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(54) **Locking device for the closing lid of washing machines**

(57) The invention concerns a locking device for the closing lid of cloth-washing machines comprising a containing body (1) that houses a cursor (6) equipped with an opening (7) capable of receiving the hook (20) mounted on the lid, and a delaying device (4) capable of locking

said cursor (6) in a position retaining the hook (20). In order to ensure that the user operates under safe conditions, the device provides a lever (11) that is equipped with means (13) to lock said cursor (6), and is connected to said body (1) by a link (12).

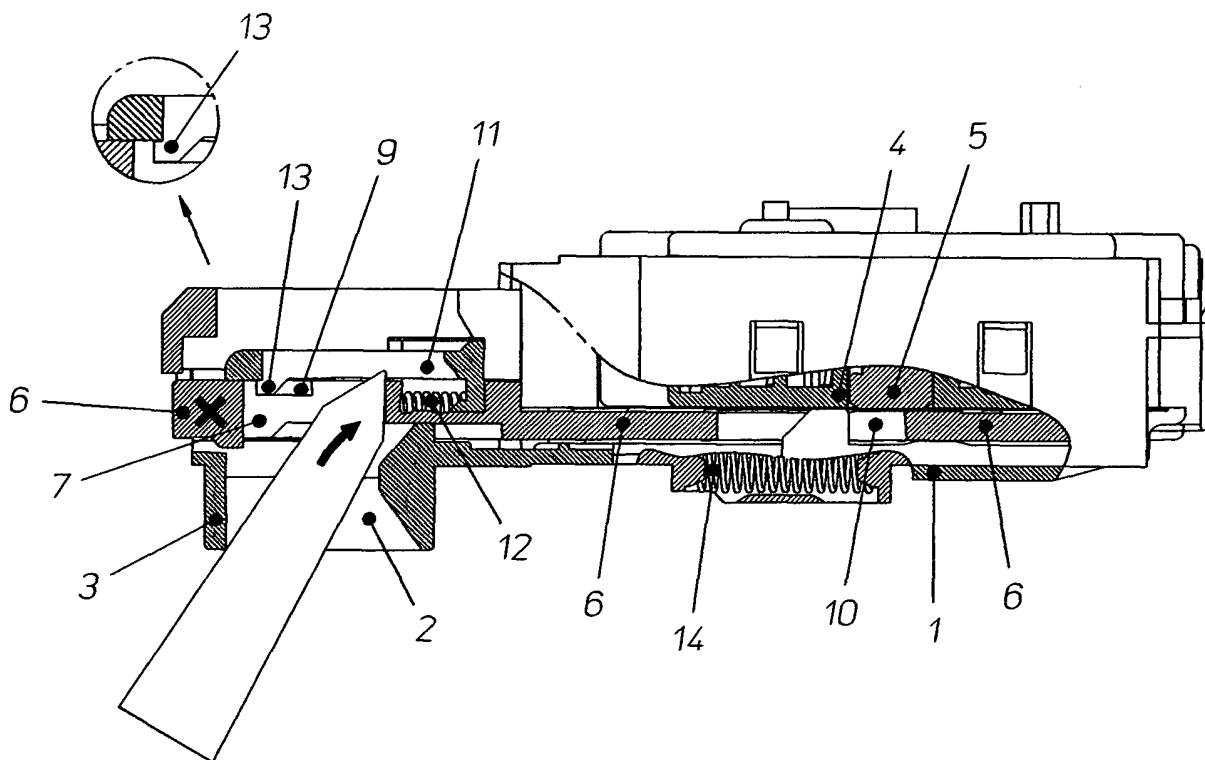


FIG. 4

Description

[0001] The present invention concerns a locking device for the closing lid or door of cloth washing machines and the like.

[0002] The invention concerns in particular, although this is not to be understood in a limiting sense, front-loading cloth washing machines.

[0003] The drum of front-loading cloth washing machines is closed by a (tightly) sealing lid hinged to the front panel of the machine and fitted with a closing latch or hook engaged by a locking device which is mounted on the machine front panel.

[0004] In order to guarantee the user's operation under safe conditions, the locking device comprises an electromechanical device known as a door-lock, that prevents the opening of the lid after the machine has been started, and delays its opening after completion of the operating cycle, until the inertial rotation of the inside drum has ended.

[0005] In the already known devices, under normal operating conditions the activation of the door-locking device is mechanically prevented if the lid is open, and in case the device is serially connected on one phase of the machine feeding system, the device also fulfils the function of preventing the machine from starting when the lid is open.

[0006] However, these known devices have the drawback that an operating cycle of the machine could be started even when the lid is open, for instance by inserting a finger in the space provided for receiving the door hook for simulating the movement of the hook that creates the conditions for activating the door-locking device.

[0007] In order to comply with the existing European and U.S. Standards in the cloth-washing machine sector, in particular Standard EN60335-27 (2003 edition), par. 20 and Standard UL2156 par. 20.8.5, the door-locking device of a washing machine must not allow the activation of the machine when a testing finger of a predetermined size is used in a tampering attempt.

[0008] There are already known devices that in compliance with the mentioned Standards provide for a mechanism that has been modified both in respect of the shape of the hook and of the shape of the cursor and of the small template provided on the machine front panel to receive the hook.

[0009] The implementing of these devices implies however a need of producing and storing a number of components for usage depending on the market the machine is addressed to.

[0010] An object of the present invention is to realize a door-locking device for cloth washing machines and the like capable of meeting the tests envisioned by the European and U.S. standards, by mechanically preventing the start-up of the machine with the lid open, when trying to tamper the device with a "finger" of the size provided for by the Standards, with a particularly simple and effective construction.

[0011] According to the invention, this object is achieved through a door-locking device for a closing lid according to claim 1. Additional advantageous characteristics are recited in the dependent claims.

[0012] The invention will now be described with reference to the attached drawings that illustrate preferred but non-limiting embodiments of the invention, in which:

Fig. 1 is a cross-section view of the door-locking device according to the invention, in an open lid position;

Fig. 2 is a cross-section view of the device in a lid-closing phase;

Fig. 3 is a cross-section view of the device in a closed lid position;

Fig. 4 is a cross-section view of the device with a test finger inserted;

Figs. 5 and 6 are cross-section views of the device in a lid opening phase;

Fig. 7 is an axonometric view of the device in an assembling phase;

Figs. 8 and 9 illustrate two possible embodiments of the locking lever shown in Fig. 7.

[0013] With reference to Figs. 1, 2 and 7, the device according to the invention comprises a containing body 1, preferably made of a thermoplastic material, that comprises a portion 15 fitted with means for fastening it to the front lid of the cloth-washing machine and a closing cover 16.

[0014] The portion 15 is realized with a square opening 2, capable of receiving the lid hook 20 and fitted with a projecting rim 3 to be seated in the front panel of the machine so as to receive and retain the hook.

[0015] The body 1 further houses a sliding cursor 6 subjected to the action of elastic means 14 and an electromechanical delaying device 4 of an already known type.

[0016] The delaying device 4 comprises a pawl 5 that is operated by a system connected to the machine actuating controls, for instance through a movable contact blade of a micro-switch mounted in series on one phase of the machine powering system.

[0017] The cursor 6 presents, at the opening 2 of the support 1, a square opening 7 fitted with a thickened frame 8 with two recesses 9.

[0018] Opposite the electromechanical delaying device 4, there is a window or seat 10 provided to receive the locking pawl 5.

[0019] With particular reference to Fig. 7, a locking lever 11 with a U-profile is seated inside the body 1, in correspondence of the opening 2 and connected to this latter with a hinge-type link 21.

[0020] The link 21 is advantageously realized with helical springs 12 arranged so as to allow, in addition to a rotation and return action of the lever 11 to its rest position, an axial motion of the lever along the sliding axis of the cursor 6.

[0021] The lever 11 is equipped with two small projections or prongs that fit into the recesses 9 of the cursor 6.

[0022] The device operates as follows.

[0023] In an opened lid position, the elements of the device are in the reciprocal positions shown in Fig. 1. In particular, the lever 11 blocks the small projections 13 of the cursor 6 so as to prevent the cursor translation, while the cursor 6 inhibits actuating the pawl 5 of the door-lock 4, since the axis of the window 10 is offset in respect of the pawl sliding axis. The machine start-up is thus inhibited.

[0024] With reference to Figures 2 and 3, upon closing the lid, the hook 20 enters the opening 2 while at the same time acting on the lever 11 and on the cursor 6, causing the rotation of the lever 11, which releases the projections 13 from the recesses 9 to disengage the cursor 6 and allow it to be shifted against the action of the elastic means 14.

[0025] As soon as the lid closing position is reached, the window 10 of the cursor 6 becomes aligned with the axis of the pawl 5 of the door-locking device 4, and this latter can snap into the holding position of the hook 20, while the lever 11 is pushed forward to rest against the cursor 6.

[0026] If on the contrary a test finger 11 is inserted into the opening as shown in Fig. 4 in an attempt to actuate the cursor 6, the lever 11 locks the cursor 6 thanks to the engagement of the small projections 13, thus preventing the sliding thereof and the consequent lodging of the seat 10 into alignment with the pawl 5. As a matter of fact the insertion of a (test) finger cannot achieve the simultaneous actuation of the locking lever 11 and of the cursor 6 (an operation properly achieved only through the insertion of the hook), and thus the start-up of the machine is prevented.

[0027] With reference to Figs. 5 and 6, in a lid opening phase at the end of the operating cycle and in accordance with the known art, the locking pawl 5 slides back and disengages the cursor 6. By rotating the hook 20 to allow it to be extracted from the opening 2, the hook acts on the lever causing its initial translation, which is needed to compensate and dampen the motion of the hook. The subsequent rotation of the hook causes the rotation of the lever 11 and the simultaneous translation of the cursor 6, which returns the elements of the device to their respective positions shown in Fig. 1.

[0028] As shown in the disclosed embodiment, advantageously the lever 11 can seat in the portion 15 of the containing body or can be mounted on the closing cover 16 of the same.

[0029] In order to simplify the device's assembling operations, it is also possible to provide elastic means for connecting the lever 11 to the support 1 or to the cover 16, which are alternative to the springs 12 but equivalent to them. For exemplifying purposes, the detail shown in Fig. 8 provides elastic flaps 17 arranged on the support 1 that oppose the ends of the lever 11, while Fig. 9 shows elastic flaps 18 arranged on the lever 11 so as to oppose

pins 19 provided on the cover 16.

[0030] Although the invention has been illustrated with reference to preferred embodiments, the same is generally susceptible of further applications and modifications intended to be included within the scope of the invention, as will be evident to the skilled of the art.

Claims

1. Locking device for the closing lid of a washing machine or the like comprising a front panel and a sealing lid hinged to said front panel and provided with a hook (20) for engagement with said locking device, said locking device comprising a containing body (1) mounted to said panel and housing a cursor (6), equipped with an opening (7) for receiving said hook (20) and a delaying device (4) adapted to lock said cursor (6) in a position retaining said hook (20), said locking device being **characterized by** comprising a lever (11) arranged in correspondence of said opening (7) and connected to said body (1) by means (21) allowing it to rotate and to axially translate, and provided with means (13) for preventing the translation of said cursor (6).
2. Locking device for the closing lid of a washing machine and the like according to claim 1, **characterized by** the fact that said connecting means (21) comprise helical springs (12).
3. Locking device for the closing lid of a washing machine and the like according to claim 1, **characterized by** the fact that said connecting means (21) comprise elastic flaps (17) acting against the ends of said lever (11).
4. Locking device for the closing lid of a washing machine and the like according to claim 1, **characterized by** the fact that said connecting means (21) comprise elastic flaps (18) arranged on said lever (11) that oppose pins (19) fastened to a cover (16) of said containing body (1).
5. Locking device for the closing lid of a washing machine and the like according to one of the preceding claims, **characterized by** the fact that said lever (11) has a U-shaped profile.
6. Locking device for the closing lid of a washing machine and the like according to one of the preceding claims, **characterized by** the fact that said means (13) preventing the translation of the cursor (6) comprises one or more small projections (13) that fit into corresponding recesses (9) in said cursor (6).
7. Locking device for the closing lid of a washing machine and the like according to one of the preceding

claims, **characterized by** the fact that said lever (11) is mounted on the cover (16) of said containing body (1).

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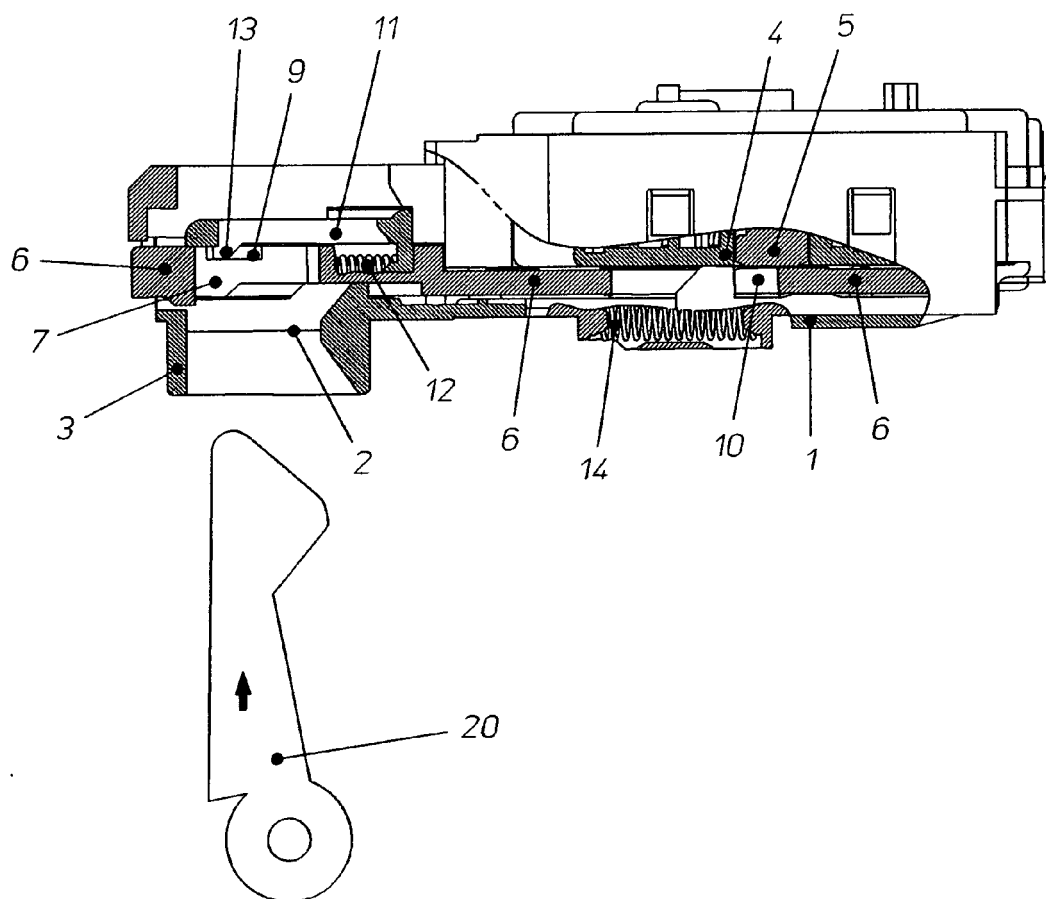


FIG. 1

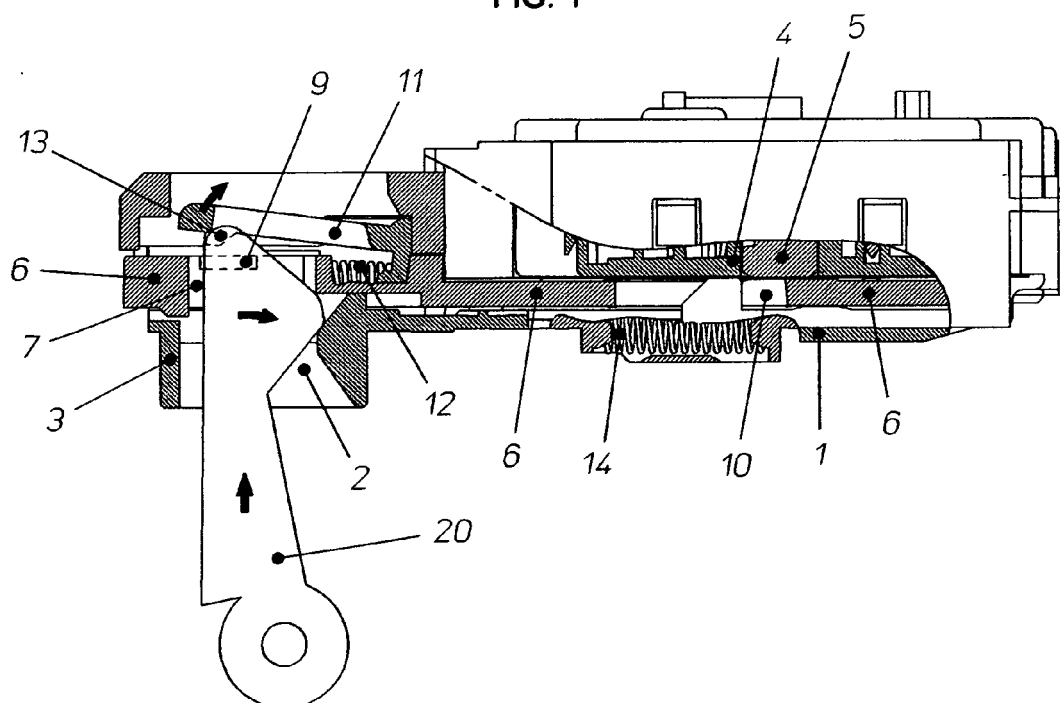


FIG. 2

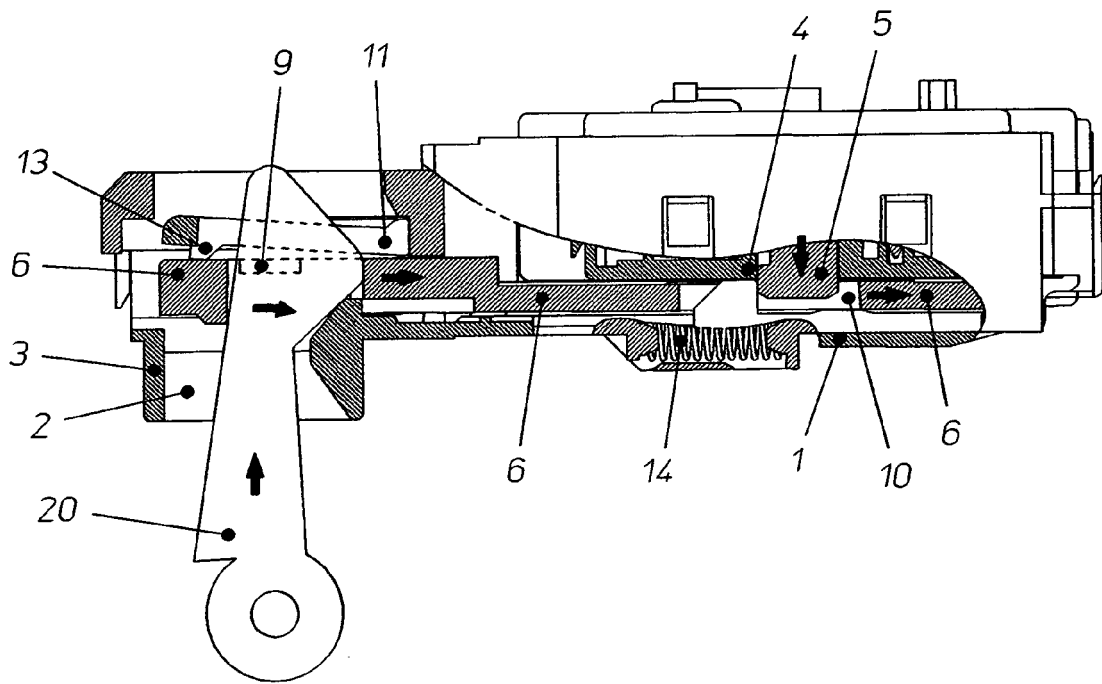


FIG. 3

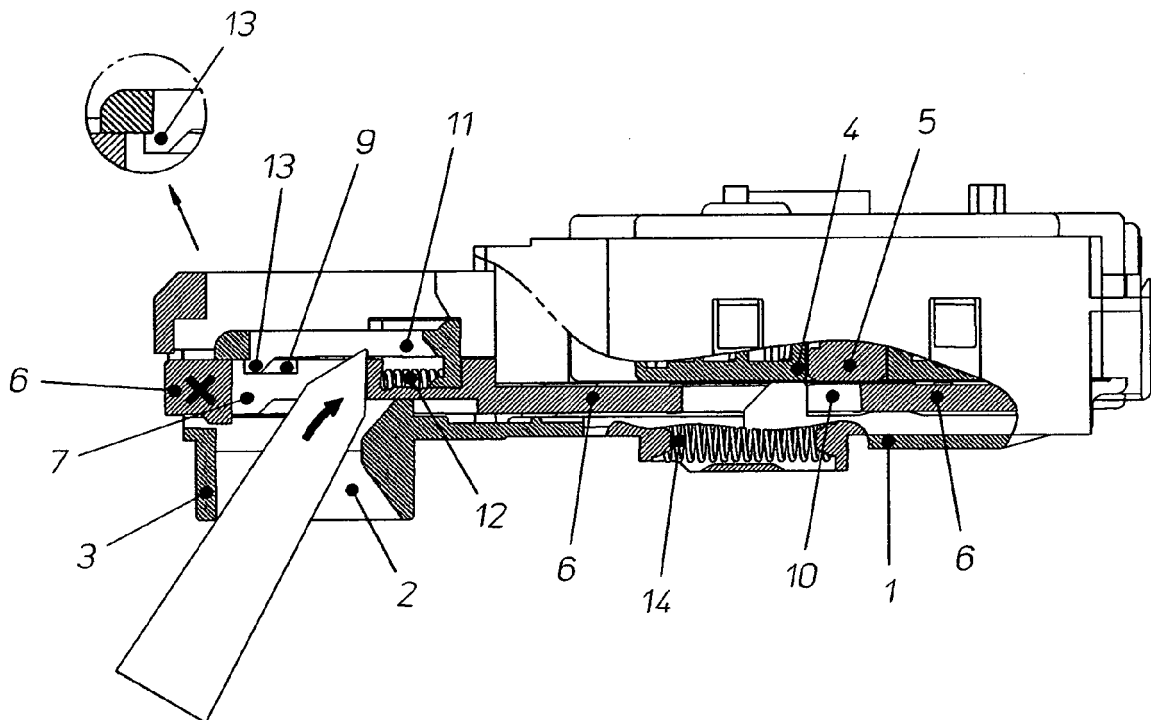


FIG. 4

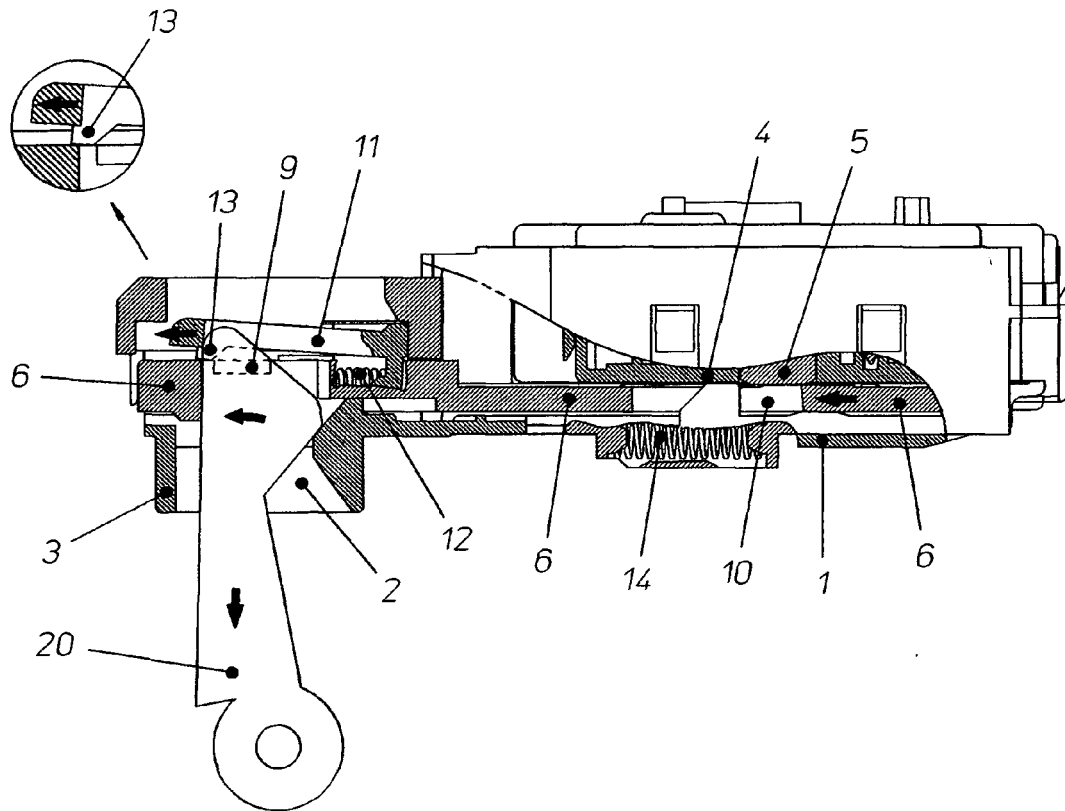


FIG. 5

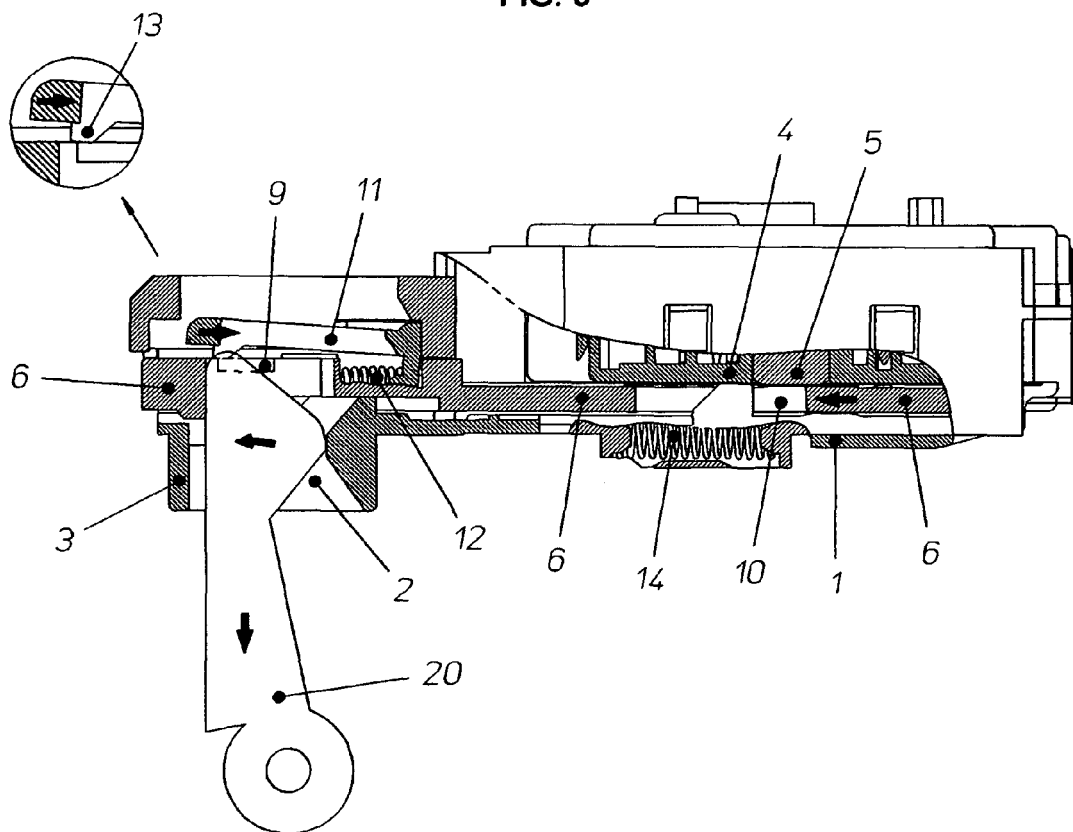


FIG. 6

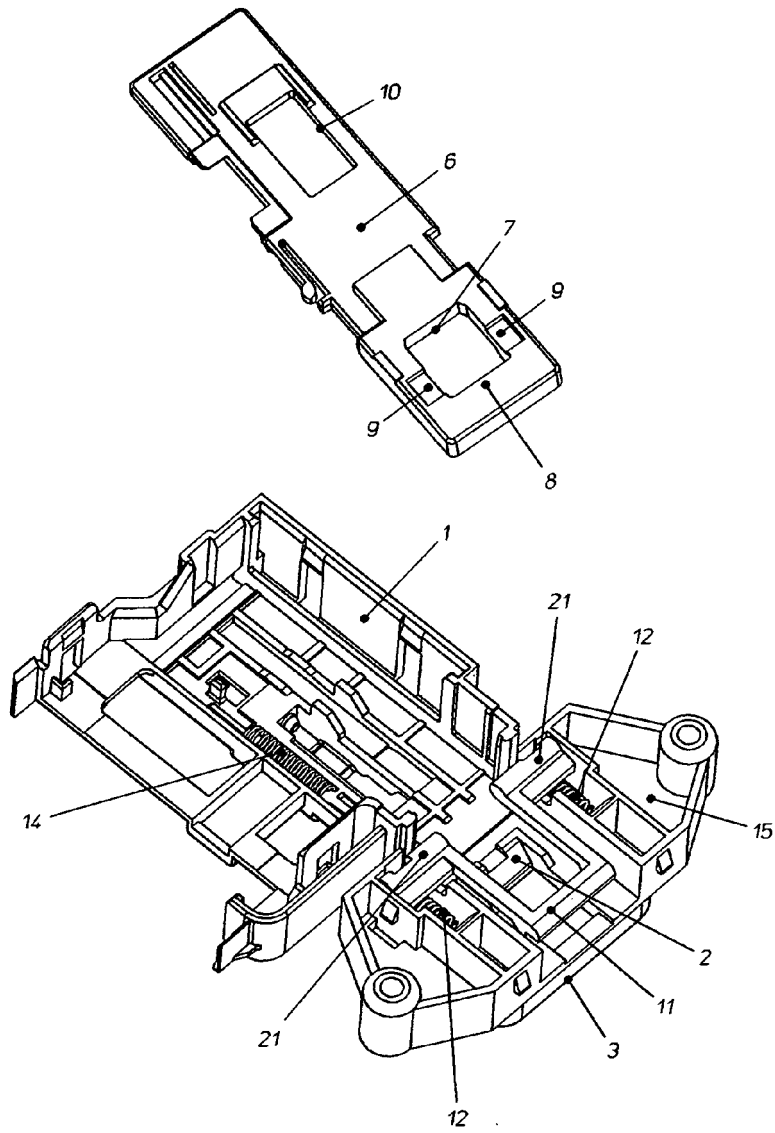


FIG. 7

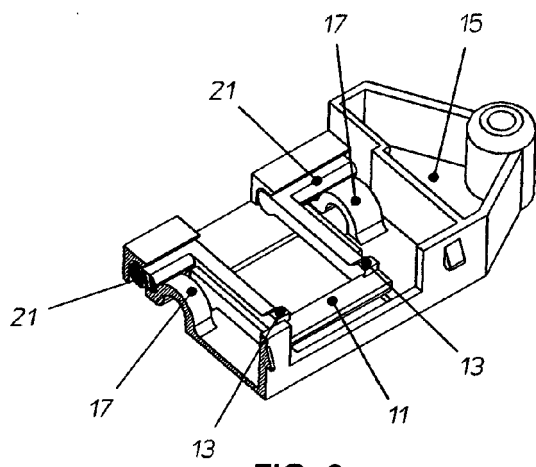


FIG. 8

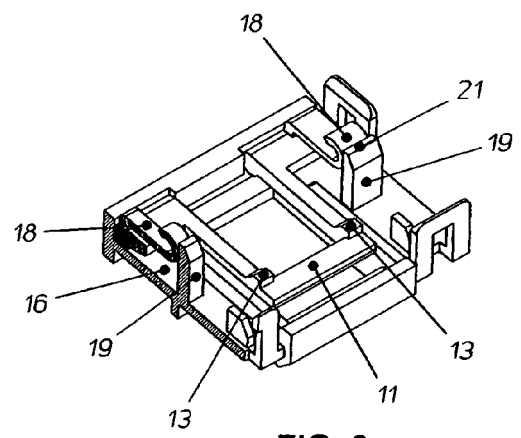


FIG. 9



EUROPEAN SEARCH REPORT

Application Number
EP 08 01 4334

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A	DE 22 57 587 A1 (ROCCHITELLI ONOFRIO) 30 May 1973 (1973-05-30) * figure 2 *	1-7	
A	EP 1 741 378 A (BITRON SPA [IT]) 10 January 2007 (2007-01-10) * claim 1; figure 1 *	1-7	
E	US 2009/013733 A1 (ROCCHITELLI ONOFRIO [IT]) 15 January 2009 (2009-01-15) * the whole document *	1-7	
E	EP 1 975 300 A (ELETTROTECNICA ROLD SRL [IT]) 1 October 2008 (2008-10-01) * claim 1; figure 1 *	1-7	
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E	DE 10 2007 008926 A1 (EMZ HANAUER GMBH & CO KGAA [DE]) 4 September 2008 (2008-09-04) * claim 1; figure 1 *	1-7	D06F
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 27 January 2009	Examiner Dupuis, Jean-Luc
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
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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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