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(54) **Retaining device for a door of a washing machine**

(57) A retaining device for a door of a domestic appliance comprises a support structure (12) adapted to be secured to the door (G), a hook member (20) projecting at least partially outside this structure (12) and mounted rotatably around an axis (18) between a locking position and an unlocking position and adapted to cooperate with a door locking device provided in the appliance, a spring element (28) adapted to urge the hook member (20) to-

wards its locking position and a handle (26) mounted rotatably on the support structure (12) and adapted to move the hook member (20) towards its unlocking position. The spring element (28) presents at least a first elastic portion (28a,28b) interposed between the support structure (12) and the hook member (20) and at least a second elastic portion (28d,28e) interposed between the support structure (12) and the handle (26).

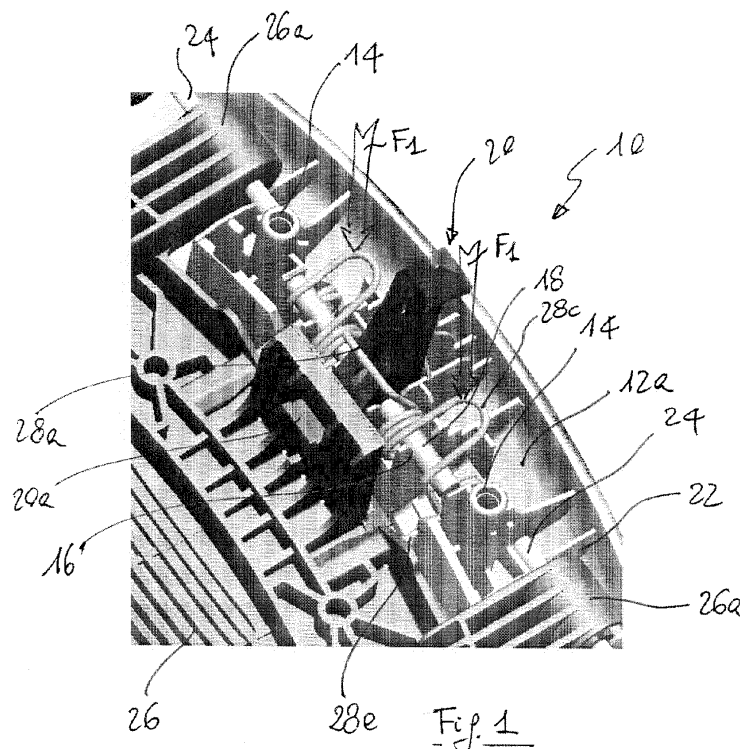


Fig. 1

Description

[0001] The present invention relates to a retaining device for a door of a domestic appliance, particularly for a washing machine, comprising a support structure adapted to be secured to the door, a hook member projecting at least partially outside this structure and mounted rotatably around an axis between a locking position and an unlocking position and adapted to cooperate with a door locking device provided in the appliance, a spring element adapted to urge the hook member towards its locking position and a handle mounted rotatably on the support structure and adapted to move the hook member towards its unlocking position.

[0002] In such retaining device the support structure is usually fixed to the edge of a glass door and it is usually formed by two round frames of polymeric material assembled and clamped around the door edge. With these known devices it is possible to open the door by actuating the handle when the door locking device is in a rest position. In known door designs for washing machines with a handle and a rotating hook member, both the handle and the hook member need a feature which pulls them to a neutral position. Known designs use two separate spring elements for keeping the handle and the hook member in their neutral position.

[0003] An object of the present invention is to provide a retaining device of the above-described type which is simpler and cheaper than the known devices. Another object is to provide a retaining system which has a low cost and is particularly easy to assemble.

[0004] These and other objects are achieved by the invention thanks to the features listed in the appended claims. The technical solution according to the invention essentially combines the function of the known two prongs into a single piece, decreasing the overall cost of the retaining device, making the assembly thereof easier.

[0005] Further characteristic features and advantages of the invention are set out in the following detailed description, given purely by way of non-limiting example, and made with reference to the accompanying drawings, in which:

- figure 1 is a prospective view of a retaining device according to the invention, where a portion of the support structure has been removed;
- figures 2a and 2b are cross sectional view of the retaining device of figure 1 in an installed configuration on the rim of a glass door of a washing machine;
- figure 3 is a prospective view of the retaining device of figure 1, in which the entire support structure has been removed;
- figure 4 is a perspective view of the hook member of the retaining device according to figures 1 to 3, with the spring element associated thereto; and
- figure 5 is a perspective view of the spring element of figure 4.

[0006] With reference to the drawings, a retaining device 10 for the glass door G of a washing machine comprises a support structure 12 made by two circular frames 12a and 12b of polymeric material mounted on the rim G1 of the glass door G and kept together for instance by screws (not shown) cooperating with fastening holes 14 (figure 1). On one of the circular frames, in the example shown the front frame 12a which faces the user in the closed configuration of the door G, there are provided seats 16 for an axle 18 of a rotating hook member 20. Similarly, the front frame 12a presents other seats 22 (cooperating with corresponding seats, not shown, in the back frame 12b) for two axles 24 on which two ends 26a of a U-shaped handle 26 are rotatably mounted. The hook member 20 presents a portion 20a which is inserted in an aperture 27 provided in a side portion 26b of the handle 26.

[0007] Around the axle 18 of the hook member 20 it is installed a single symmetrical spring element 28 made of shaped elastic metal wire which has a central U-shaped portion 28a placed around the hook member 20, second coil portions 28b wound around the axle 18, third U-shaped portions 28c adapted to abut against the back frame 12b as it will be clear in the following description, fourth coil portions 28d and fifth rectilinear end portions 28e abutting the handle 26. Thanks to the shape and assembly of the spring element 28, such spring has at least two features which function independently of one another when fixed in the assembled position. The first central portion 28a pushes on the door hook member 20. The arrows F1 in figures 1 and 5 indicate where the back frame 12b would compress the spring element 28, creating a predetermined pre-tension. The back frame 12b also prevents the spring element 28 from moving when the handle 26 or the hook member 20 is rotated. The coil portions 28b and 28d of the spring element 28 reduce the increase of force as the hook member 20 or the handle 26 is moved from its neutral position. In figure 5 there are shown also the potential force F2 exerted by the spring element 28 against the hook member 20 and the potential force F3 exerted against the handle 26.

[0008] The retaining device described above substantially operates as follows.

[0009] When the door G is closed, it is brought towards the front wall of the domestic appliance (not shown); in this movement the hook member 20 cooperates with a door locking device (not shown) and consequently oscillates about the axle 18 in a counter-clockwise direction when looking at figure 1, 2a and 2b, against the action of the spring element 28. In order to open the door G (when the hook member is not blocked by the door locking device), the user pull the handle 26 so that, thanks to the coupling between the angled portion 20a of the hook member 20 and the aperture 27 provided in a portion 26b of the handle, the hook member is rotated so as to free it from the locking device. The rotational movement of the handle 26 around its axle 24 is carried out against the force F3 exerted by the spring element 28,

and when the user leaves the handle 26, this latter return to its neutral position shown in figures 2a and 2b.

[0010] In the closed position, the hook member 20 may be rotated due to its relative position to the door lock (this varies due to tolerances of the door). Without the spring acting on the handle, the handle would be free to rotate to some extent, but with the spring acting independently on the handle, the handle stays in the neutral position.

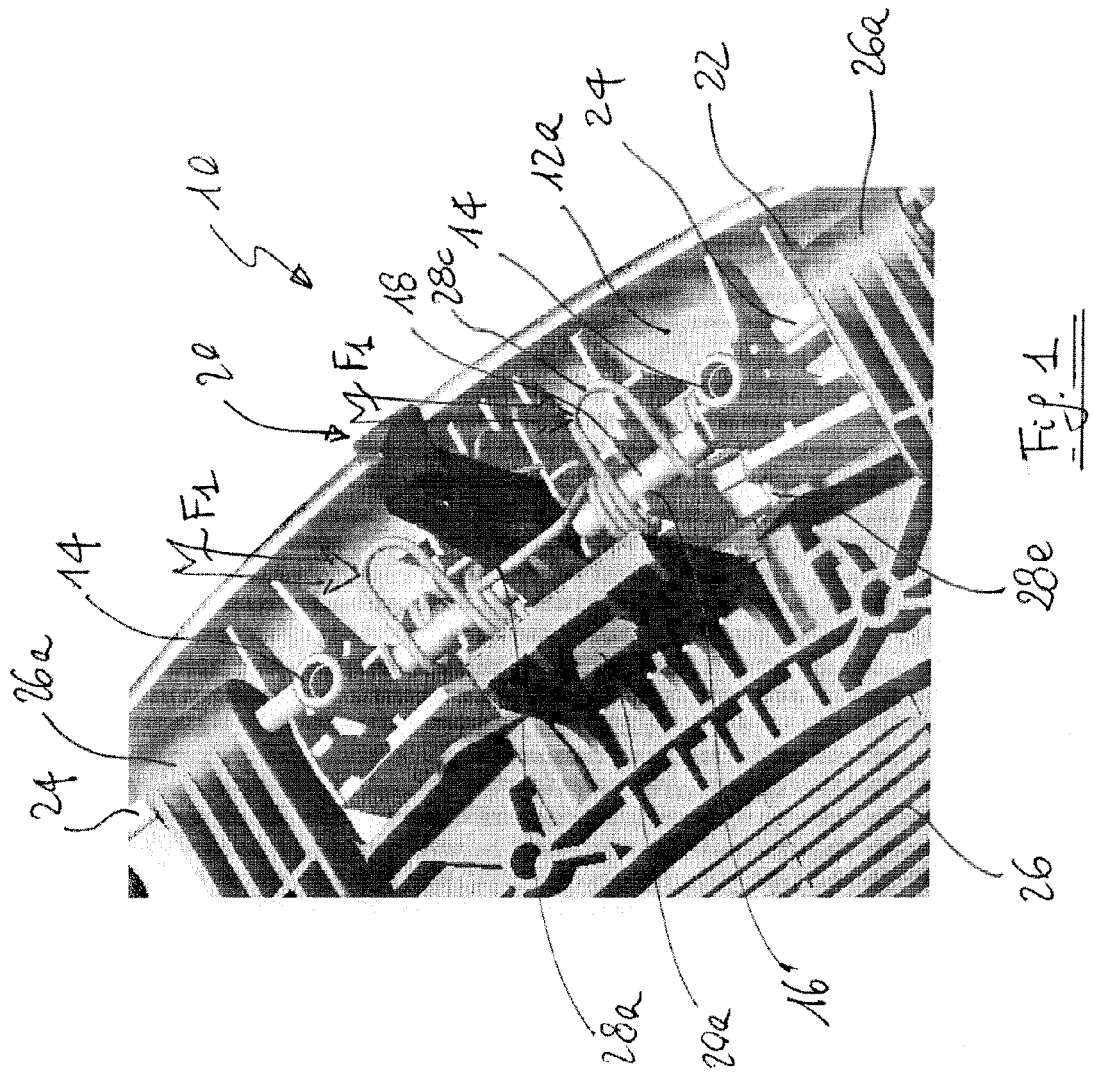
[0011] The solution of the invention as described above enables the use of a single spring element for driving both the hook member and the handle towards a neutral position and to elastically react against the rotational movement of such components. The device of the invention is particularly suited to use in washing machines, of both the top-loading and front-loading types.

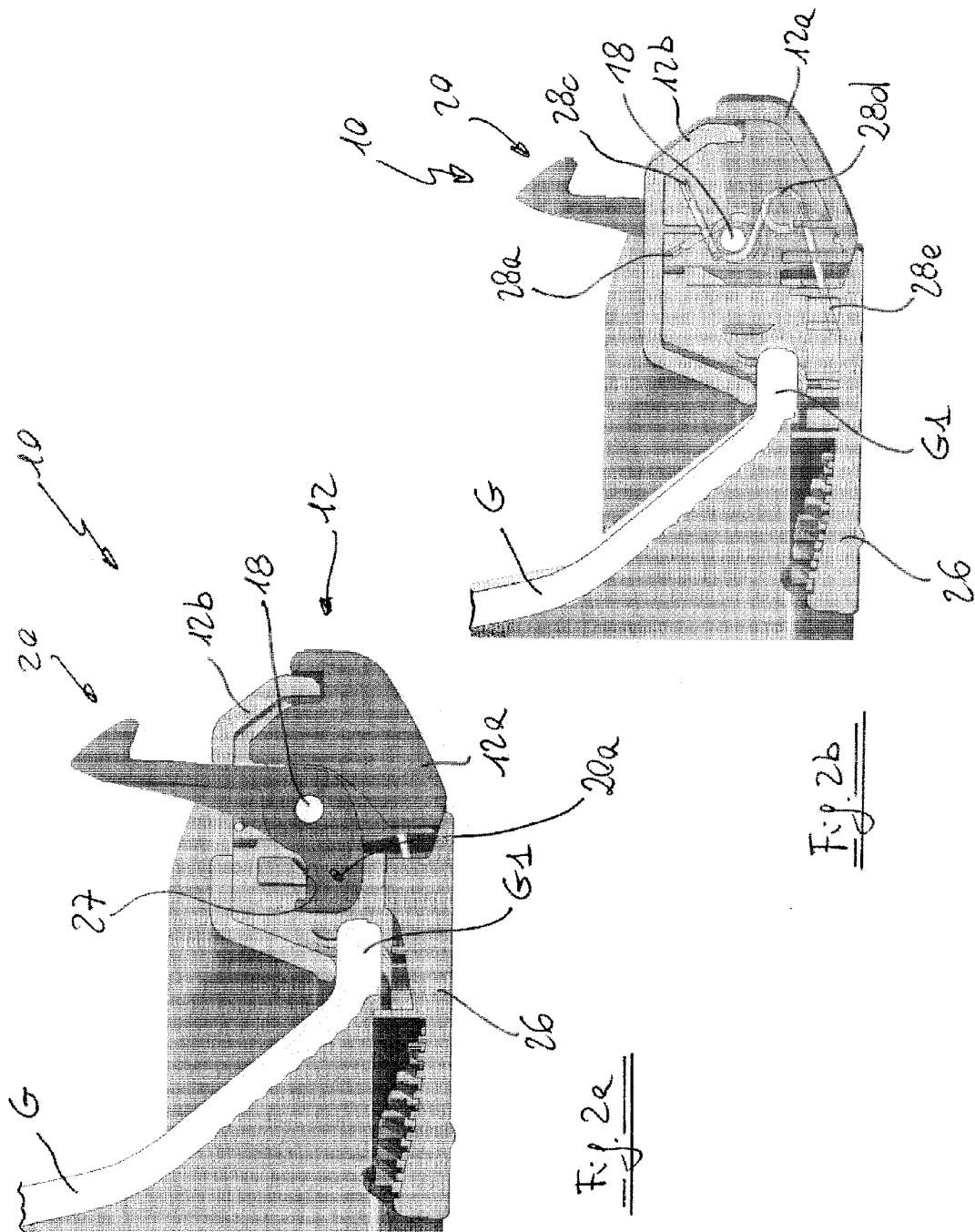
Claims

1. A retaining device for a door (G) of a domestic appliance, particularly for a washing machine, comprising a support structure (12) adapted to be secured to the door, a hook member (20) projecting at least partially outside this structure (12) and mounted rotatably around an axis (18) between a locking position and an unlocking position and adapted to cooperate with a door locking device provided in the appliance, a spring element (28) adapted to urge the hook member (20) towards its locking position and a handle (26) mounted rotatably on the support structure (12) and adapted to move the hook member (20) towards its unlocking position, **characterized in that** the spring element (28) presents at least a first elastic portion (28a, 28b) interposed between the support structure (12) and the hook member (20) and at least a second elastic portion (28d, 28e) interposed between the support structure (12) and the handle (26).
2. A retaining device according to claim 1, wherein the spring element comprises a shaped elastic wire (28), the first elastic portion of the spring element (28) having two first symmetrical coil parts (28b) adjacent the hook member (20) and joined together by a U-shaped central portion (28a) abutting the hook member (20).
3. A retaining device according to claim 2, wherein the second elastic portion of the spring element (28) comprises two second symmetrical coil parts (28d).
4. A retaining device according to claim 2 or 3, wherein the first symmetrical coil parts (28b) are wound around an axle (18) of the hook member (20).
5. A retaining device according to claim 2 and 3, wherein between each first coil part (28b) and each second coil part (28d) the spring element (28) presents a U-

shaped portion (28c) acting on the support structure (12).

6. A retaining device according to any of claim 2-5, wherein the spring element (28) presents substantially rectilinear ends (28e) contacting the handle (26)
7. A retaining device according to any of the preceding claims, wherein the spring element (28) is shaped so that the first and second elastic portions are pre-tensioned against the hook member (20) and the handle (26) respectively.
8. Domestic appliance, particularly front loading washer, having a door (G) provided with a door retaining device according to any of the preceding claims.





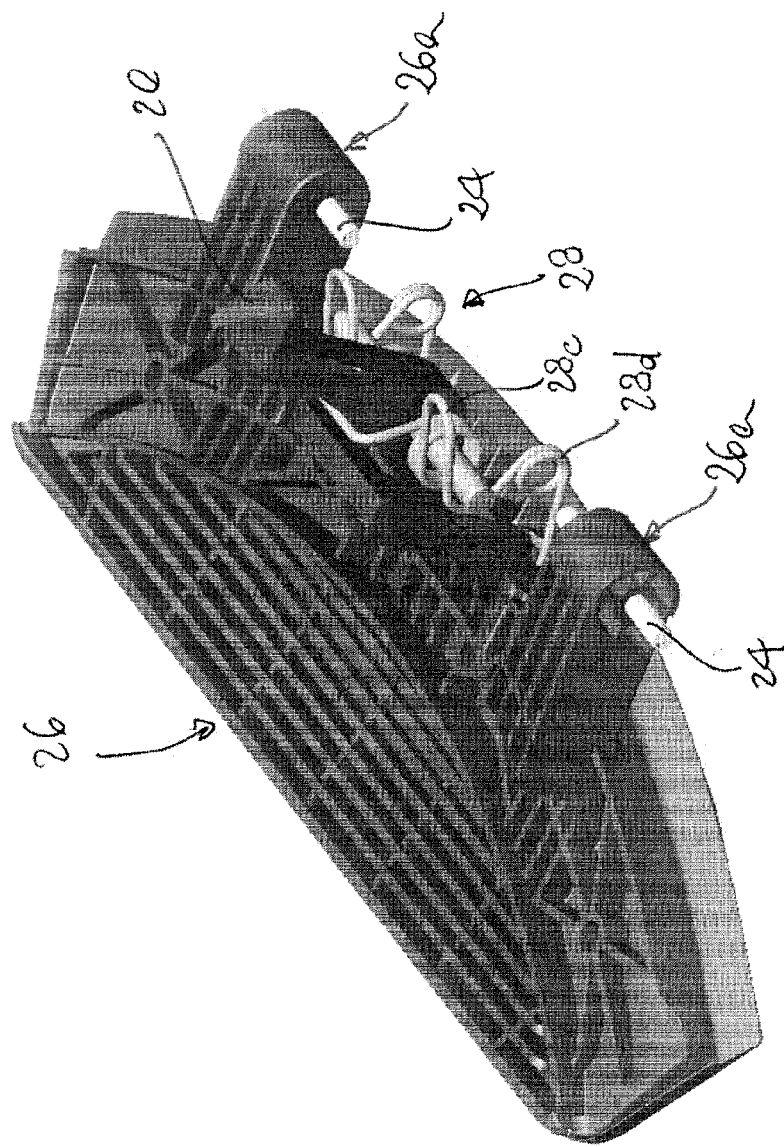


Fig. 3

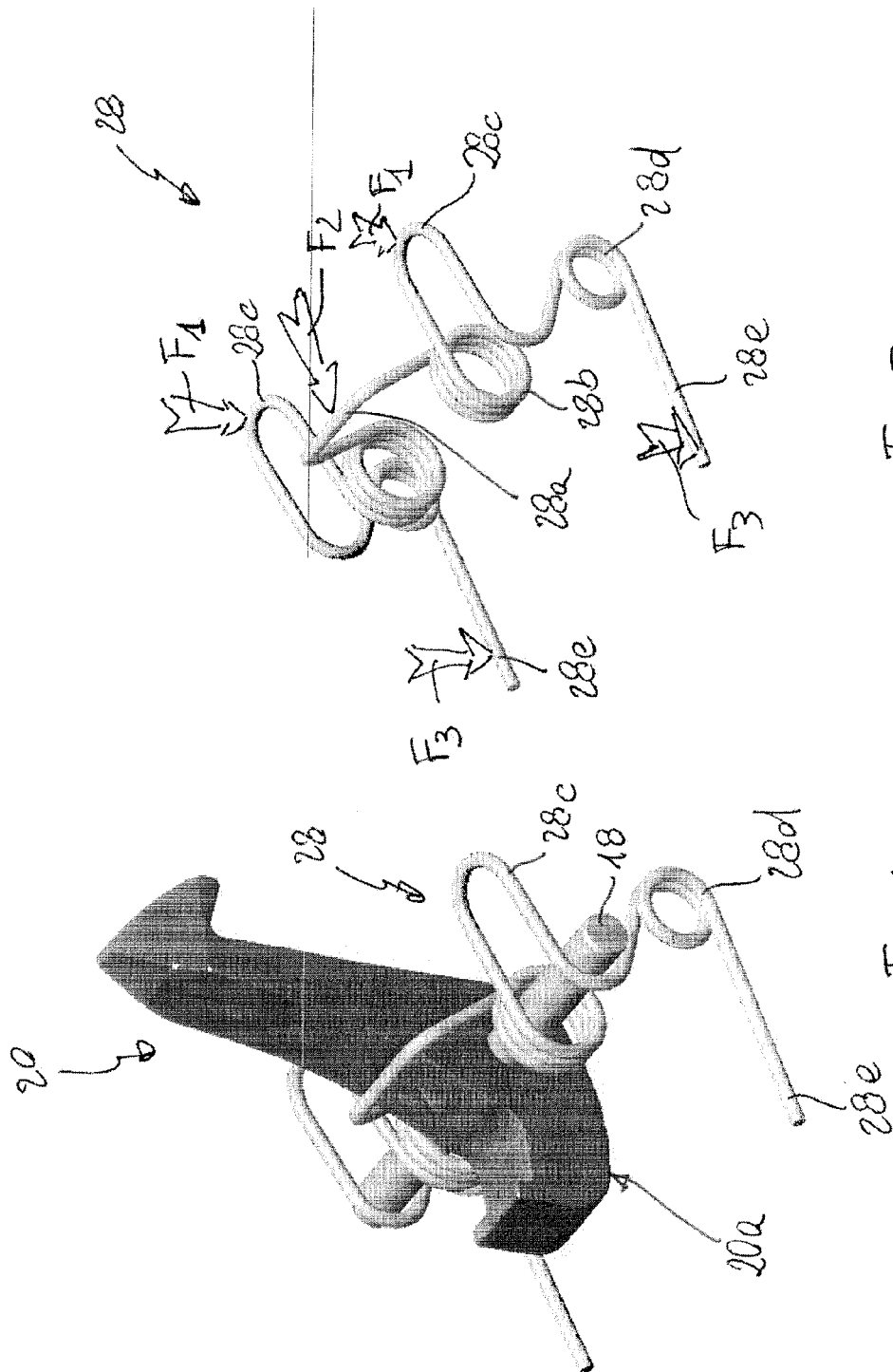


Fig. 5

Fig. 4



EUROPEAN SEARCH REPORT

Application Number
EP 10 19 3986

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	DE 38 09 998 C2 (BOSCH SIEMENS HAUSGERAETE [DE]) 14 April 1994 (1994-04-14) * column 2, line 49 - column 3, line 37; figures 1,5-10 *	1,2,4, 6-8	INV. D06F37/28 A47L15/42 D06F39/14
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			D06F A47L
Place of search		Date of completion of the search	Examiner
Munich		19 May 2011	Fachin, Fabiano
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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EPO FORM 1503 03.82 (P04C01)

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

EP 10 19 3986

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
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19-05-2011

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