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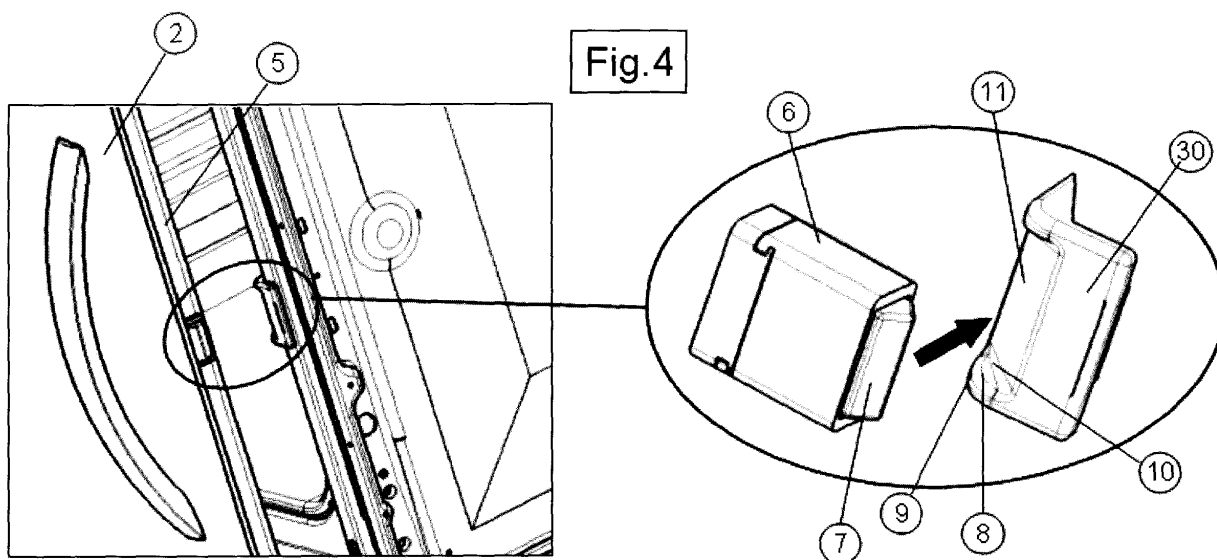
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(54) **Improvement in the door closing device of a cooking oven**

(57) The present invention refers to a cooking oven, which is provided with a cooking cavity and a related door hinged on a vertical side edge thereof, a door locking device located on a vertical front corner edge of the cooking cavity, an engagement or latching device attached to the corresponding vertical corner edge of the door and comprising a fixed member connected to the vertical corner edge of the door, a latch elastically engaging a receptacle provided in the fixed member and adapted to slide therein so as to be able to both be introduced in said fixed member and protrude therefrom.

The recessed locking device comprises a first lower portion with an outwardly opening surface having a triangular shape, which is positioned so as to feature an outer edge and an opposite inner side, and which is inclined on the horizontal plane with a slope descending from the inner side towards the opposite outer edge; it further comprises a vertical surface extending through said inner side, and an inner recess provided behind said first portion. The purpose of said triangular surface sloping on the horizontal plane is to enable the door to automatically rise and move into alignment as it is being closed.



Description

[0001] The present invention refers to an improved kind of oven for cooking food, preferably intended for home use, comprising a laterally opening door for gaining access into and closing the cooking cavity of such oven.

[0002] While reference is specially made throughout the following description to a food cooking oven of the built-in type, it will nevertheless be appreciated that what is being explained, illustrated and generally set forth in the same specification shall be understood as equally applying to - and thus used in - food cooking oven that is integrated in a free-standing cooking appliance that includes both a cooking oven and a cooking surface, i.e. a cooktop.

[0003] The ovens, which the present invention refers to, are largely known as such in the art, as they are for instance described in the European patent application no. 07107936.2, to which reference should therefore be made for greater convenience and reasons of brevity.

[0004] The actual problem addressed and solved by the present invention concerns the possibility for the oven door to sink relative to, or either prove difficult to initially move into a perfectly lined-up, well-centered relationship with the aperture of the cooking cavity, which it is intended to close.

[0005] It may in fact occur that the door is assembled in such manner as to cause it to be poorly centered, in the sense that it turns out to be slightly inclined on the horizontal plane; this would of course give rise to the practical drawback deriving from the fact that the matching parts forming the door lock, i.e. the door locking parts or members, which are due to come into a perfect mutual alignment between the side edge of the door and the corresponding side edge of the cooking cavity of the oven, turn eventually out as being out of alignment relative to each other and this gives rise to clear difficulties when trying to close the door, or even makes it plainly impossible for the same door to be closed at all.

[0006] In a still worse case, it may occur that such out-of-alignment condition of the oven door takes place in the field, where the oven has been used for a certain time, thereby making it necessary for a serviceman to be called in view of having the problem removed by restoring the aligned condition of the door.

[0007] Known from the disclosure in the German utility model no. DE 20 2004 003 995 U1 is a solution aimed at ensuring the centered condition of a laterally hinged oven door by means of one or more appropriately shaped supports provided along the lower edge of the access aperture into the cooking cavity.

[0008] Although effective, such solution has however a couple of main drawbacks, i.e.:

- a first drawback derives from the fact that such supports are made up by kind of "wedges", or shims, lying exposed to the sight of the user; this generates a clear impression of precariousness and poor qual-

ity, which is of course a particularly undesired fact in the case of ovens that are sold on the market as even quite sophisticated appliances capable of combining various different cooking modes, provided with advanced electronic programming and control means, featuring an elaborate stylish design, and so on;

- a second drawback lies in the fact that the above-cited solution may even occur to eventually prove or become inadequate, since said supports can in fact be quite easily removed and, anyway, for them to be able to work in the intended manner, they must intervene on, i.e. interfere with the closing travel of the door when the latter is still sufficiently open, thereby proving of hindrance to and braking the final part of the closing motion of the door.

[0009] It would therefore be desirable, and it is actually a main purpose of the present invention, to provide an oven for food cooking applications provided with a side-hinged door, in which the above-noted drawbacks are effectively done away with, and in which the parts making up the door lock arrangement are reliably allowed to automatically move into mutual alignment when the door is being closed.

[0010] According to the present invention, these aims, along with further ones that will become apparent from the following disclosure, are reached in a kind of food cooking oven provided with a sidewise opening door that incorporates the features and characteristics as defined and recited in the appended claims.

[0011] Advantages and features of the present invention will anyway be more readily understood from the description that is given below by way of non-limiting example with reference to the accompanying drawings, in which:

- Figure 1 is a perspective outer view of a half-open oven door and the related devices according to the present invention;
- Figure 2 is an outer perspective view of a side of a first device according to the present invention;
- Figure 2A is an exploded view of the parts making up the device shown in Figure 2;
- Figures 2B and 2C are median horizontal cross-sectional views of the device shown in Figure 2 in two operative states thereof, respectively;
- Figures 3 and 3A are respective views of a second device according to the present invention, as shown in two different outer perspective views thereof;
- Figure 4 and the associated enlarged outsert are outer perspective views of the devices according to the

present invention, as shown in the phase during which the door is being closed, however prior to its being fully shut;

- Figures 5A, 5B and 5C are views of the devices according to the present invention in three successive operative states thereof, respectively;
- Figures 6A, 6B and 6C are median horizontal cross-sectional views of the devices to the present invention in the states as they are shown in the corresponding Figures 5A, 5B and 5C, respectively;
- Figures 7 and 8 are plan elevational views from a point located inside the cooking cavity, i.e. from the inner side of the door, of the two corresponding positions of the door illustrated in Figures 5A, 6A and Figures 5C, 6C, respectively.

[0012] With reference to Figure 1, a food cooking oven according to the present invention comprises a cooking cavity 1 capable of being closed by a door 2 that is hinged on an upright side edge (not shown) thereof, and

a) a recessed catching or locking device 30 located on the front upright side edge 3 of the cooking cavity, which most obviously lies opposite to the upright side edge on which the door is hinged, and

b) an engagement or latching device 4 attached to the outer side edge 5 of the door and adapted to engage said catching or locking device to retain the same door in the closed condition thereof.

[0013] With reference to Figures 2, 2A, 2B and 2C, the above-cited engagement or latching device 4 comprises a fixed member 6 that is firmly joined to said side edge 5 of the door, and a latch 7 that is capable of elastically sliding in a housing or accommodation provided within said fixed member 6 in a manner largely known as such in the art.

[0014] Said latch 7 can take, i.e. move into a plurality of different positions, among which a first position, as illustrated in Figure 2B, in which said latch is substantially introduced in said fixed member 6, and a second position, as illustrated in Figure 2C, in which said latch is substantially protruding with an outer portion thereof, which shall be illustrated and described in greater detail further on.

[0015] With reference to Figures 4, 5A, 5B, 5C, said recessed locking or catching device comprises in turn an outer portion and an inner portion; the outer portion has a bottom or lower surface 8, which is accessible from outside, and which is so positioned as to feature an outer edge 9 and an inner side 10 opposite thereto, wherein said surface has a substantially triangular shape and is inclined on the horizontal plane with a descending slope from said inner side 10 towards said outer edge 9 opposite thereto; the area above said inclined surface 8 is

void, since it is due to accommodate the latch 7 as it fits thereinto.

[0016] From said inner side 10 there rises a vertical planar surface 11 that delimitates said upper zone, into which the latch 7 is due to fit, at both sides thereof. The latch 7 itself may be provided in a variety of different shapes. As shown in Figures 2, 2B and 2C, however, it is advantageously in the shape of a wedge, with an upright corner edge 12 dividing two opposite upright planar sides 13 and 14 from each other.

[0017] The inward facing side 13 is so oriented as to be able to couple in an almost parallel manner with said planar surface 11, so that, as the door is being closed, it is pressed by said surface with a substantially orthogonal force, thereby facilitating its being inserted in the fixed member 6.

[0018] With reference to Figures 5A, 5B, 7 and 8, the lower side 15 of said latch 7 is a planar one and is arranged at such height, relative to said inclined bottom surface 8, as to cause said lower side 15 of the latch 7 to come into interference with said inclined bottom surface 8 when the door is being closed; as a reaction thereto, the entire latch is urged upwards and, as a result, such reaction is passed on to the fixed member 6 and, from the latter, to the whole door, thereby raising it to the desired extent, i.e. by the desired amount.

[0019] It will be appreciated that the just described devices shall of course be so positioned relative to each other - as far as their height is concerned - as to ensure that, when the door is positioned in the correct manner, said latch is able to fit into said upper zone, or void space above the bottom surface, and the inward facing side 13 thereof couples up with said upright planar surface 11 without any interference occurring therewith, since there is no need in this case for the inclination of the door to be corrected, actually. Quite at the contrary, if the door is undesirably inclined downwards with its edge 3, then the afore-cited interference would enable the required correction to automatically occur by a pre-established amount, i.e. to a pre-established extent, while this would anyway take place solely in the final phase of the door closing travel (Figures 5B, 5C, 7).

[0020] Basically, and with particular reference to Figures 5B and 8, the present invention is based on the fact that, with the above-described configuration, the lower extremities of an inner recess 20 and an upright corner edge 22 are positioned at the same height as the highest inner point 16 of said inclined surface 8.

[0021] The inner portion of said locking or catching device has an outwardly opening recess 20 that is sized and positioned so that, when the door is brought into its fully closed position, said latch is able to correctly fit into it and engage it in a stable and firm manner.

[0022] To such purpose, the outward facing upright side 14 of said latch is in turn oriented so that, when inserted in said recess 20, it couples up in an adequately angled manner with the side 21 of the same recess that is facing the front side of the oven, as this is clearly illus-

trated in Figure 6C; it should in fact be suitably reminded that the force needed for the door to be released and pulled open most obviously depends not only on the force of reaction of the spring 31, but also on the extent of the angle "n" comprised between the tangent line "a" meeting said outward facing side 14 and the straight line "b" extending orthogonally to the radial straight line "r" between the hinging axis of the same door and the point of contact of said sides 14 and 21 with each other.

[0023] This improvement has the purpose of ensuring that - once the latch is fully inserted in said recess 20 - the same latch is firmly and stably retained therein and, at the same time, the possibility is given for it to be released and removed from said recess by normally pulling the door, so as to enable the latter to be opened.

[0024] The orientation of said inner side 21 of the recess 20 and the outward facing side 14 of the latch shall of course be such as to allow for a force to be exerted in a direction that will cause the latch to be inserted in the fixed member 6 by simply pulling the door into opening.

[0025] In order to ensure that the latch 7 is able to fit into said recess 20 immediately upon the inclination of the door having possibly been corrected, between said upright surface 11 and said recess 20 or, better, said side 21 there is advantageously provided an adequately narrow upright corner edge 22 (Figures 3, 7, 6A-6C); this is effective in ensuring that, upon the inclination of the door having possibly been corrected, the latch 7 engages the recess 20 immediately, thereby preventing the door from inclining downwards again.

Claims

1. Food cooking oven comprising:

- a cooking cavity (1),
- a door (2) provided to close said cooking cavity and hinged on an upright side edge thereof,
- a recessed catching and locking device (30) provided on a front upright corner edge (3) of said cooking cavity,
- an engagement or latching device (4) attached to the corresponding upright corner edge (5) of said door,

characterized in that said engagement or latching device (4) comprises:

- a fixed member (6) connected in a firmly joined manner to said upright corner edge (5) of said door,
- a latch (7) that elastically engages a receptacle provided within said fixed member, and is adapted to slide therewithin so as to be able to move into and take a plurality of different positions, among which a first position, in which said latch is substantially introduced in said fixed member

(6), and a second position, in which said latch is substantially protruding with at least an outer portion (13, 14) thereof,

and **in that** said recessed catching and locking device (30) comprises:

- a first lower portion provided with a surface (8) that has a triangular shape, is accessible from outside, is so positioned as to feature an outer corner edge (9) and an inner side (10) opposite thereto, and is further inclined on the horizontal plane with a descending slope from said inner side (10) towards said outer corner edge (9) opposite thereto,
- a vertical planar surface (11) extending through said inner side (10),
- an inner recess (20) provided right behind said first portion towards the interior of said cooking cavity.

2. Cooking oven according to claim 1, **characterized in that** said opposite inner side (10) and said vertical surface (11) are inclined relative to a plane extending parallel to the aperture which said door is intended to close.

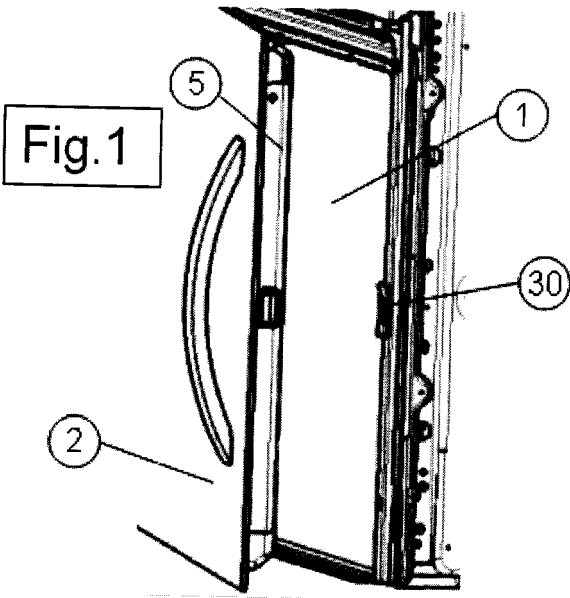
3. Cooking oven according to claim 1 or 2, **characterized in that** an upright corner edge (22) separates said vertical surface (11) from said inner recess (20).

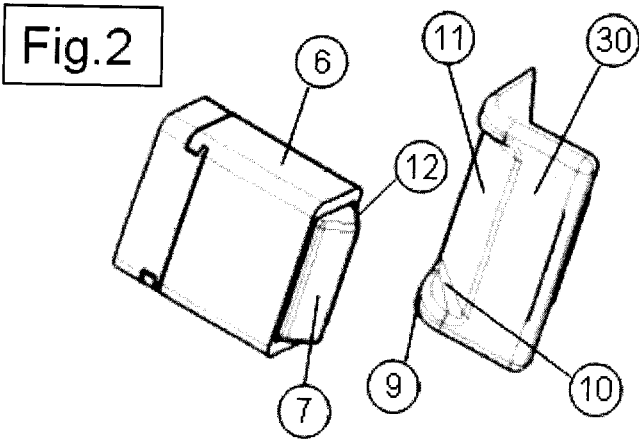
4. Cooking oven according to claim 3, **characterized in that** the lower extremities of said inner recess (20), said upright corner edge (22) are positioned at the same height as the highest inner point (16) of said inclined surface (8).

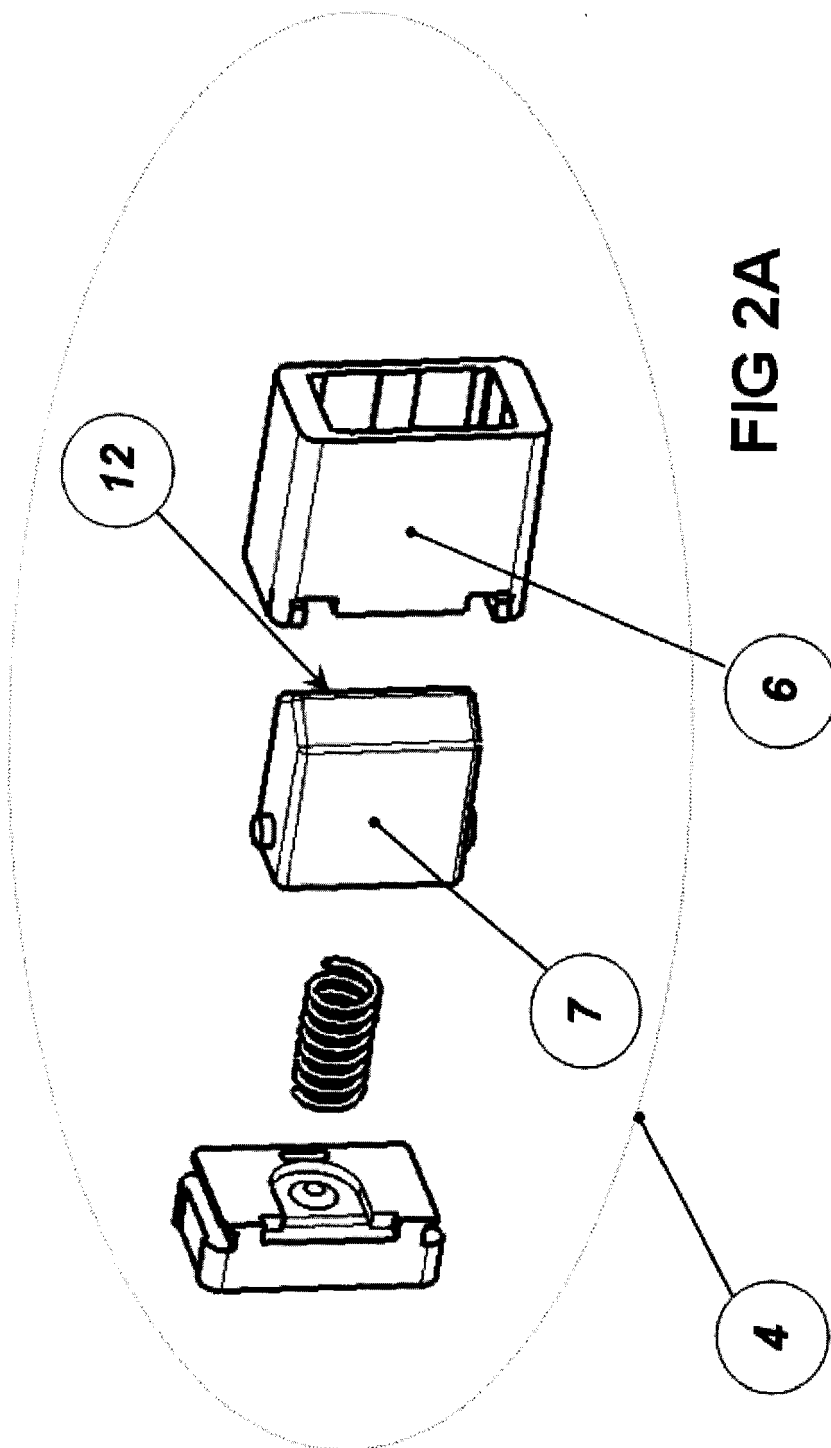
5. Cooking oven according to any of the preceding claims, **characterized in that** the outward-facing portion of said latch (7) is in the shape of a wedge provided with a respective upright corner edge (12).

6. Cooking oven according to claim 5, **characterized in that** the inner side (13) of said wedge is oriented vertically and is so inclined as to be able to move into contact with said vertical surface (11) in a substantially parallel manner when the door is being closed.

7. Cooking oven according to claim 5 or 6, **characterized in that** the outer side (14) of said wedge is oriented vertically and is so inclined as to be able to move into contact in a substantially parallel manner with the outward-facing side (21) of said inner recess (20) when the door is fully closed.







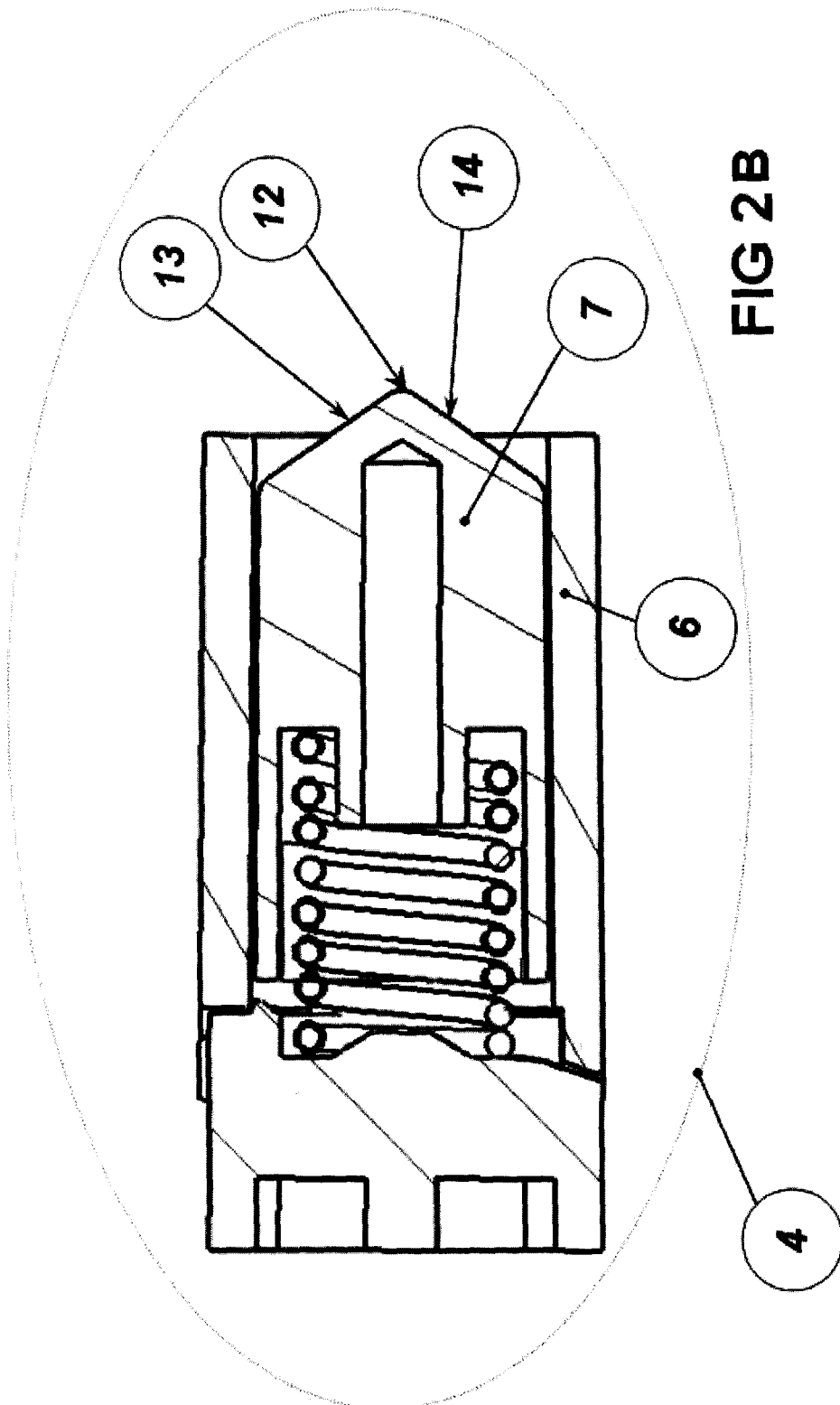
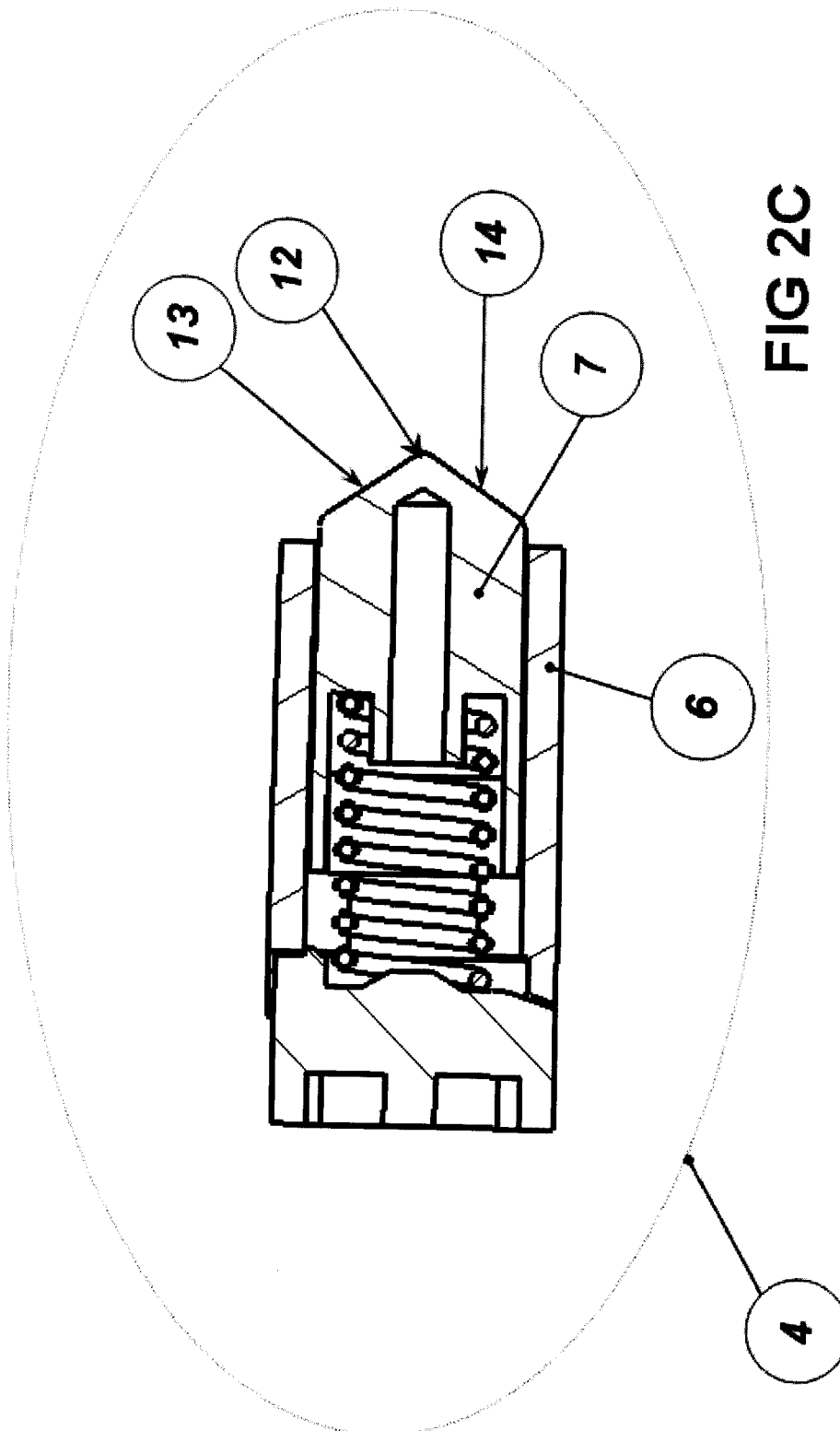
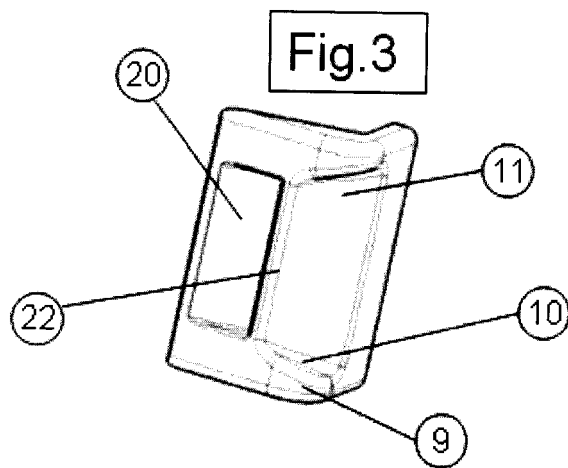


FIG 2B





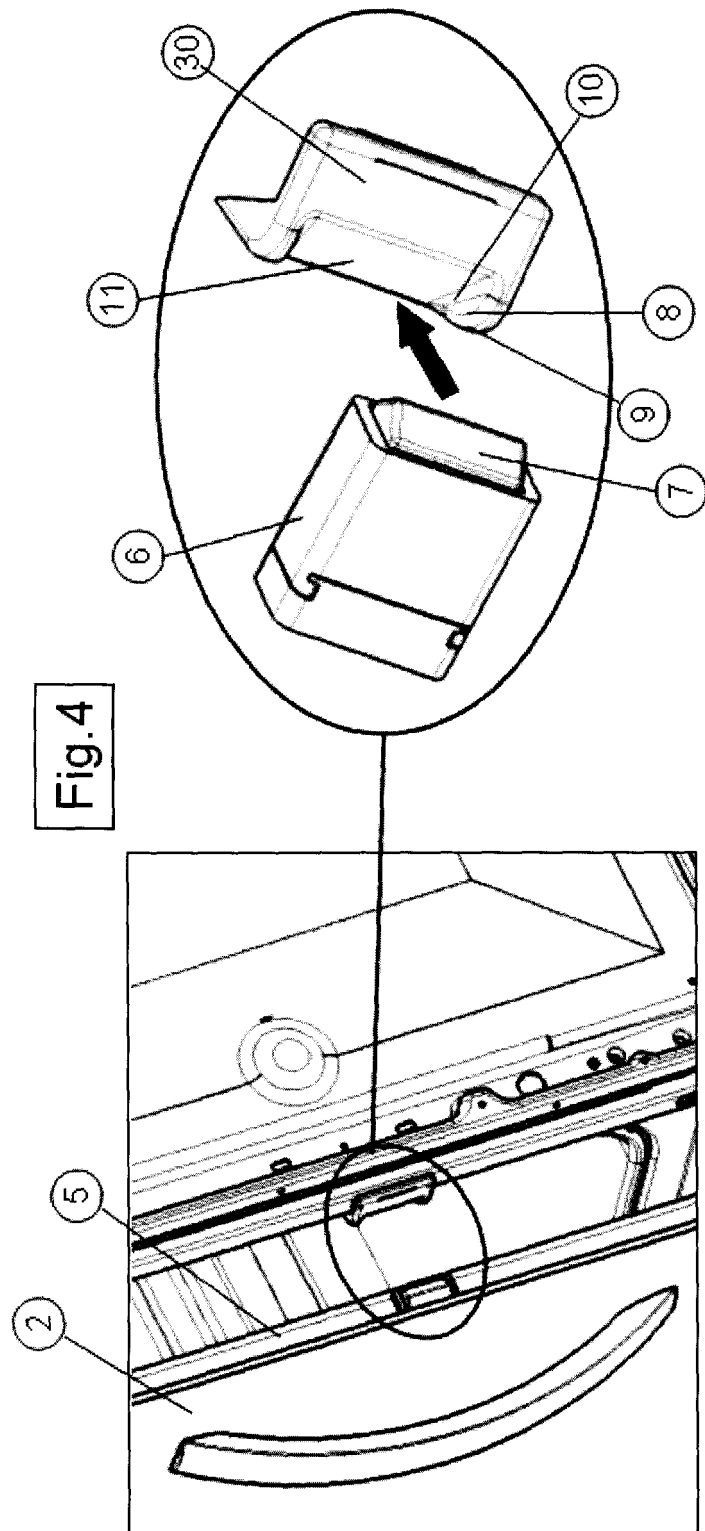


Fig.4

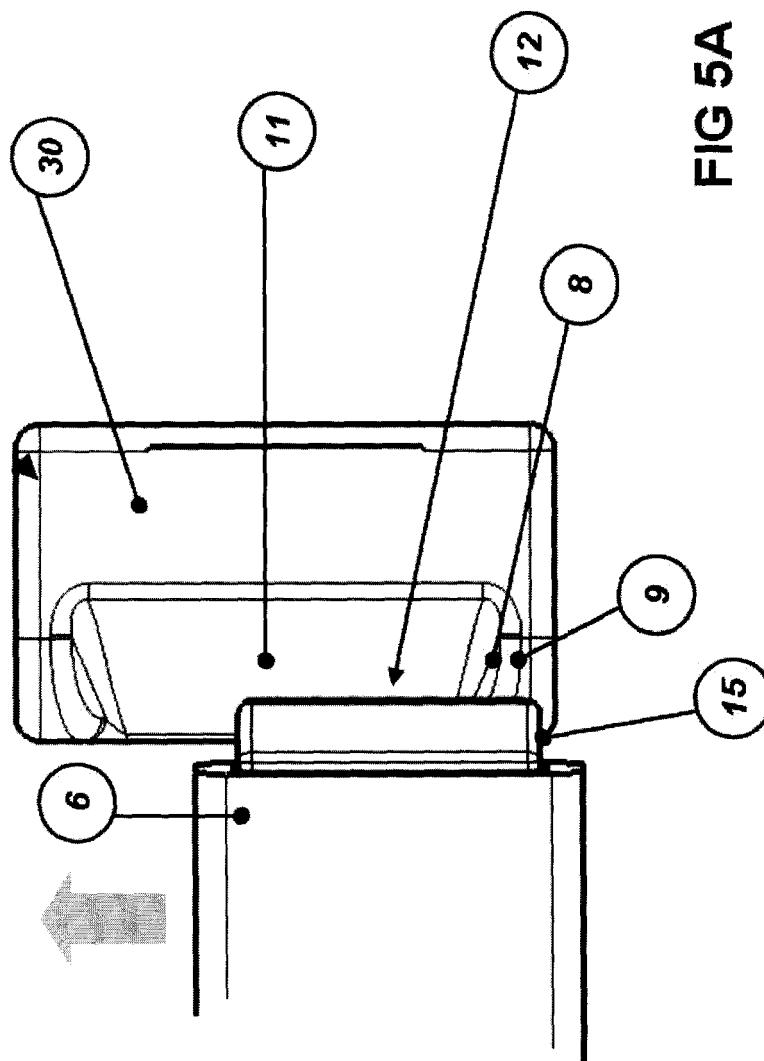
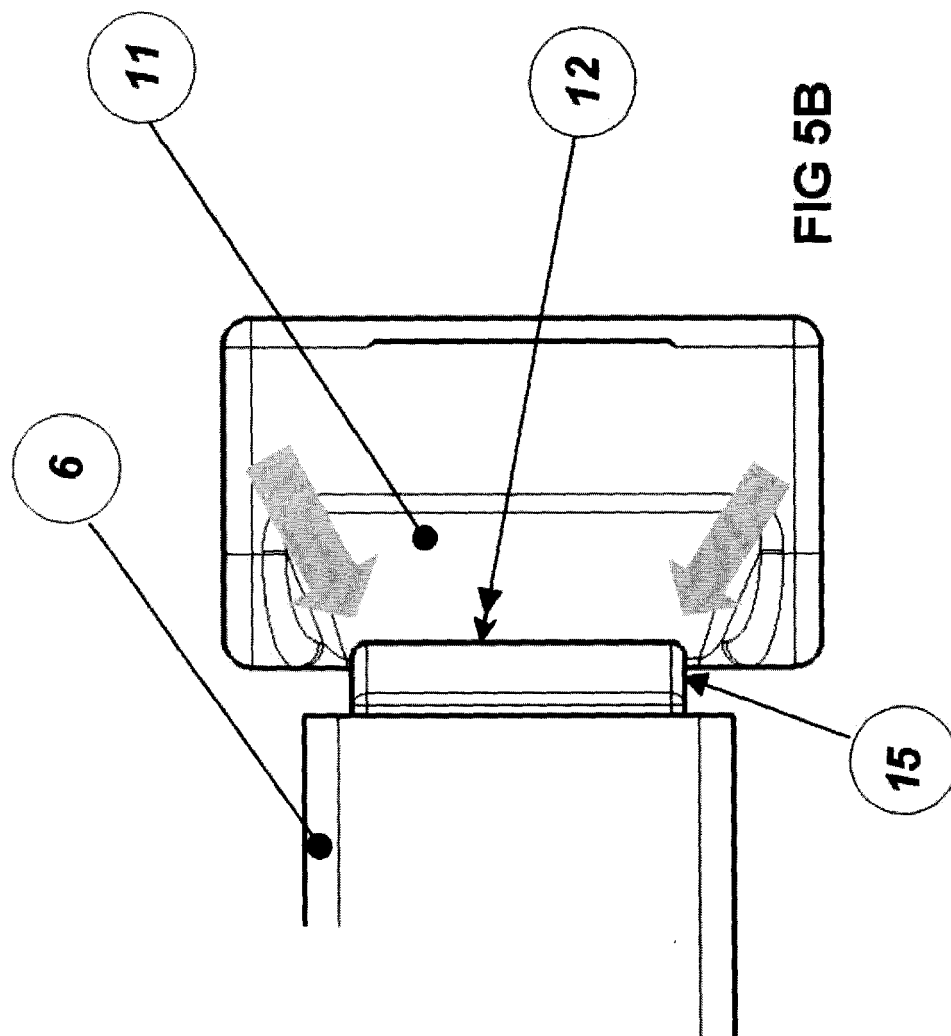
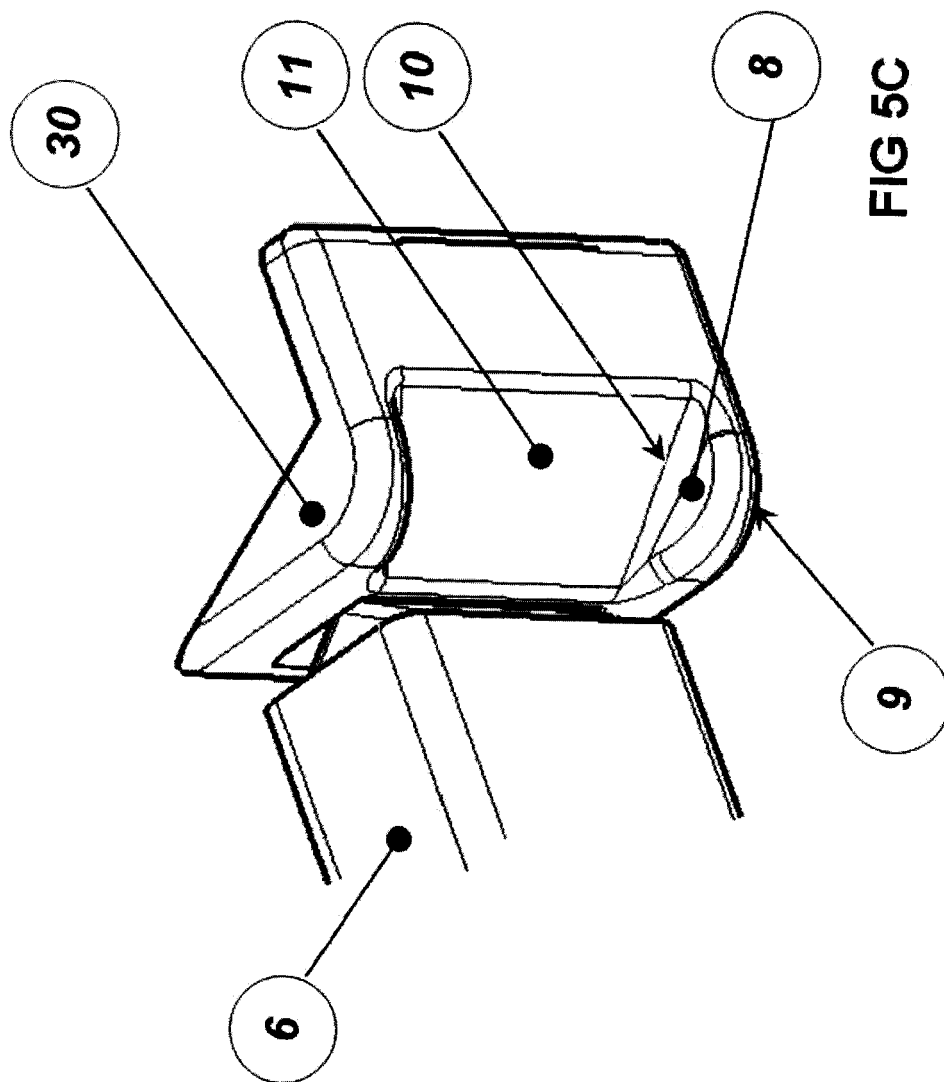


FIG 5A





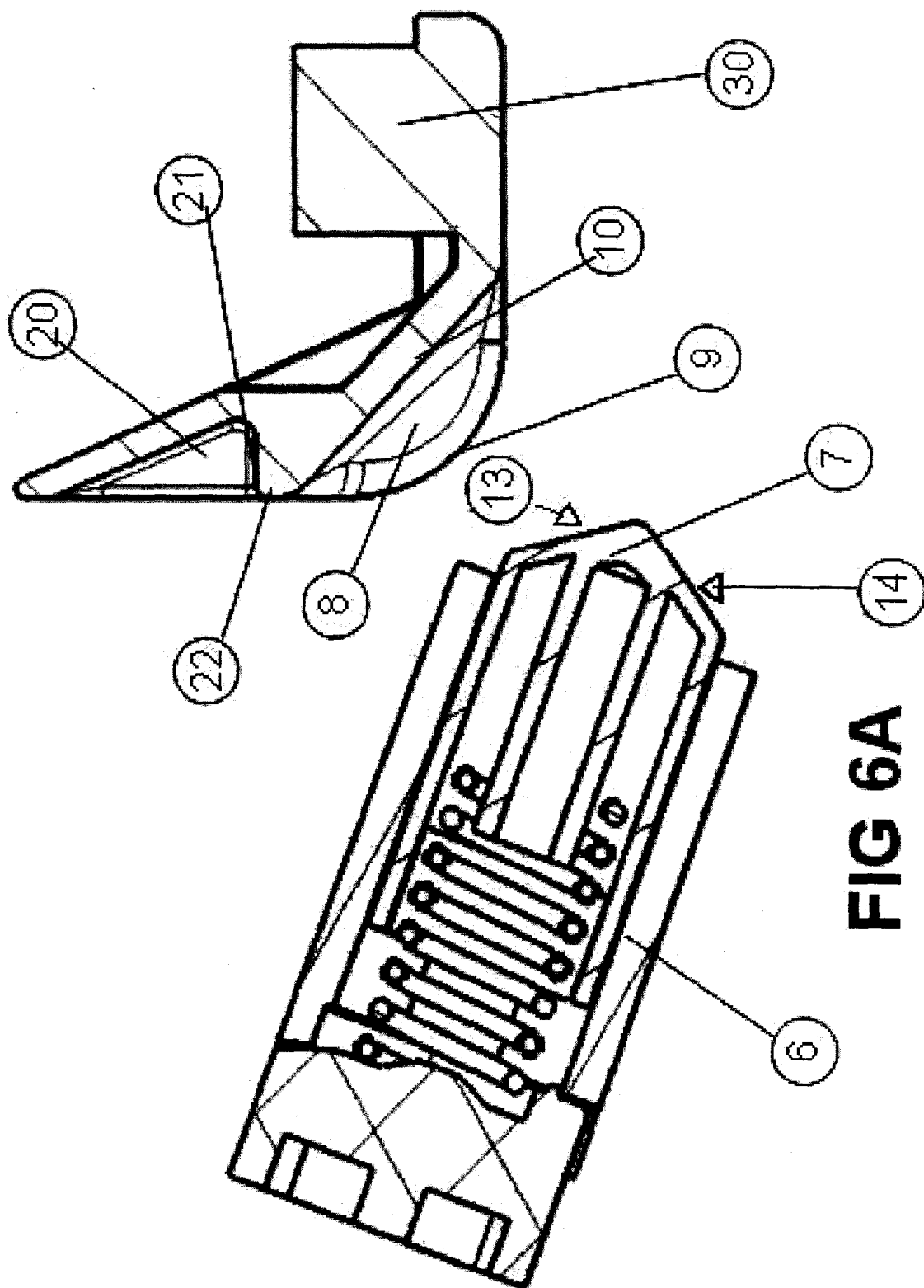
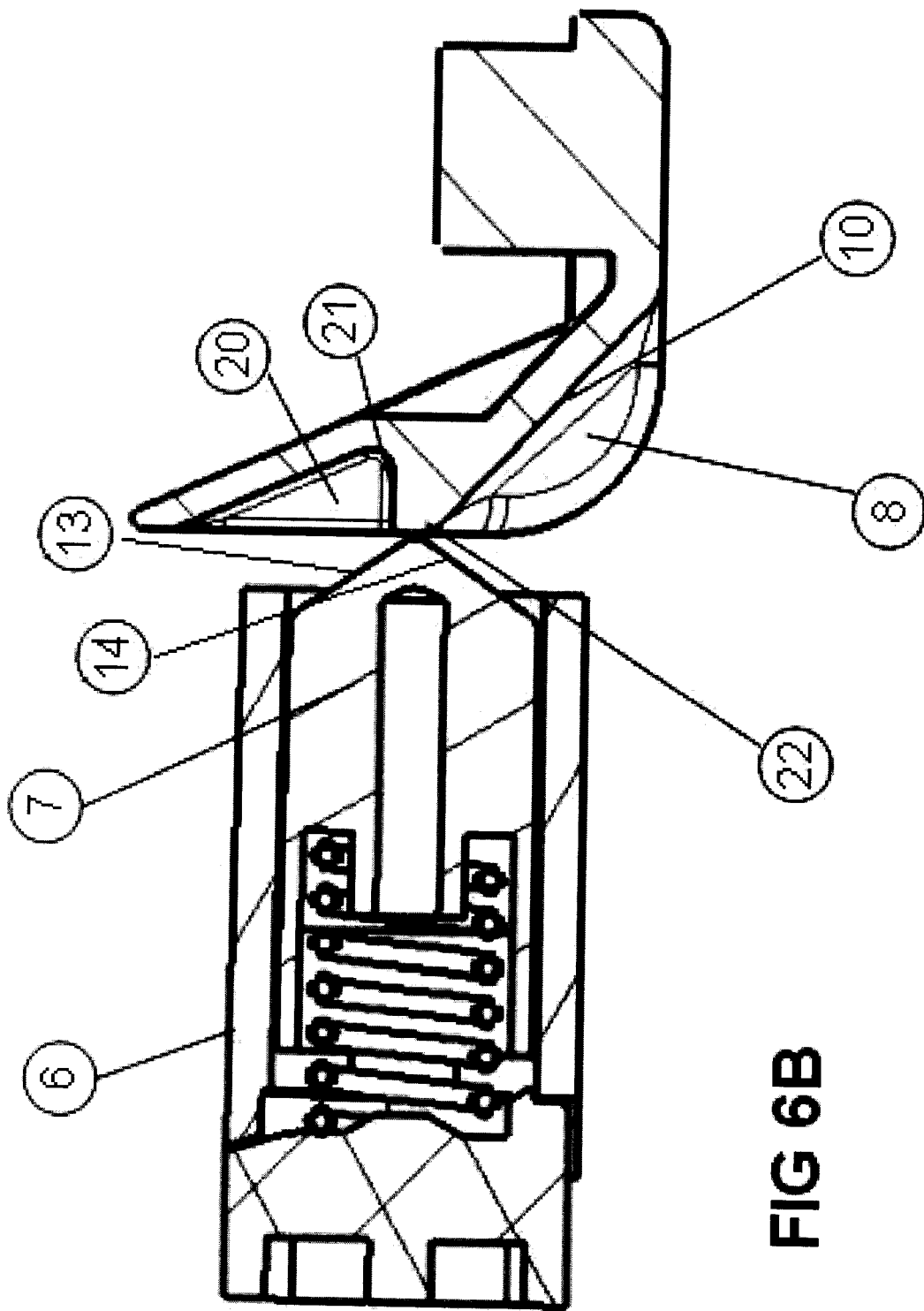


FIG 6A



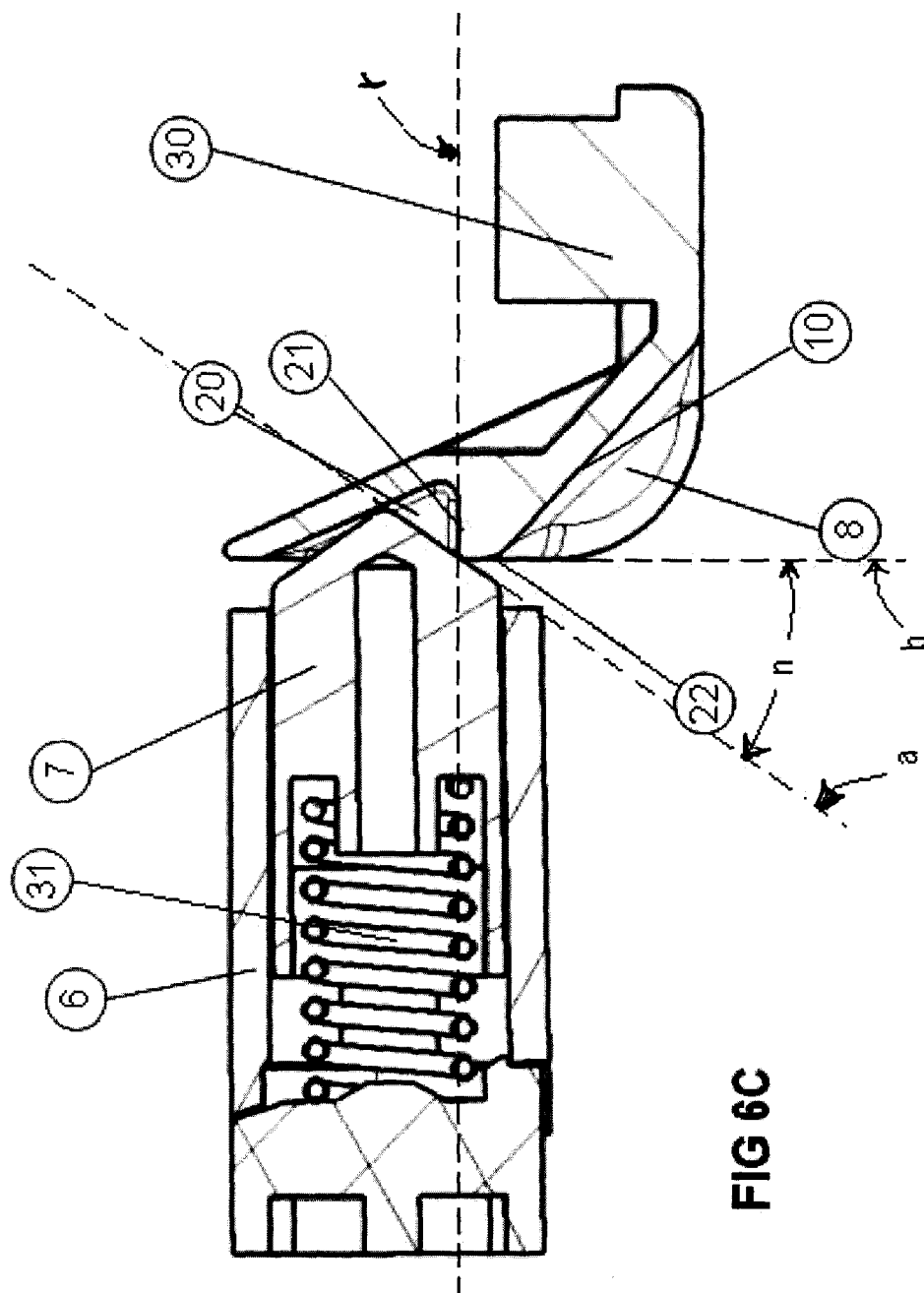
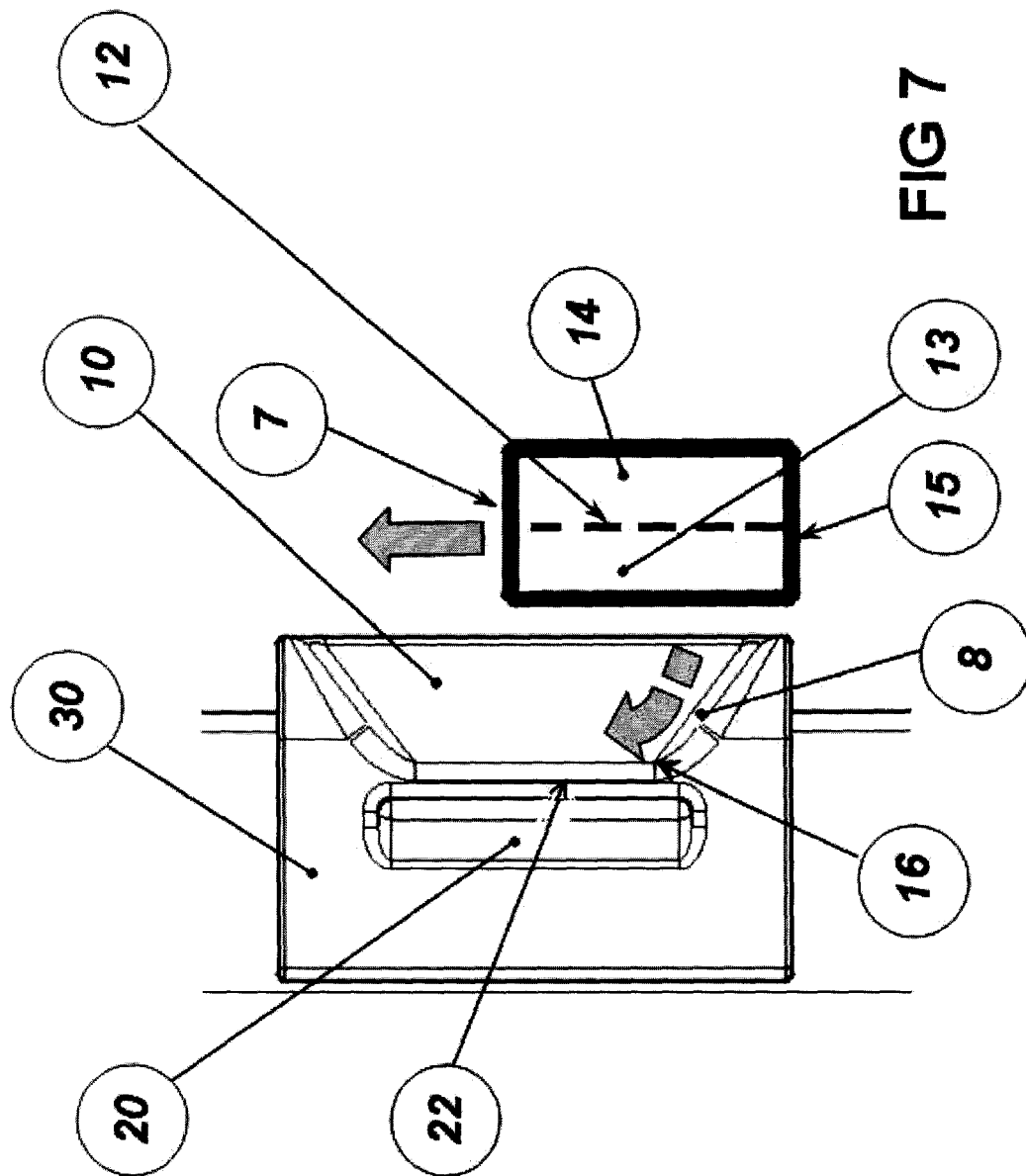
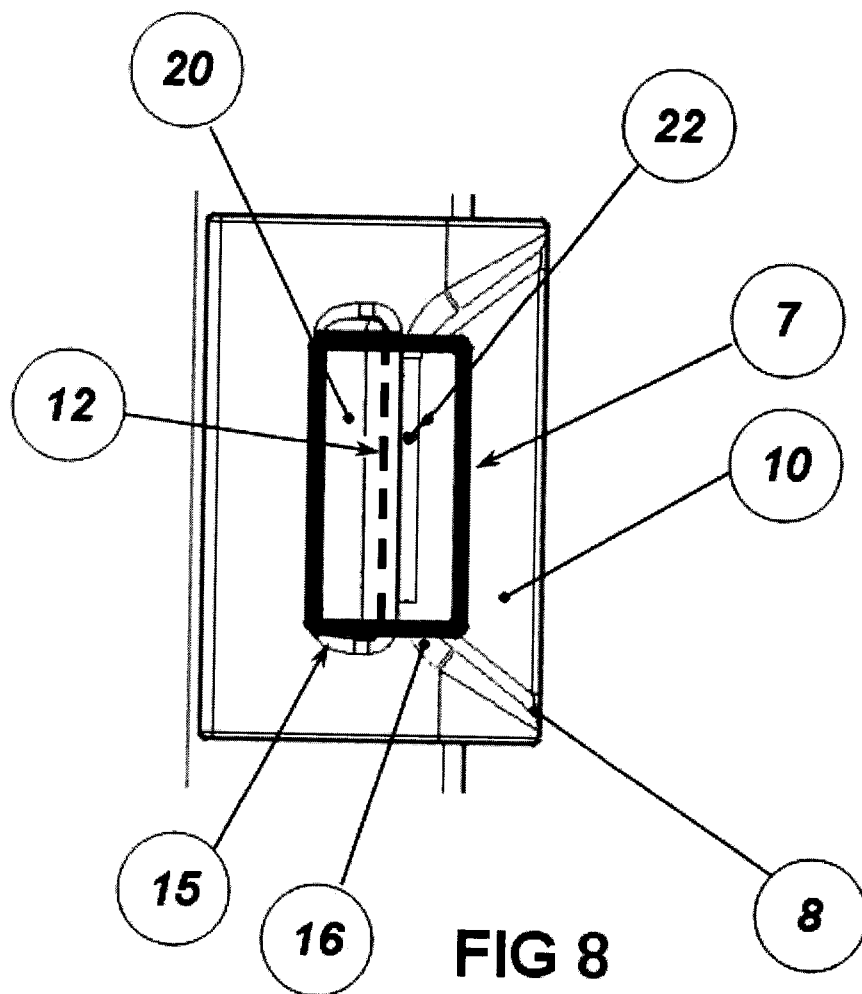


FIG 6C







European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 07 10 9424

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	US 4 875 721 A (OKAMOTO KENZO [JP] ET AL) 24 October 1989 (1989-10-24) * figure 2 *	1-7	INV. F24C15/02 E05C19/02
Y	US 6 145 898 A (ONDERKA OSWALD [DE] ET AL) 14 November 2000 (2000-11-14) * figures 10-16 *	1-7	
Y	DE 197 28 426 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 7 January 1999 (1999-01-07) * abstract; figure 1 *	1-7	
A	EP 1 500 764 A (GRETSCH UNITAS GMBHBAUBESCHLAE [DE] GRETSCH UNITAS GMBH [DE]) 26 January 2005 (2005-01-26) * figures 4,5 *	1-7	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			F24C E05C A47L D06F
Place of search		Date of completion of the search	Examiner
The Hague		12 November 2007	Rodriguez, Alexander
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 07 10 9424

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12-11-2007

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4875721 A	24-10-1989	NONE	
US 6145898 A	14-11-2000	AT 244330 T EP 0878576 A1	15-07-2003 18-11-1998
DE 19728426 A1	07-01-1999	NONE	
EP 1500764 A	26-01-2005	DE 20311828 U1	02-10-2003

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- EP 07107936 A [0003]
- DE 202004003995 U1 [0007]