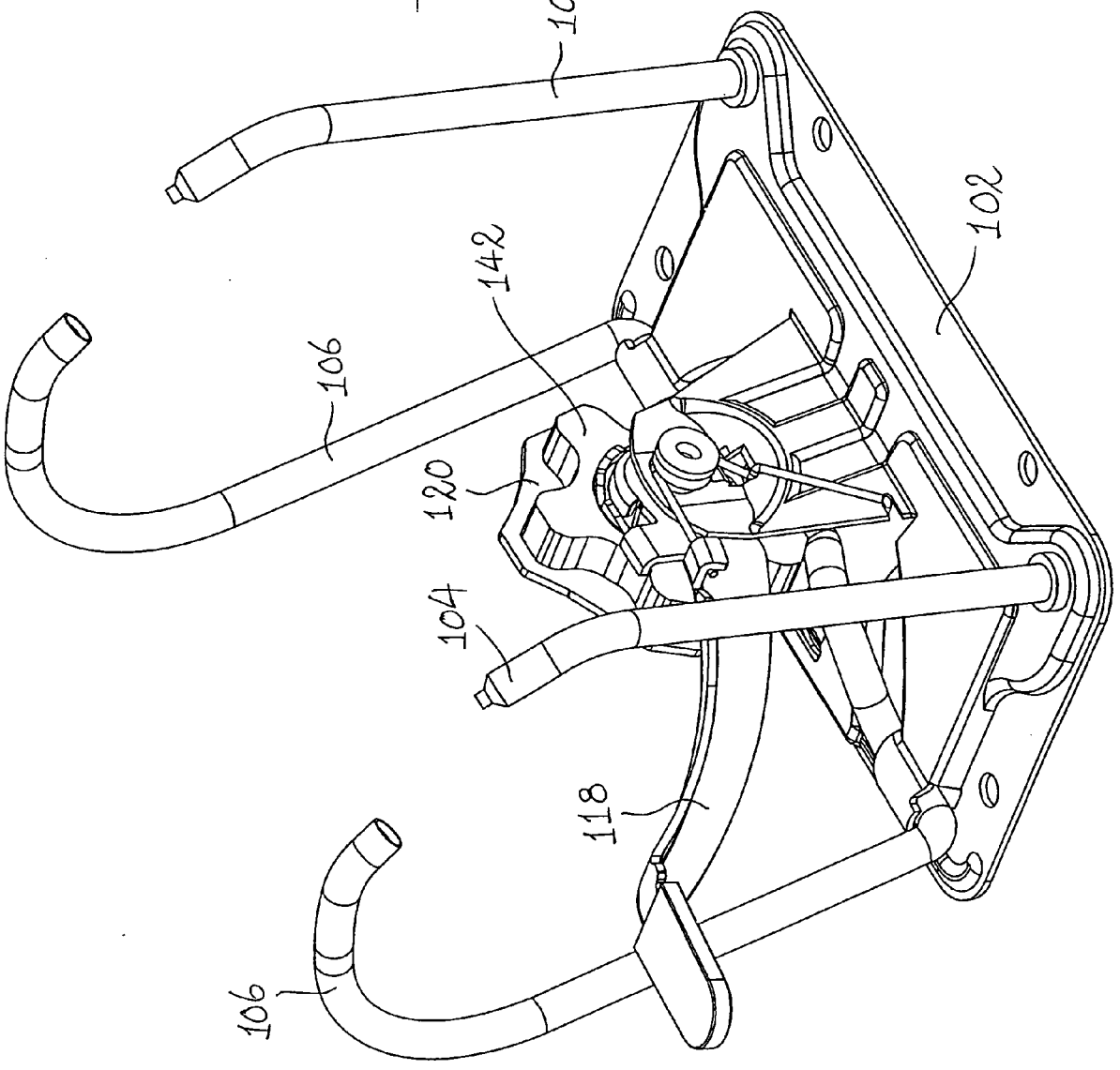


Fig. 13B

Fig.14



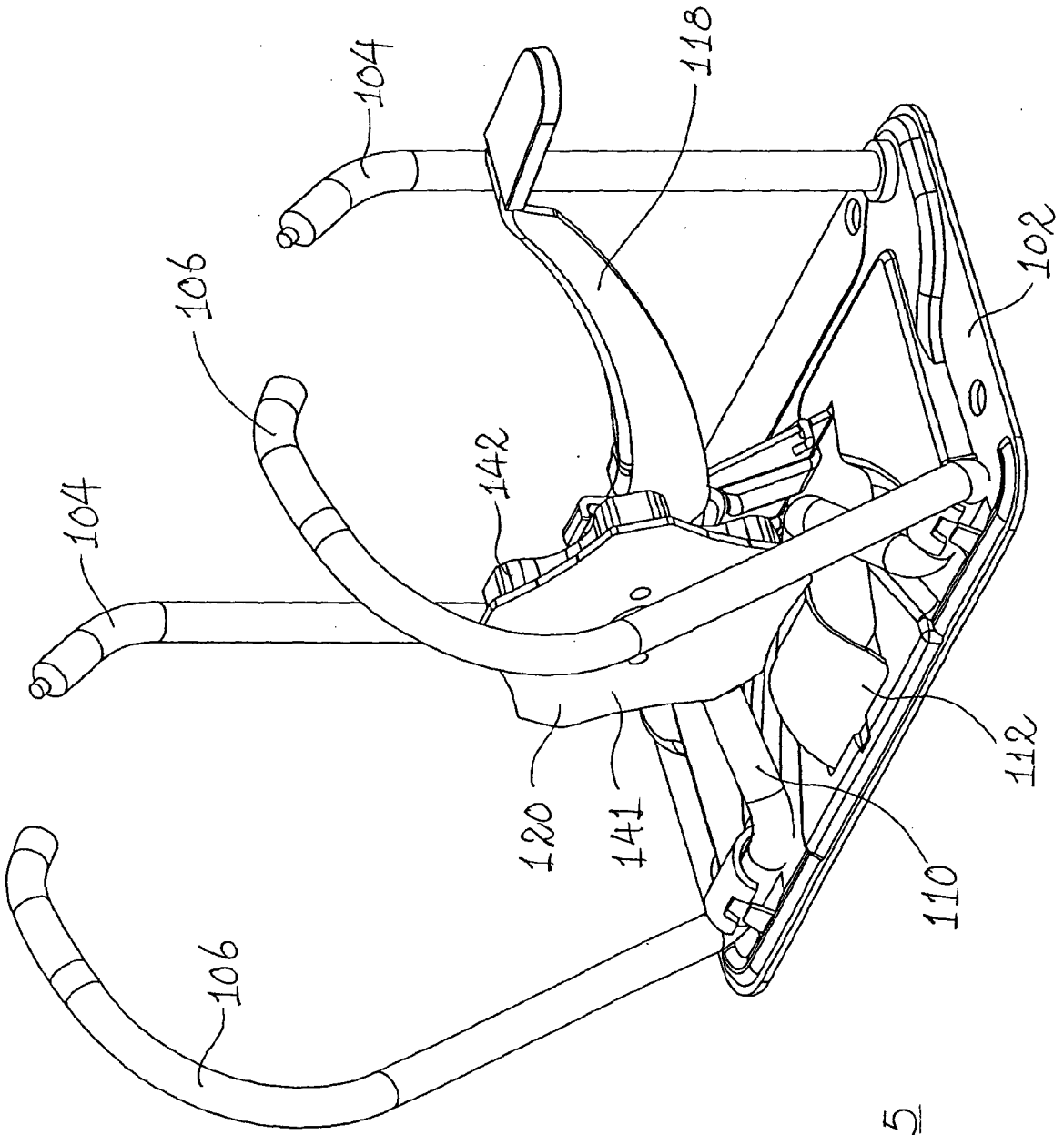


Fig.15

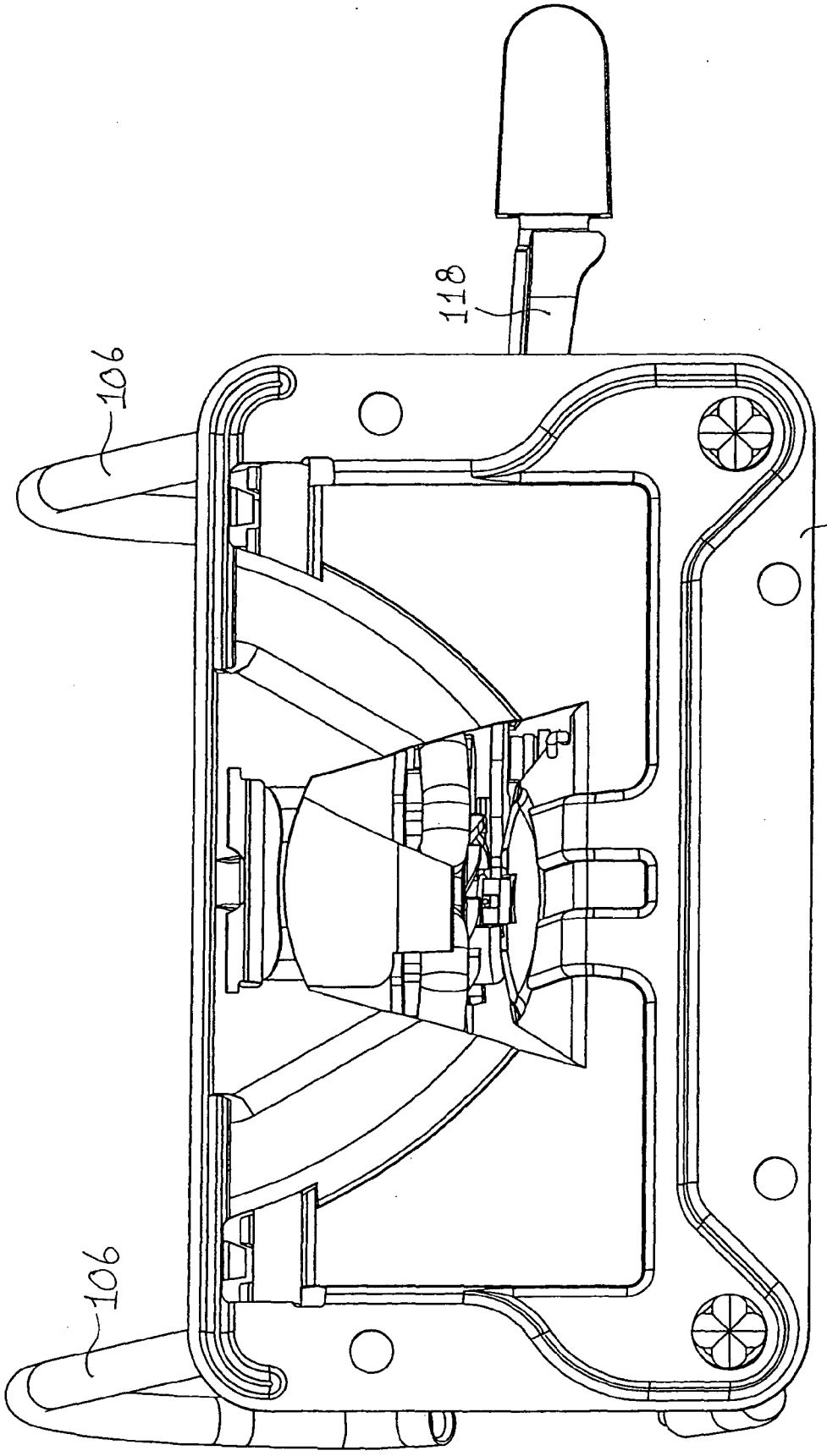


Fig.16

Fig.17A

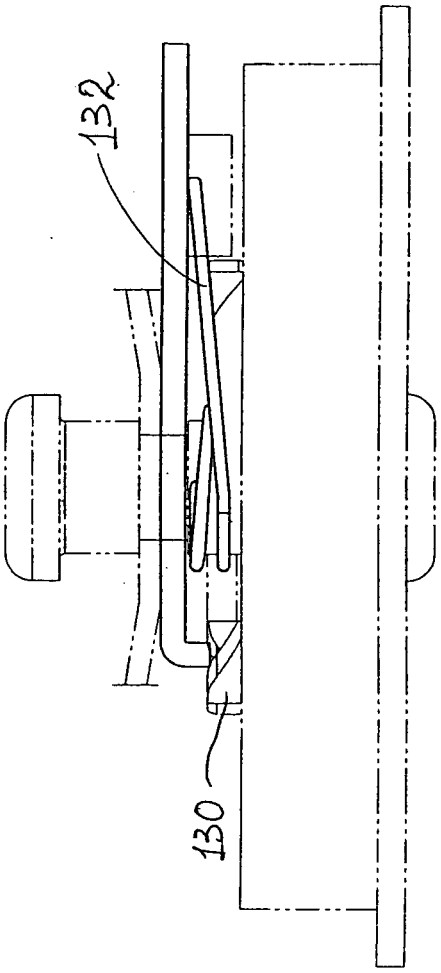
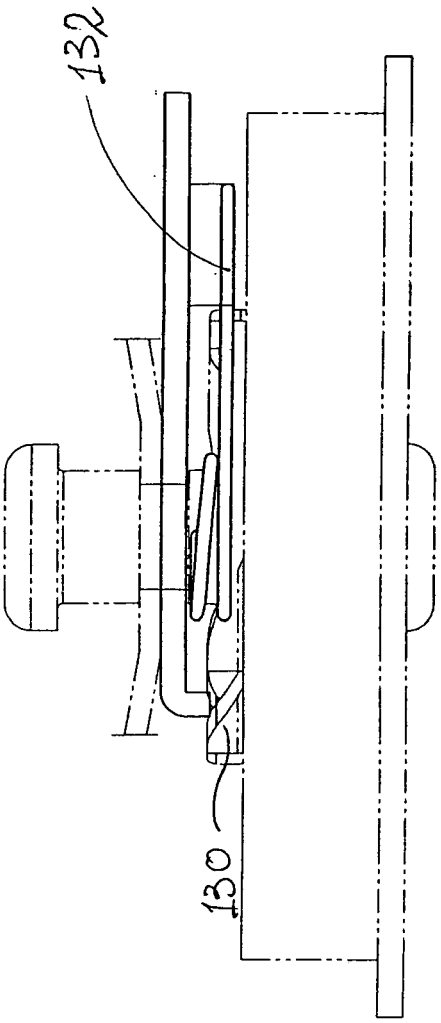
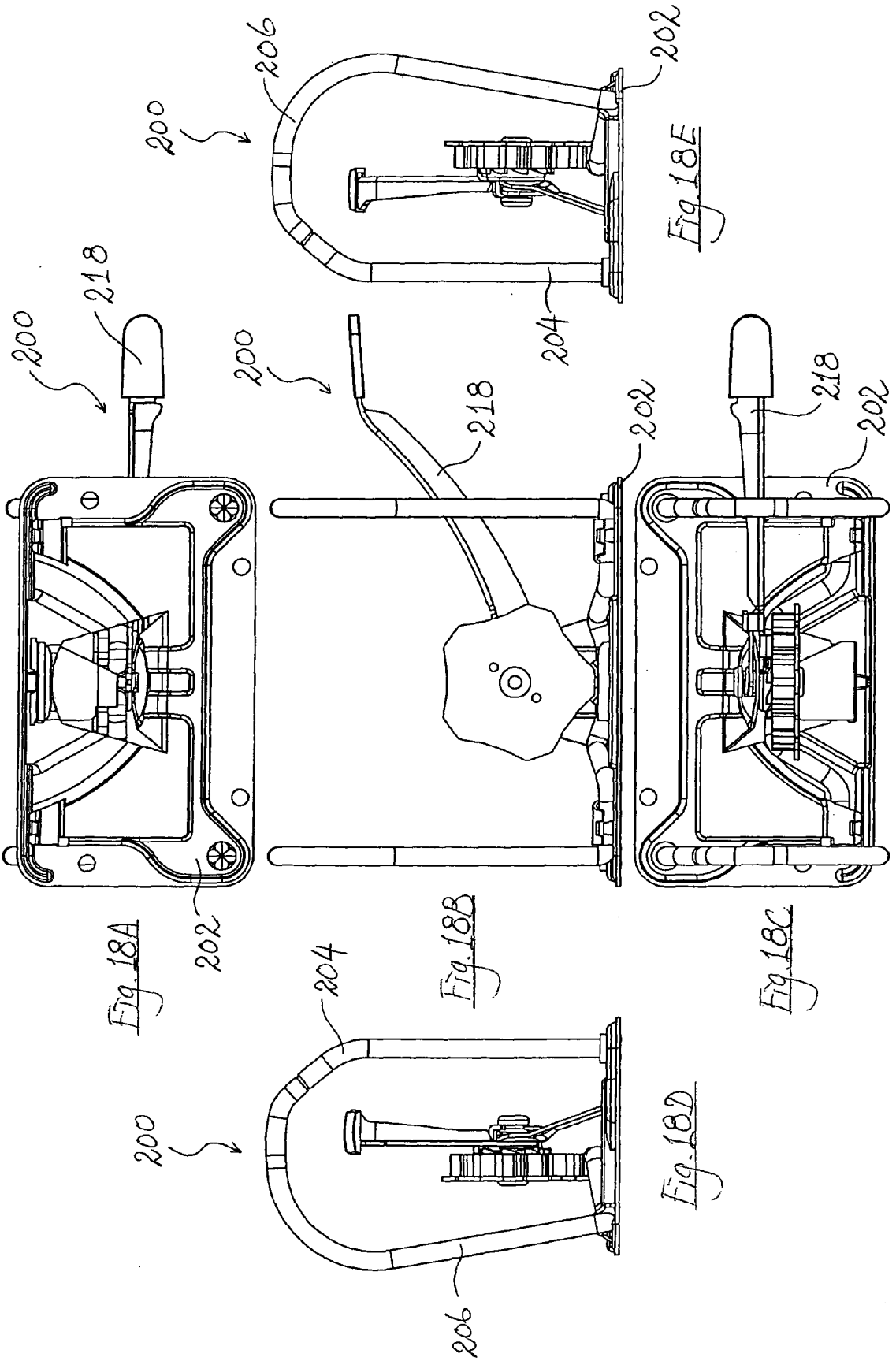


Fig.17B




200
218
202
Fig.18A
200
218
202
Fig.18B
200
218
202
Fig.18C
200
206
202
204
Fig.18E
200
204
206
Fig.18D

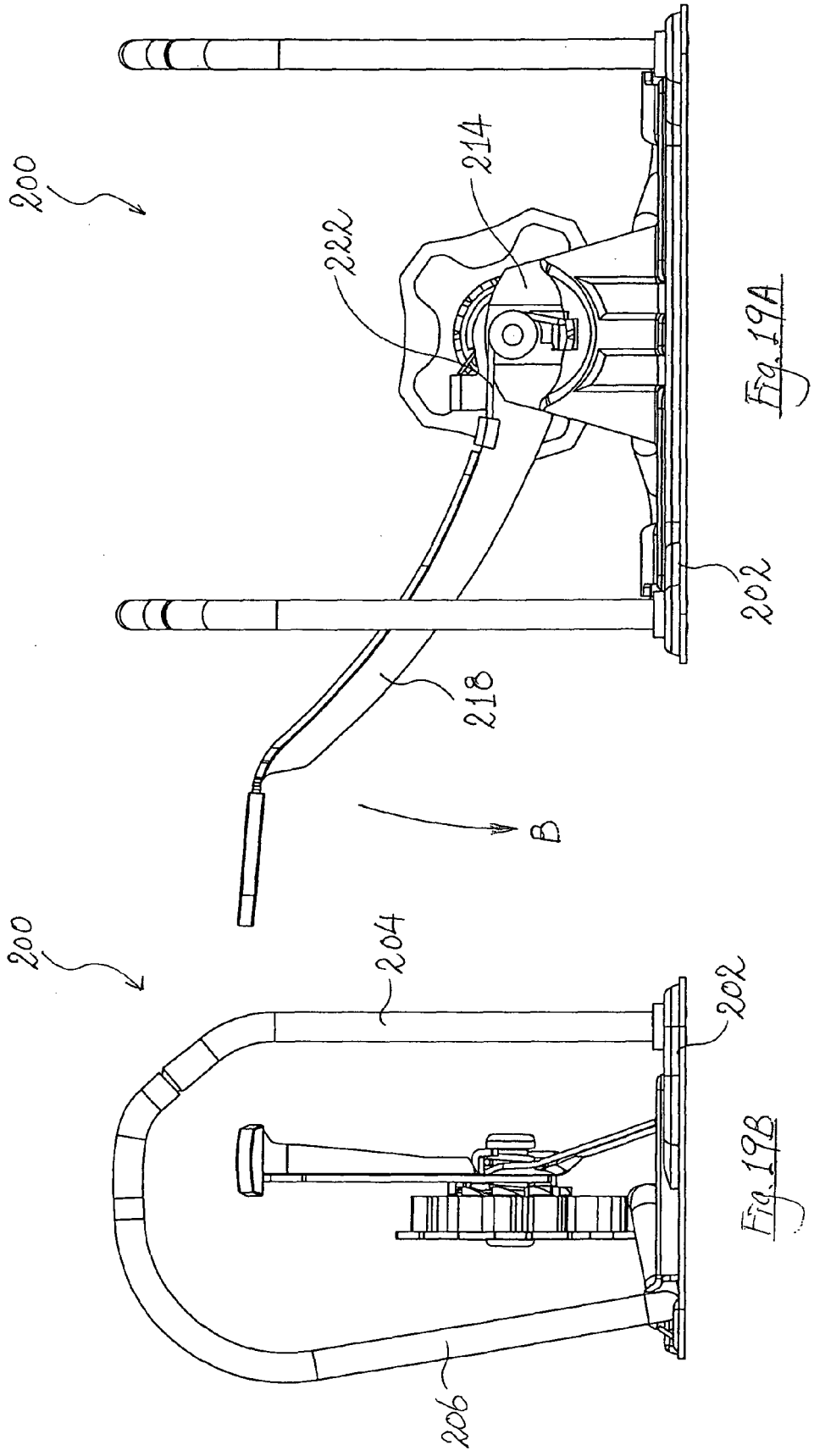
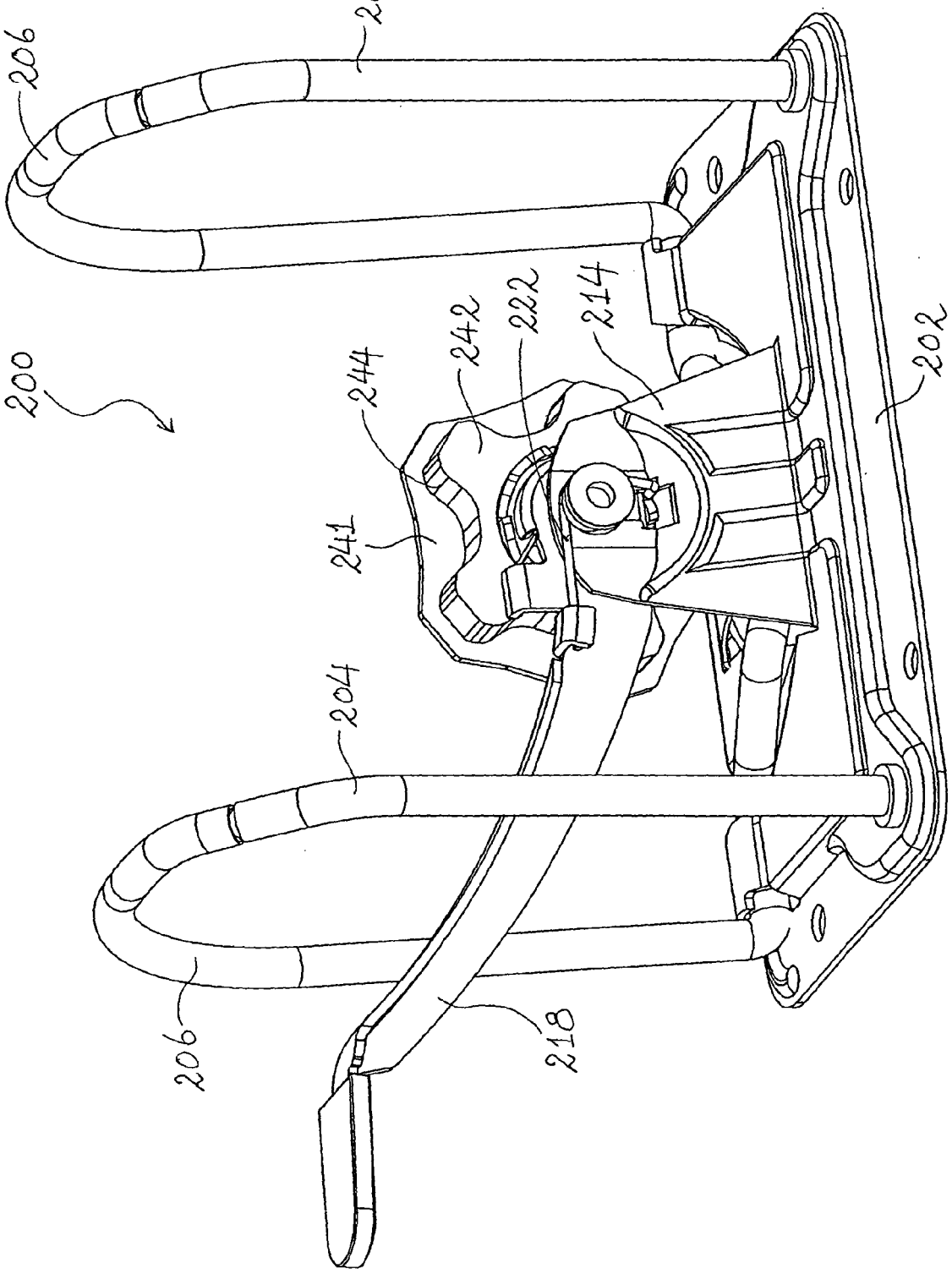


Fig. 19A

Fig. 19B

Fig.20



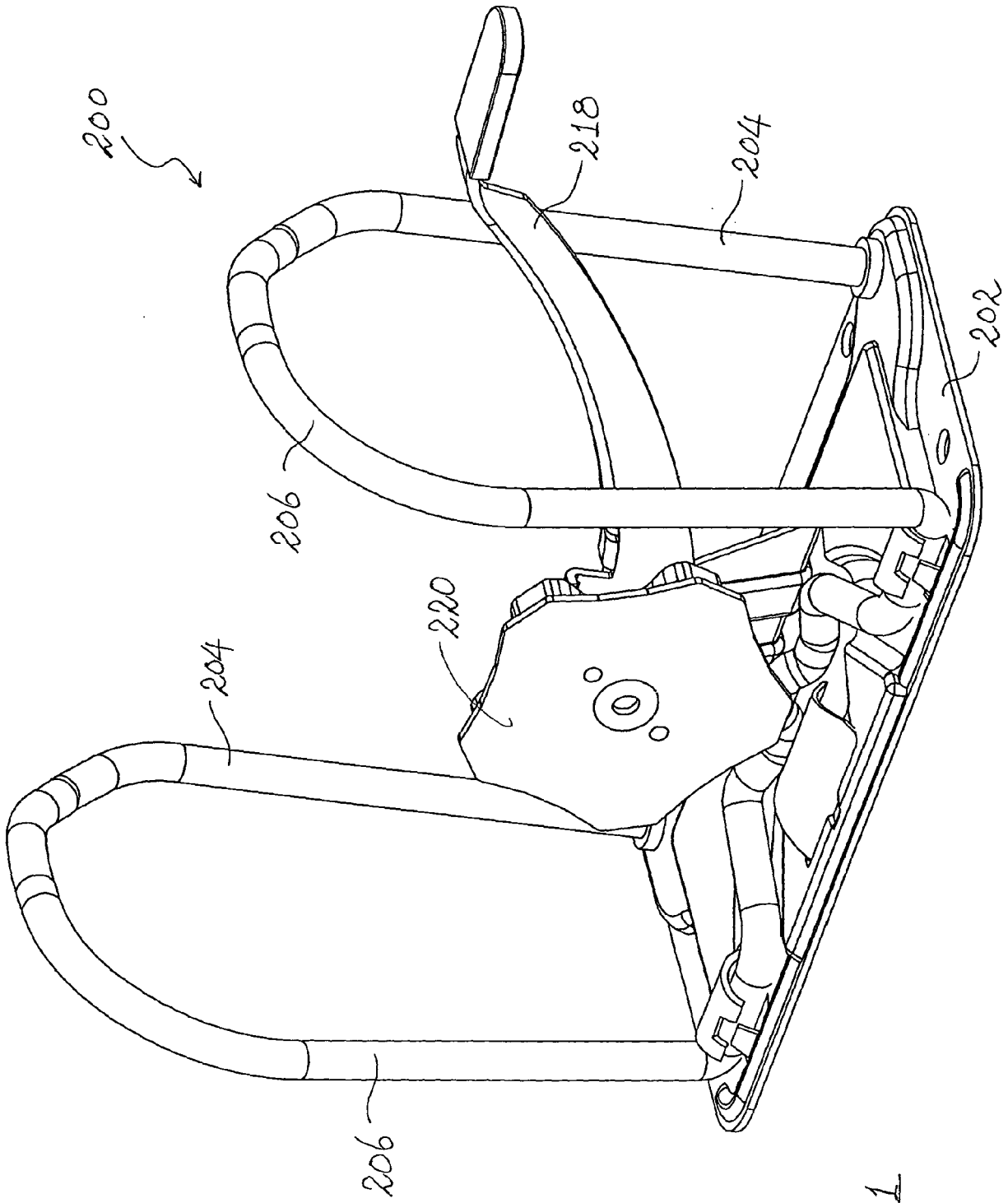


Fig 21

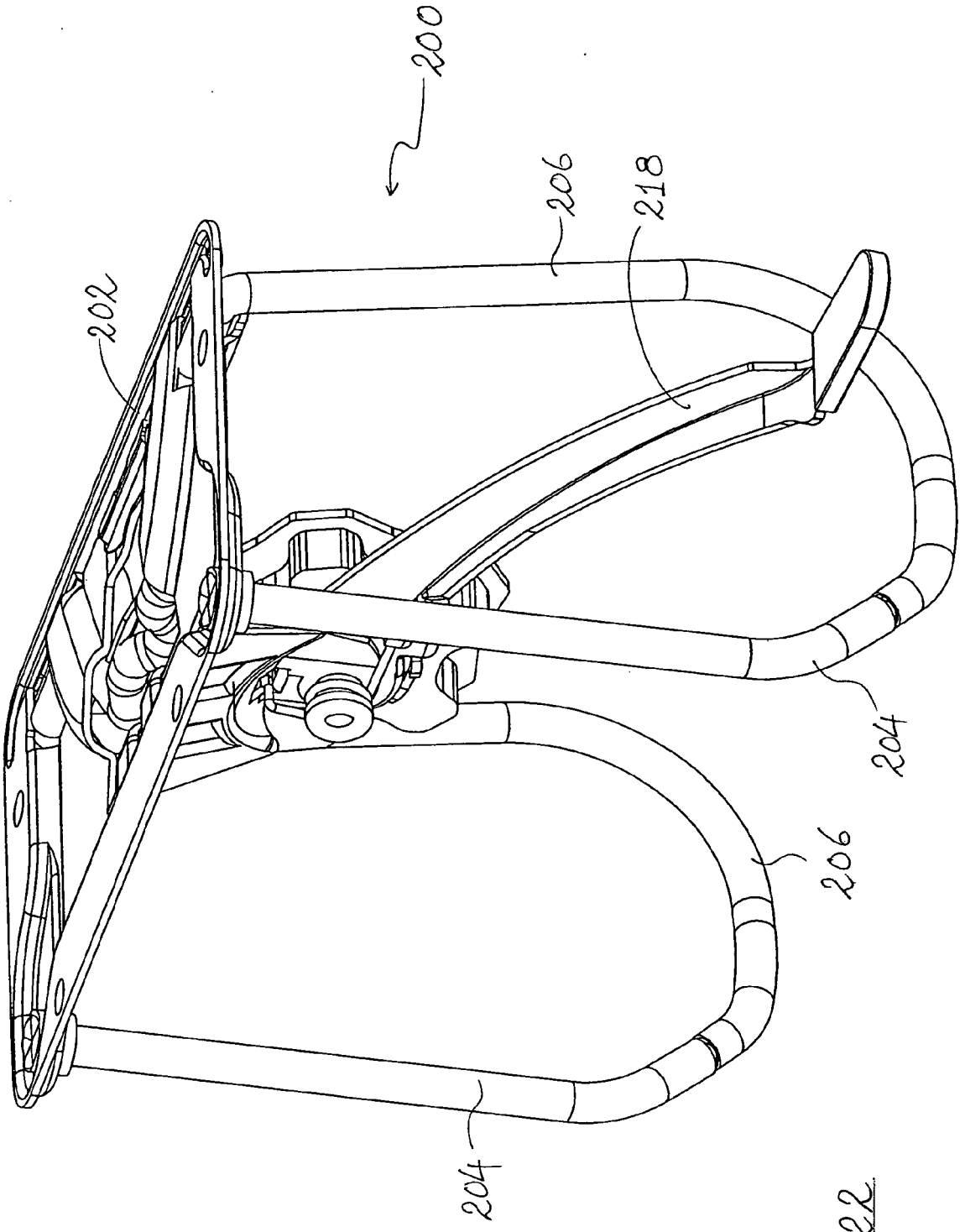


Fig. 22

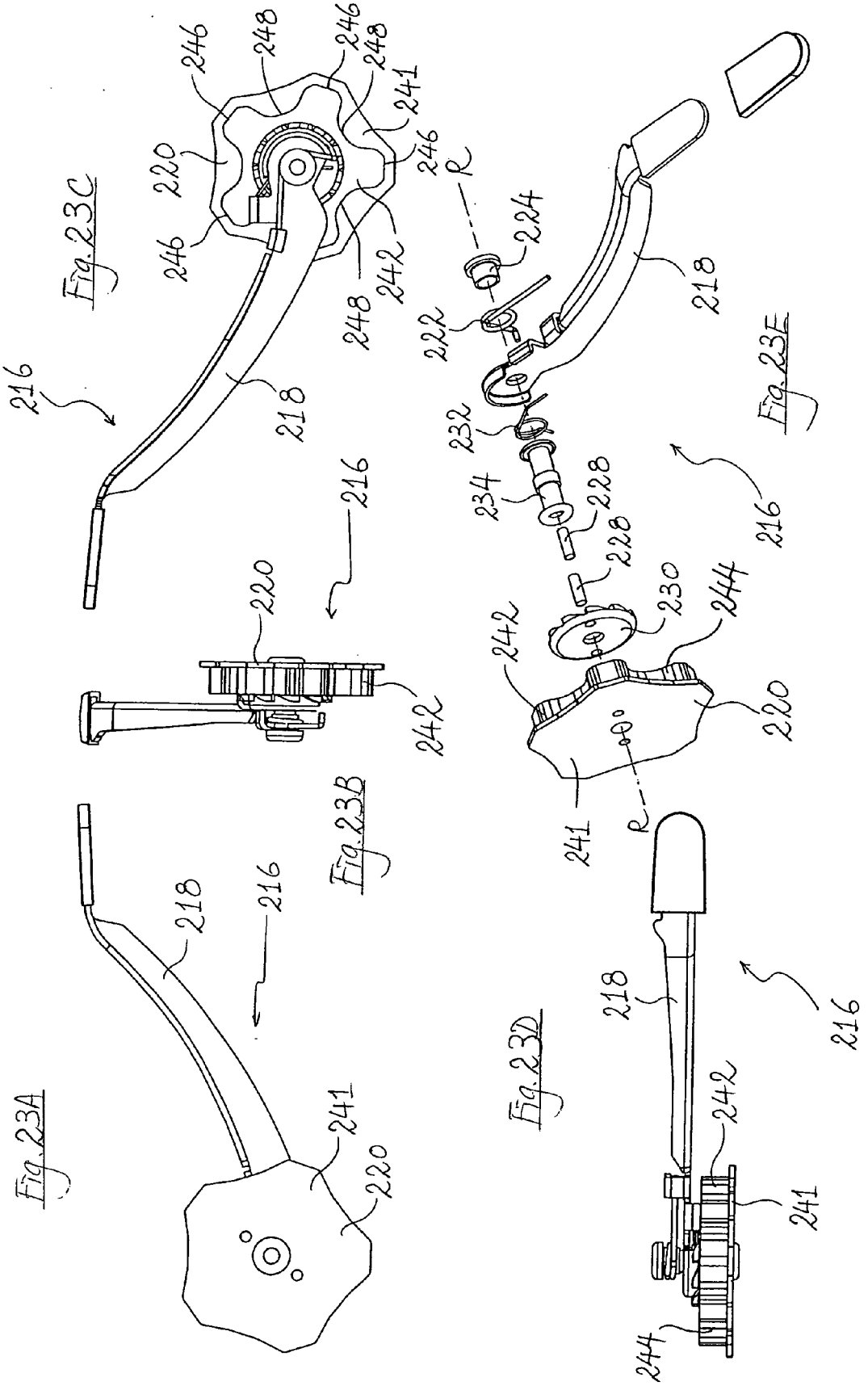


Fig.23A
Fig.23B
Fig.23C
Fig.23D
Fig.23E
216
218
220
241
242
244
246
248
222
224
228
230
232
234
R

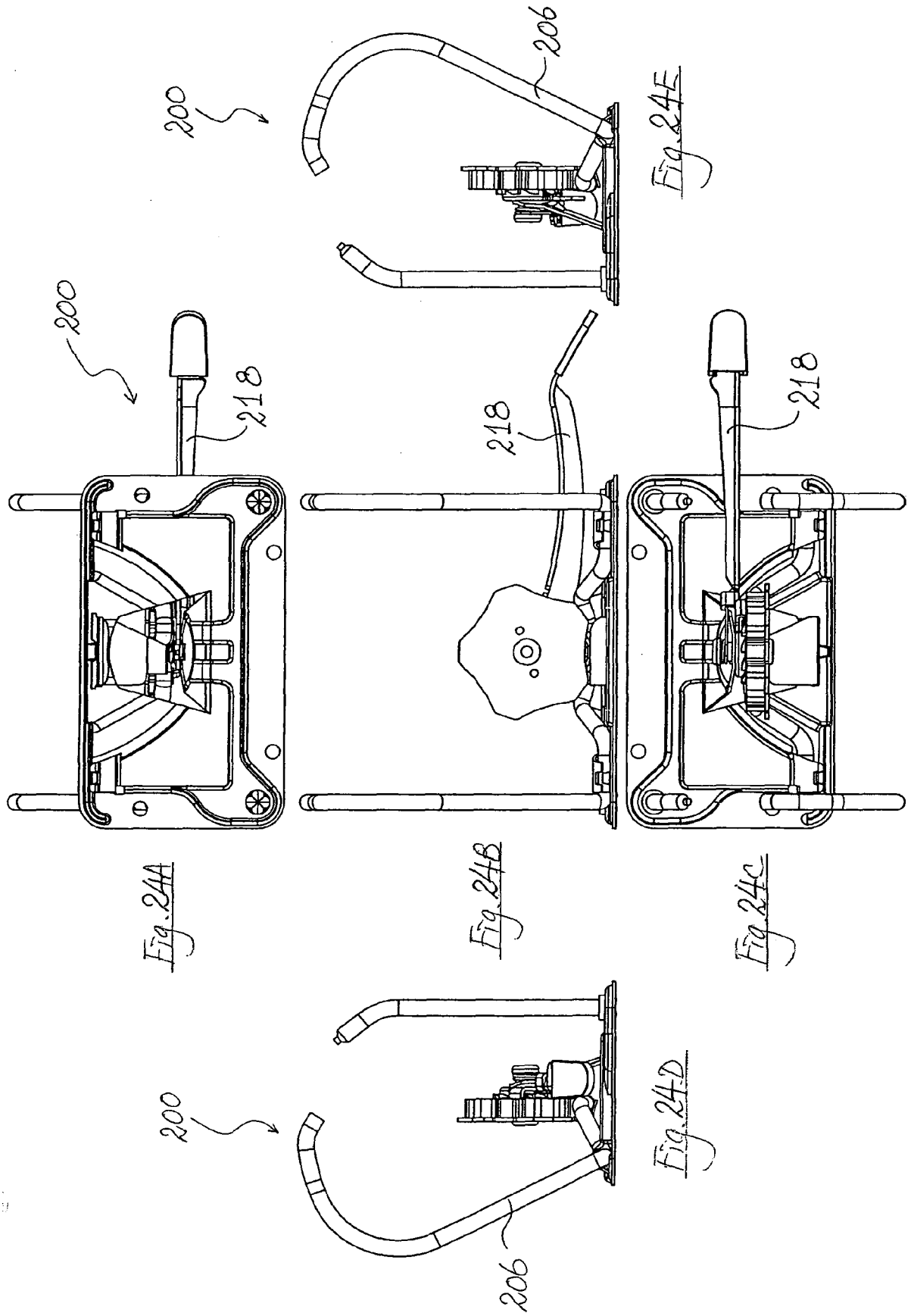


Fig.24A

Fig.24B

Fig.24C

Fig.24D

Fig.24E

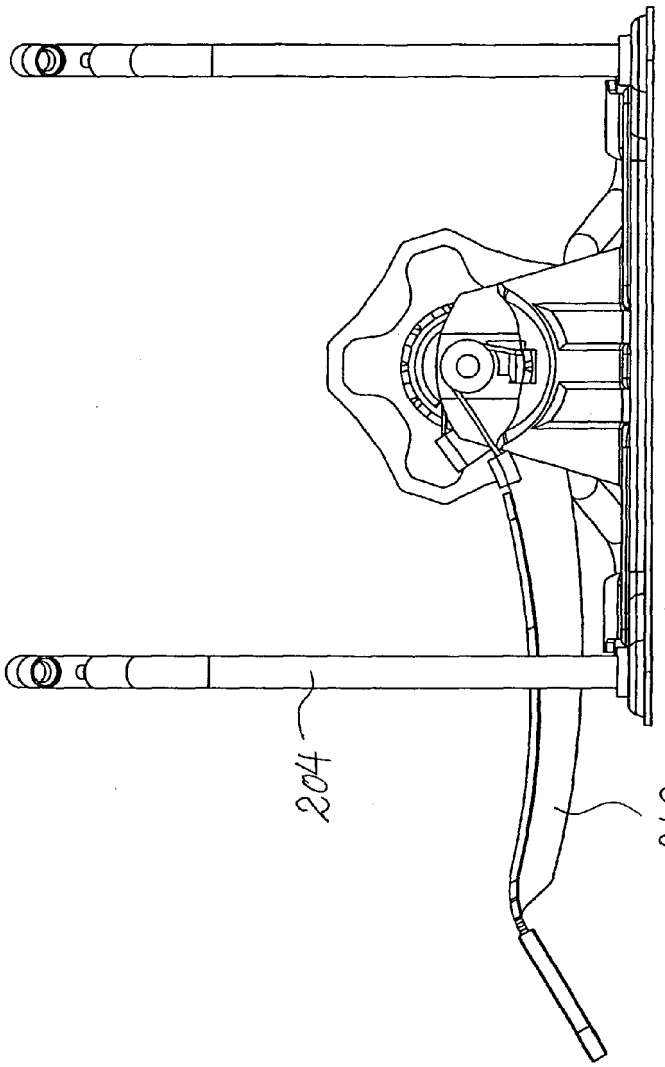


Fig.25A

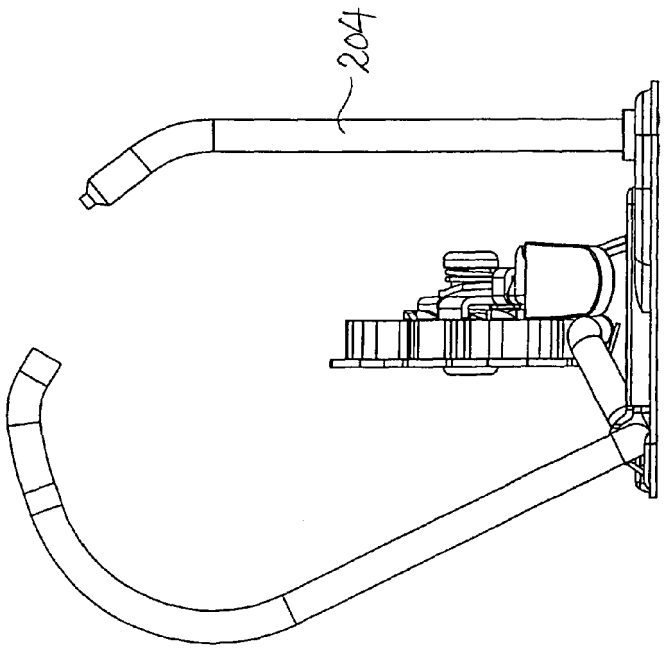


Fig.25B

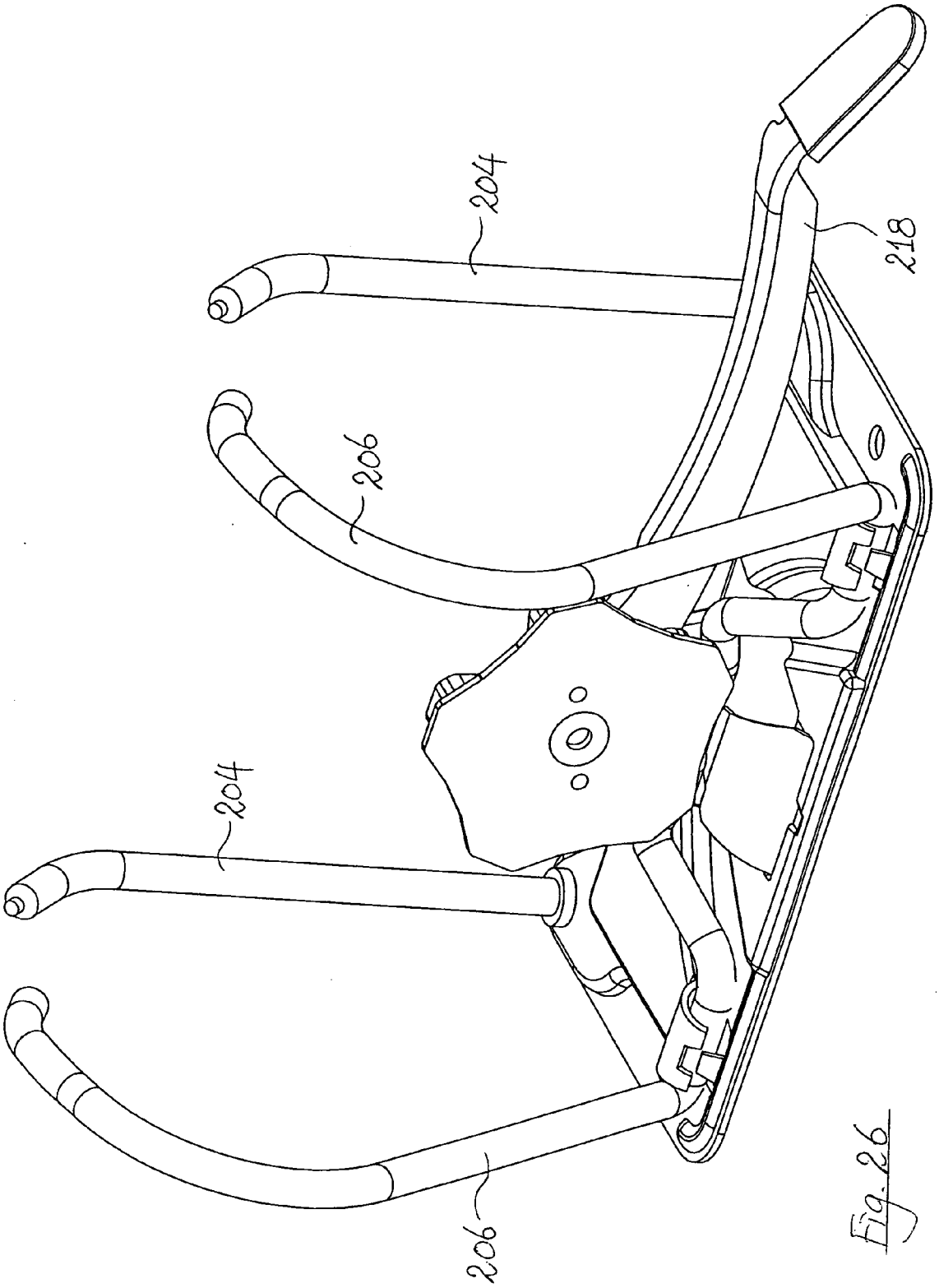


Fig. 26

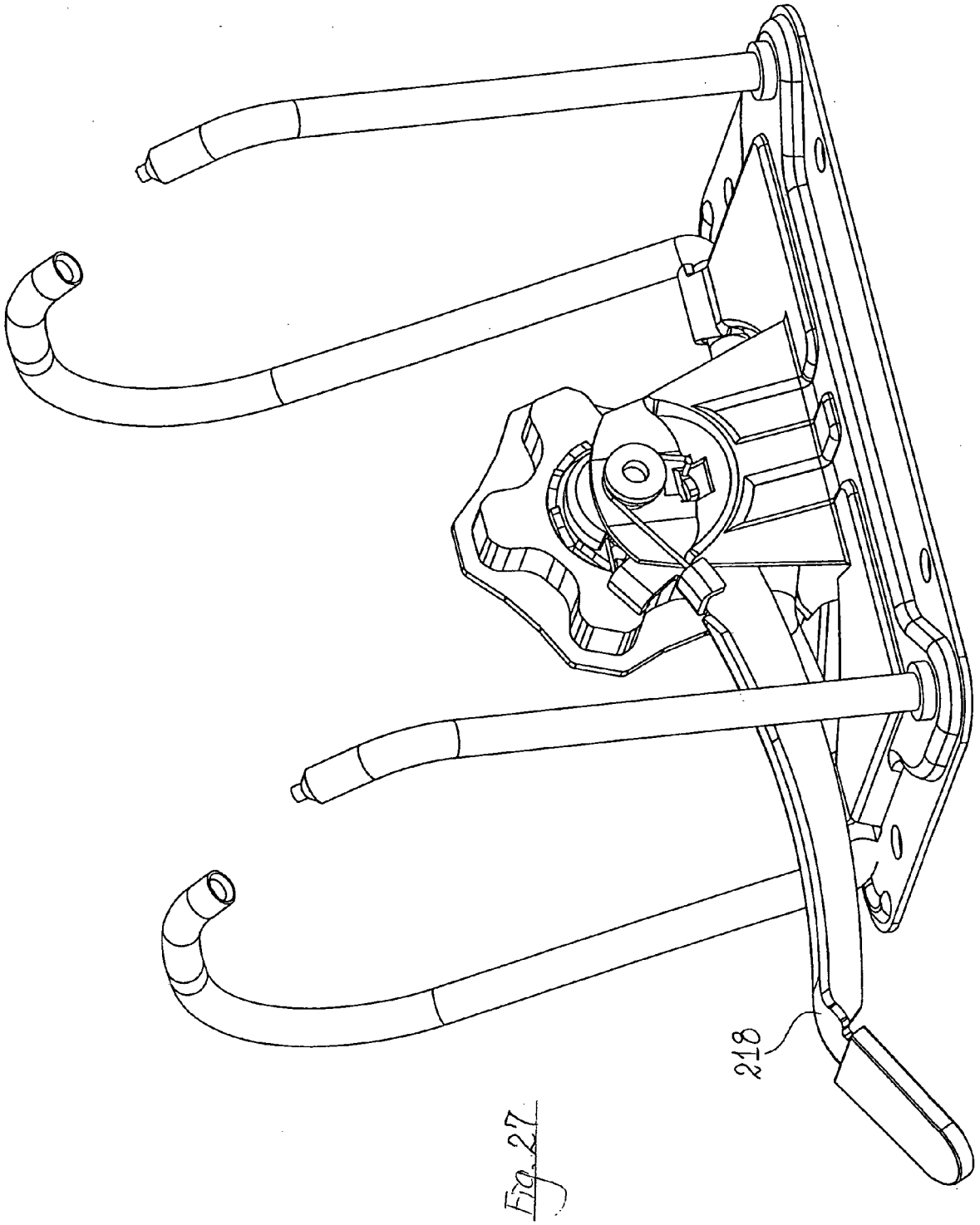
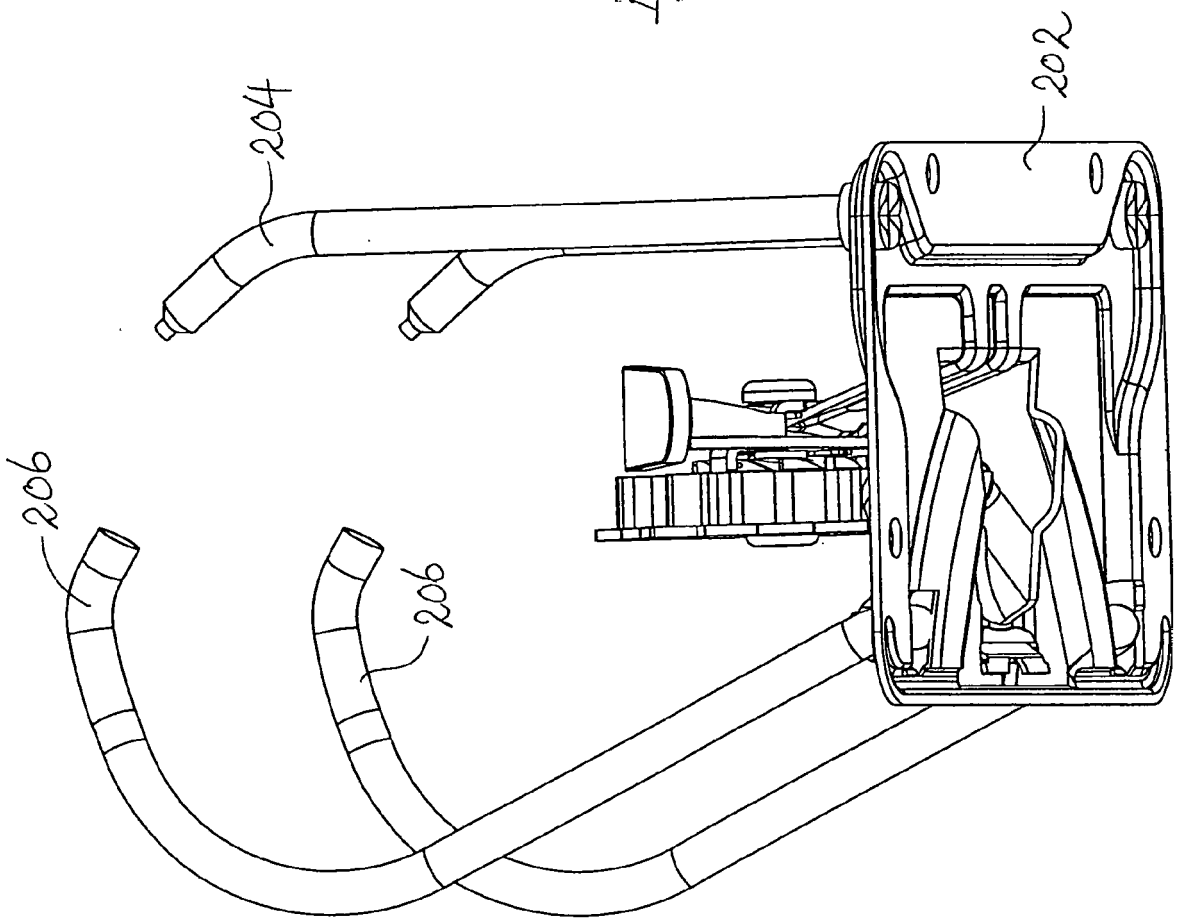


Fig. 27

Fig. 28



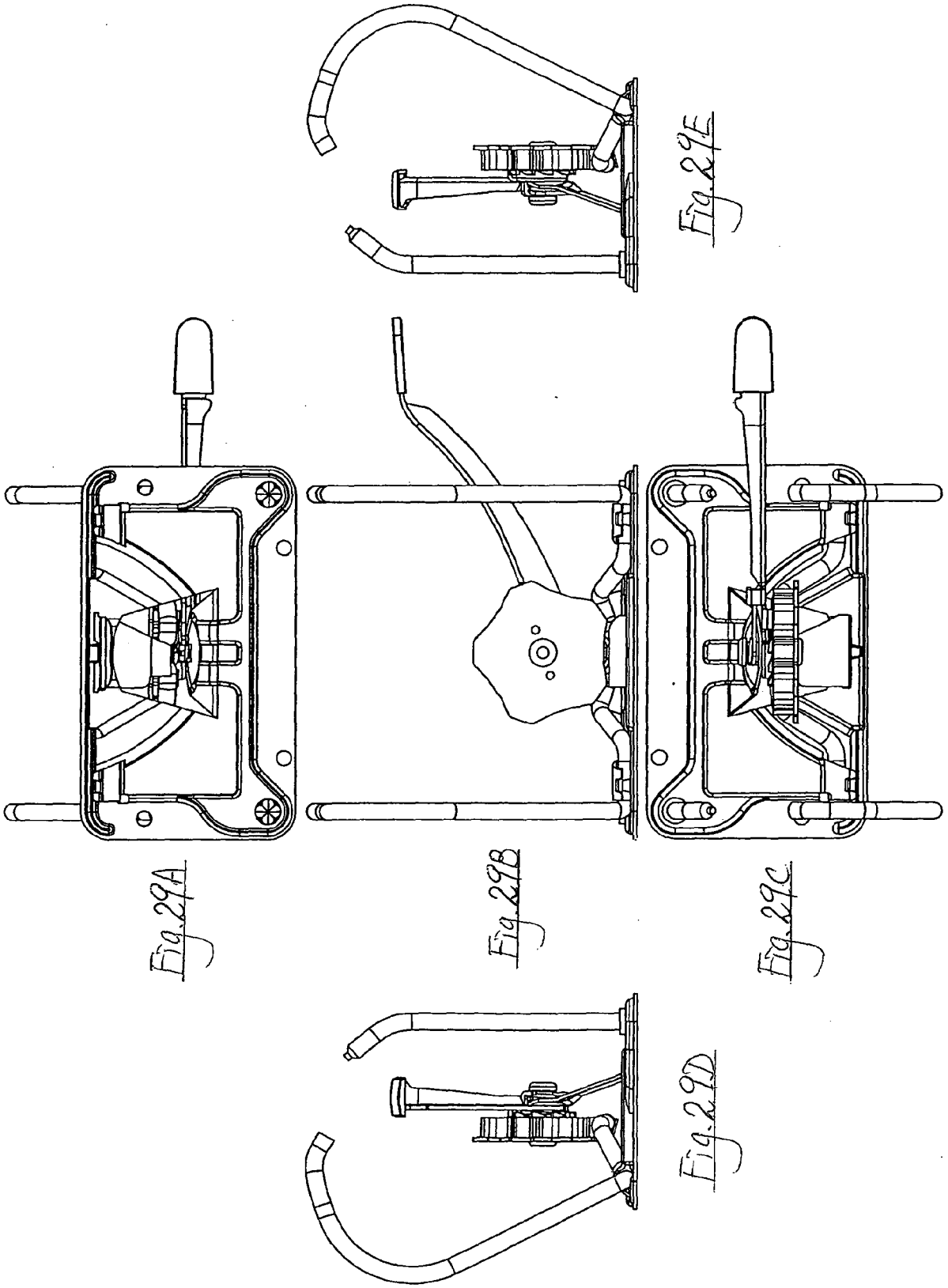


Fig.29A

Fig.29B

Fig.29C

Fig.29D

Fig.29E

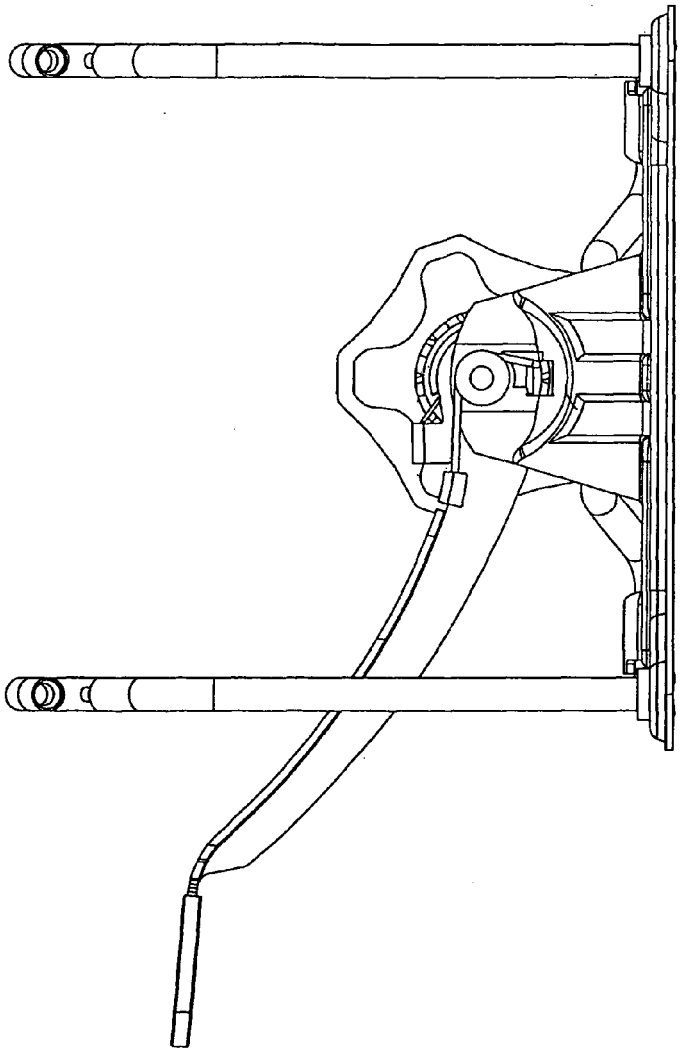


Fig.30A

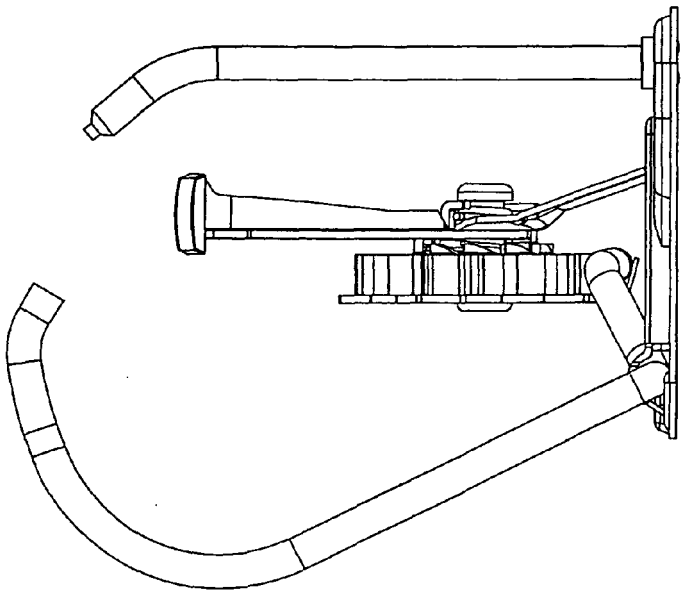


Fig.30B

Fig. 31

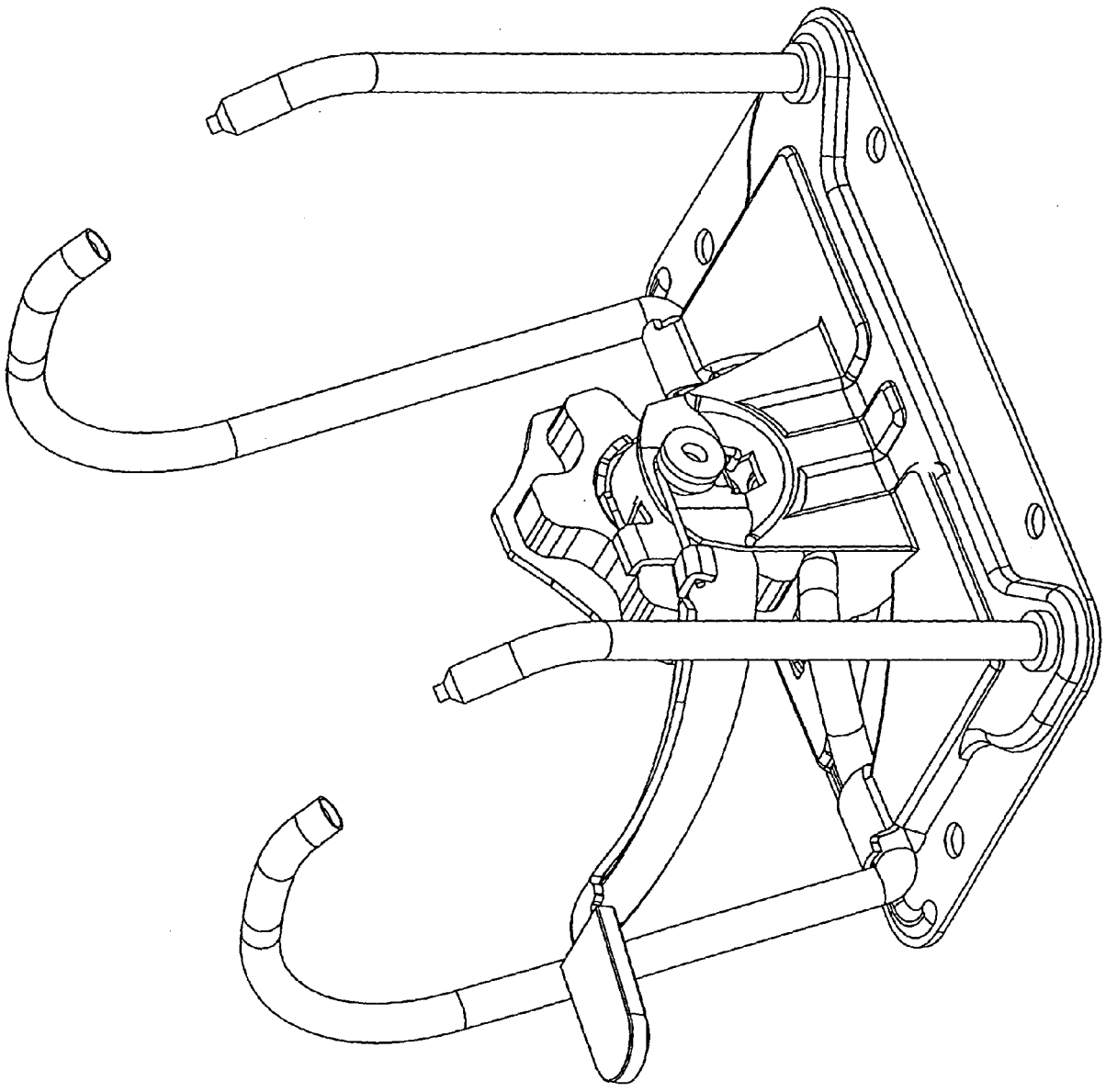
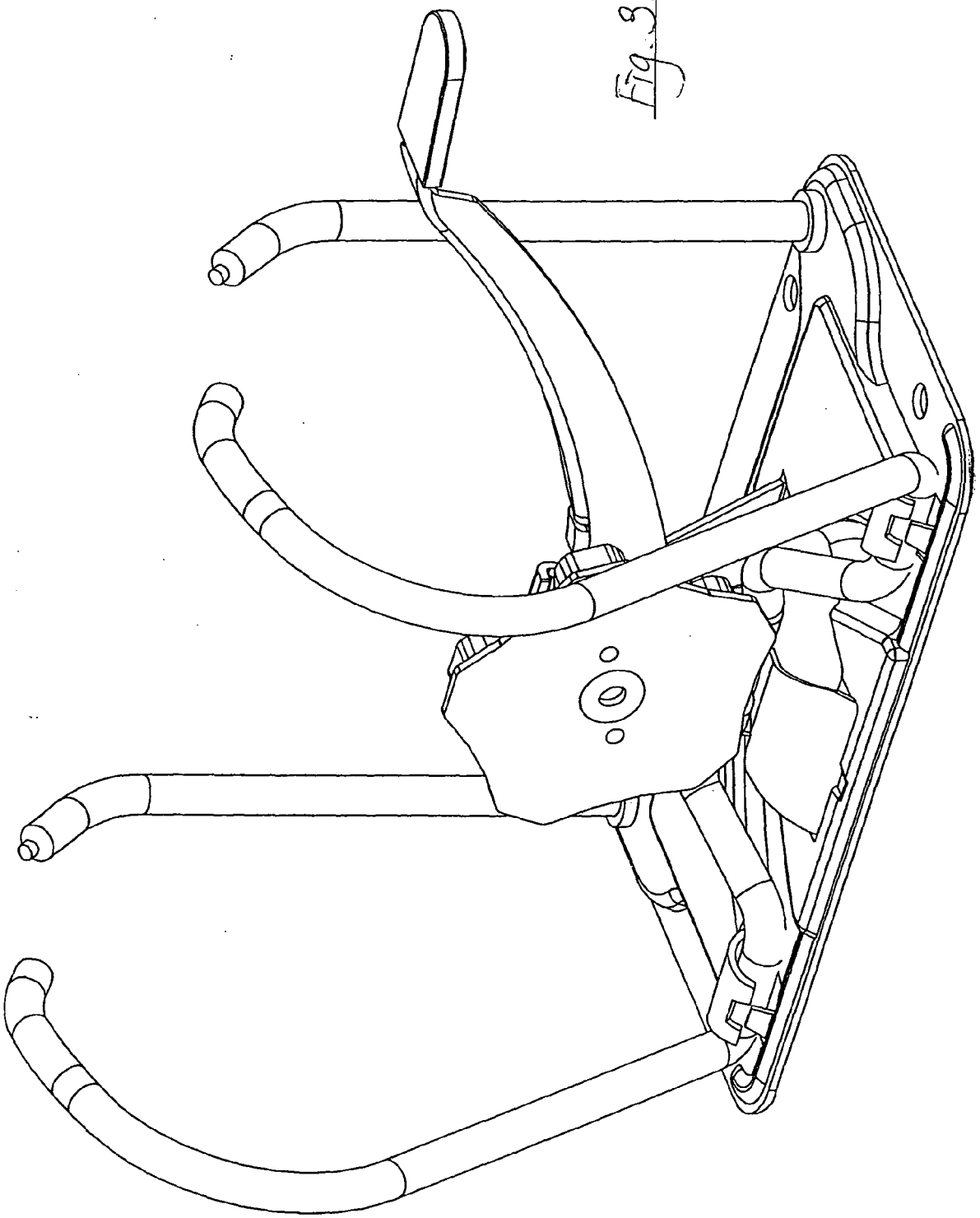


Fig. 32



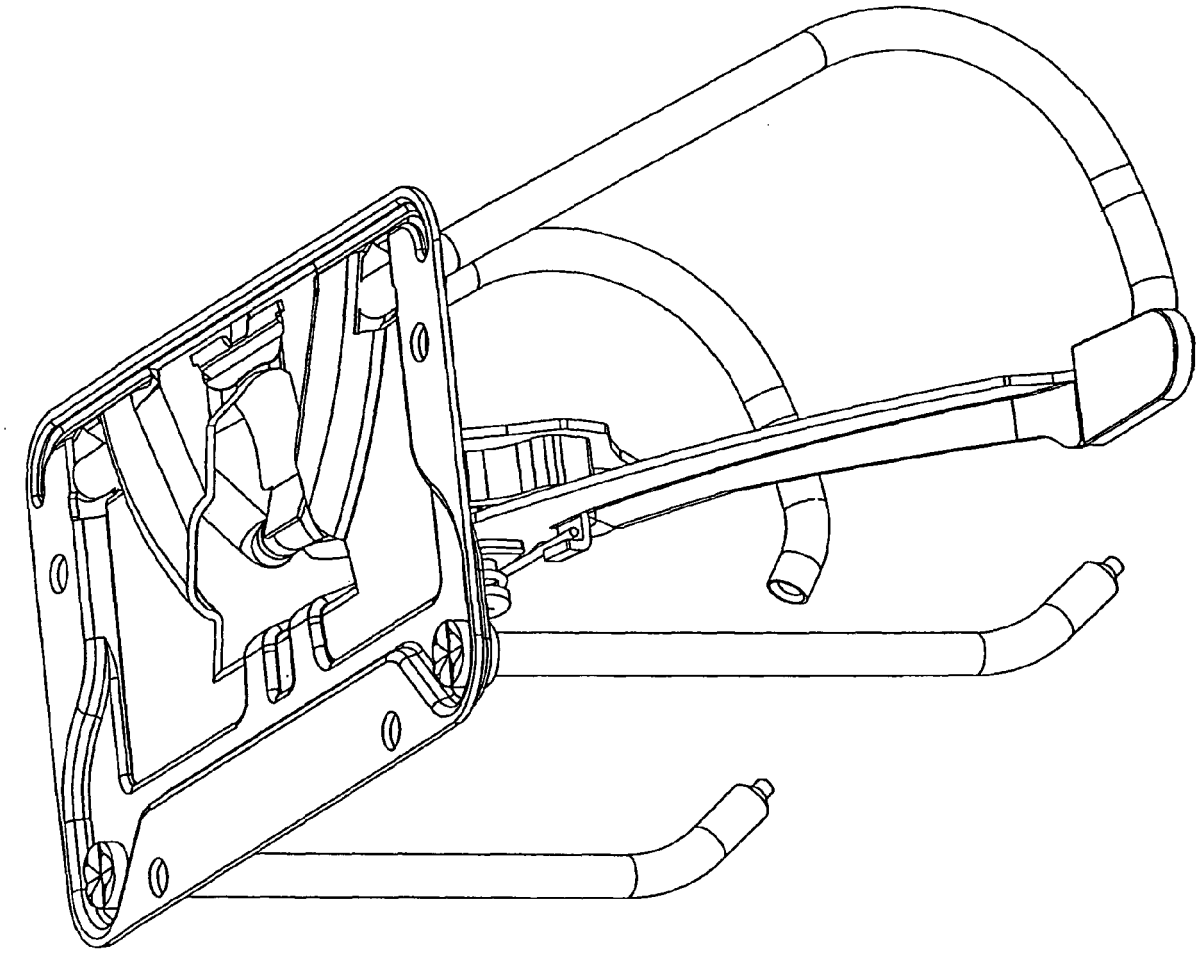


Fig 33

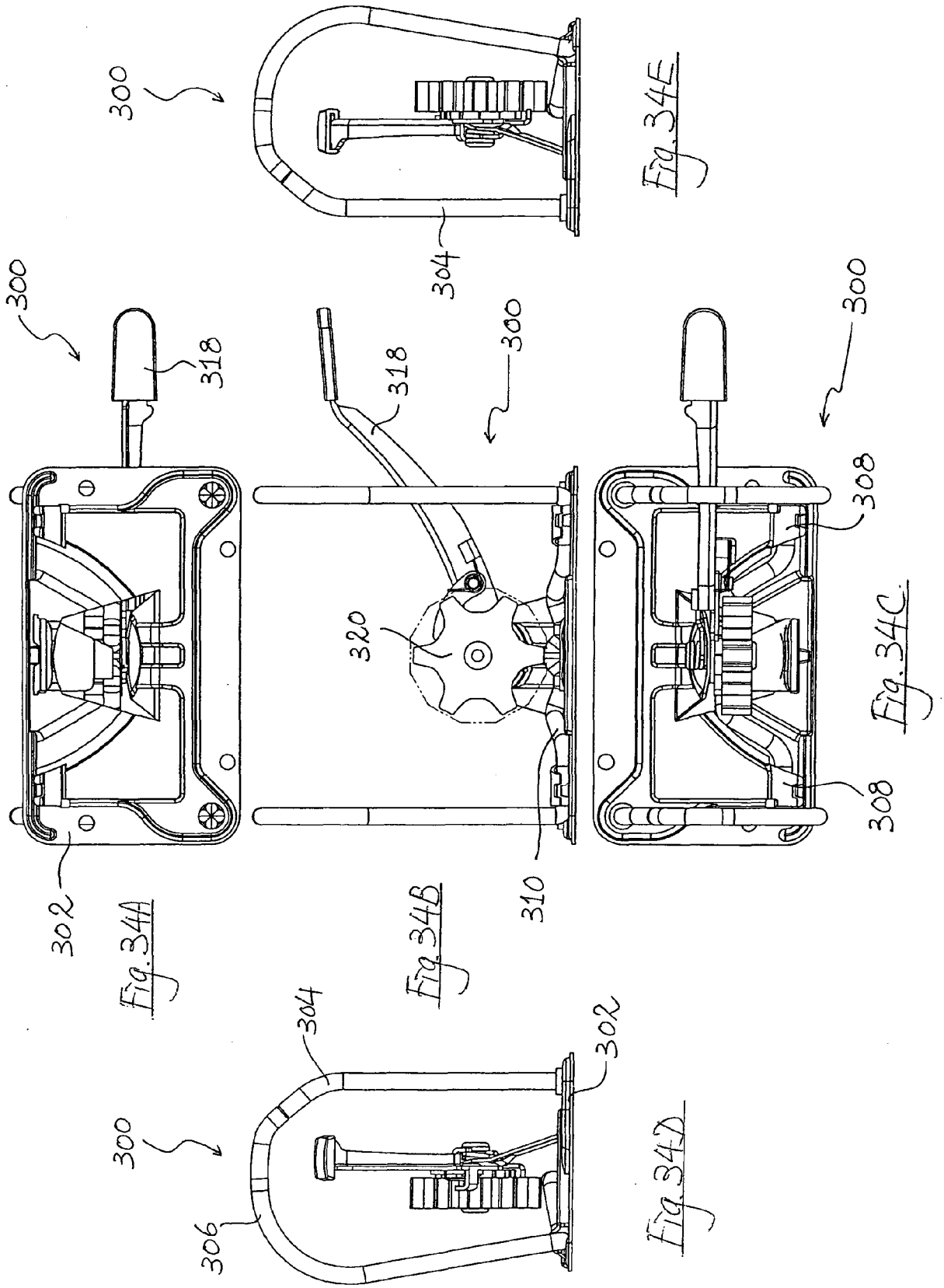


Fig. 34A Fig. 34B Fig. 34C Fig. 34D Fig. 34E

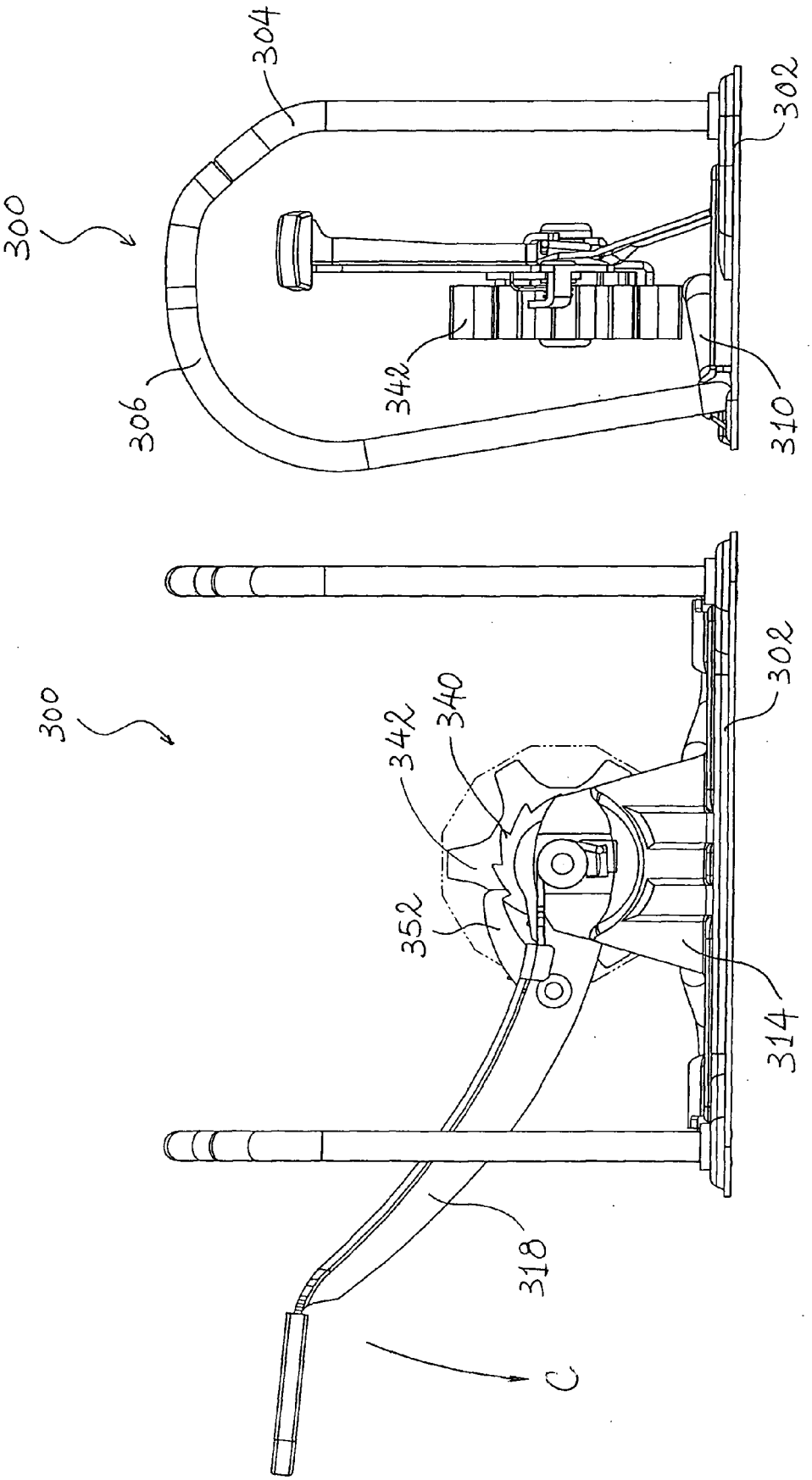


Fig.35B

Fig.35A

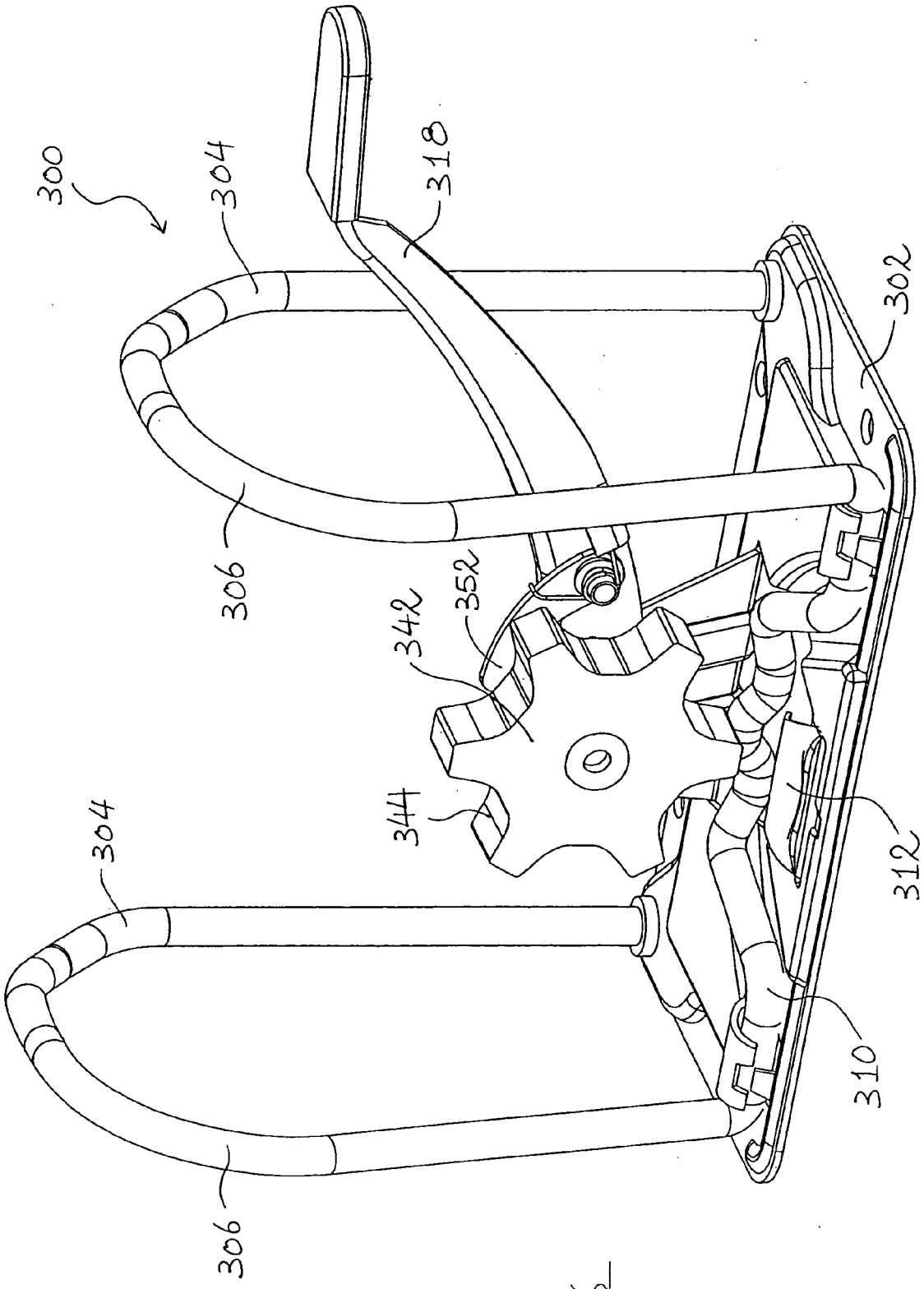


Fig. 36

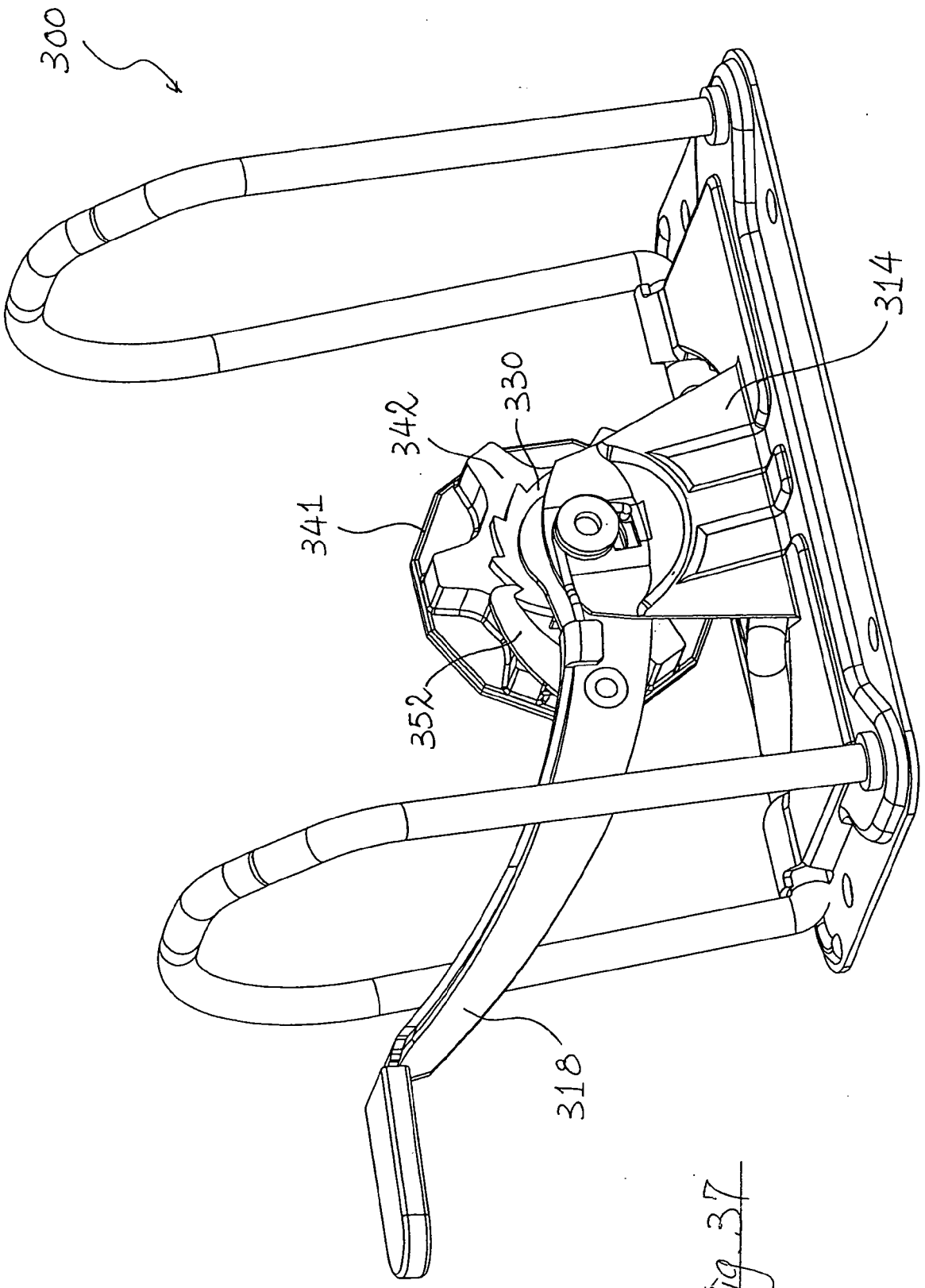


Fig. 37

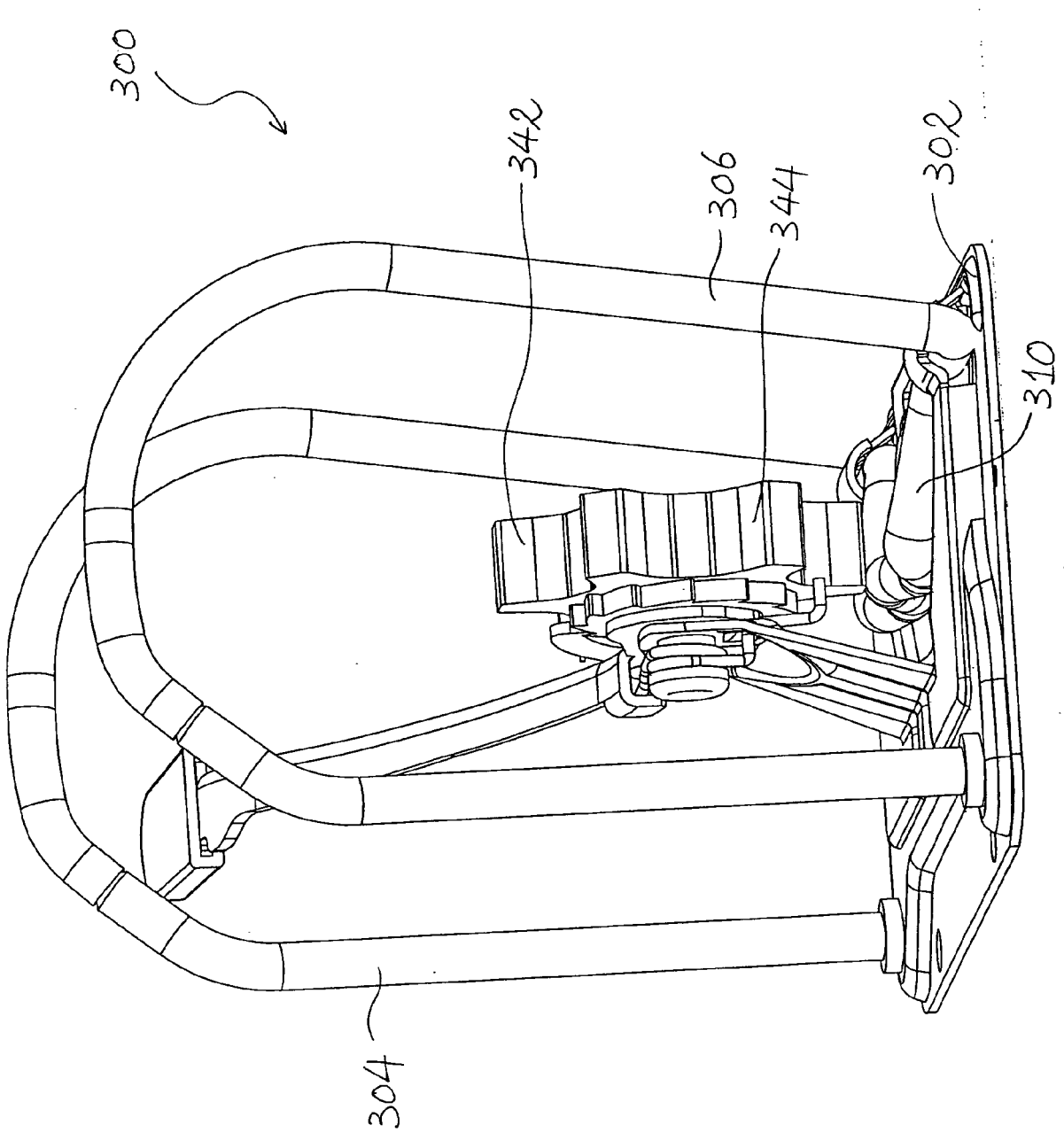


Fig. 38

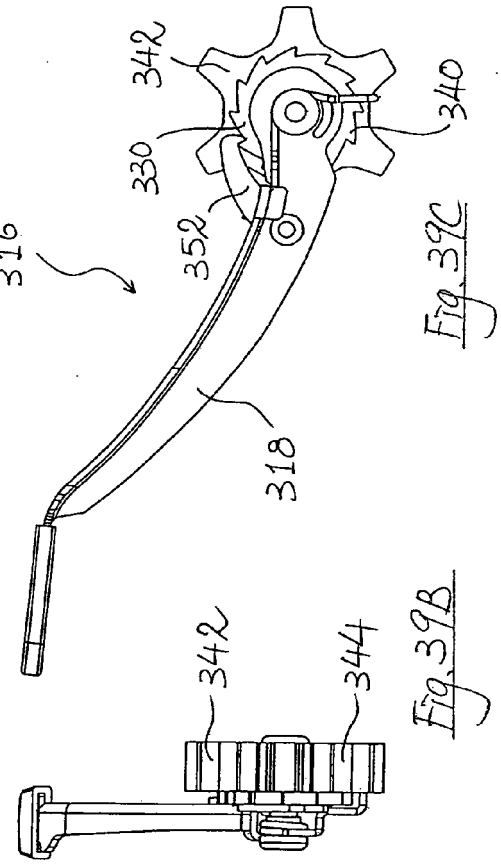


Fig.39C

Fig.39B

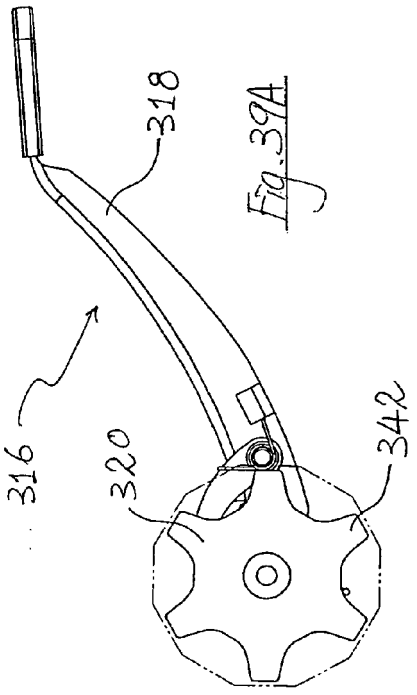


Fig.39A

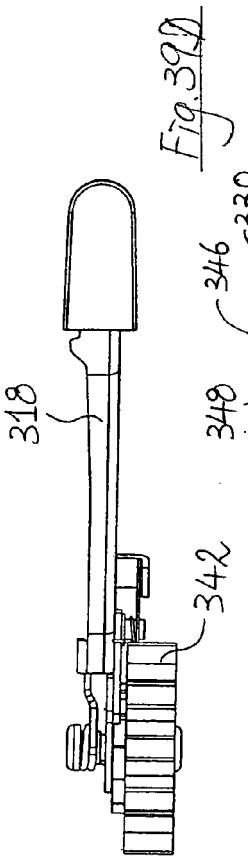


Fig.39D

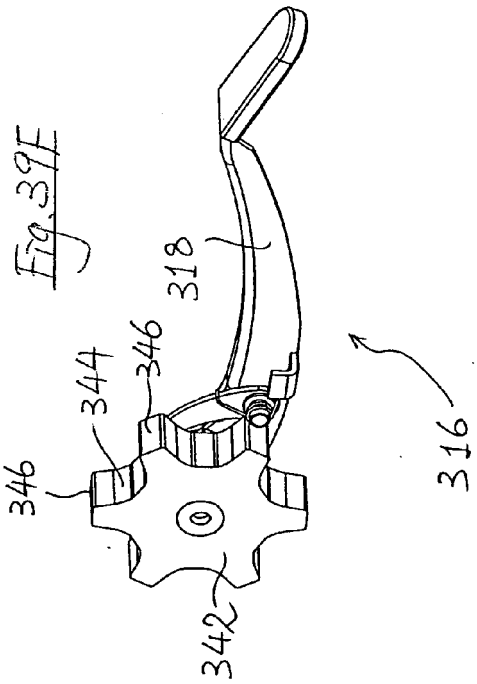


Fig.39F

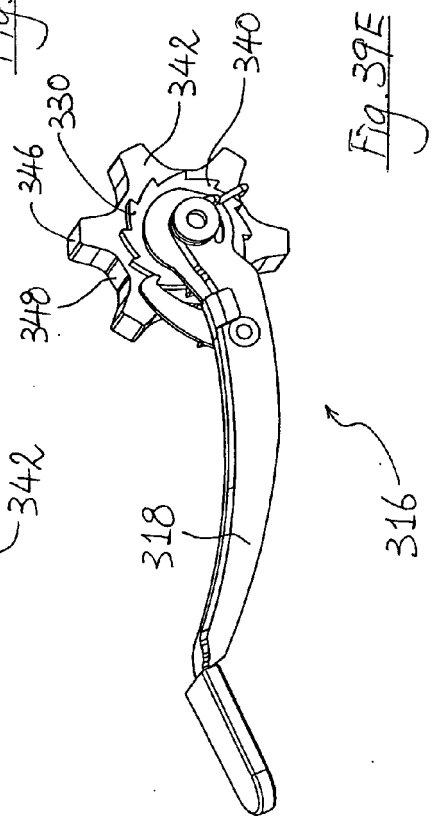
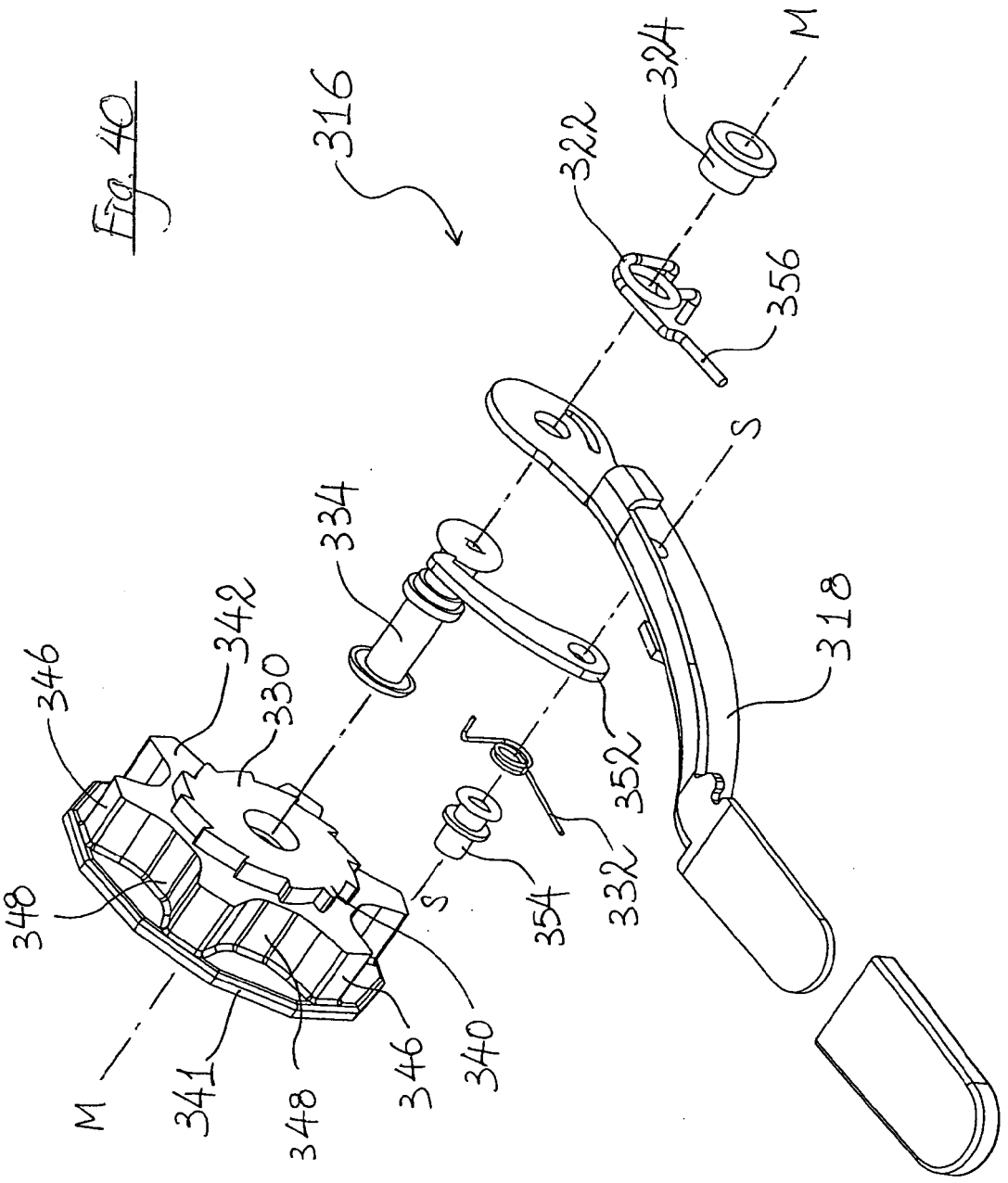


Fig.39E

Fig. 40


316
322
324
M
356
S
334
342
346
330
318
348
352
S
354
332
341
348
346
340
M

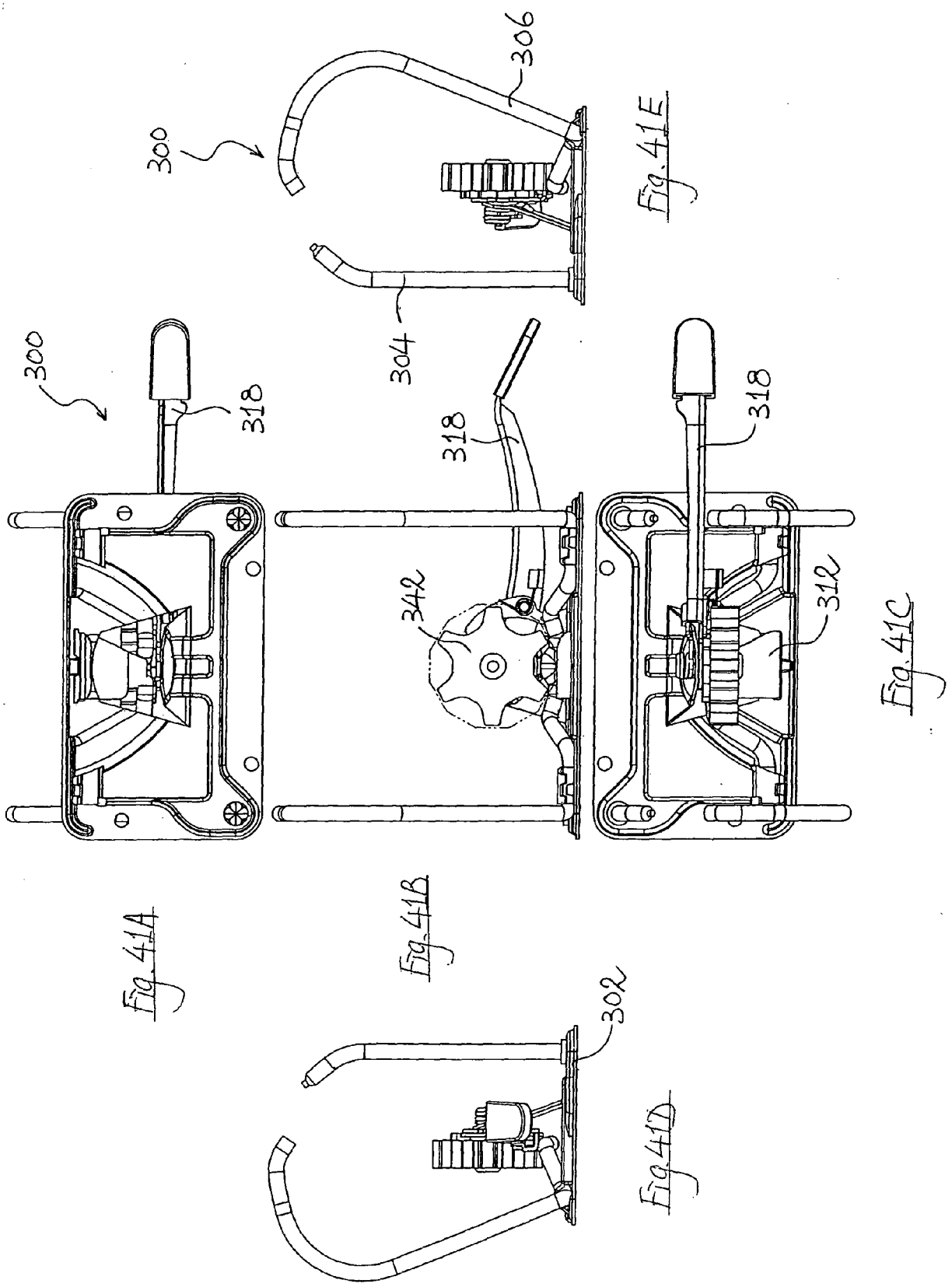


Fig. 41A

Fig. 41B

Fig. 41C

Fig. 41D

Fig. 41E

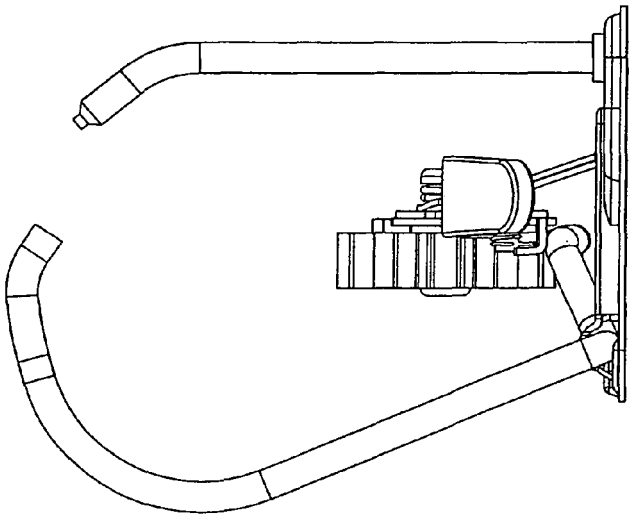


Fig. 42B

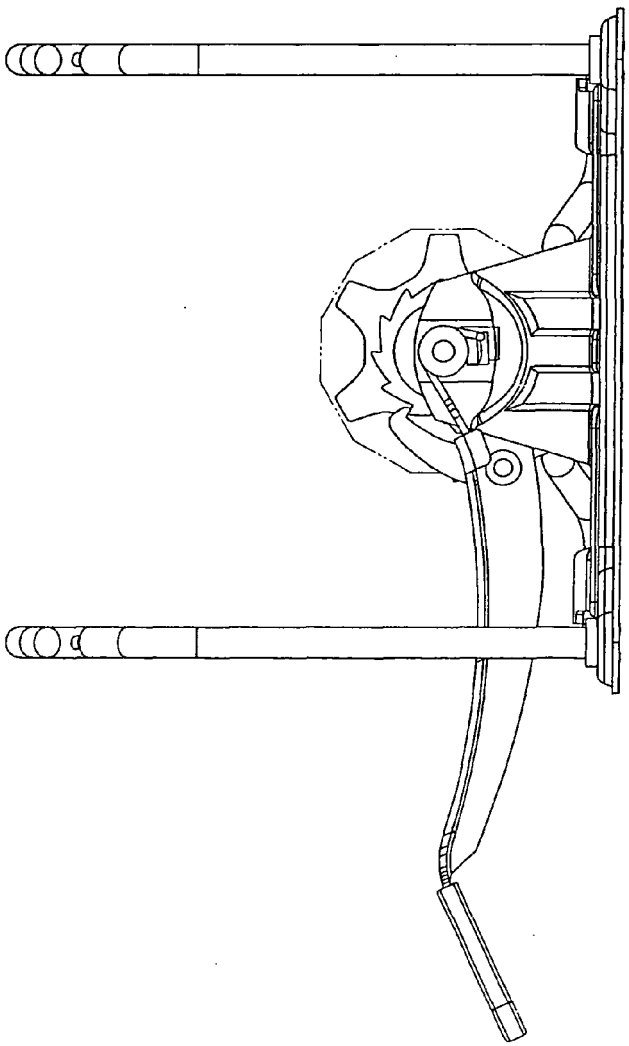


Fig. 42A

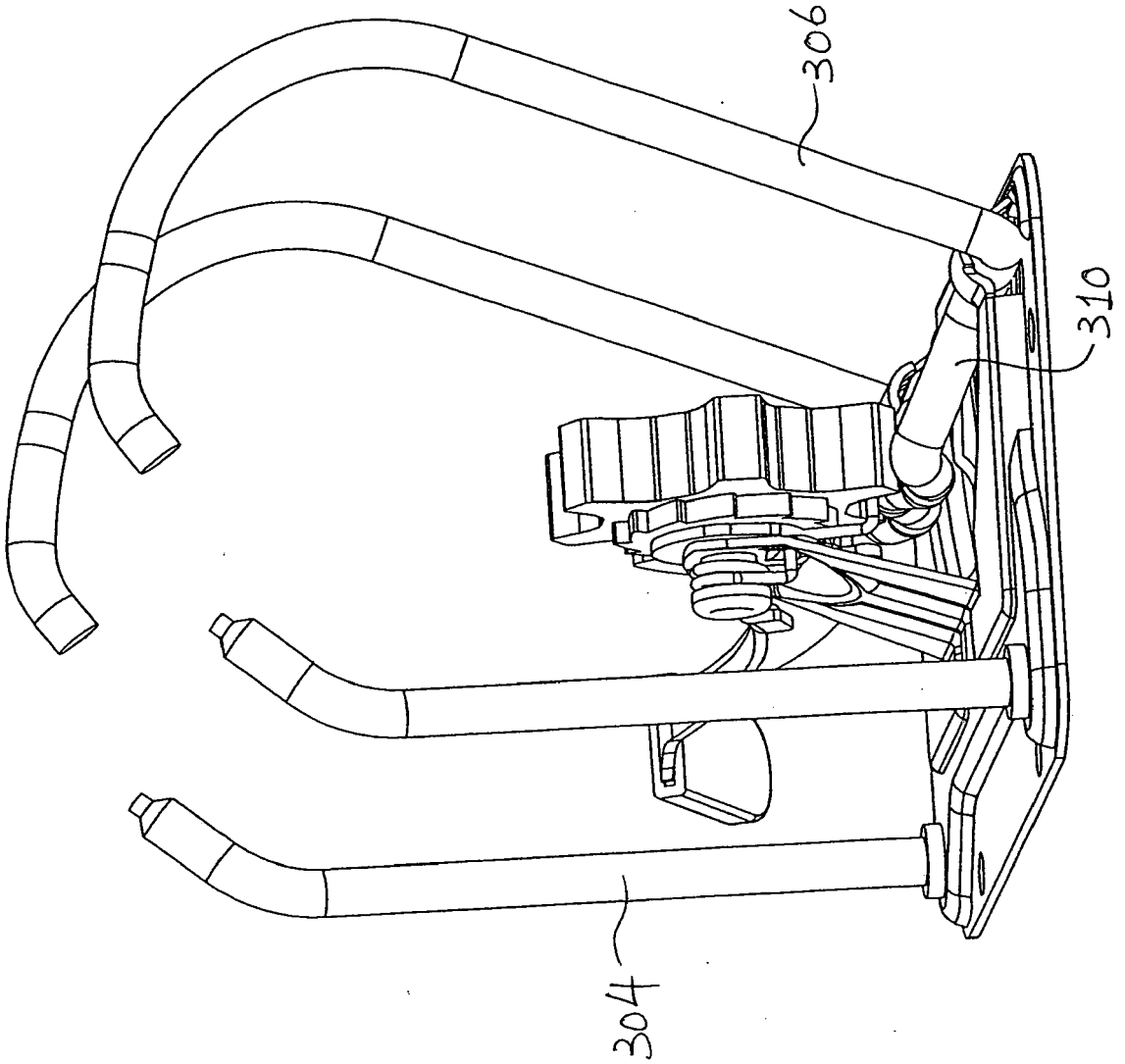


Fig. 43

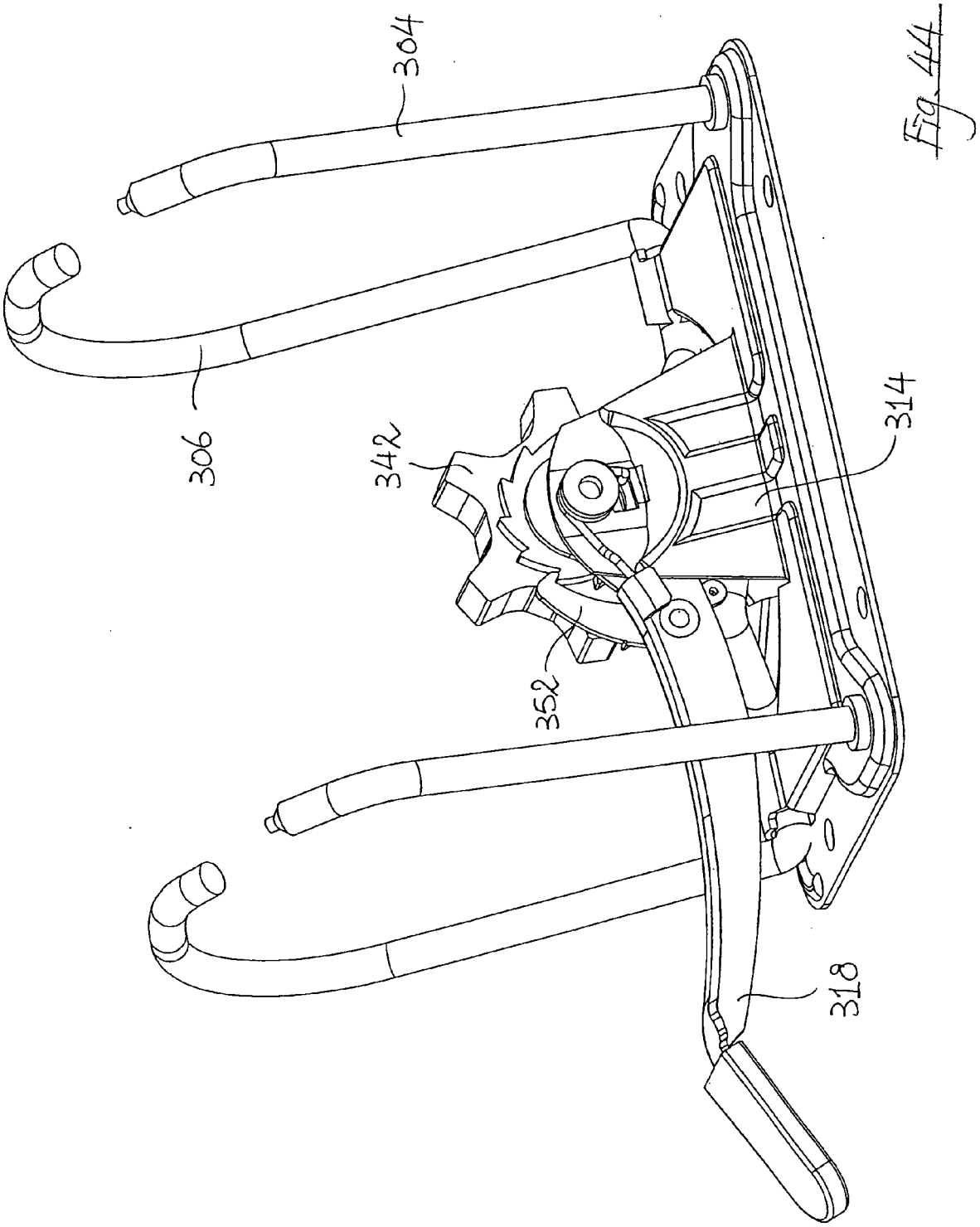


Fig. 44

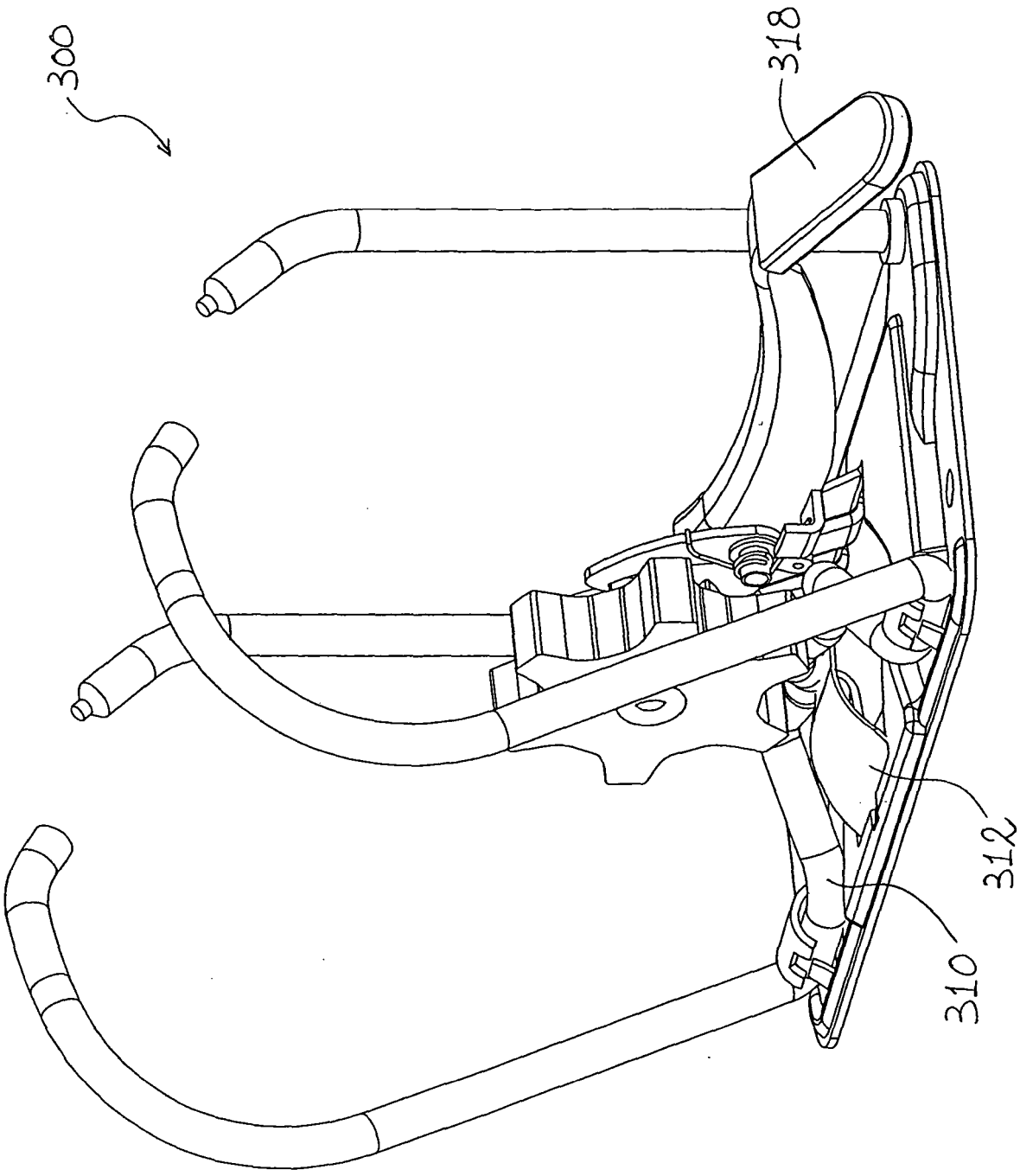


Fig 45

Fig. 46

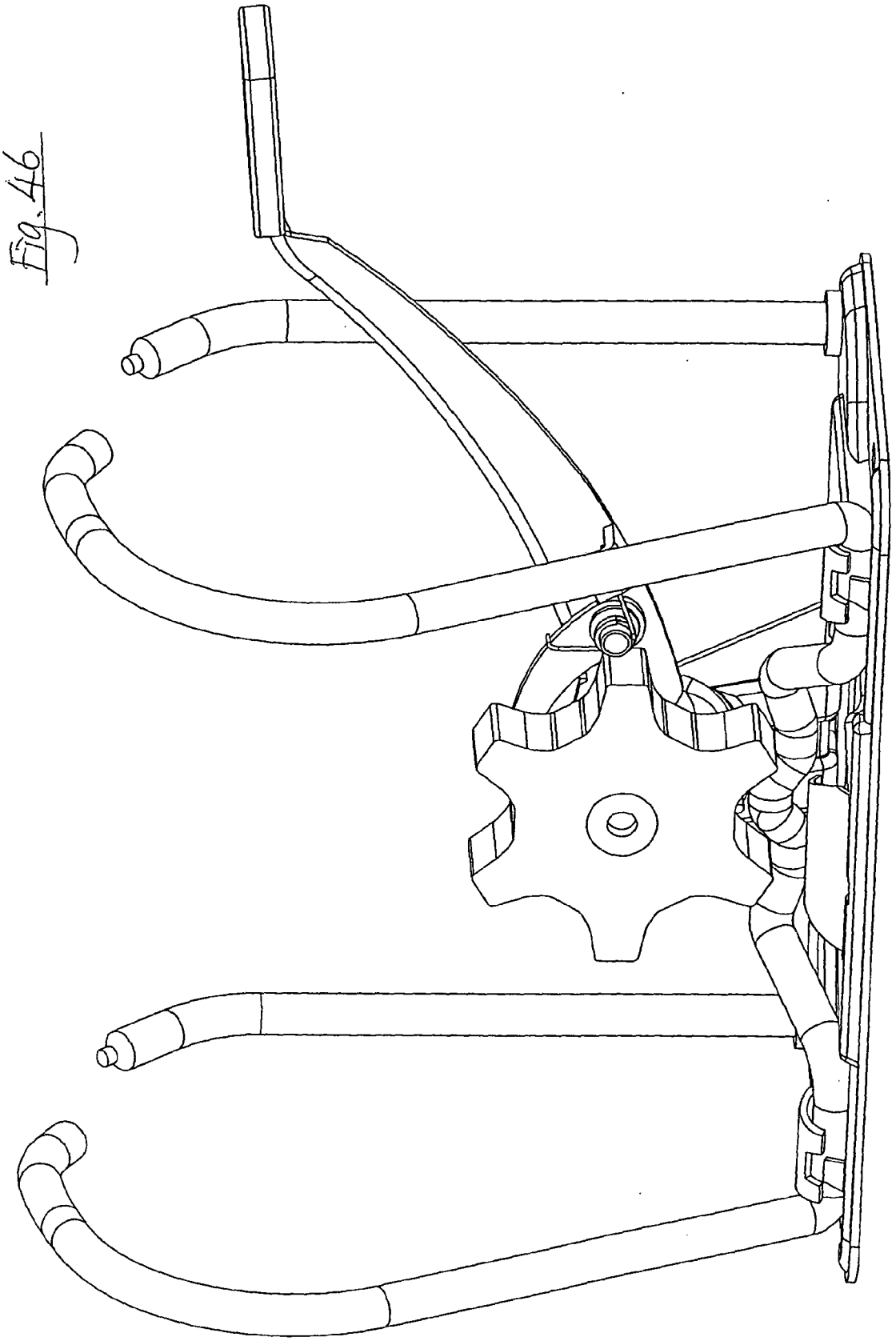
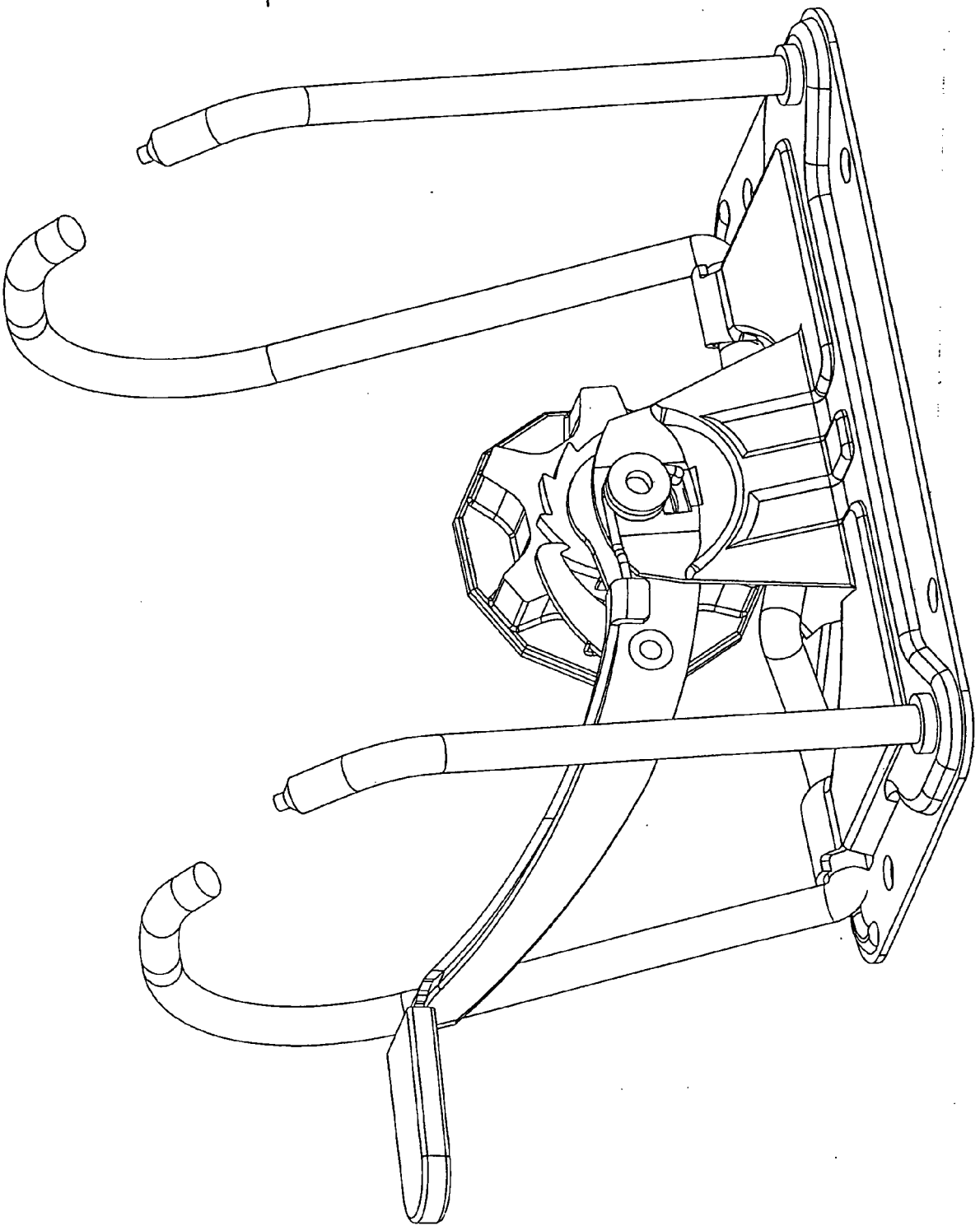


Fig. 47



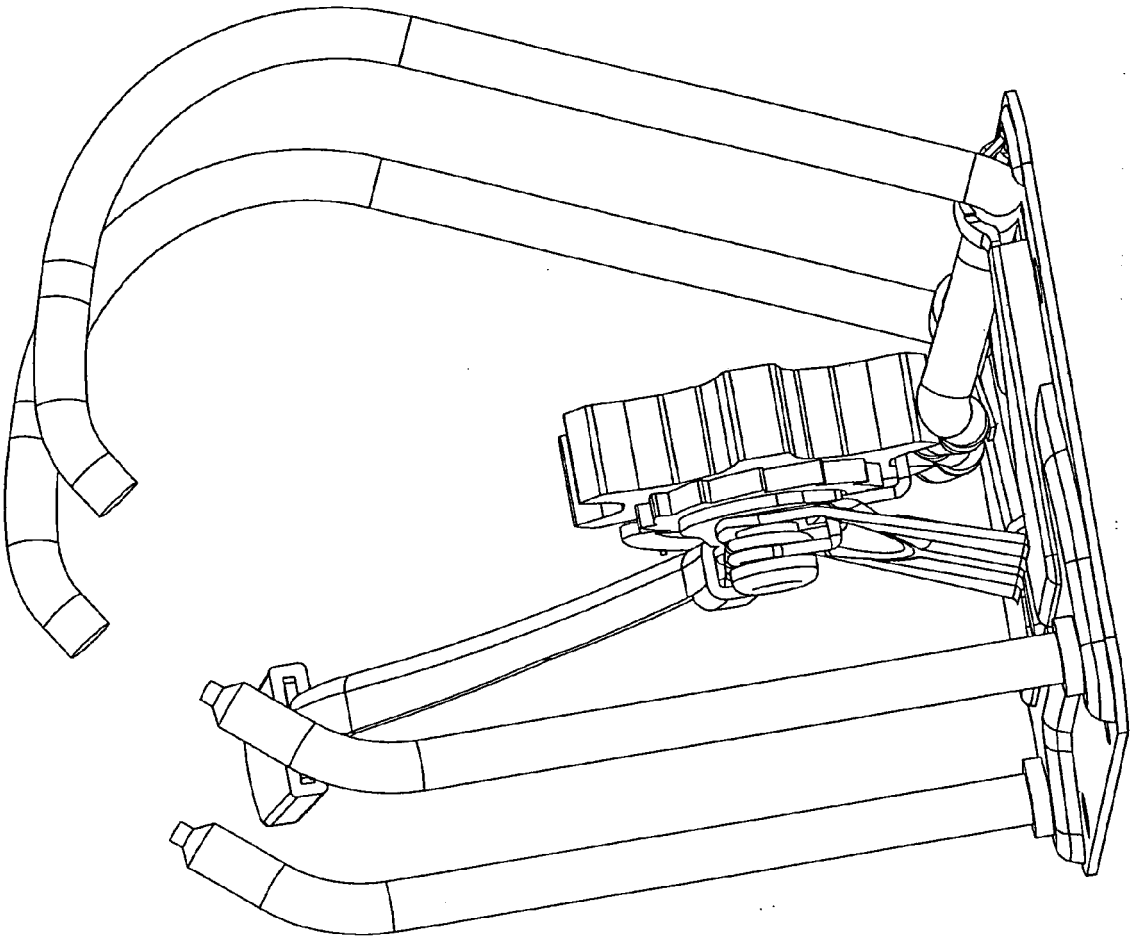


Fig. 48

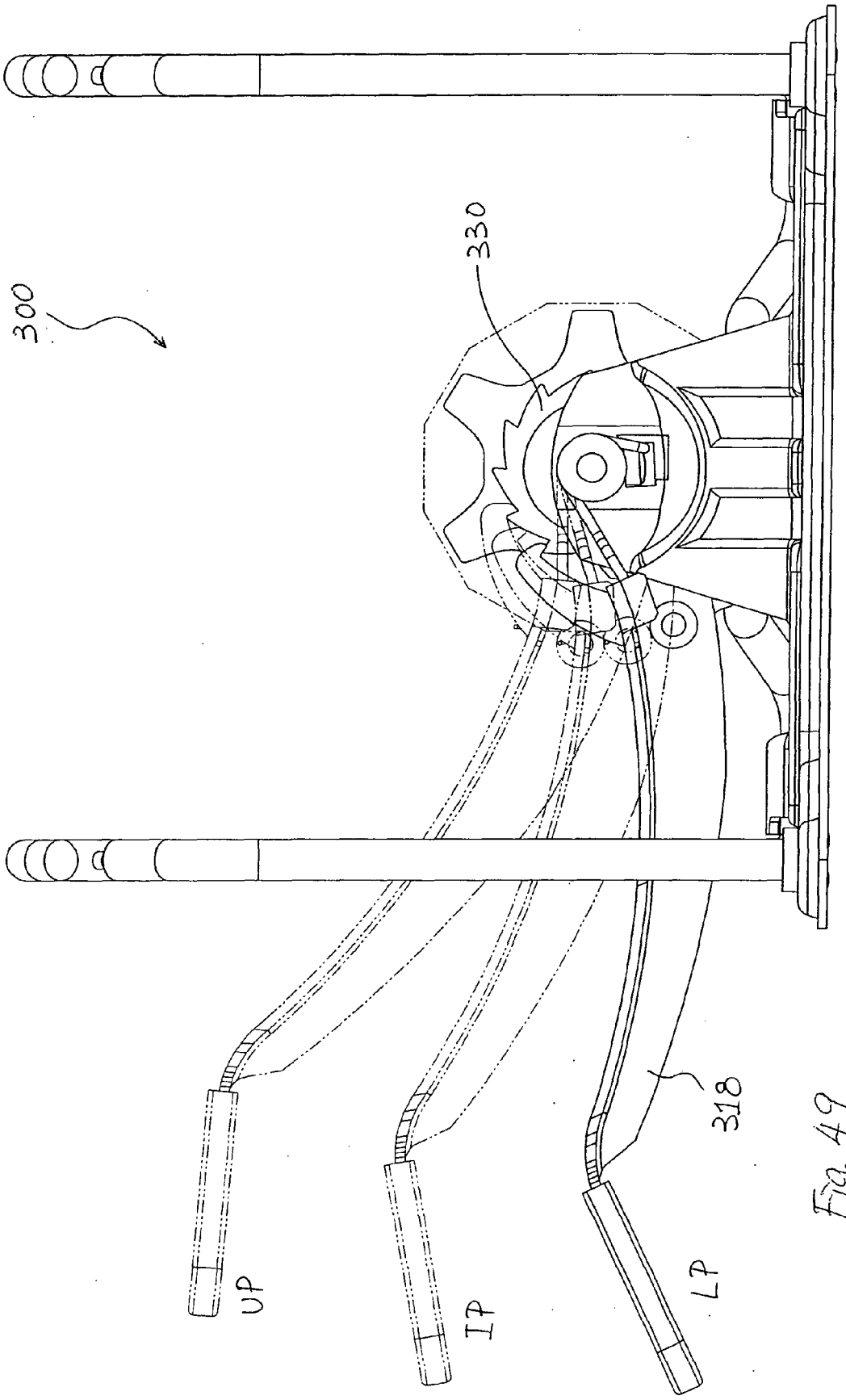


Fig. 49

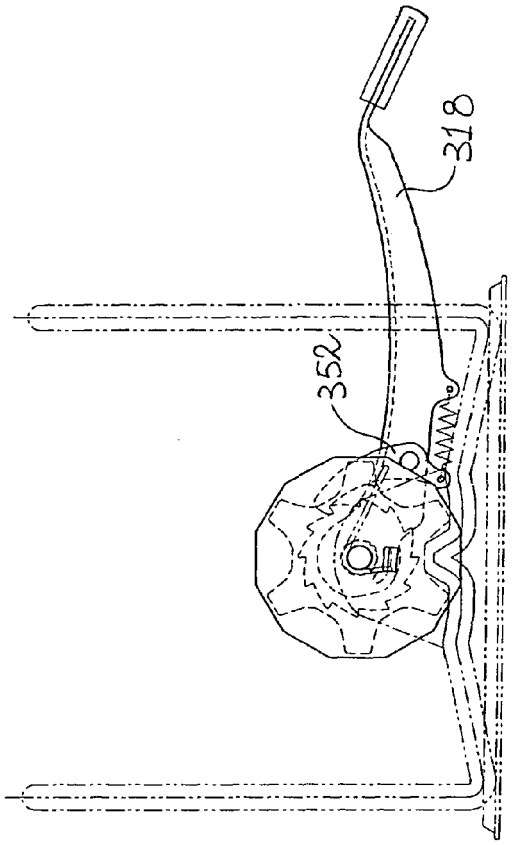


Fig.50B

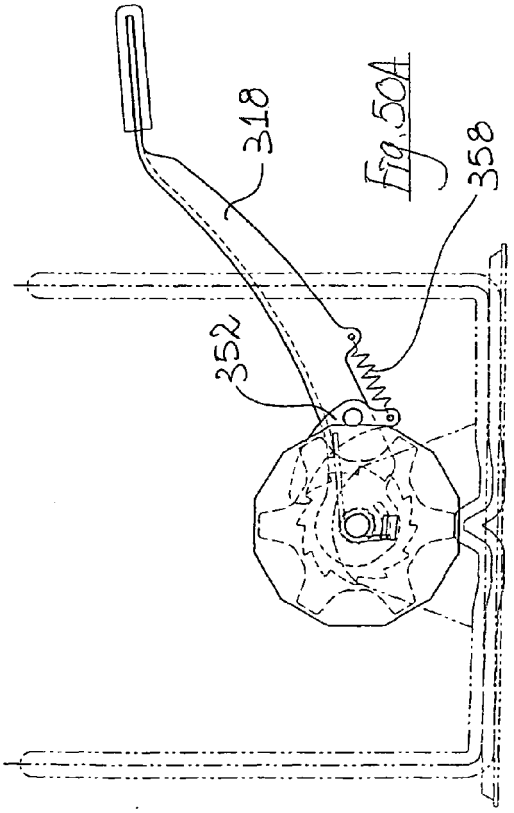


Fig.50A

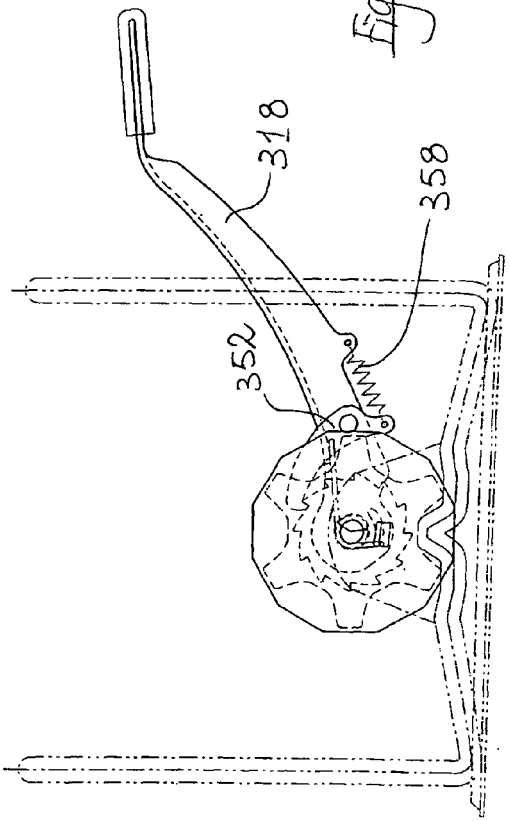


Fig.50C

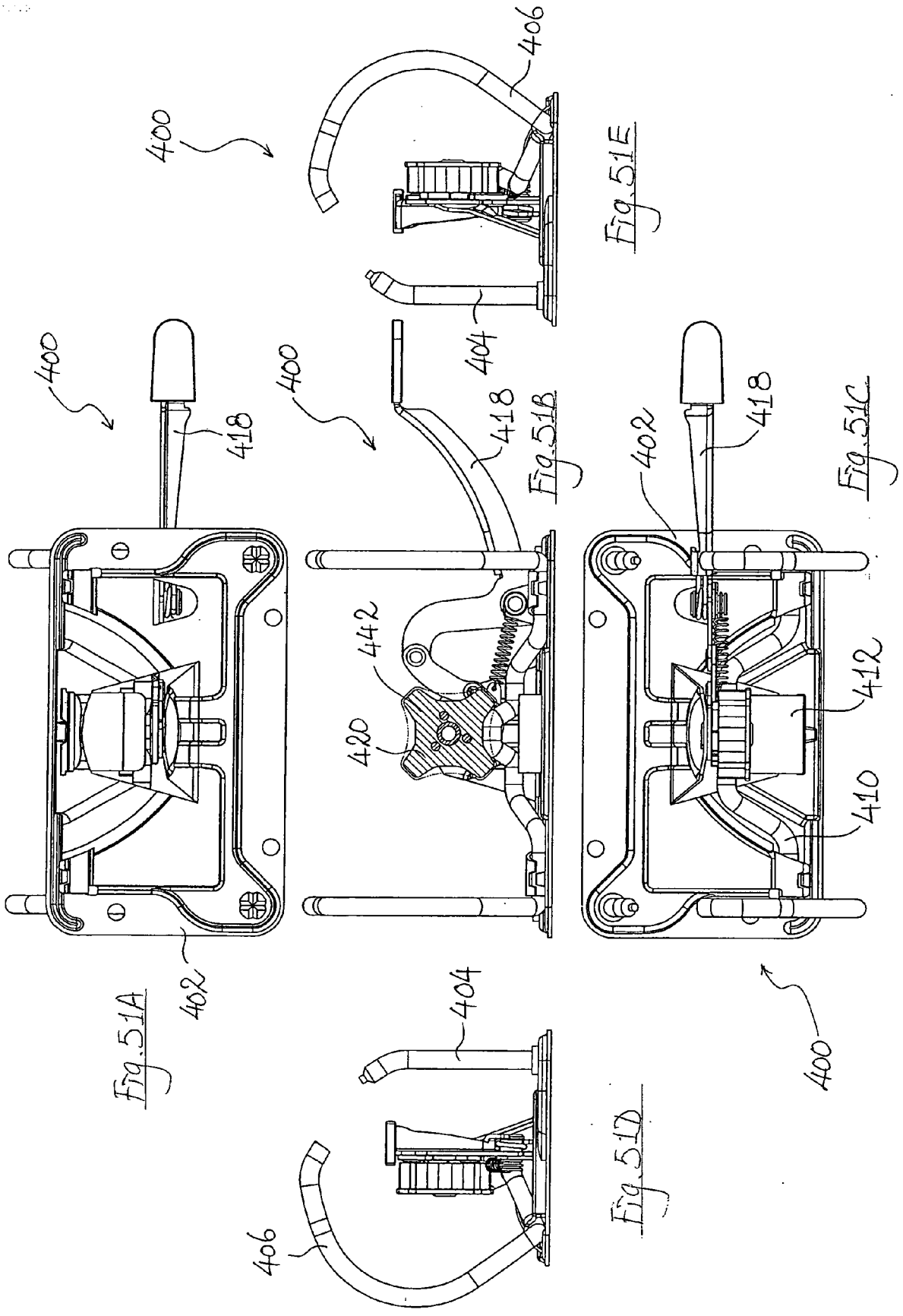


Fig.51A

Fig.51B

Fig.51C

Fig.51D

Fig.51E

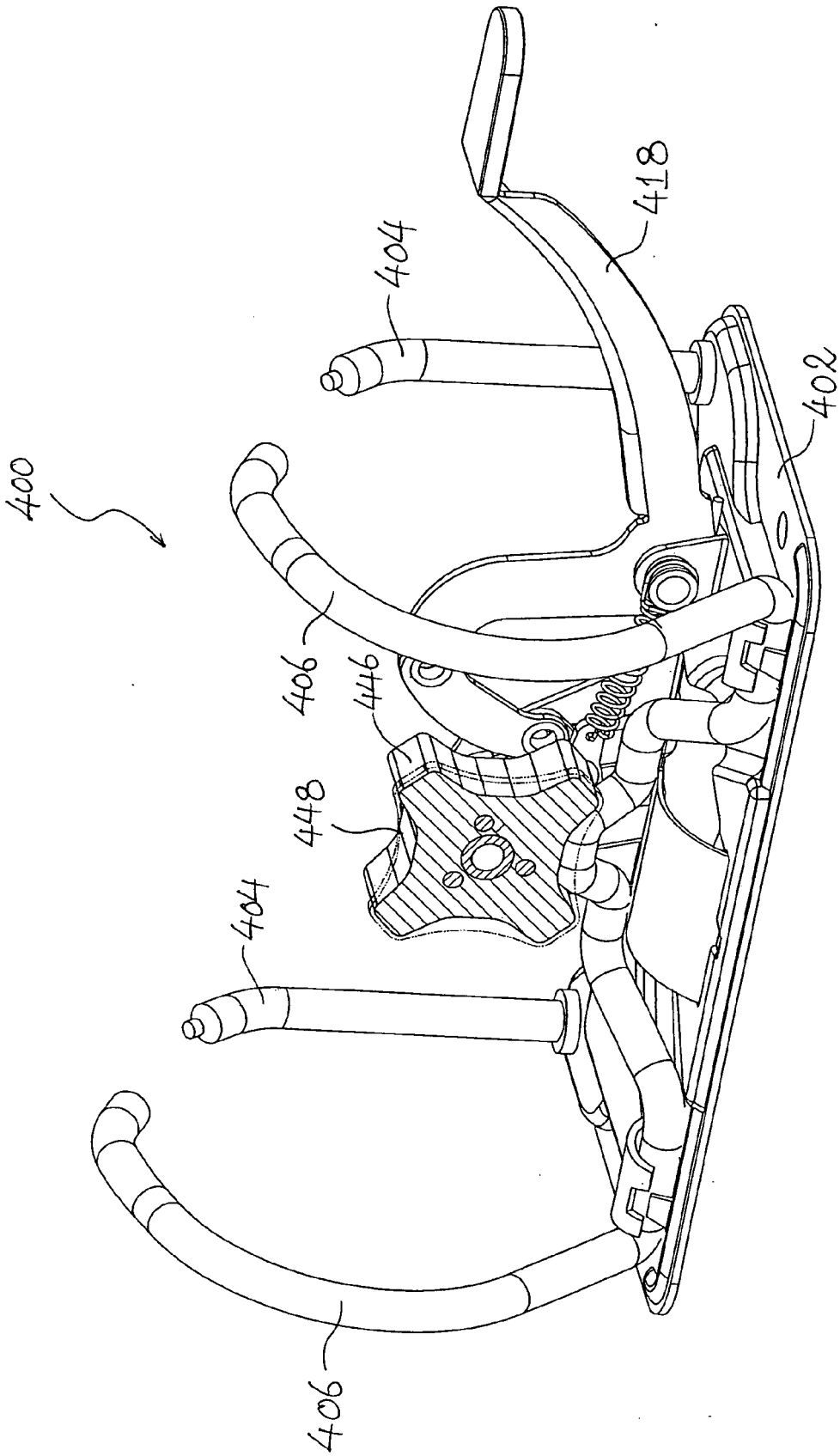


Fig.52

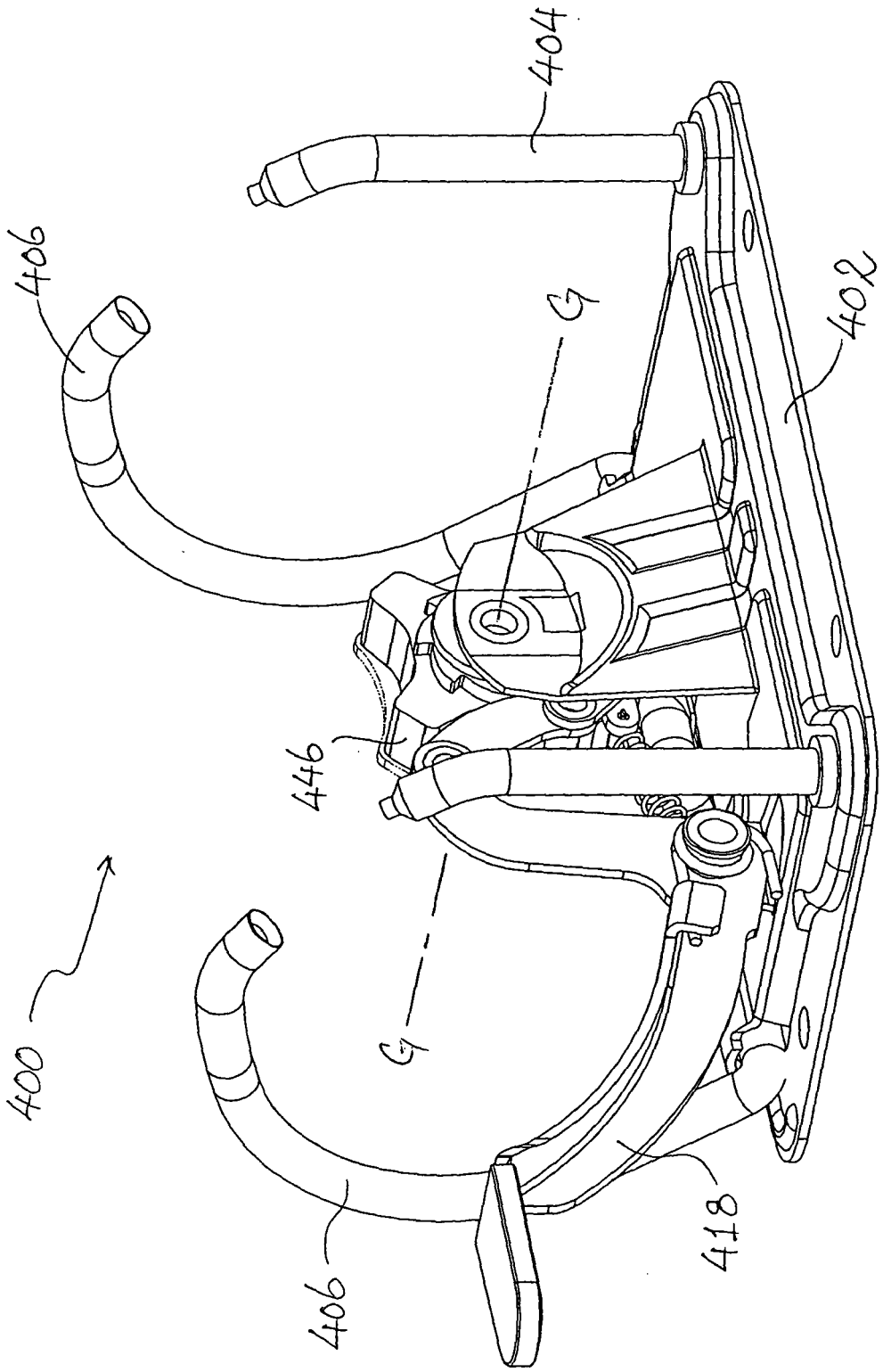


Fig. 53

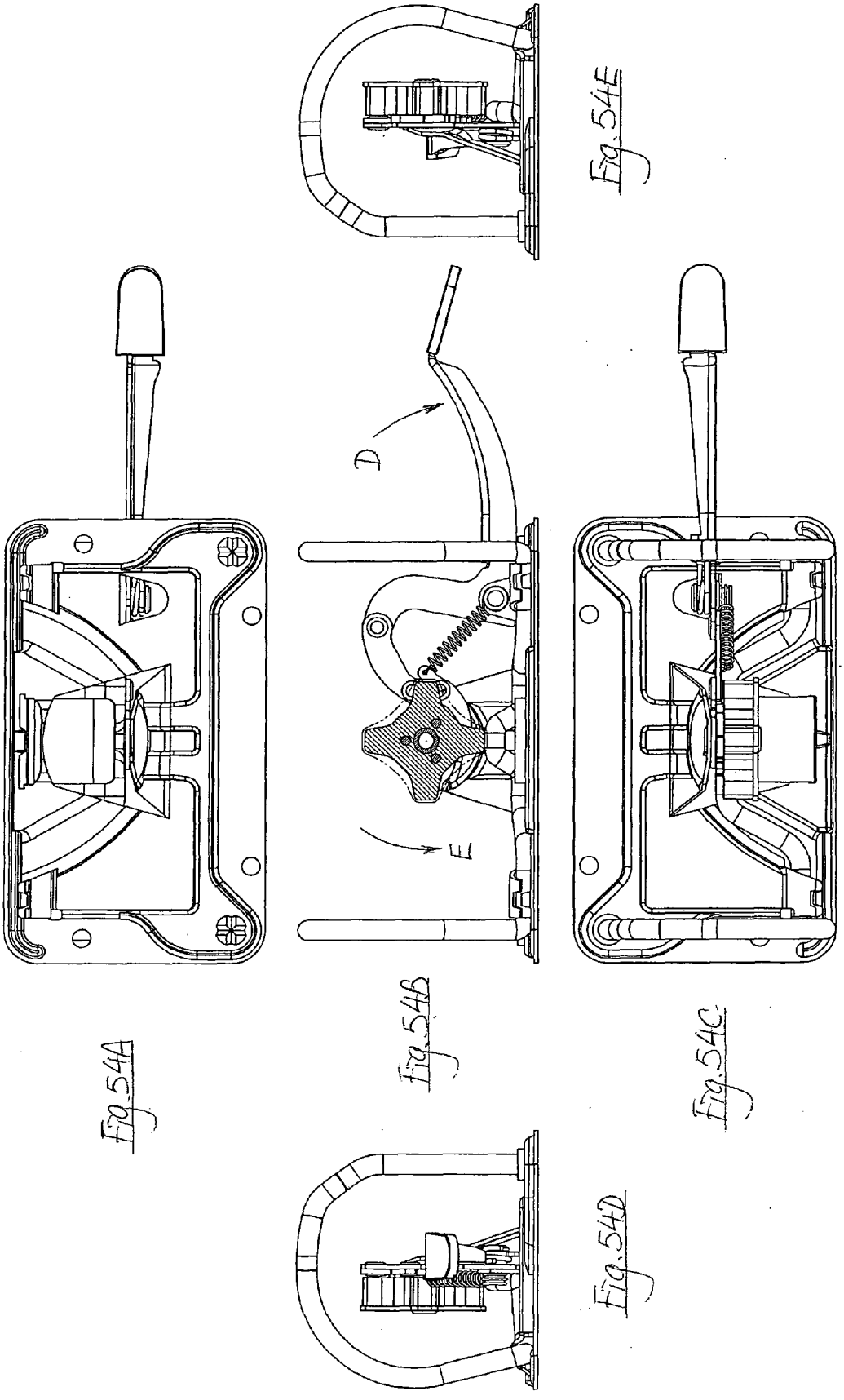


Fig.54A

Fig.54B

Fig.54C

Fig.54D

Fig.54E

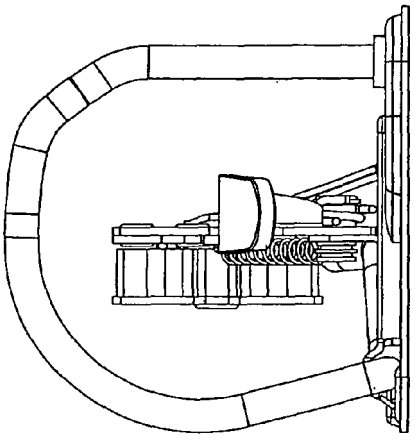


Fig.55B

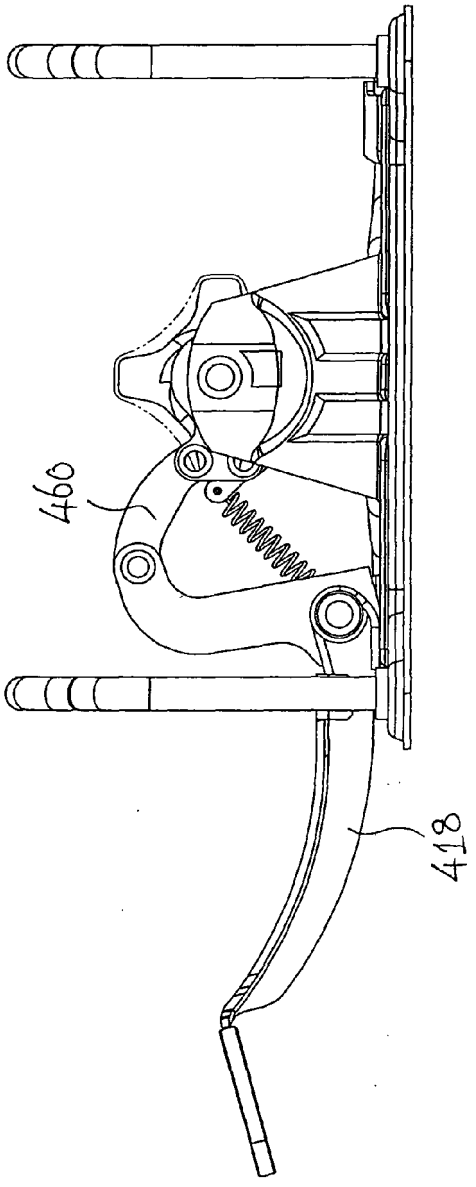


Fig.55A

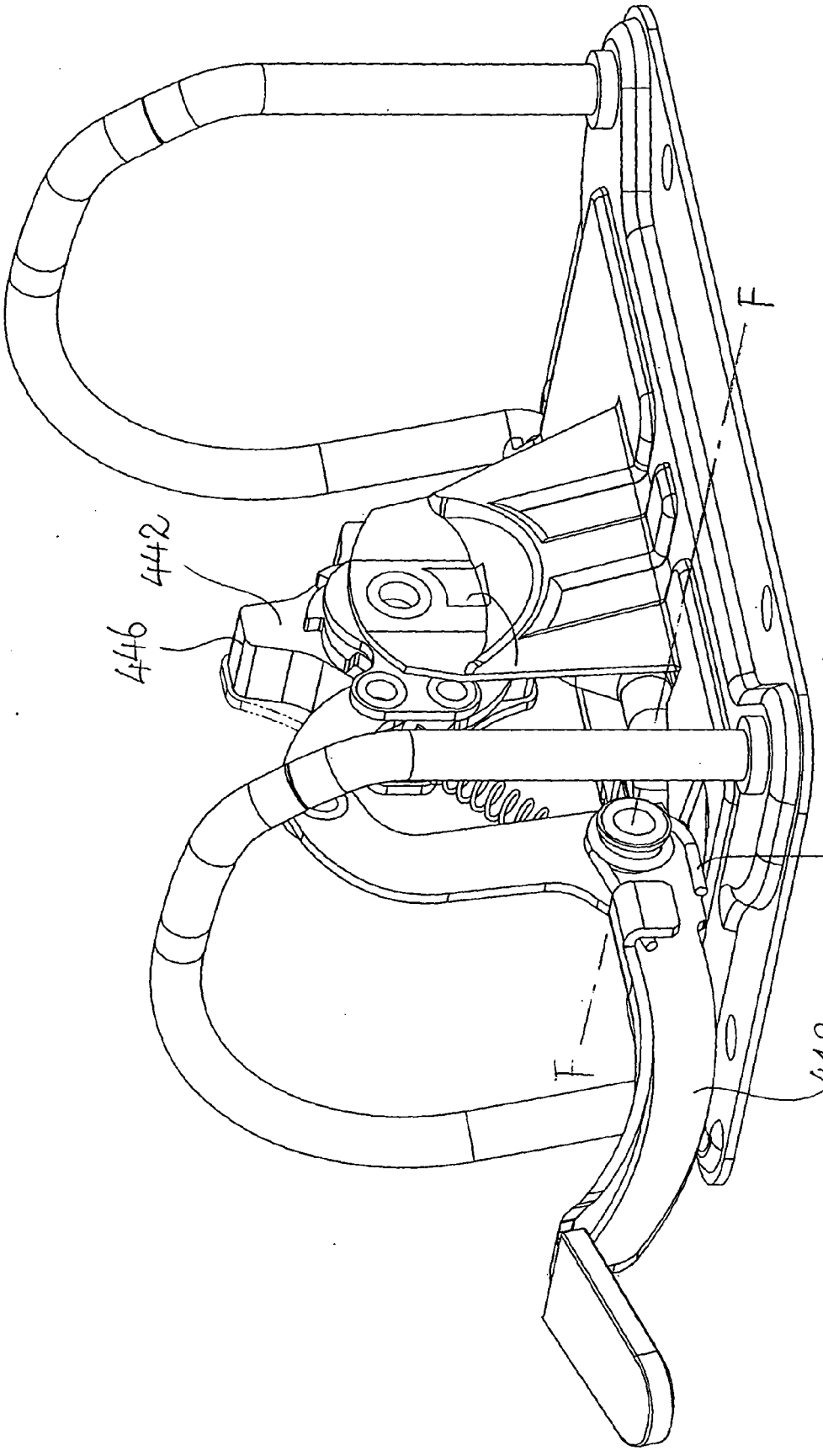


Fig.56

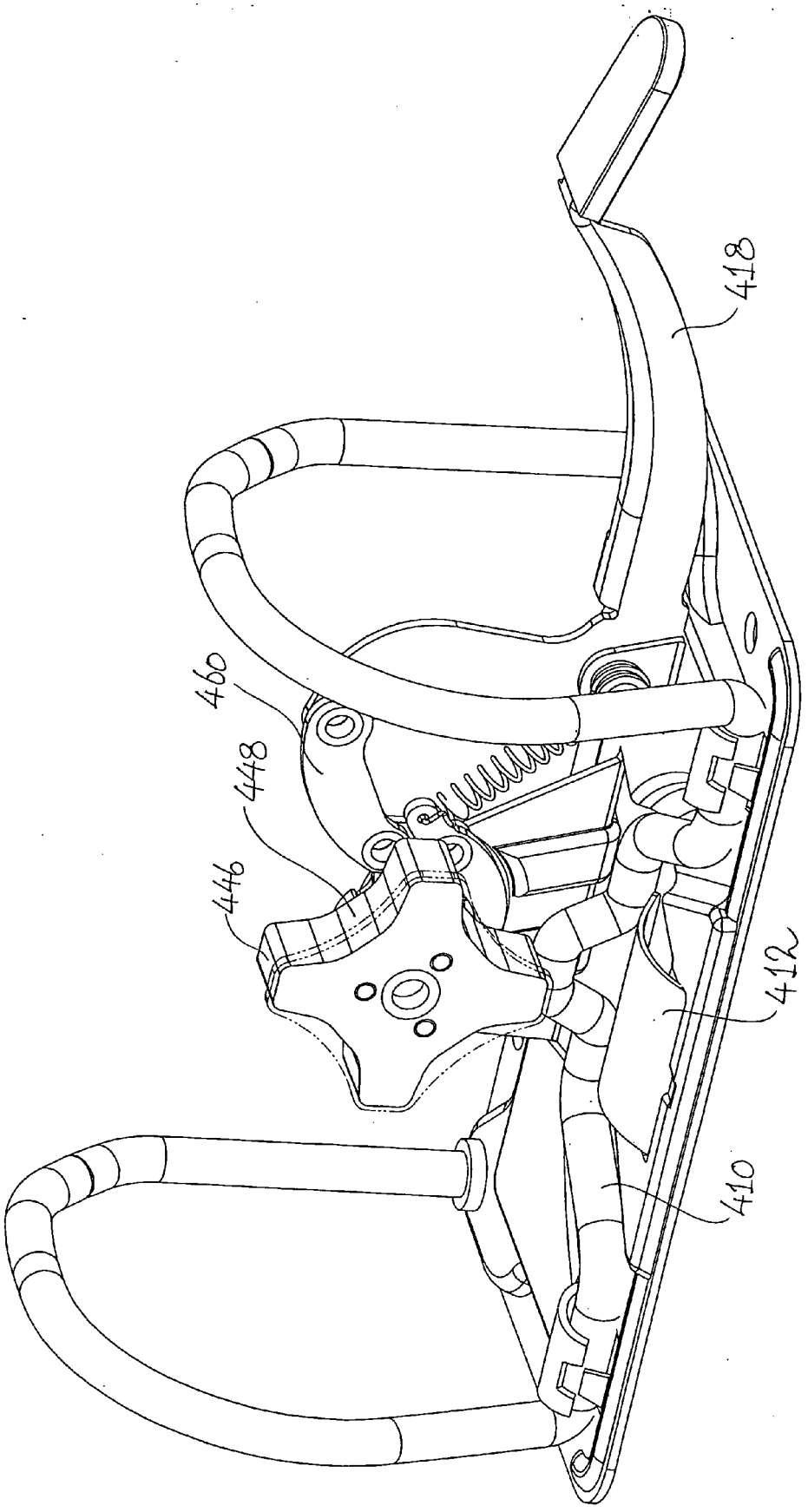


Fig. 57

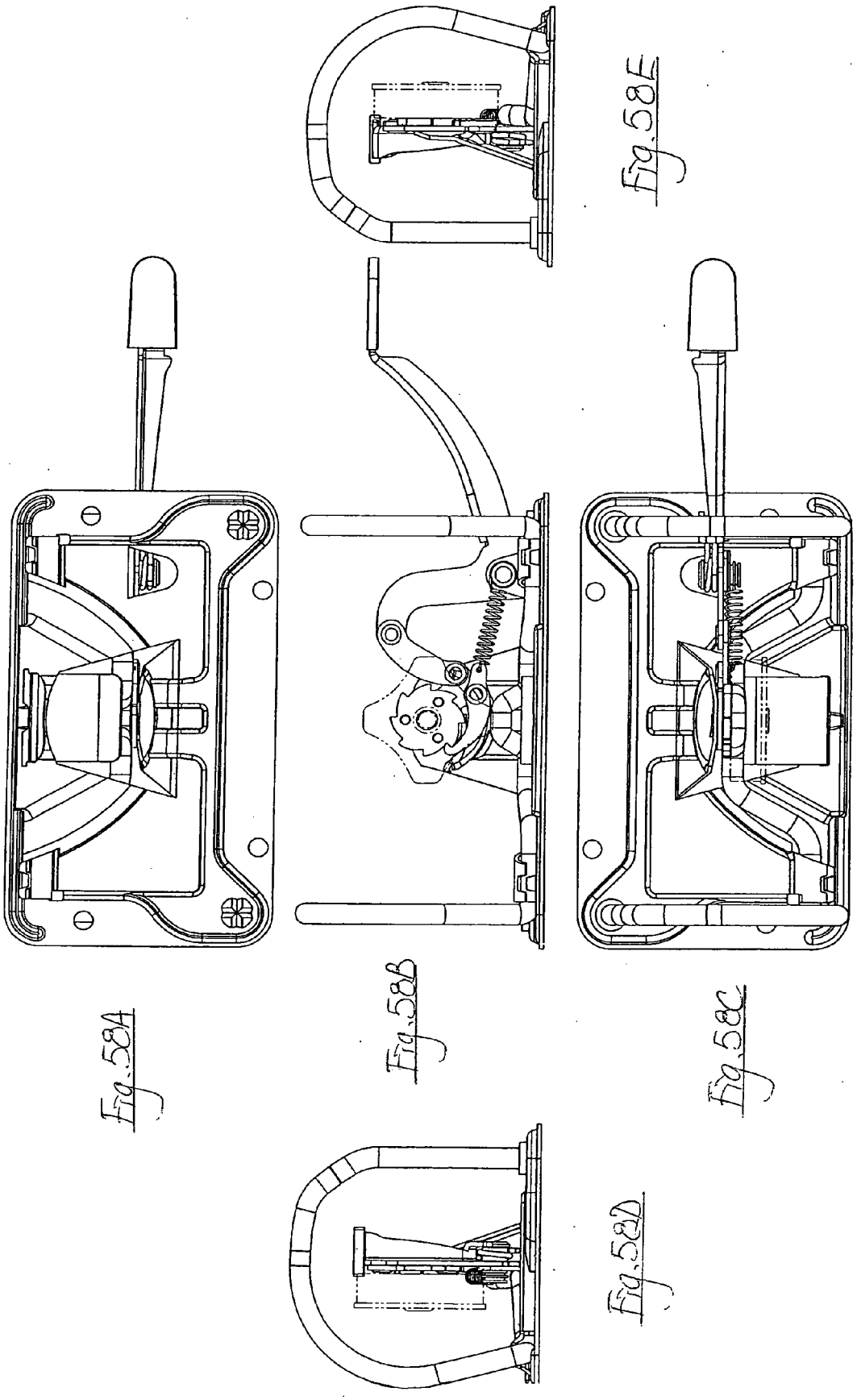


Fig.58A

Fig.58B

Fig.58C

Fig.58D

Fig.58E

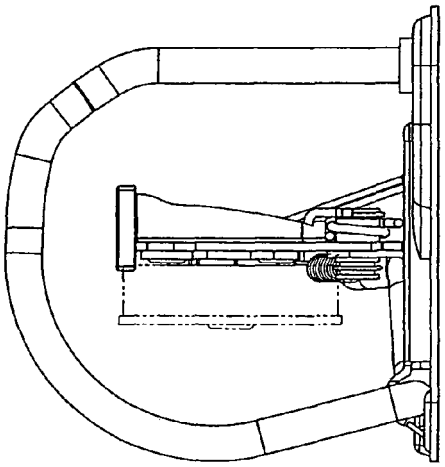


Fig.59B

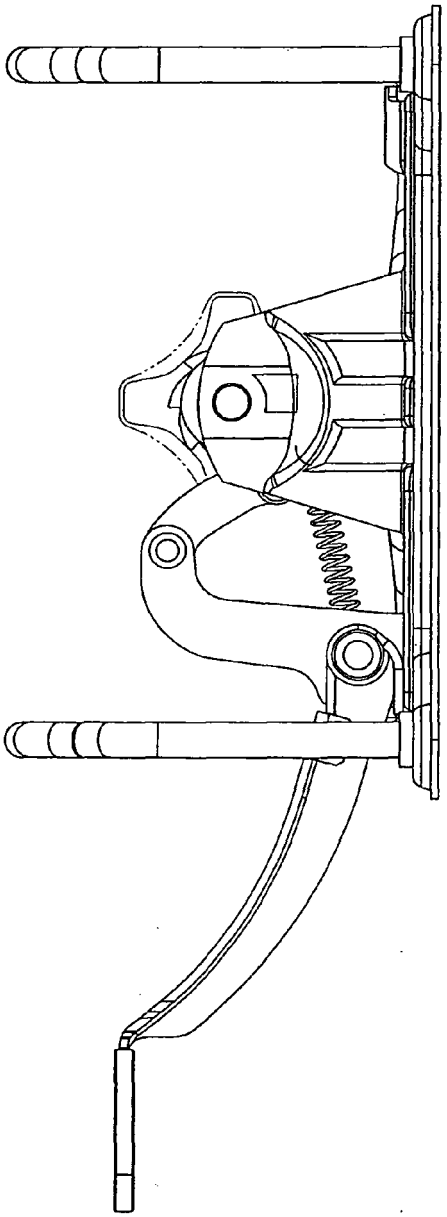


Fig.59A

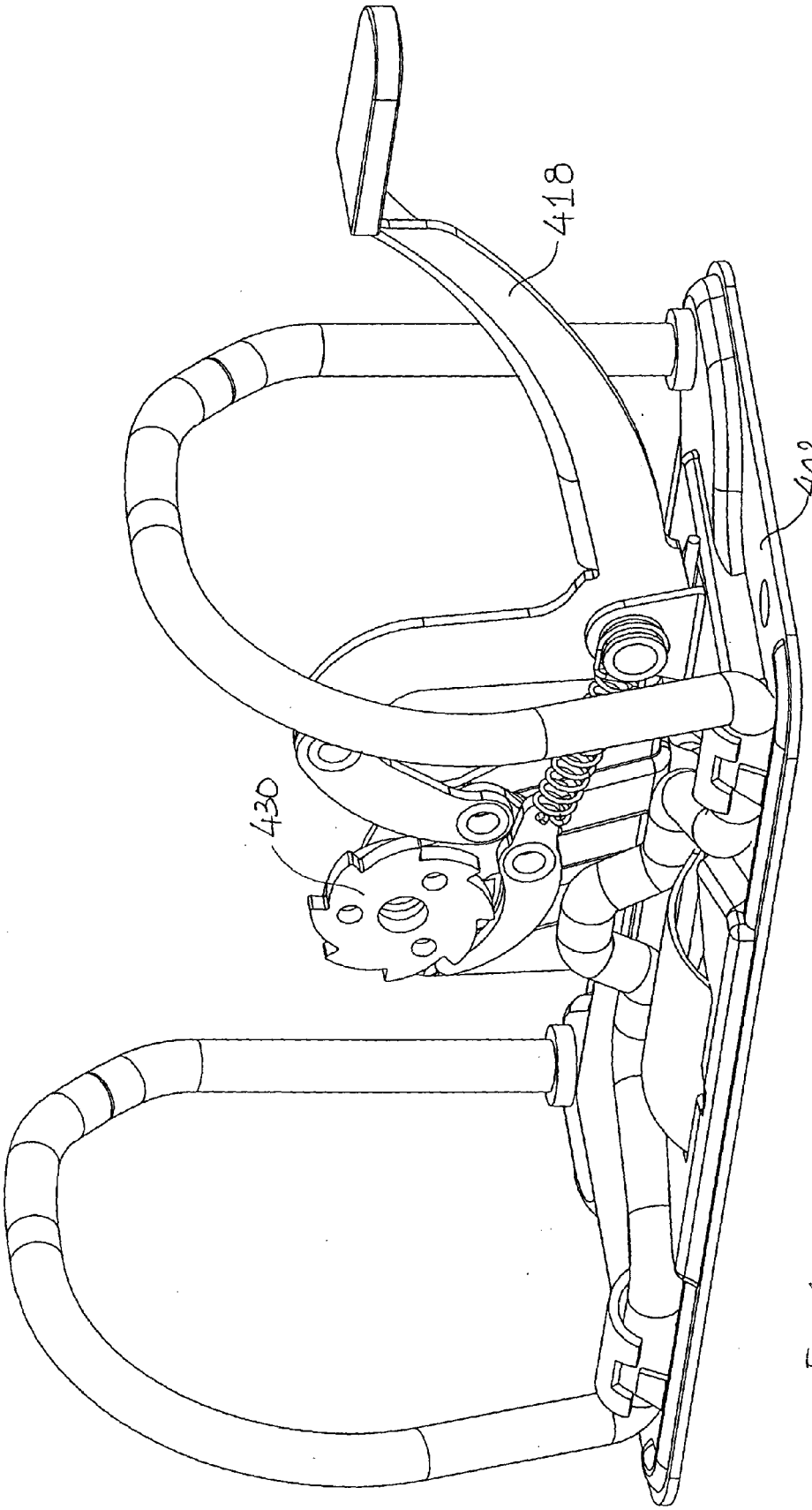


Fig. 60

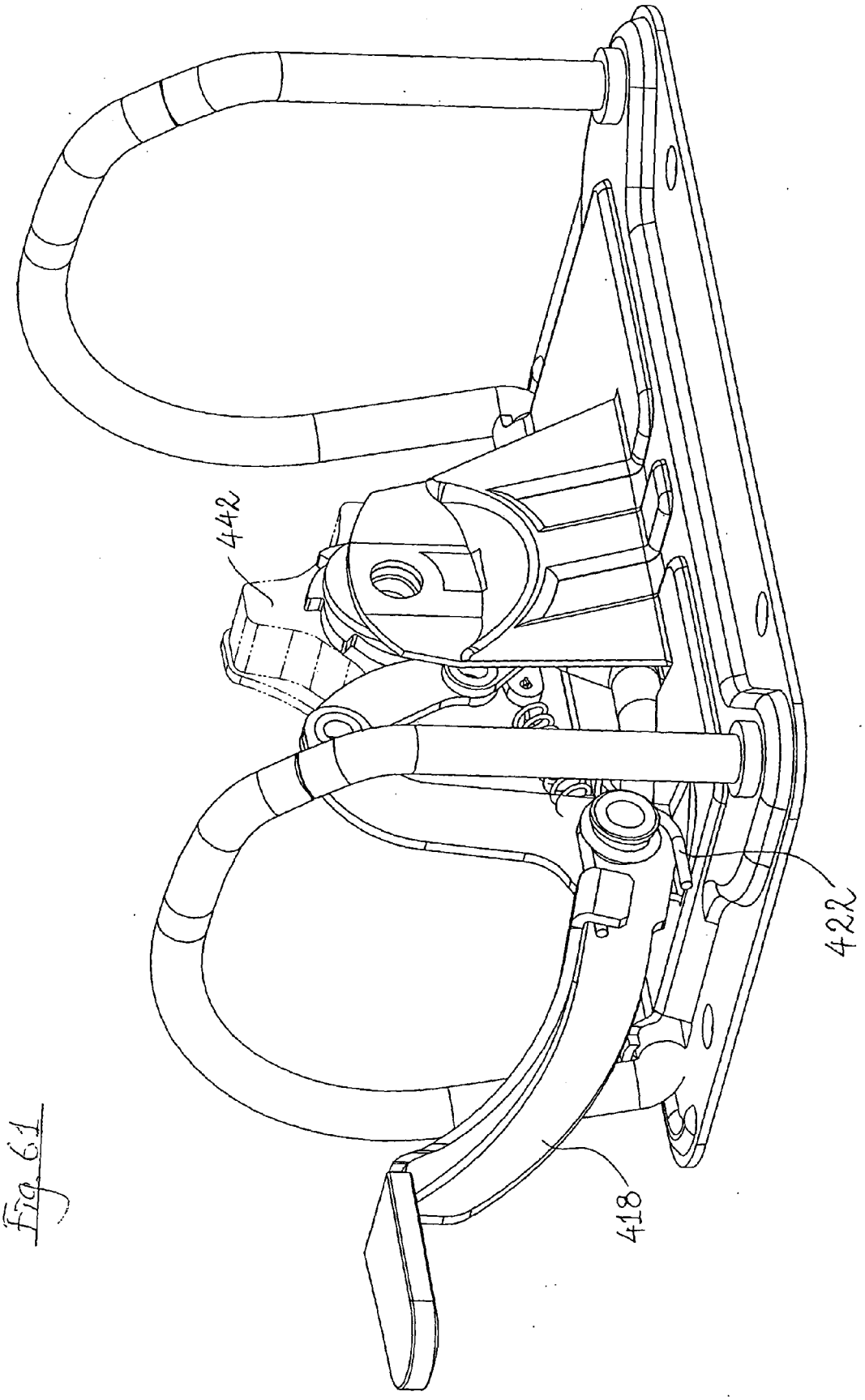


Fig. 61

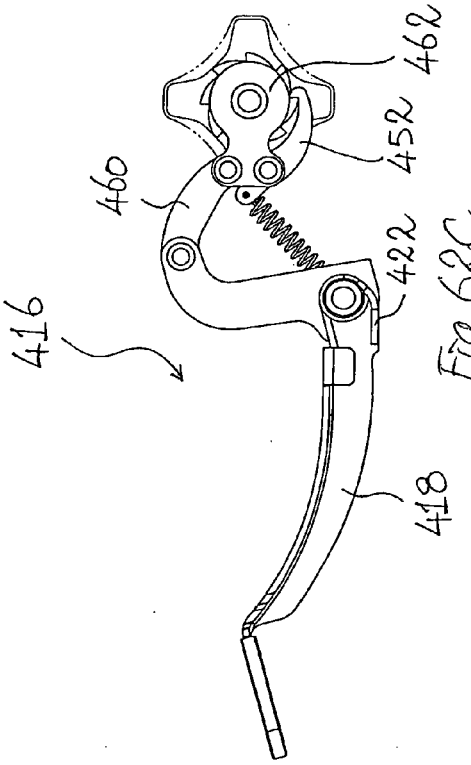


Fig.62C

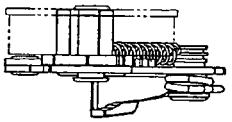


Fig.62B

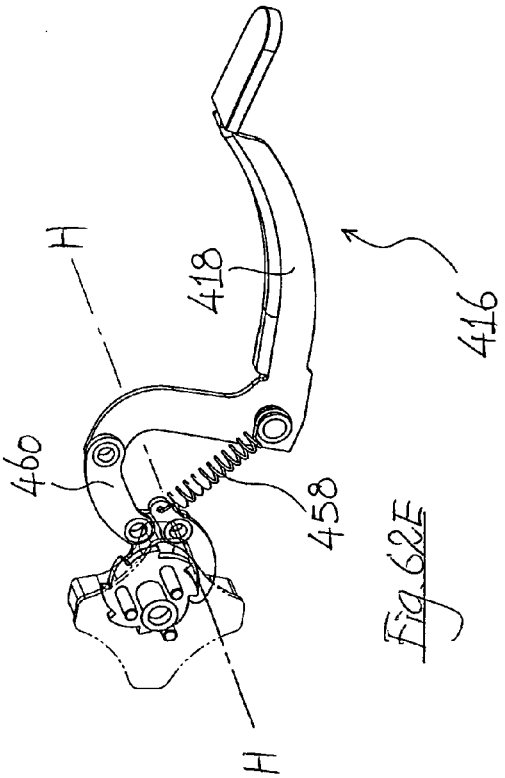


Fig.62E

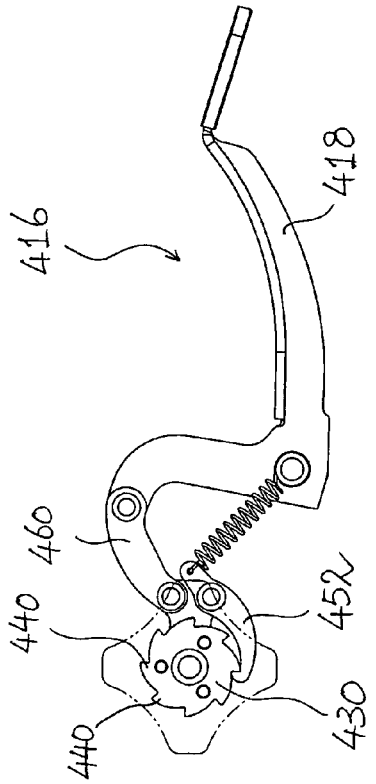


Fig.62A

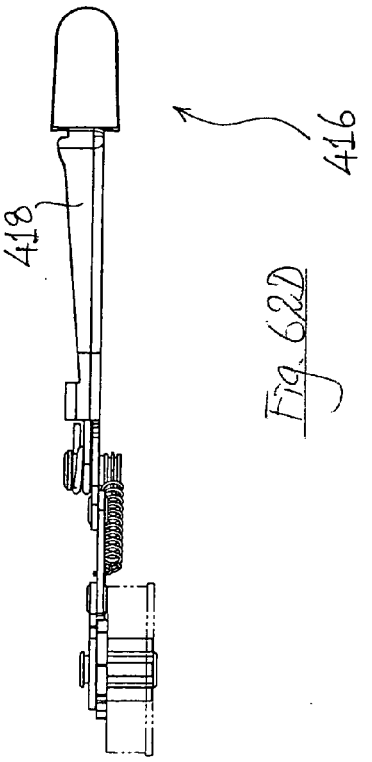


Fig.62D

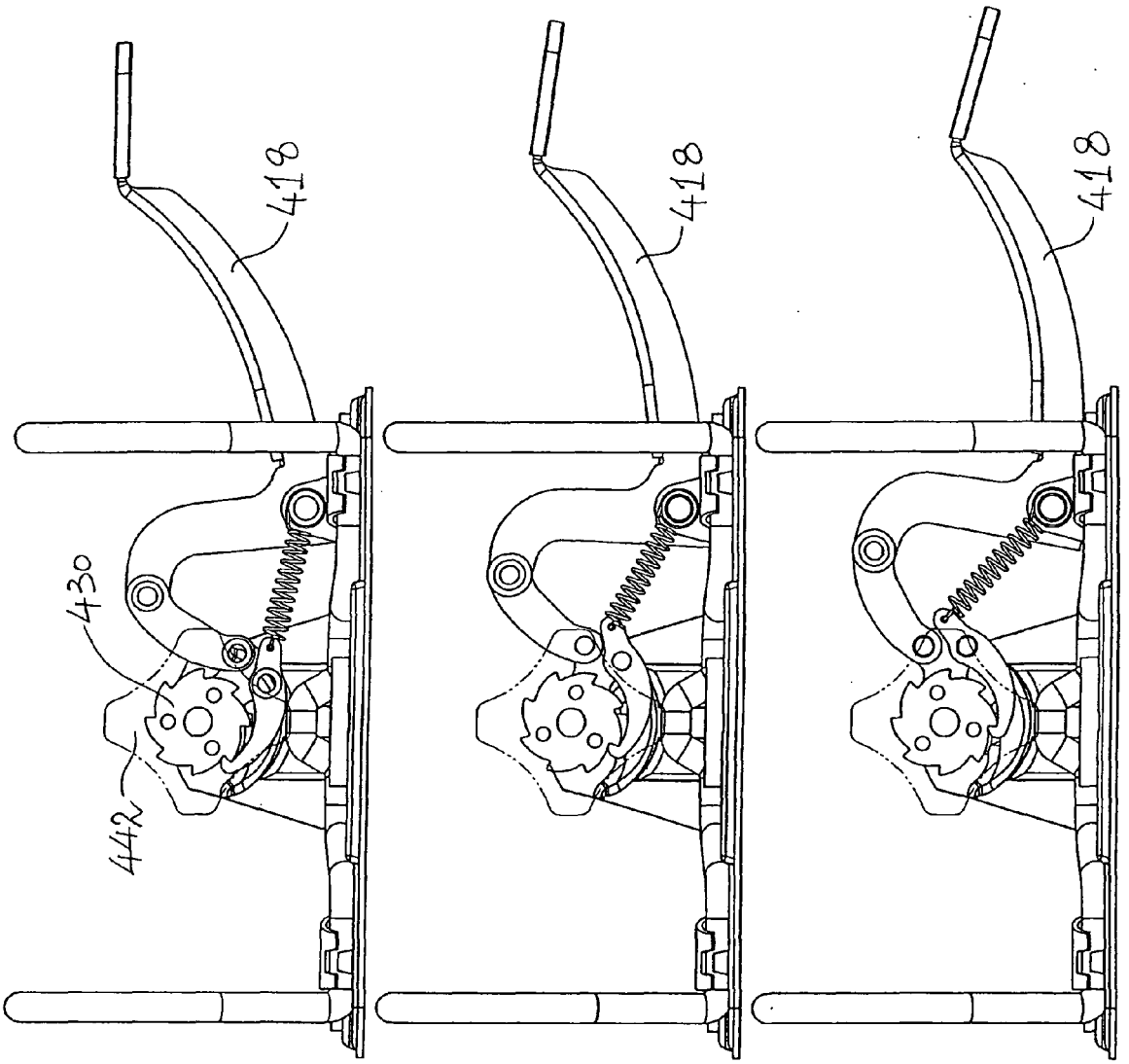


Fig. 63A

Fig. 63B

Fig. 63C

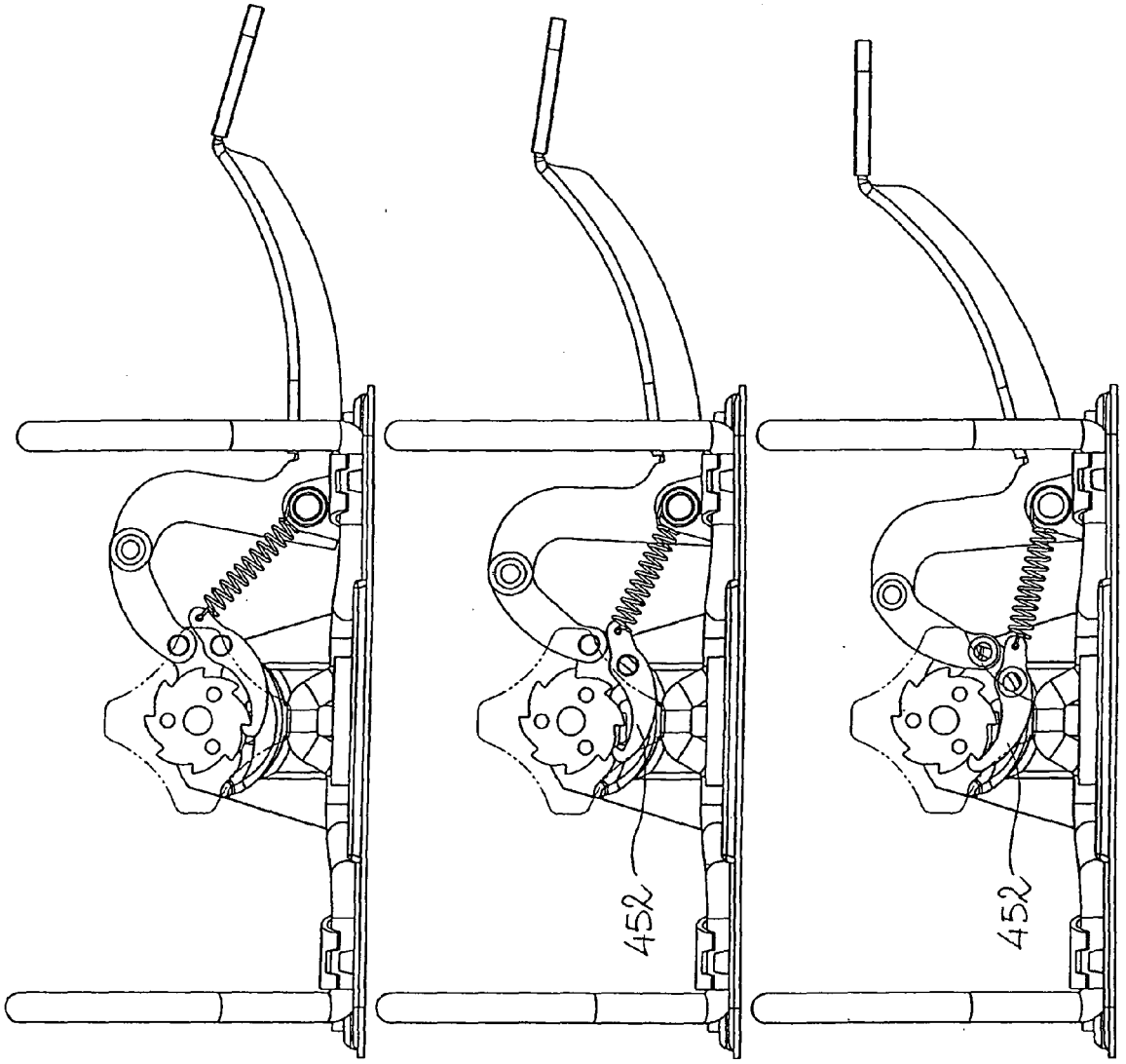


Fig. 64A

Fig. 64B

Fig. 64C

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 09 00 1138

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2 894 400 A (MATHIAS BONN) 14 July 1959 (1959-07-14) * column 2, line 20 - column 3, line 50; figures *	1,2	INV. B42F13/24
X	WO 01/56810 A (ZUST EDUARD [CH]; HUG MAX [CH]) 9 August 2001 (2001-08-09) * page 8, line 12 - page 9, line 21; figures 3,4 *	1,2	
X	US 2 494 898 A (REA CHARLES C) 17 January 1950 (1950-01-17) * column 1, line 46 - column 3, line 46; figures *	1,2	
A	GB 663 058 A (ROBESIO PEDANTE; CESARE TORRICELLA) 12 December 1951 (1951-12-12) * page 2, line 80 - page 2, line 90; figures *	1-13	
			TECHNICAL FIELDS SEARCHED (IPC)
			B42F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	19 March 2009	Louvion, Bernard

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

EPO FORM 1503 03.82 (P04C01)

4

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 09 00 1138

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

19-03-2009

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2894400 A	14-07-1959	BE 538548 A	
		BE 545035 A	
		CH 336800 A	15-03-1959
		CH 339180 A	30-06-1959
		DE 1076082 B	25-02-1960
		FR 1140360 A	19-07-1957
		FR 1146768 A	14-11-1957
		GB 815108 A	17-06-1959
		GB 779384 A	17-07-1957
		NL 101809 C	
		US 2894513 A	14-07-1959
WO 0156810 A	09-08-2001	AU 2141001 A	14-08-2001
US 2494898 A	17-01-1950	NONE	
GB 663058 A	12-12-1951	NONE	

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82