

(19)



(11)

EP 2 690 366 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
29.01.2014 Bulletin 2014/05

(51) Int Cl.:
F24C 15/02^(2006.01) A47L 15/42^(2006.01)

(21) Application number: **12177992.0**

(22) Date of filing: **26.07.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(72) Inventor: **Lampitelli, Francesco**
47122 Forli (IT)

(74) Representative: **Baumgartl, Gerhard Willi**
Electrolux Dienstleistungs GmbH
Group Intellectual Property
90327 Nürnberg (DE)

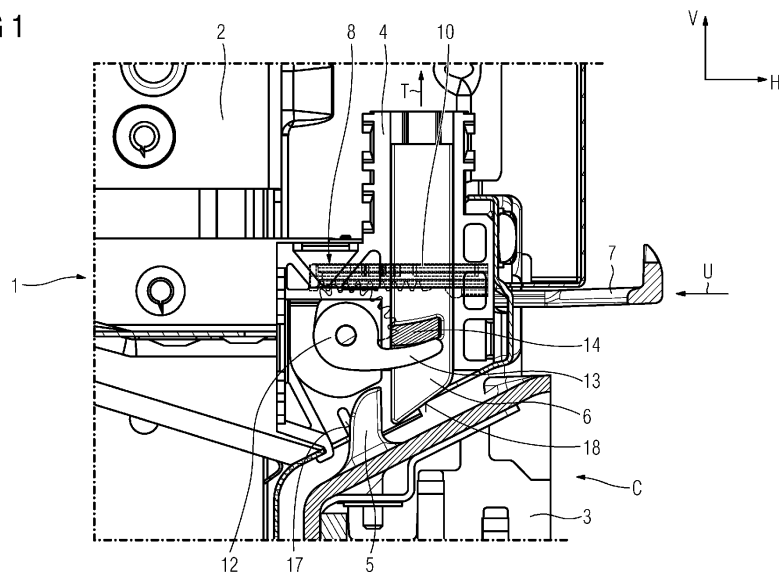
(71) Applicant: **Electrolux Home Products Corporation**
N.V.
1130 Brussel (BE)

(54) **Appliance with locking device**

(57) The invention relates to an appliance (1), especially to a domestic appliance, comprising a housing element (2), wherein a door (3) is arranged at the housing element (2), which door (3) can be positioned in a closed position (C) and in an opened position (O), wherein a child lock device (4) is arranged which can prevent the opening of the door (3) when the door (3) is in its closed position (C). To obtain a compact design and a secure locking of the appliance which makes it impossible for a child to open the door of the appliance, the invention is characterized in that the child lock device (4) comprises a hook element (5) which is arranged in or at the door (3), a catch element (6) designed to cooperate with the hook element (5), wherein the catch element (6) is ar-

ranged in the housing element (2), wherein the catch element (6) can move in a translational direction (T), for being in engagement with the hook element (5) to prevent the opening of the door (3) or for being in disengagement with the hook element (5) to allow an opening of the door (3), an activator element (7) for actuating the catch element (6), wherein the activator element (7) is arranged to be moved in a translational direction (U) to move the catch element (6) in its position in which it is disengaged with the hook element (5), and transmission means (8) to transmit the translational movement of the activator element (7) in its translational direction (U) into a translational movement of the catch element (6) in its translational direction (T).

FIG 1



EP 2 690 366 A1

Description

[0001] The invention relates to an appliance, especially to a domestic appliance, comprising a housing element, wherein a door is arranged at the housing element, which door can be positioned in a closed position and in an opened position, wherein a child lock device is arranged which can prevent the opening of the door when the door is in its closed position.

[0002] Domestic appliances, especially domestic ovens are known in the art which are equipped with child lock systems to prevent that the oven door can be opened by a young child.

[0003] There are several requests for a child lock system of the mentioned kind:

A standard door lock should make it difficult for a child to open the oven door using both hands. Thus, it should not be possible for a child to open the oven door with a one-hand operation. The principle of the lock function is the need of two operation forces to unlock the door. It shall be possible to easily activate or deactivate the door lock by an adult but not for a child. It should not be possible to open the locked door with a pulling force up to 90 N. Thus, it should not be possible for very young children up to 36 months to open the door when the lock device is activated. Also, it shall not be possible to deactivate the door lock by mistake. On the other side, it shall be possible to open the oven door without the use of tools if the door lock breaks.

[0004] In US 3 328 062 A1 a door lock system is described that has a moving hook element for locking and which makes use of a wheel element. The handle has to be lifted upwards for opening of the door whilst the door has to be pulled forwards.

[0005] US 3 498 285 A1 discloses a stove latch system which has multiple locking pins which are engaged upon the movement of one handle. The handle has to be moved sideways whilst the door has to be pulled forwards for opening.

[0006] In US 2002/0079709 A1 a locking system is shown comprising a moving pin in a latch for a dishwasher door. Here, the handle has to be pushed upwards whilst the door has to be pulled forwards for opening.

[0007] All pre-known solutions have only quite small contact areas between the lock and the door to be secured. So, the pulling forces to open the door in the locked status are limited.

[0008] Thus, it is an object of the present invention to propose an appliance of the generic type with a child lock device which has a higher security against unauthorized opening of the door when the lock device is activated. Furthermore, the activation and disengagement of the lock device should be possible in a better ergonomic manner. Also it is aimed to design the lock device in such a way that it becomes easily possible to bring the lock

device in a permanently disengaged status; on the other hand it should be also possible to again activate the lock device if required.

[0009] The solution of this object according to the invention is characterized in that the child lock device comprises

- a hook element which is arranged in or at the door,
- a catch element designed to cooperate with the hook element, wherein the catch element is arranged in the housing element, wherein the catch element can move in a translational direction, for being in engagement with the hook element to prevent the opening of the door or for being in disengagement with the hook element to allow an opening of the door,
- an activator element for actuating the catch element, wherein the activator element is arranged to be moved in a translational direction to move the catch element in its position in which it is disengaged with the hook element, and
- transmission means to transmit the translational movement of the activator element in its translational direction into a translational movement of the catch element in its translational direction.

[0010] Preferably, the translational direction of the catch element is identical with the vertical direction. Also, it is preferred that the translational direction of the activator element is identical with the horizontal direction.

[0011] The catch element is preferably biased into the direction in which it is in engagement with the hook element by spring means. The spring means are preferably a compression spring.

[0012] The transmission means comprise according to a preferred embodiment of the invention

- a rack element which is connected with the activator element and which has a gearing,
- a gear wheel which is arranged rotatable in the housing element and which is in engagement with the gearing of the rack element,
- a lever element which is connected with the gear wheel or which is part of the gear wheel, wherein the lever element can be brought in contact by rotation of the gear wheel with a contact element which is arranged at or in the catch element to move the catch element in its translational direction.

[0013] Preferably, the contact element is designed as a crank element which has a contact section with a substantial arcuated, preferably circular, form seen in a direction which is perpendicular to the translational direction of the movement of the catch element and is per-

pendicular to the translational direction of the movement of the activator element.

[0014] To establish a disengaged status of the child lock device it is realized preferably by a push-push system. The push-push system has a guide which moves the rack element until it reaches the locking position. In the locking position it is possible to remove the activator element by pulling it out.

[0015] The hook element and/or the catch element have preferably slanted side faces to allow the easy closing of the door when the catch element is in its position to prevent the opening of the door.

[0016] The door can be arranged pivotable at the housing element or it can be arranged translationally movable relatively to the housing element.

[0017] The proposed appliance is preferably an oven, especially a domestic oven.

[0018] The proposed child lock system provides much stronger locking capabilities as the pre-known systems. The described solution has a pin (catch element), which is moved preferably in a vertical direction, which establishes the locking function through a spring and which establishes the opening function through a gear wheel. The pin engages with the door, which leads to a significant larger contact surface, which in turn is able to withstand higher pull out forces of the locked door.

[0019] Additionally, two different and contrary movements have to be made to unlock the door. The lock (activator/actuator) has to be pushed inwards and the door has to be pulled outwards. This leads to an enhanced security.

[0020] A specific feature of the proposed child lock device it that a pin (catch element) is provided which moves vertically for locking the door. The activation of the device is preferably done by a horizontal movement of the activator element. Preferably, a compression spring is housed inside the pin and is used to exert a force of impediment to unlock the system. The structure of the door has a "tooth" (hook element) which is - in the activated status - in contact with the pin, this condition prevents the opening of the door. When the door is closed the pin at the bottom is in contact with the "tooth" present on the structure of the door. In this condition the door is locked.

[0021] After pushing the activating element (activator) the pin moves upwards and the door can be opened regularly. When the force on the activator stops the pin returns to the operating position due to the force of the spring action. When the door is open the pin is in its normal position. The shape of the "tooth" and the pin are designed - with slanted surfaces - in order to activate the system in an automatic way at the moment when the user is closing the door.

[0022] The proposed device has also a permanently disabled position. The child lock device can here be arranged in a passive status by pushing the activator to an end position. This passive status is reversible and can be reversed easily by again pushing the activator.

[0023] The child lock device is located inside the struc-

tural components and the user could see on the activating element.

[0024] The vertical movement of the pin (catch element) brings the advantage of having a larger contact surface between the pin and the "tooth" (hook element) on the inner door compared to pre-known solutions. This allows to increase the security for locking the door. That is, the vertical movement of the pin produces multiple benefits such as greater surface contact between the pin and the "tooth" on the structural door and small working volume of the pin during normal operation.

[0025] The proposed system of gears (rack element and gear wheel) allows an easy and cost efficient realization. Also, it is beneficially that this gear system is less cumbersome to have a vertical translation of the pin actuated by the pressure on the activator element.

[0026] The volume occupied by the pin between the locking and unlocking position is the minimum possible as the pin has a vertical movement. So, interference problems with structural parts can be better avoided.

[0027] The proposed solution has a high degree of robustness as well as constancy in time of performance, i. e. the required components maintain their function during a high number of operation cycles. The required distance in the translational direction of the activator element is quite small, what improves the compactness of the lock device. So, the volume of working space is minimal which is required by the locking system whilst a quite big engagement surface is given between the pin and the "tooth".

[0028] Also, the permanent deactivation function is very beneficial. This allows to disable the device until the time when the user needs it without disassembling parts. It is possible to deactivate the locking system just with only a small movement of the activator element. The child lock device has thus a locking position which allows to disable the device until the user needs to use it again without disassembling of any parts. Once the child lock device is disabled the activator element can be removed.

[0029] The proposed device meets all the child lock specification due to its high robustness. Over the time a high degree of steadiness of the compression of the spring forces is given during the lifetime of the system, i. e. a constancy on performance is ensured.

[0030] In the drawings an embodiment of the invention is depicted.

Fig. 1 shows a part of a sectional side view of a domestic appliance being a domestic oven, wherein a housing element and a door is shown,

Fig. 2 shows a child lock device as a part of Fig. 1,

Fig. 3 shows a perspective view of the child lock device,

Fig. 4 shows the child lock device according to Fig.

- 2 with a part of the door,
- Fig. 5 shows a part of a sectional view according to Fig. 1, wherein the child locking device is in a position for opening the door,
- Fig. 6 shows in the depiction of Fig. 5 the closing of the door,
- Fig. 7 shows the child lock device according to Fig. 2 in a perspective view and in a top plan view, wherein it is in a deactivated position,
- Fig. 8 shows in the depiction of Fig. 5 the child lock device being in the deactivated position according to Fig. 7,
- Fig. 9 shows a part of a sectional view according to Fig. 1, wherein the child lock device is in a passive status and the activator is just removed,
- Fig. 10 shows an exploded view of the child lock device,
- Fig. 11 shows a domestic appliance with an activator element and
- Fig. 12 shows the domestic appliance according Fig. 11 with removed activator element.

[0031] In Fig. 1 a domestic appliance 1 being a domestic oven is shown. The appliance 1 has a housing element 2 and a door 3. The door 3 is here shown in its closed position C. A child lock device 4 is arranged in the housing 2, that is the door 3 cannot be opened unless the child lock device is in the locked position as shown in Fig. 1.

[0032] The child lock device 4 comprises a hook element 5 ("tooth") which is arranged at the door 3. Furthermore, the device has a catch element 6 which can be moved in a translational direction T which is identical with the vertical direction V. When the catch element 6 is in the depicted position it hinders - due to the hook element 5 an opening of the door 3.

[0033] The child lock device 4 has furthermore an activator element 7 which is supported in the housing 2 and which can be moved forth and back in a translational direction U which is identical with the horizontal direction H. The activator element 7 is removably connected with a rack element 10 which has a gearing 11 and which is part of transmission means 8 by which the horizontal movement in the direction U is transmitted onto the catch element 6 to move it in the vertical direction T. For doing so, the rack element 10 is meshing with the gearing of a gear wheel 12 which is rotatable arranged in the housing element 2. A lever element 13 being an appendage of the gear wheel 12 extends substantially radially from the gear wheel 12. Thus, if the gear wheel 12 rotates the

lever element 13 moves upwards.

[0034] When doing so the lever element 13 is in contact with a contact element 14 which is an elastic spring element. It has a contact section 15 (see Fig. 2) which has a substantial circular shape.

[0035] During normal use of the child lock device 4 the activator element 7 is moved for opening of the door into the direction of the arrow U in Fig. 1 and Fig. 2. By doing so, the corresponding translational movement of the rack element 10 causes a rotary movement of the gear wheel 12 counter-clockwise so that the lever element 13 is moving upwards and presses onto the contact element 14 and more specifically on its contact section 15. Thus, the catch element 6 is moved upwards and the door 3 can be opened as soon as the catch element 6 has reached the respective height.

[0036] When taking away an opening force onto the activator element 7 in the direction of the arrow U the catch element 6 takes again its locked position according Fig. 1 and Fig. 2 as spring means 9 being a compression spring biases the catch element 6 into the closed position. This can be seen in Fig. 3, i. e. the catch element 6 is pressed downwards by means of the compression spring 9.

[0037] In Fig. 4 it can be seen again how the elements are positioned when the child lock device 4 is in the locking position. Here the door 3 with the hook element 5 is depicted. It can be seen that the door 3 cannot be opened due to the position of the catch element 6.

[0038] In Fig. 5 it can be seen that the activator element 7 is pressed in the direction of the arrow U so that the transmission means 8 have lifted the catch element 6 into the direction of arrow T. Consequently, the child lock device 4 is now in its opened position O and the door 3 can be opened.

[0039] In Fig. 6 it is shown how the door 3 is closed again when the child lock device 4 is in the closed position. Due to slanted side faces 17 and 18 of the hook element 5 and the catch element 6 (see for example Fig. 4) the door 3 can be closed in spite of the fact that the catch element 6 is in the lower (closed) position. When the door 3 is closed and the hook element 5 thus passes the catch element 6, the catch element 6 is lifted accordingly to allow the hook element 5 to pass so that the door 3 can reach its complete closed position.

[0040] In Fig. 7 and Fig. 8 a further beneficial feature of the proposed child lock device is illustrated. The figures show the assembled device. In the rack element 10 there is a push-push track with a guide that slides inside the locking device.

[0041] Thus, the child lock device is deactivated in this position as it is depicted in Fig. 7 and Fig. 8.

[0042] To activate the child lock device 4 again the activator element 7 needs only to be pushed in the direction A according to Fig. 8. Then, the transmission means 8 bring back the elements in the position in which the child lock device 4 is activated again.

[0043] A track push-push system 16 is shown in Fig.

7. which also comprises a guide element 19.

[0044] In Fig. 9 and Fig. 10 details of the mentioned arrangement can be seen.

[0045] Thus, in the locking status of the device there is the possibility to remove the activator element 7.

[0046] In Fig. 11 the activator element 7 is shown which is still at the appliance 1. According to Fig. 12 the activator element 7 is removed. The child lock system is passive now.

Reference Numerals

[0047]

1	Appliance (domestic oven)	15
2	Housing element	
3	Door	
4	Child lock device	
5	Hook element	5
6	Catch element	10
7	Activator element	
8	Transmission means	
9	Spring means (compression spring)	
10	Rack element	
11	Gearing	25
12	Gear wheel	
13	Lever element	
14	Contact element (crank element)	
15	Contact section	
16	Track push-push system	30
17	Slanted side face	
18	Slanted side face	
19	Guide element	
C	Closed position	35
O	Opened position	
T	Translational direction of the catch element	
U	Translational direction of the activator element	
V	Vertical direction	
H	Horizontal direction	40
A	Push for unlock	
R	Remove the activator element	

Claims

1. Appliance (1), especially domestic appliance, comprising a housing element (2), wherein a door (3) is arranged at the housing element (2), which door (3) can be positioned in a closed position (C) and in an opened position (O), wherein a child lock device (4) is arranged which can prevent the opening of the door (3) when the door (3) is in its closed position (C), **characterized in that** the child lock device (4) comprises

- a hook element (5) which is arranged in or at the door (3),

- a catch element (6) designed to cooperate with the hook element (5), wherein the catch element (6) is arranged in the housing element (2), wherein the catch element (6) can move in a translational direction (T), for being in engagement with the hook element (5) to prevent the opening of the door (3) or for being in disengagement with the hook element (5) to allow an opening of the door (3),

- an activator element (7) for actuating the catch element (6), wherein the activator element (7) is arranged to be moved in a translational direction (U) to move the catch element (6) in its position in which it is disengaged with the hook element (5), and

- transmission means (8) to transmit the translational movement of the activator element (7) in its translational direction (U) into a translational movement of the catch element (6) in its translational direction (T).

2. Appliance according to claim 1, **characterized in that** the translational direction (T) of the catch element (6) is identical with the vertical direction (V).

3. Appliance according to claim 1 or 2, **characterized in that** the translational direction (U) of the activator element (7) is identical with the horizontal direction (H).

4. Appliance according to one of claims 1 to 3, **characterized in that** the catch element (6) is biased into the direction in which it is in engagement with the hook element (5) by spring means (9).

5. Appliance according to claim 4, **characterized in that** the spring means (9) are a compression spring.

6. Appliance according to one of claims 1 to 5, **characterized in that** the transmission means (8) comprise

- a rack element (10) which is connected with the activator element (7) and which has a gearing (11),

- a gear wheel (12) which is arranged rotatable in the housing element (2) and which is in engagement with the gearing (11) of the rack element (10),

- a lever element (13) which is connected with the gear wheel (12) or which is part of the gear wheel (12), wherein the lever element (13) can be brought in contact by rotation of the gear wheel (12) with a contact element (14) which is arranged at or in the catch element (6) to move the catch element (6) in its translational direction (T).

7. Appliance according to claim 6, **characterized in that** the contact element (14) is designed as a crank element which has a contact section (15) with a substantial arcuated, preferably circular, form seen in a direction which is perpendicular to the translational direction (T) of the movement of the catch element (5) and is perpendicular to the translational direction (U) of the movement of the activator element (7). 5
8. Appliance according to one of claims 1 to 7, **characterized in that** the child lock device is realized by a push-push system. 10
9. Appliance according to one of claims 1 to 8, **characterized in that** the catch element (6) is biased into the direction in which it is in engagement with the hook element (5) by spring means. 15
10. Appliance according to one of claims 1 to 9, **characterized in that** the child lock device (4) has a locking position which allows to disable the child lock device (4) until the user needs to use it again. 20
11. Appliance according to claim 10, **characterized in that** the activator element (7) is arranged removably at the child lock device (4). 25
12. Appliance according to one of claims 1 to 11, **characterized in that** the hook element (5) and/or the catch element (6) have slanted side faces (17, 18) to allow the closing of the door (3) when the catch element (6) is in its position to prevent the opening of the door (3). 30
13. Appliance according to one of claims 1 to 12, **characterized in that** the door (3) is arranged pivotable at the housing element (2). 35
14. Appliance according to one of claims 1 to 12, **characterized in that** the door (3) is arranged translationally movable relatively to the housing element (2). 40
15. Appliance according to one of claims 1 to 14, **characterized in that** it is an oven (1), especially a domestic oven. 45

50

55

FIG 1

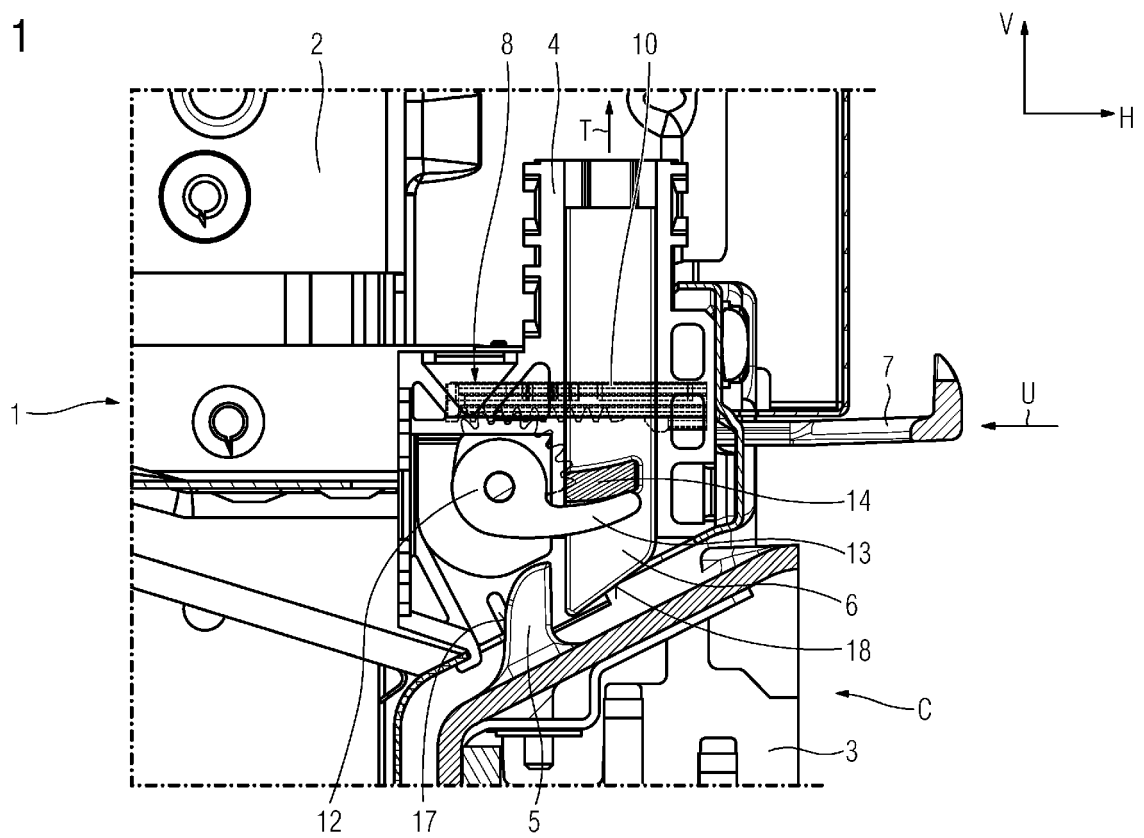


FIG 2

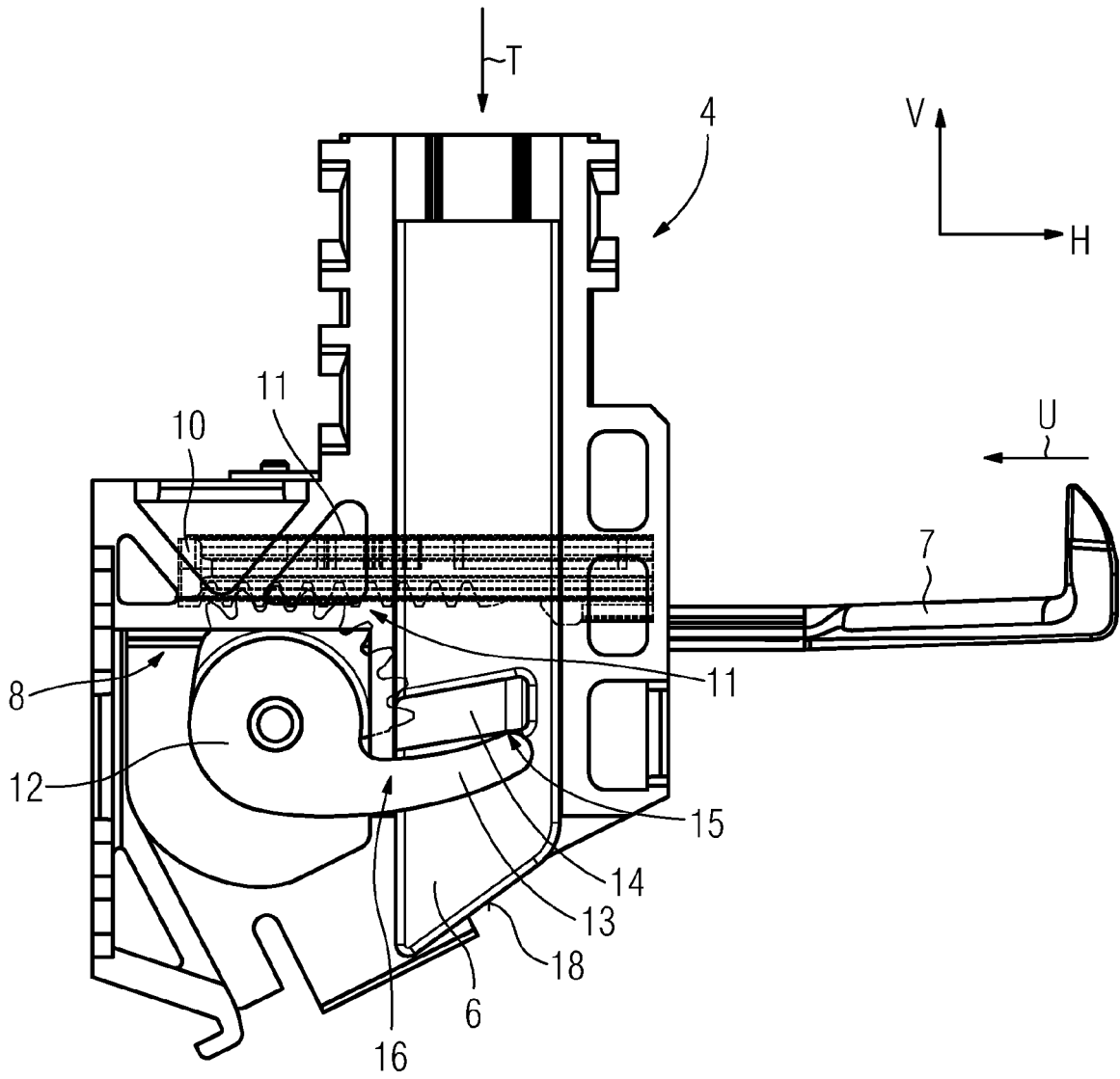


FIG 3

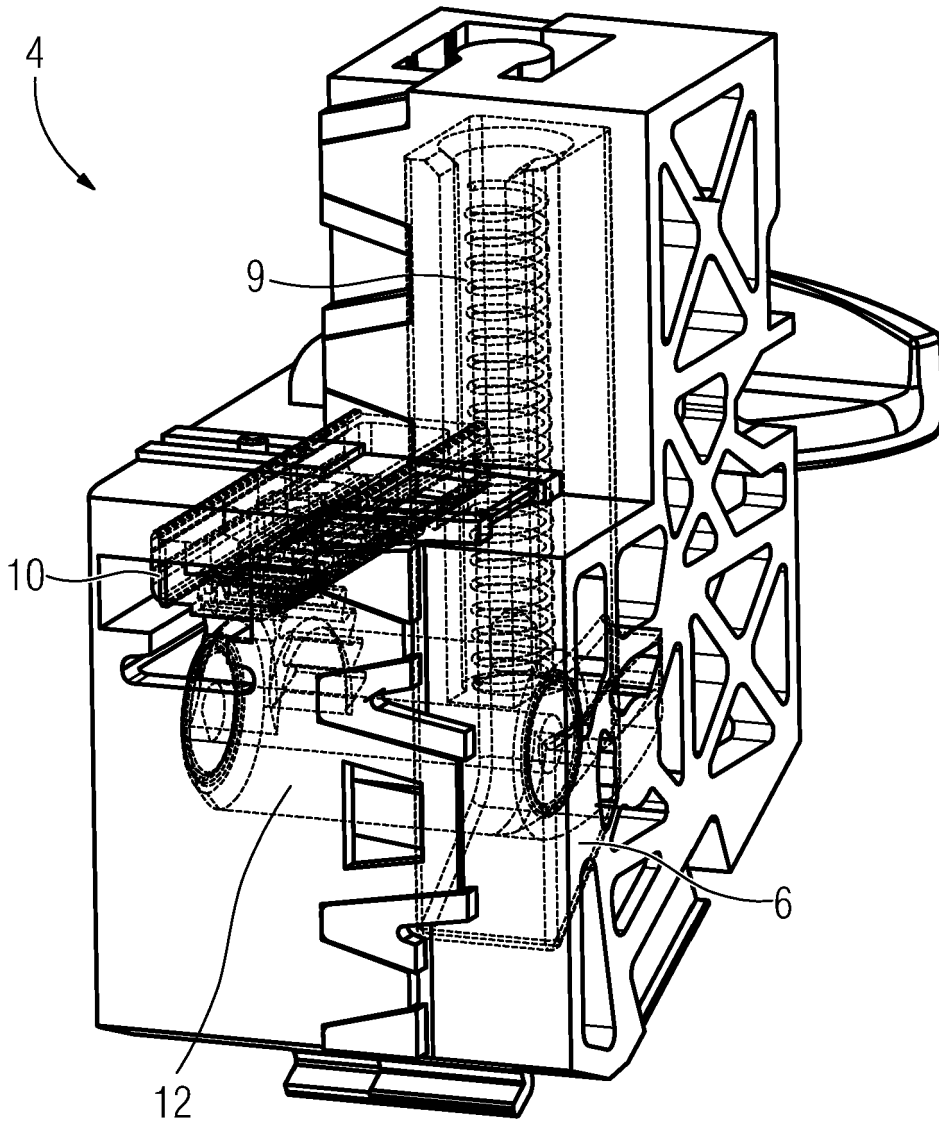
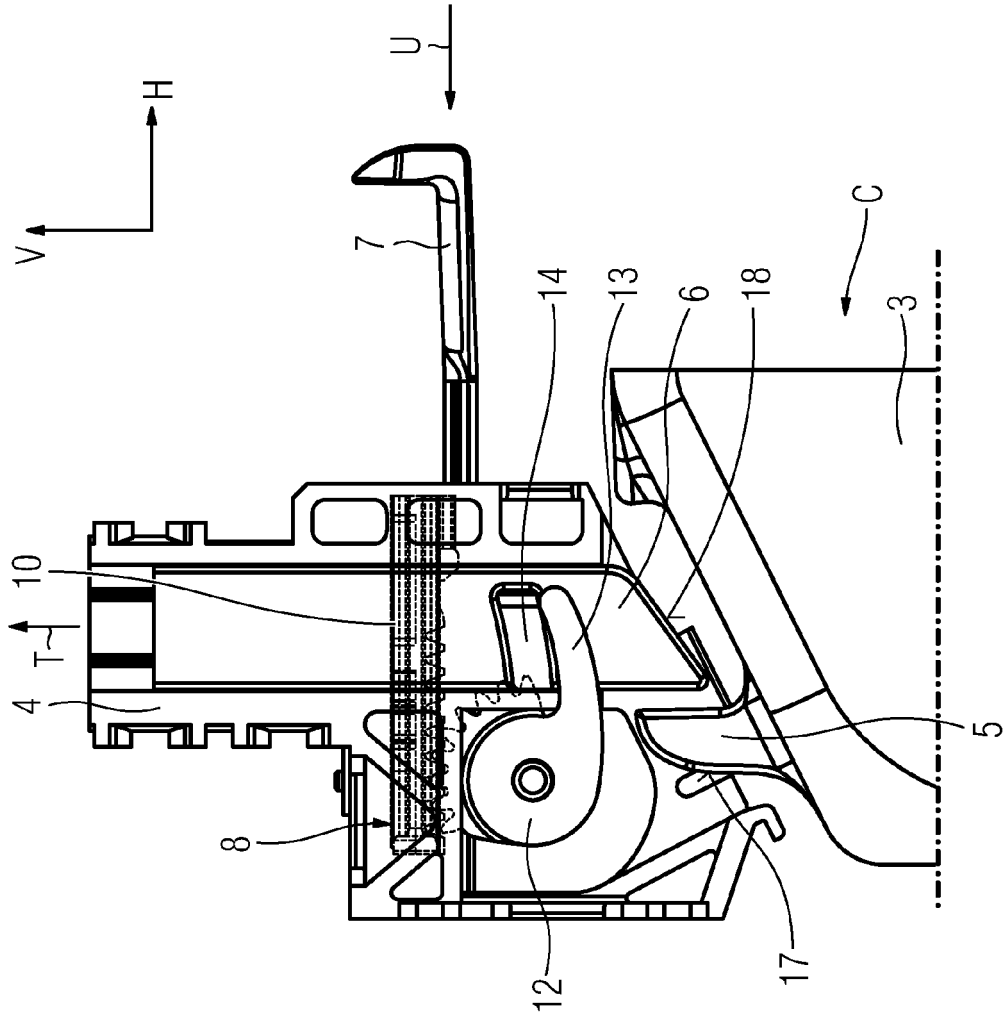


FIG 4



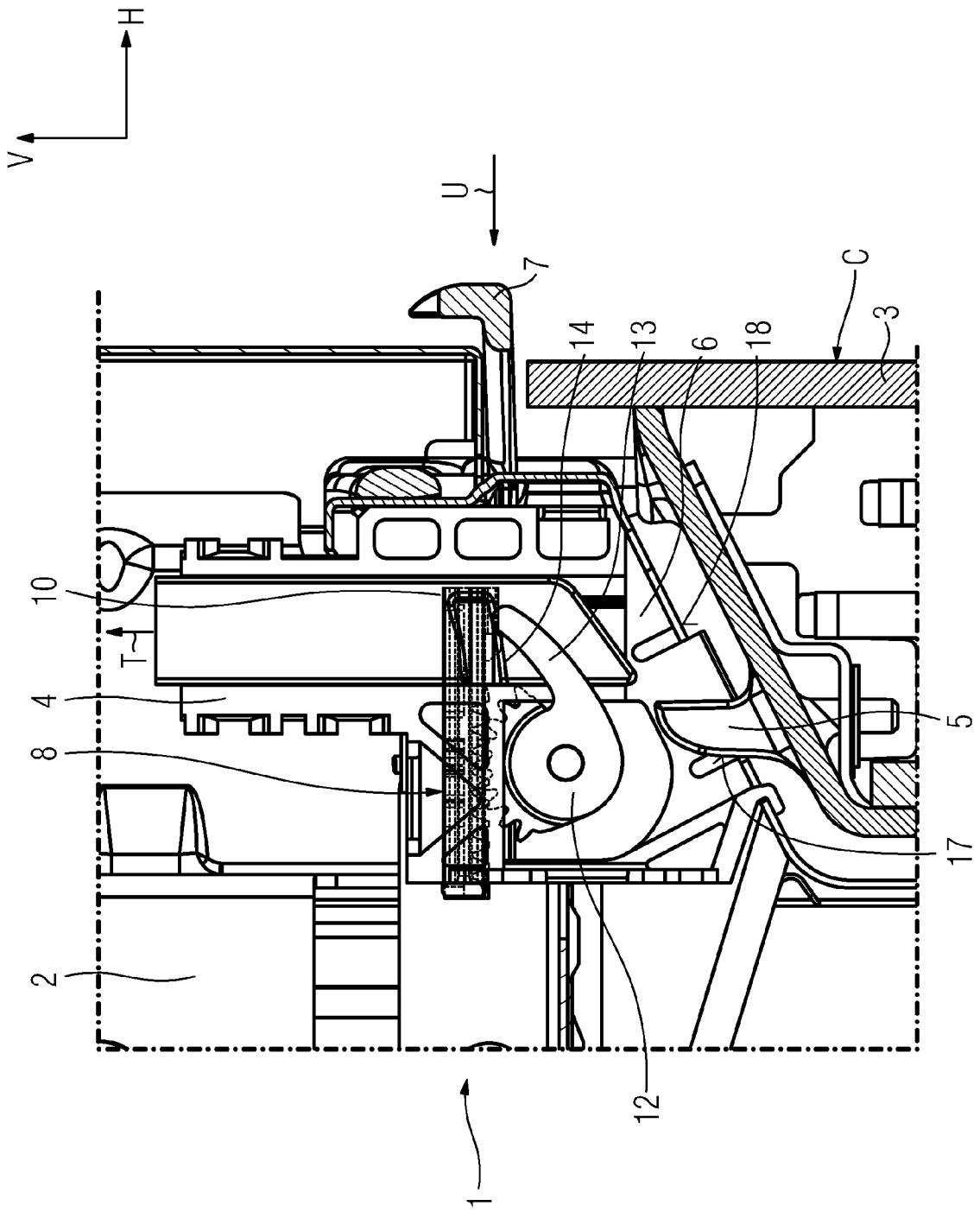


FIG 5

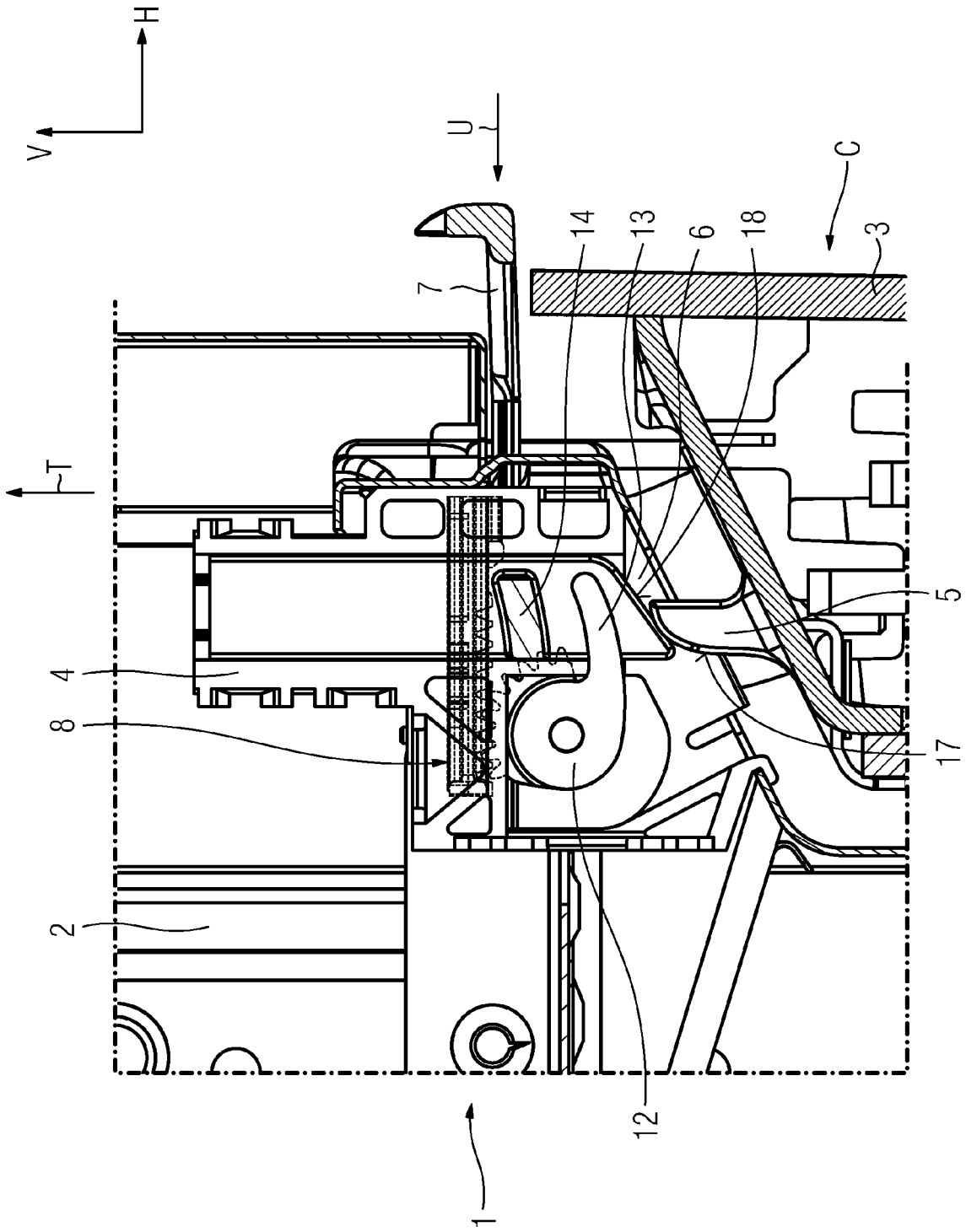


FIG 7

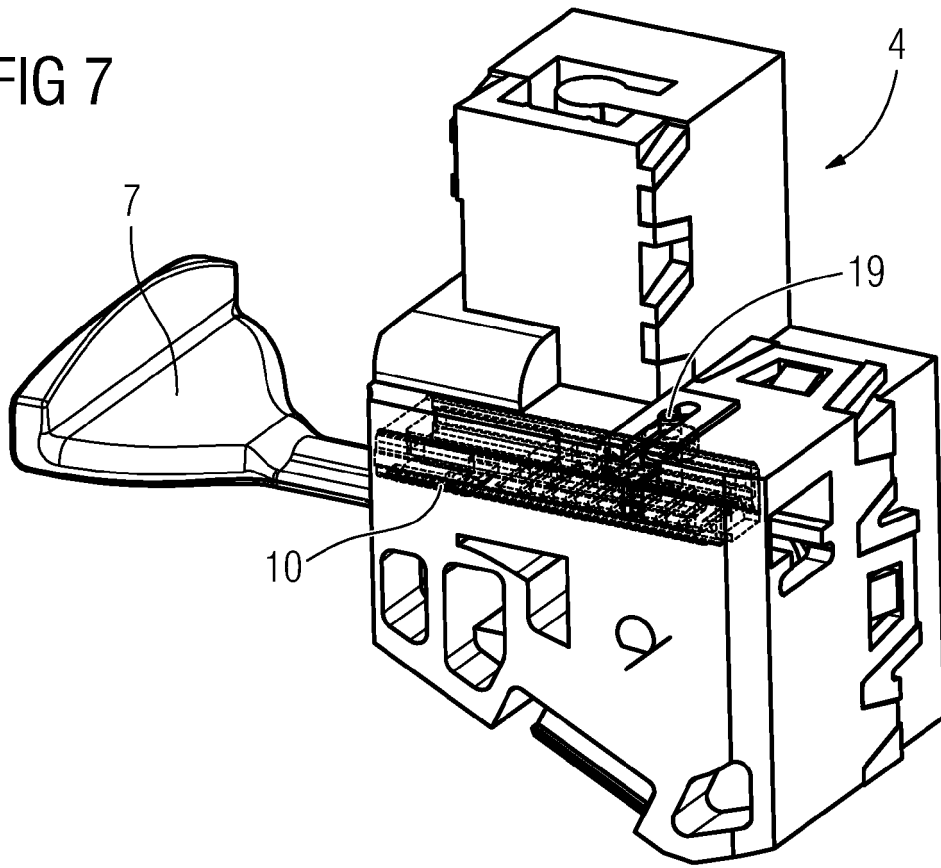
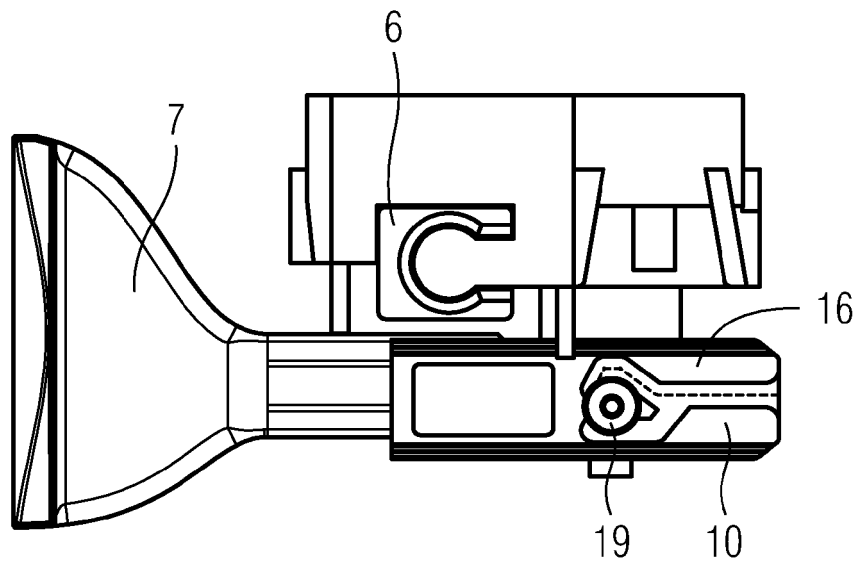
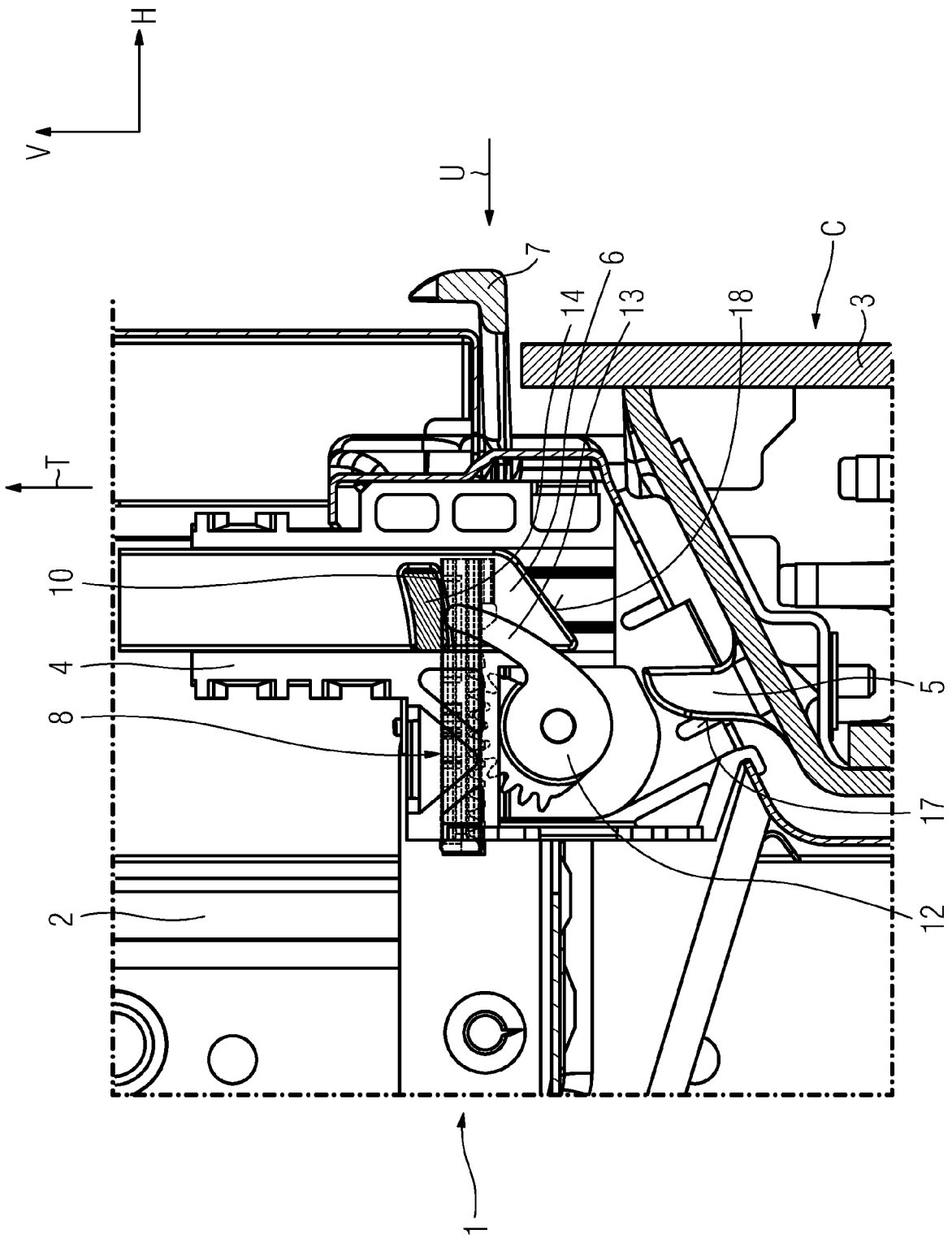


FIG 8





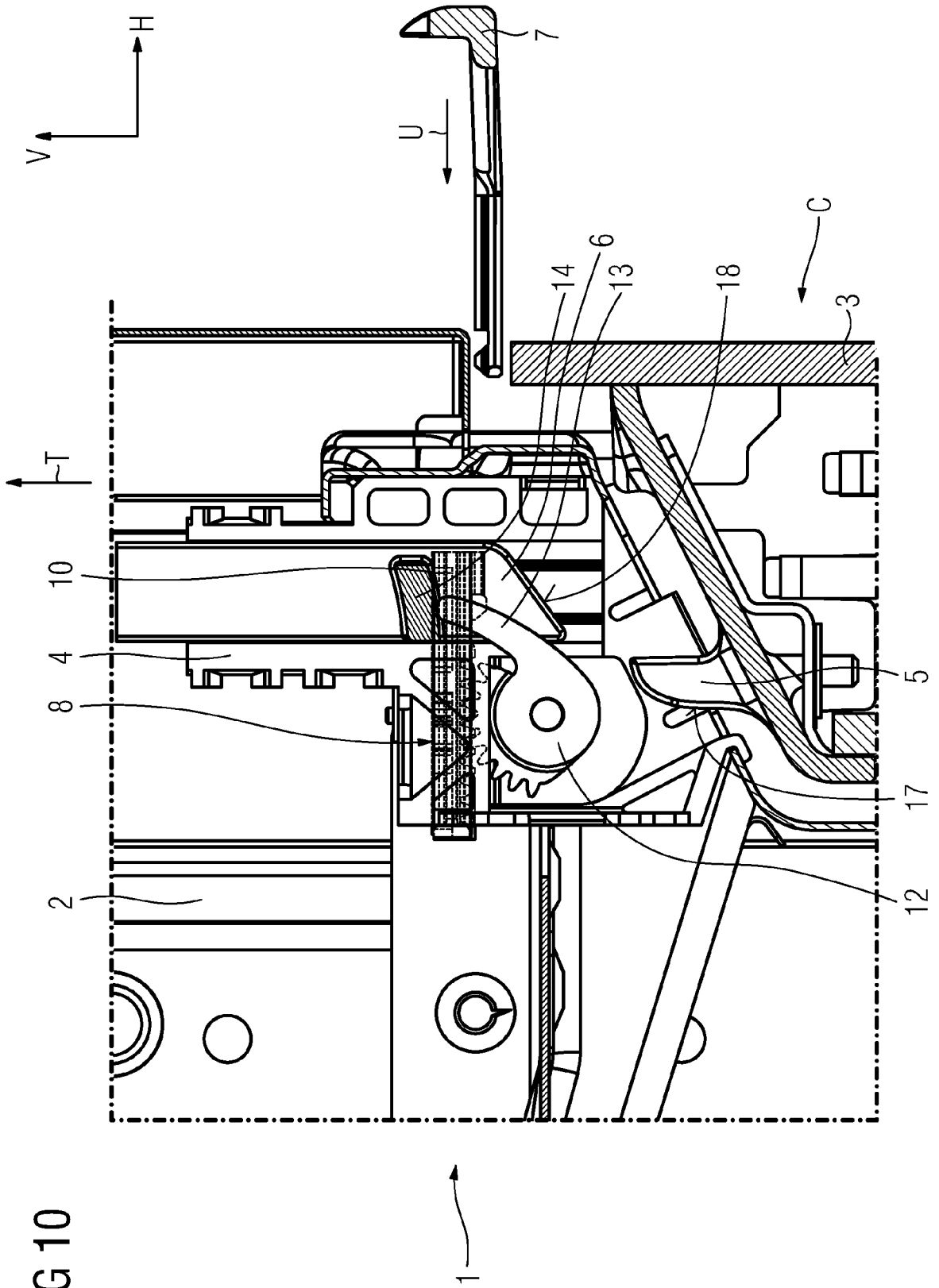


FIG 11

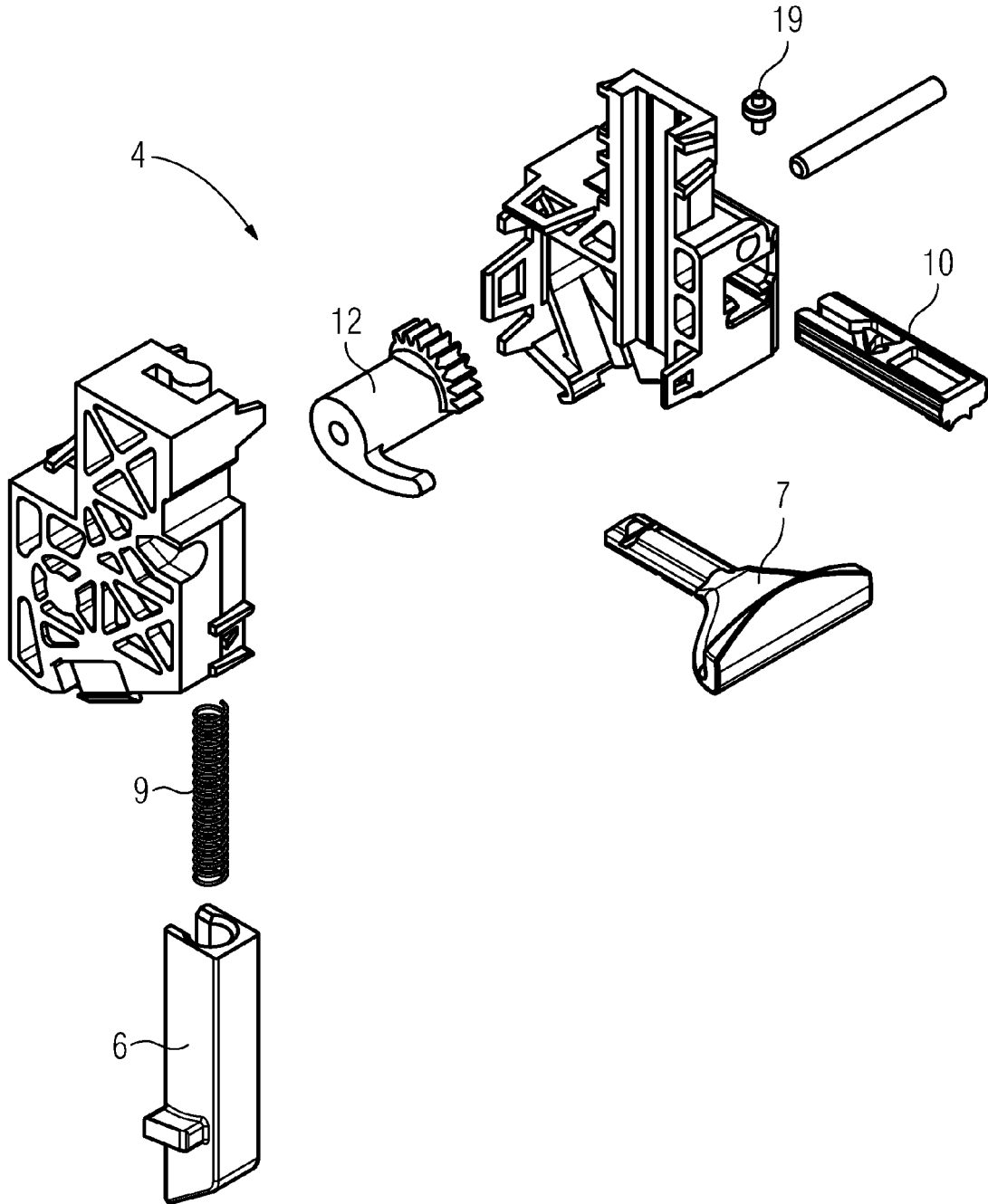


FIG 12

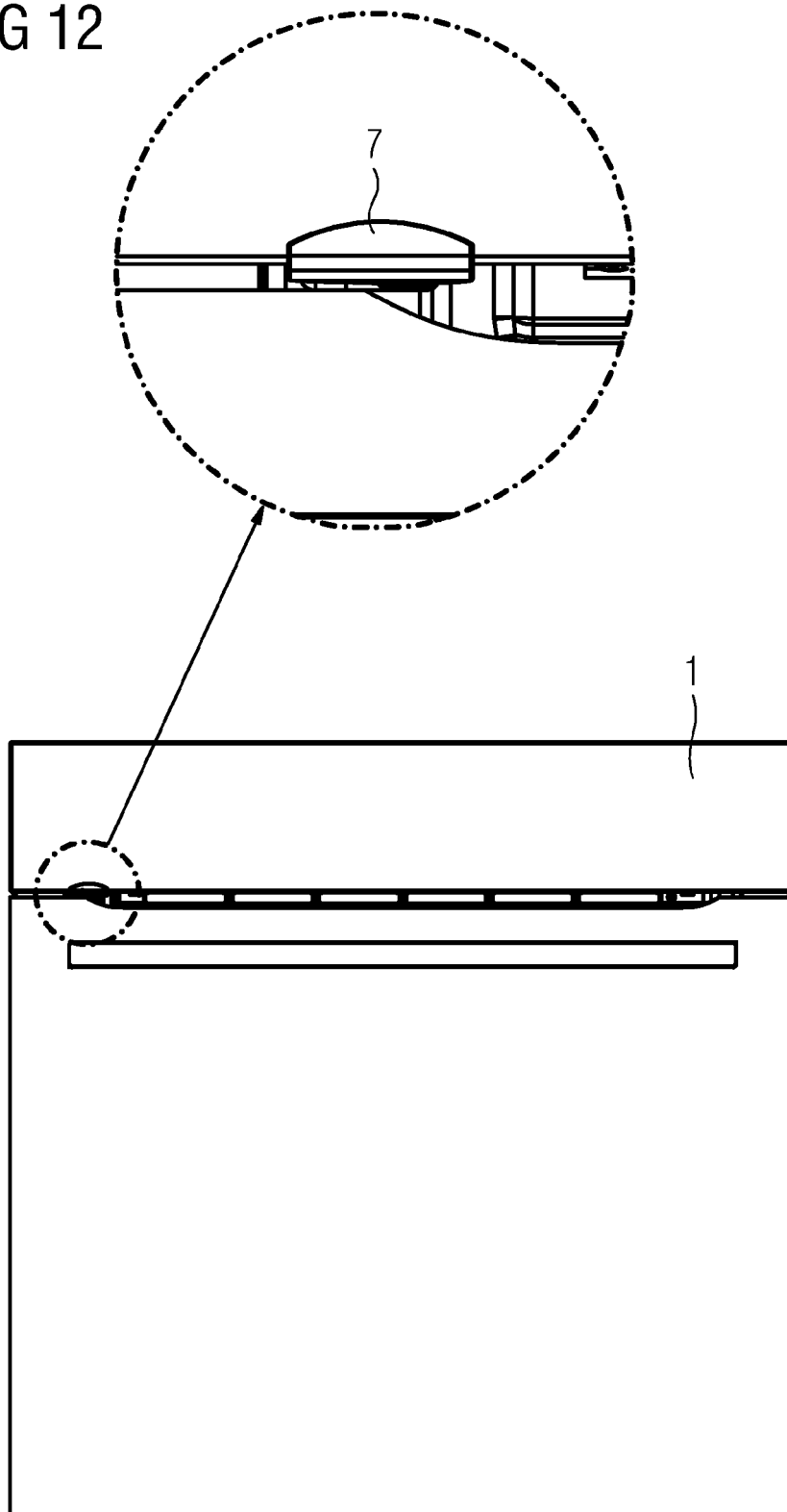
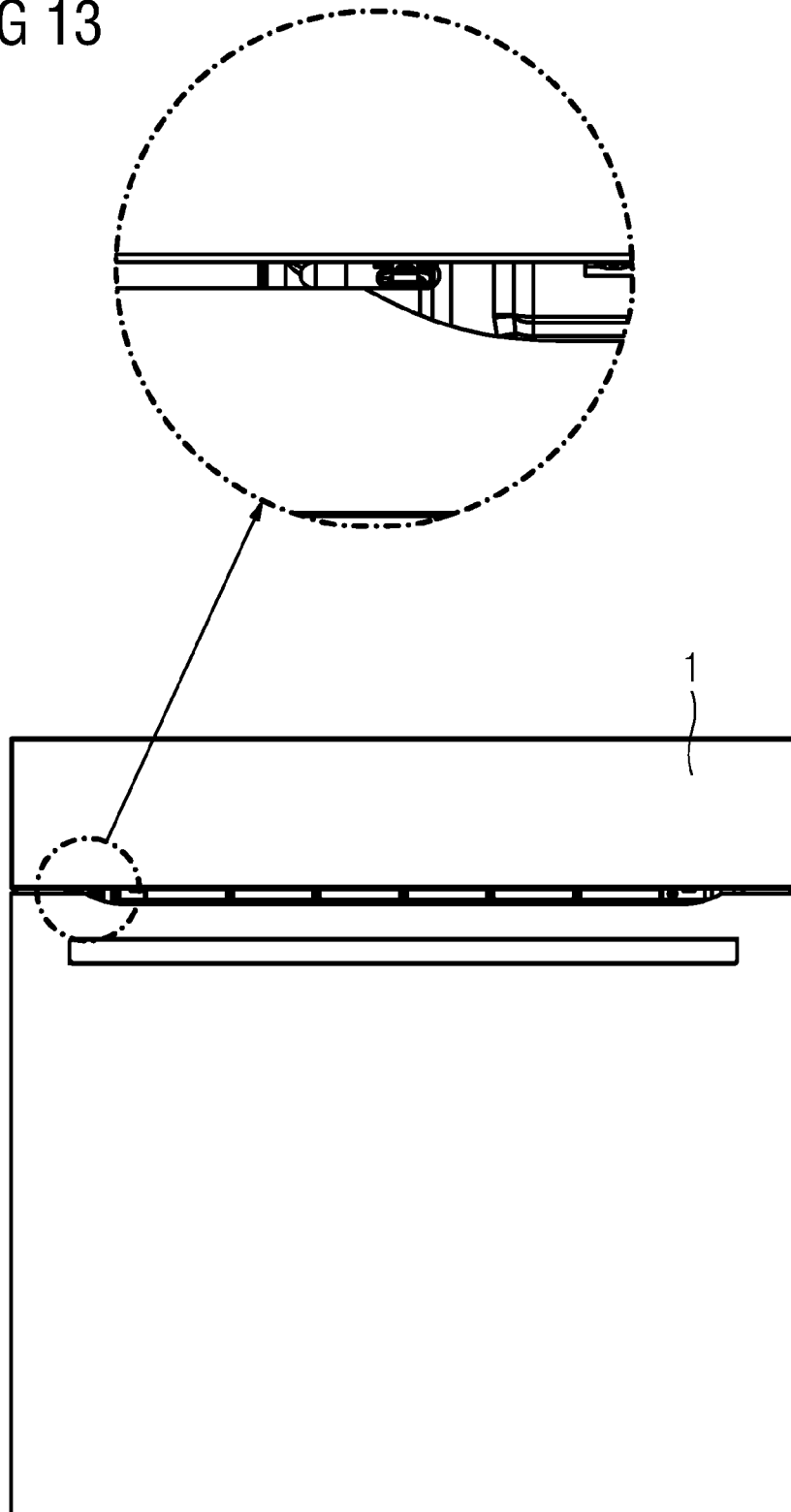


FIG 13





EUROPEAN SEARCH REPORT

Application Number
EP 12 17 7992

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	DE 24 44 546 A1 (ELECTROLUX AB) 7 May 1975 (1975-05-07) * page 1, paragraph 3 - page 2, paragraph 4; figure 1 *	1-15	INV. F24C15/02 A47L15/42
Y	----- US 7 451 628 B1 (KIM HYUN [KR]) 18 November 2008 (2008-11-18) * column 3, lines 1-10; figures 2-5 *	1-15	
A	----- US 2 431 105 A (BRINSON GAYLORD A) 18 November 1947 (1947-11-18) * the whole document *	1	
A	----- US 3 997 201 A (DESCHAAF CLIFFORD L ET AL) 14 December 1976 (1976-12-14) * figures 5,6 *	1	
A	----- GB 2 207 180 A (GOLD STAR CO GOLD STAR CO [KR]) 25 January 1989 (1989-01-25) * the whole document *	1	
A	----- EP 1 722 166 A1 (MATSUSHITA ELECTRIC IND CO LTD [JP]) 15 November 2006 (2006-11-15) * the whole document *	1	TECHNICAL FIELDS SEARCHED (IPC) F24C A47L
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 14 November 2012	Examiner Rodriguez, Alexander
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	

1
EPO FORM 1503 03.82 (P04C01)

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

EP 12 17 7992

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.

14-11-2012

Patent document cited in search report	Publication date	Patent family member(s)	Publication date	
DE 2444546	A1	07-05-1975	DE 2444546 A1	07-05-1975
			FI 279774 A	01-05-1975
			NO 743875 A	26-05-1975
			SE 393446 B	09-05-1977
			SE 7314774 A	02-05-1975

US 7451628	B1	18-11-2008	CN 101311484 A	26-11-2008
			KR 20080103219 A	27-11-2008
			US 7451628 B1	18-11-2008

US 2431105	A	18-11-1947	NONE	

US 3997201	A	14-12-1976	AU 498005 B2	01-02-1979
			AU 1566376 A	12-01-1978
			BR 7604484 A	26-07-1977
			CA 1050088 A1	06-03-1979
			US 3997201 A	14-12-1976

GB 2207180	A	25-01-1989	GB 2207180 A	25-01-1989
			US 4826224 A	02-05-1989

EP 1722166	A1	15-11-2006	CN 1942712 A	04-04-2007
			EP 1722166 A1	15-11-2006
			JP 2005249345 A	15-09-2005
			US 2007175891 A1	02-08-2007
			WO 2005085712 A1	15-09-2005

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- US 3328062 A1 [0004]
- US 3498285 A1 [0005]
- US 20020079709 A1 [0006]