

Europäisches Patentamt
European Patent Office
Office européen des brevets



(11) Publication number: **0 490 928 B1**

(12)

EUROPEAN PATENT SPECIFICATION

- (49) Date of publication of patent specification: **31.08.94** (51) Int. Cl.⁵: **E05D 3/06**, E05D 7/00,
E05D 15/56, F25D 23/02
- (21) Application number: **90913025.4**
- (22) Date of filing: **04.09.90**
- (86) International application number:
PCT/FI90/00208
- (87) International publication number:
WO 91/03616 (21.03.91 91/07)

(54) **A HINGE FOR FRENCH DOORS IN A REFRIGERATOR.**

(30) Priority: **05.09.89 FI 894185**

(43) Date of publication of application:
24.06.92 Bulletin 92/26

(45) Publication of the grant of the patent:
31.08.94 Bulletin 94/35

(84) Designated Contracting States:
AT BE CH DE DK FR GB IT LI LU NL SE

(56) References cited:
DE-C- 3 218 838
GB-A- 2 128 244

(73) Proprietor: **OY ELECTROLUX AB**
Teollisuuskatu 1 B
SF-00550 Helsinki (FI)

(72) Inventor: **LAURINEN, Olavi**
Sommelontie 43
SF-28300 Pori (FI)

(74) Representative: **Barlow, Roy James et al**
J.A. KEMP & CO.
14, South Square
Gray's Inn
London WC1R 5LX (GB)

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid (Art. 99(1) European patent convention).

EP 0 490 928 B1

Description

The present invention relates to a hinge for French doors in a refrigerator. More precisely, the invention relates to a hinge according to the preamble of Claim 1.

In a refrigerator, as in a window structure, French doors are opposite doors covering the opening, without a post between them. In connection with a refrigerator this means that the inside vertical edges of the doors must seal effectively against each other. The seals of the doors must not rub against each other during the opening of both of the doors, or only one of the doors. Rubbing would cause wear of the seals and would make the opening of the doors more difficult.

For this reason, the doors must open with a yielding movement, i.e. with a movement taking place simultaneously both outward and laterally, and not with the conventional movement taking place along the arc of a circle. Thus the seal surfaces will not rub against each other.

In addition, the hinge should be of small dimensions and in particular such that the hinge will not protrude beyond the side-wall plane. The hinge should be easy to use and reliable in such a manner that the door will open and close easily and, beyond a certain angle of opening, it will remain open by itself and will close rapidly when the opening angle has reached a sufficiently small angle. In addition, the hinge should be durable, allowing the door to be opened completely, i.e. through almost 270°.

There is available on the market today, a hinge used in French doors of a refrigerator. This hinge is a relatively large-sized structure and therefore aesthetically poor. It extends in the lateral direction of the refrigerator beyond the plane of the side wall and also protrudes from the frontal plane of the refrigerator. The yielding movement, i.e. the lateral component of the movement, is effected with the aid of a notch in the swiveling part of the hinge so that the notch will guide the path of movement of the door, a guide roller in the hinge frame sliding in this notch. The swiveling part turns about a pin which is at the end of an arm attached to a spring.

In addition to the prior-art hinge being large-sized and protruding beyond the dimensions of the refrigerator, its path of movement is limited. The door opens at maximum through only approx. 110°. Also, the hinge structure is weak, since the weight of the door strains the said spring and for this reason clunks during opening when the doors are loaded. If the spring breaks, the hinge will be unserviceable.

The object of the present invention is to provide, for French doors in a refrigerator, a hinge from which the above disadvantages have been elimi-

nated.

This is achieved with the hinge structure according to the invention, the principal characteristics of which are given in the characterizing clause of claim 1.

The hinge structure according to the invention is small in size and aesthetically pleasing. When installed in place it does not protrude beyond the side plane or the frontal plane of the refrigerator. It is strong and enables the doors to be opened through an angle ranging from 0 to 270° without the hinge bending yielding and thereby straining the structure. The hinge is easy to open and close. The first, primarily lateral, opening phase is rapid. After the first opening phase the hinge is stationary and the door pivots only about the hinge pin. The last, primarily lateral, closing phase occurs rapidly with the additional effect produced by the spring. The opposite door remains closed, if so desired, while one door is being opened.

The hinge according to the invention is described below in the form of a preferred embodiment, with reference to the accompanying drawings, in which:

Figure 1 depicts a top plan view of the hinge frame for the lower edge of the door,

Figure 2 depicts, from the side turning to face the hinge frame, the swiveling part which attaches the door and constitutes part of the hinge frame depicted in Figure 1,

Figure 3 depicts the hinge parts depicted in Figure 1 and Figure 2, interconnected in the operating position,

Figure 4 depicts a front view of the combination according to Figure 3,

Figure 5 depicts the frame and swiveling part of a hinge for the upper edge of the door, interconnected in the operating position,

Figures 6a, 6b and 6c depict a hinge according to Figure 3, attached to the lower edge of a door, in operation, i.e. a) in the closed position, b) slightly before the extreme position of the phase of lateral movement, and c) with the lateral movement locked, the door opening freely,

Figure 7 depicts a separate latch part made of thermosetting plastic, and

Figure 8 depicts a separate slide made of thermosetting plastic.

In all the figures the corresponding parts are indicated by the same reference numerals. The frame and swiveling part of the hinge are preferably made of a pressure-casting mix and the separate parts, such as the latch, the slide and the roller, of thermosetting plastic.

The frame of the lower-edge hinge, depicted in Figure 1, is indicated by reference numeral 1. The notch which renders, to the roller in the door, a lateral component of movement is indicated by

numeral 2. The said roller is indicated by 3. The pin 6 of the swiveling part 21 is fitted in a hole 5 in the hinge frame and serves as the pivot axis for the swiveling part. The p-shaped groove 7 in the frame is intended for receiving the load-lightening spring 8 of the hinge. The frame has a lower surface and an upper surface, between which the notch 2 is formed. In the end receiving the swiveling part there is only the lower surface, the swiveling part forming a surface in the same plane as the upper surface. The swiveling part is attached to the frame by means of the pin 6 and to the door by means of a pin 22. The maximum dimensions of the assembled hinge are: approx. 35 mm deep, approx. 105 mm wide, and approx. 17.5 mm high. In the height dimension, the attaching height of the attaching wall occupies approx. 4.5 mm.

The hinge structure has as its essential parts a separate slide 9 and a spring 10 acting on it, as well as a latch 11 with its spring 11a. The slide 9 is fitted in the lower surface of the frame, between one of the vertical walls and a stop 12 and guide 13 opposite that wall, and is capable of reciprocating in its own longitudinal direction, guided by the guides. The lower surface of the frame also has a pin 14, which serves as a limiter and mates with an opening 15 in the slide. The latch 11 with its spring is located in the swiveling part 21, in the vertical partition wall 16 of which there is a notch corresponding to the latch end and a concave arch corresponding to the spring 11a of the latch. The slide 9 has a bore 17, parallel to the direction of movement of the slide, into which bore one end of the spring 10 loading the slide is fitted. The length and rigidity of the spring 10 have been adjusted so that the spring will be compressed between the slide bore 17 and the stop 12 abutting the other end of the spring. The free end of the latch 11 has been fitted to extend, in the closed position of the door, somewhat beyond the said stop 12; see Figures 3 and 6a. In the closed position of the door the roller 3 at the lower edge of the door is in the notch 2. That end 18 of the slide 9 which faces the notch is cam-shaped and in the closed position of the door protrudes so far into the notch area that the roller 3 will touch the oblique surface inside the cam. Simultaneously the roller 3 will touch the opposite wall of the notch 2, which wall forms another cam 19, but in the opposite direction.

When the door is being opened and the roller 3 retracts from the notch 2, the cam 19 will force the roller to move in the lateral direction; in Figures 3 and 4 to the left. There-upon the roller 3 for its part will force the slide end 18 to move likewise to the left, thereby compressing the spring 10. The rear slide end 20, which is a cam delimited by a straight line and an arc, will gradually meet the arm of the latch 11 and detach the latch from its contact with

the stop 12 against the spring force of the spring 11a. Simultaneously the swiveling part 21 will swivel somewhat outward in the lateral direction along with the door movement; see Figures 6a-6c. When the roller 3 is at the peak 19 of the cam of the frame and simultaneously presses the slide 9 at the peak 18 of its cam, the front end 20 of the slide 9 has detached the latch end from the stop 12; Figure 6b. When the door moves still more, the roller 3 will move along the surface subsequent to the cam 19 and will pass the slide peak 18, whereupon the slide 9 is pushed to the right by the action of the spring 10. At the same time the free end of the latch 11 will move to the stop 12, the slide having been pushed out of the way, i.e. to the right in Figure 6c, under the action of the spring force of the spring 11a. In this position the latch 11 locks the lateral movement of the hinge, and the door will open freely about the pin 22. From phase 6a to phase 6b the door has opened through only a few degrees, but has at the same time moved laterally approx. 3-4 mm. Thus the most important objective of the invention has been achieved, i.e. the opening of the door in a yielding fashion so that the seals of the door will not rub against each other. By the time of phase 6c, the door has opened slightly more, primarily with respect to the opening angle, and the slide 9 has moved to behind the roller 3 in the notch 2, and the latch 11 is locked against the stop 12. Thereafter the door will pivot about the pin 22 and the swiveling part 21 is propped in a stationary state through the action of the latch 11 bearing on the stop 12. Thus the hinge structure will not yield when the door moves. For this reason the hinge is very durable. Thus another important objective of the invention has been achieved.

The door is free to open through up to 270°, and owing to the said latch solution, moving even a heavily loaded door within the opening range 0 - 270° will not strain the hinge detrimentally. When the door is being closed after having been opened, the following will occur when the roller 3 arrives in the notch 2. The slide 9 will be pushed to the left (from the situation of Figure 6c), the rear end 20 of the slide sliding along the shaped arm of the latch 11. When the roller is at the cam peaks 18 and 19, the slide has detached the latch end from the stop 12 by pushing, whereupon the swiveling part is free to pivot counterclockwise under the effect of the closing movement. The closing movement is enhanced and sped up by the slide 9, which projects behind the roller 3 and closes the door in a moment, thereby increasing the closing force. The rapid closing is also promoted by the magnet generally used in the seals. The closing, of course, takes place primarily from the side; as does the opening, and so no rubbing of the seals will occur

in connection with the closing.

The spring 8 depicted in Figure 3 is used only in the lower hinge of the door, where the weight of the door loads the hinge. It is intended for lightening thy load, but is not indispensable. It is not used in the upper hinge of the door, as is evident from Figure 5.

The lower and upper hinges function in principle in exactly the same manner. However, there are nonessential additional differences between their structures, mainly owing to their different locations. The openings in the upper and lower surfaces of the hinge are covered with cover plates. Figure 5 depicts a limiter plate 23, which is fastened to the swiveling part by means of a screw. The cover plate 24, covering the latch, the slide and the spring, is attached to the frame by means of a screw.

Fault-less functioning of the hinge requires high precision in the design of not only the notch but also of the latch, the latch spring 11a and both ends of the slide 9. This can be defined in the main geometrically. Figures 3 and 5 show that the guiding edge of the notch 2 may be of a different shape at the mouth opening; in one hinge the angle is sharper, in the other more gentle. The figures depicting the notch 2 also show that its outlines are made up of circular arcs of various sizes. In addition, the resilience of the latch 11 and the rigidity of the spring 10 affect the functioning.

It is clear that the details of the hinge structure can be varied within the art. What is essential is the forced lateral movement caused by the roller, the bearing of the swiveling part of the hinge against the stop in order to absorb loads, and the enhancing of the closing movement by means of a rapid slide movement. The embodiment depicted above provides an advantageous example of how this can be accomplished.

Claims

1. A hinge for French doors in a refrigerator, the hinge comprising a frame (1) which is intended to be attached to the cabinet part of the refrigerator and a swiveling part (21) which is pivotally attached to the hinge frame and serves as the hinge pin of the door, and furthermore a notch (2) and a roller (3) working in conjunction with each other in order to cause a force-guided lateral movement, **characterized** in that the notch (2) is located in the hinge frame (1) and the roller (3) is for location at the upper or respectively lower edge of the door; and in that the hinge also has a spring-loaded slide (9) which receives its reciprocating movement from the said roller, and a locking member (11) guided by the slide.

2. A hinge according to Claim 1, **characterized** in that at one end of the slide (9) there is a cam (18) which extends into the notch (2), to the area of influence of the roller (3).
3. A hinge according to Claim 1 or 2, **characterized** in that that end (20) of the slide (9) which is farther away from the notch (2) is able to act on the locking member (11) in the pushed-in state of the slide, thereby promoting the closing of the door and increasing the closing force.
4. A hinge according to any of the above claims, **characterized** in that the locking member is made up of a latch (11) fitted pivotally to the swiveling part (21) of the hinge, the latch having a spring (11a) which bears on the swiveling part, and in that the latch can be moved against a fixed stop (12) in order to lock the lateral movement of the hinge while the door rotates freely.
5. A hinge according to Claim 4, **characterized** in that the spring (11a) is a hook-shaped member which is integral with the latch (11).
6. A hinge according to any of the above claims, **characterized** in that there is a load-lightening spring (8) fitted between the swiveling part (21) and the frame (1).

Patentansprüche

1. Scharnier für eine Flügeltür bei einem Kühlschrank, umfassend einen Rahmen (1), der dazu dient, am Schrankteil des Kühlschranks befestigt zu werden, ein Schwingteil (21), das am Scharnierrahmen schwenkbar befestigt ist und als Scharnierangel dient, ferner eine Nut (2) und eine Rolle (3), die miteinander zusammenarbeiten, um eine zwangsgeführte Seitenbewegung zu erzeugen, dadurch gekennzeichnet, daß die Nut (2) im Scharnierrahmen (1) angeordnet ist, daß die Rolle zur Anordnung an der Oberkante bzw. der Unterkante der Tür vorgesehen ist, daß das Scharnier einen federbelasteten Schlitten aufweist, der seine hin- und hergehende Bewegung von der Rolle erhält, und daß ein Verriegelungsglied (11) vom Schlitten geführt ist.
2. Scharnier nach Anspruch 1, dadurch gekennzeichnet, daß an einem Ende des Schlittens (9) ein Nocken (18) vorgesehen ist, der sich in die Nut (2) hineinerstreckt bis zu dem Einflußbereich der Rolle (3).

3. Scharnier nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß jenes Ende (20) des Schlittens (9), das von der Nut (2) weiter entfernt ist, auf das Verriegelungsglied (11) im eingeschobenen Zustand des Schlittens einzuwirken vermag, und damit das Schließen der Tür fördert und die Schließkraft steigert. 5
4. Scharnier nach einem der obigen Ansprüche, dadurch gekennzeichnet, daß das Verriegelungsglied aus einem Riegel (11) aufgebaut ist, der an das Schwingteil (21) des Scharniers angelenkt ist, daß der Riegel eine Feder (11a) aufweist, die am Schwingteil anliegt, und daß der Riegel gegen einen Festanschlag (12) bewegbar ist, um die Seitenbewegung des Scharniers beim freien Verschwenken der Tür zu verriegeln. 10 15
5. Scharnier nach Anspruch 4, dadurch gekennzeichnet, daß die Feder (11a) ein hakenförmiges Element ist, die einteilig mit dem Riegel (11) ist. 20
6. Scharnier nach einem der vorausgegangenen Ansprüche, dadurch gekennzeichnet, daß eine lastverringende Feder (8) zwischen Schwingteil (21) und Rahmen (1) montiert ist. 25

Revendications

1. Articulation pour portes à la française dans un réfrigérateur, l'articulation comprenant un cadre (1) qui est destiné à être fixé à la partie enceinte du réfrigérateur et une partie pivotante (21) qui est montée pivotante sur le cadre d'articulation et sert d'axe d'articulation de la porte et, en outre, une entaille (2) et un rouleau (3) travaillant conjointement en vue de provoquer un mouvement latéral guidé de manière forcée, caractérisée en ce que l'entaille (2) est située dans le cadre d'articulation (1) et le rouleau (3) destiné à être placé sur les bords respectivement supérieur ou inférieur de la porte; et en ce que l'articulation présente également un coulisseau (9) sollicité par un ressort, qui reçoit son mouvement de va-et-vient depuis ledit rouleau et un organe de verrouillage (11) guidé par le coulisseau. 30 35 40 45 50
2. Articulation selon la revendication 1, caractérisée en ce qu'à une extrémité du coulisseau (9), il existe une came (18) qui traverse l'entaille (2) vers la zone d'influence du rouleau (3). 55
3. Articulation selon la revendication 1 ou 2, caractérisée en ce que l'extrémité du coulisseau (9) qui est la plus éloignée de l'entaille (2) peut 5

agir sur l'organe de verrouillage (11) lorsque le coulisseau se situe à l'état poussé vers l'intérieur, de manière à favoriser la fermeture de la porte et à augmenter la force de fermeture.

4. Articulation selon l'une quelconque des revendications précédentes, caractérisée en ce que l'organe de verrouillage est constitué d'un dispositif de verrouillage (11) monté pivotant sur la partie pivotante (21) de l'articulation, le dispositif de verrouillage présentant un ressort (11a) qui porte contre la partie pivotante et en ce que le dispositif de verrouillage peut être déplacé de façon à venir contre une butée fixe (12), en vue d'empêcher le mouvement latéral de l'articulation pendant que la porte tourne librement.
5. Articulation selon la revendication 4, caractérisée en ce que le ressort (11a) est un organe en forme de crochet et est réalisé d'un seul tenant avec le dispositif de verrouillage (11).
6. Articulation selon l'une quelconque des revendications précédentes, caractérisée en ce qu'un ressort d'allégement de charge (8) est monté entre la partie pivotante (21) et le cadre (1).

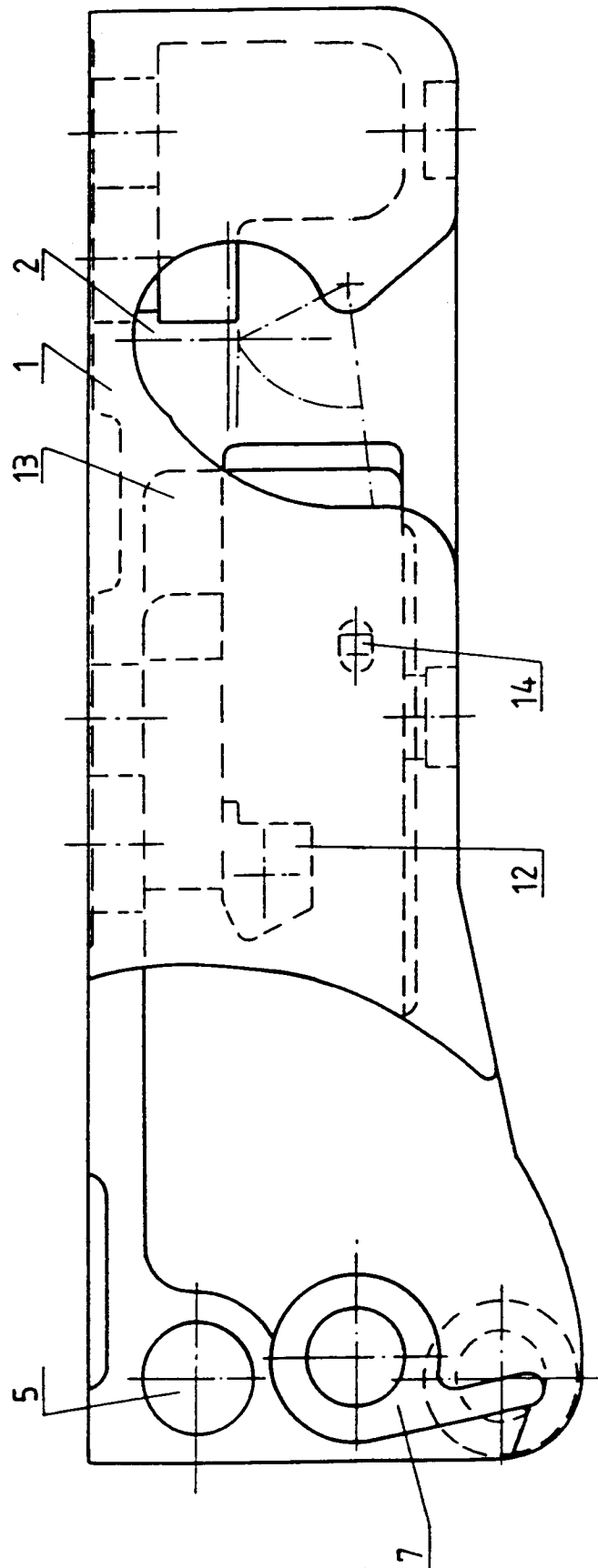


FIG. 1

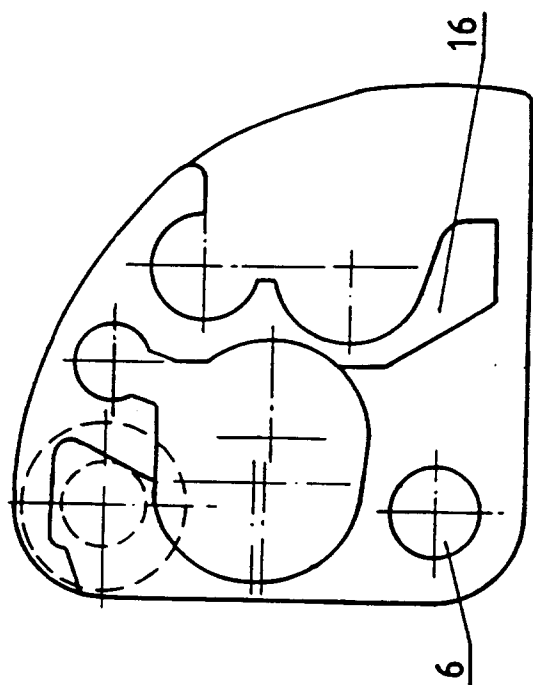


FIG. 2

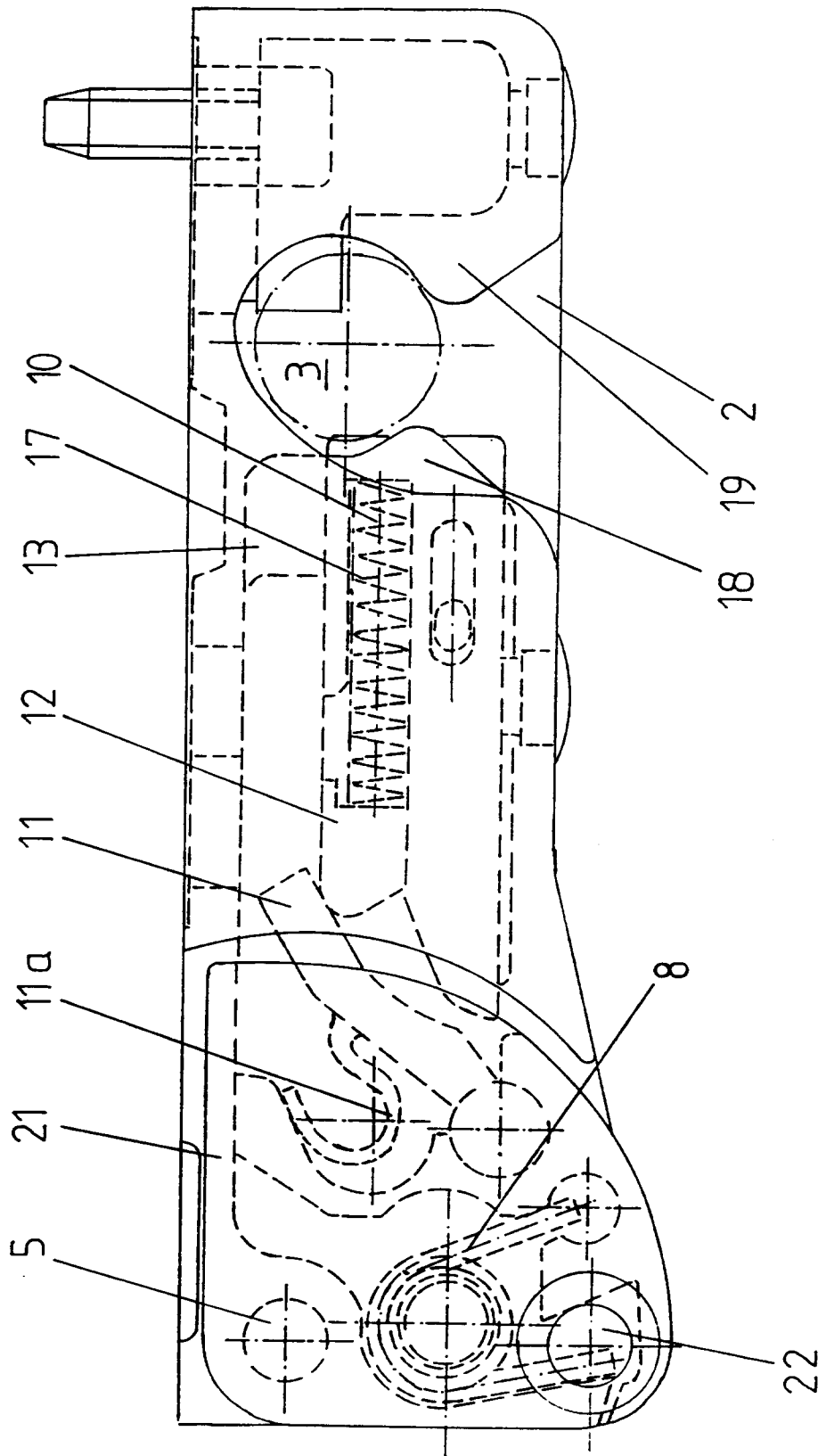


FIG. 3

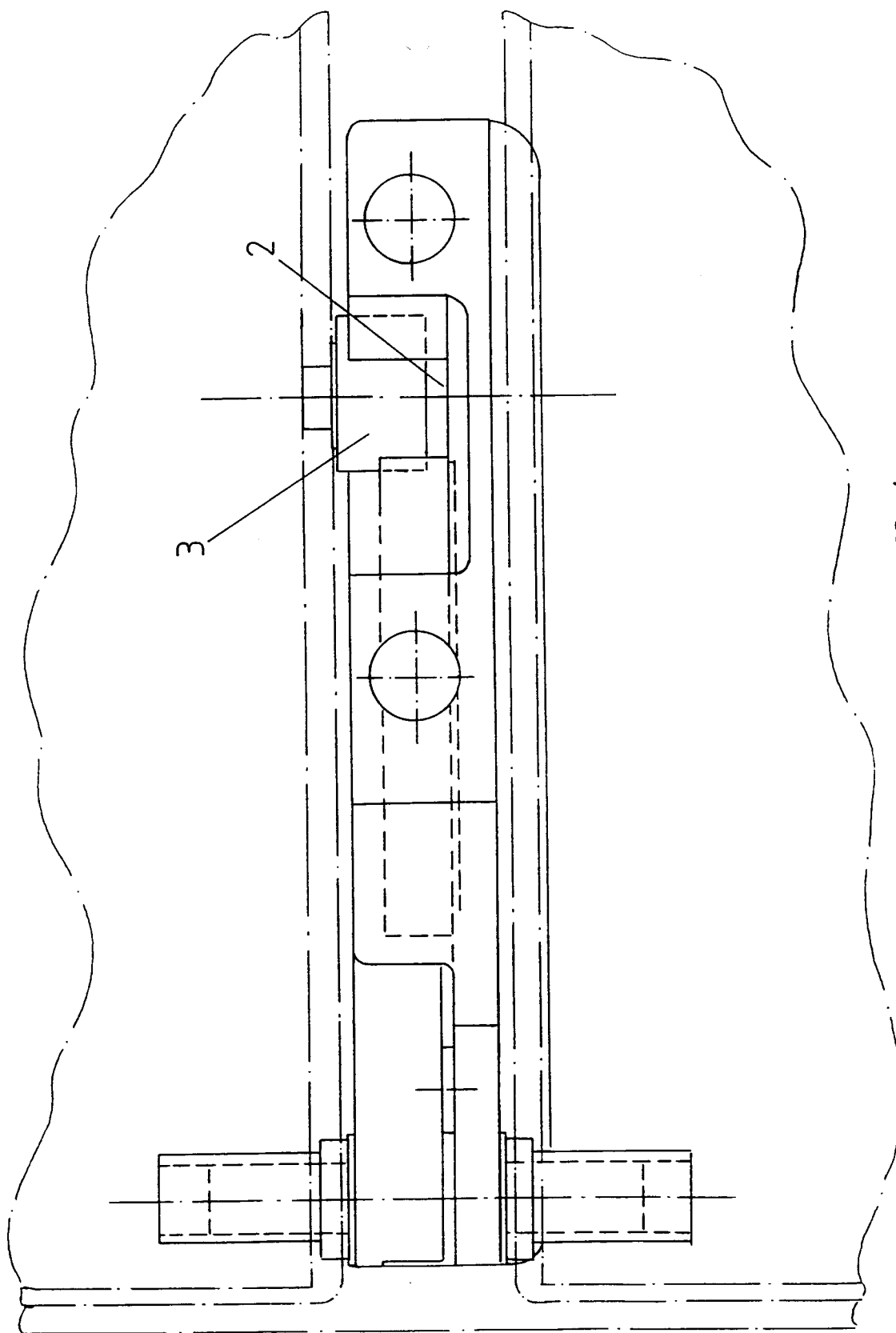


FIG. 4

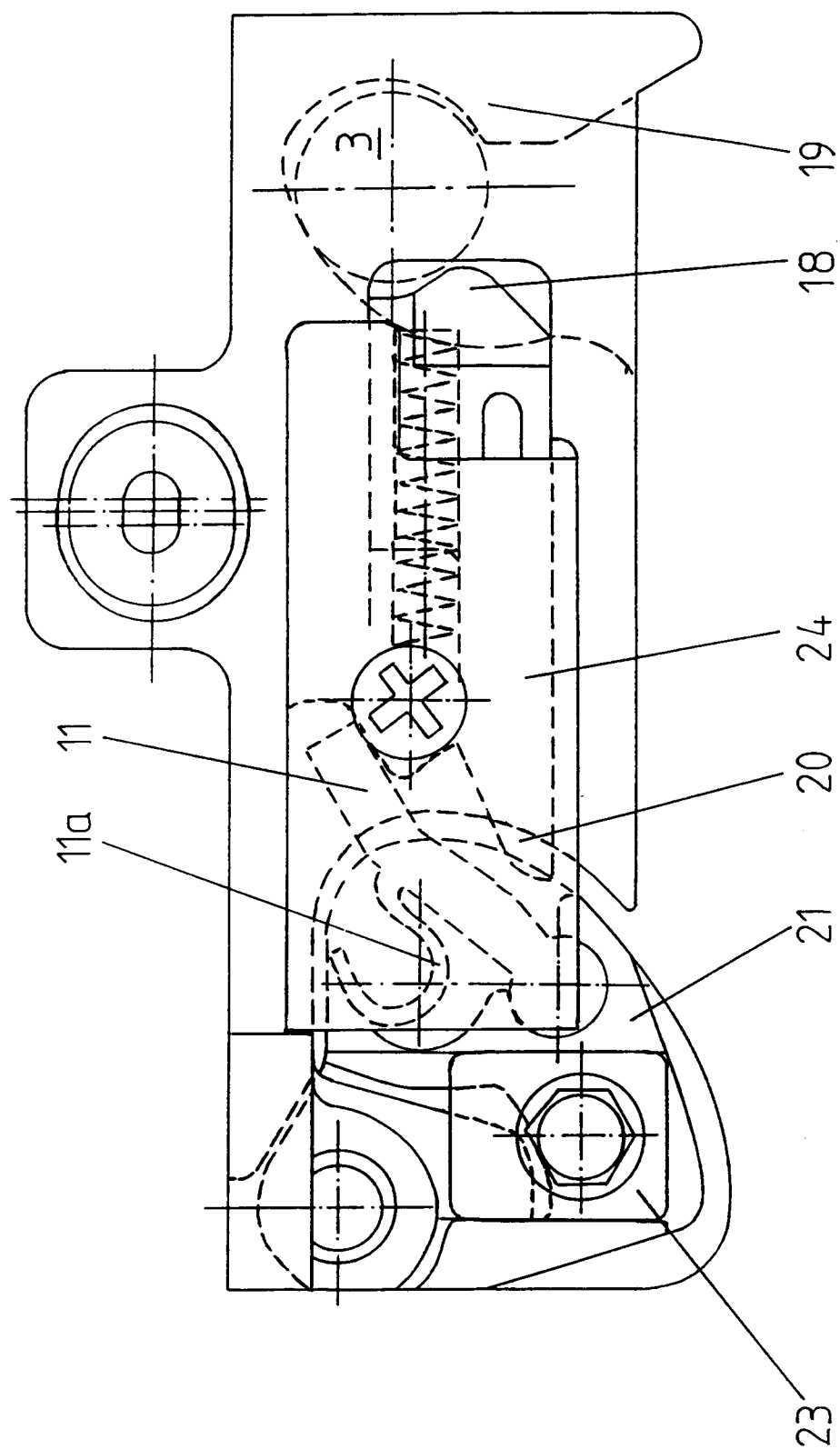
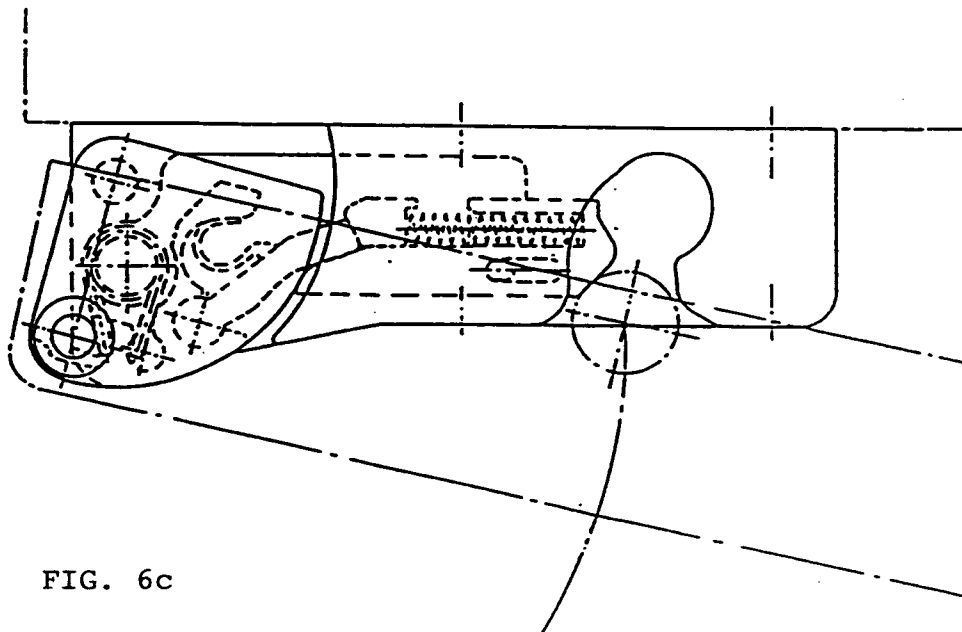
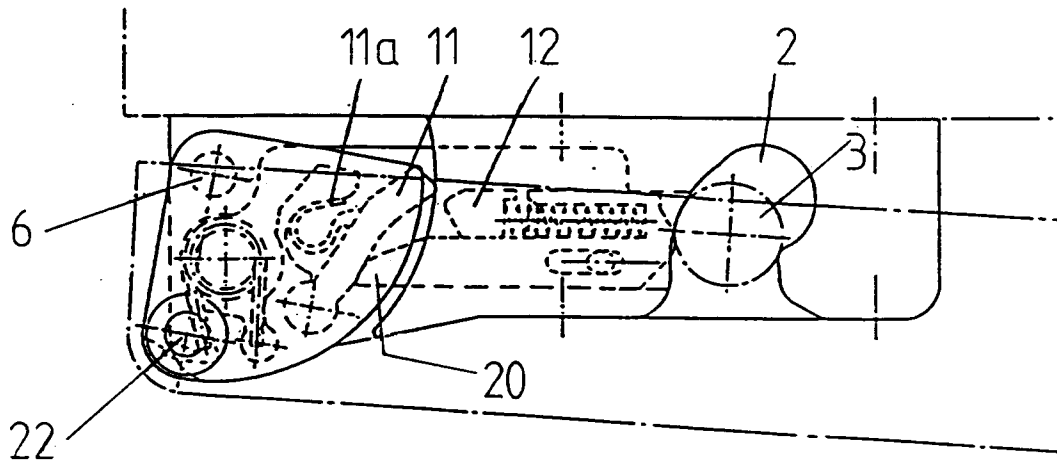
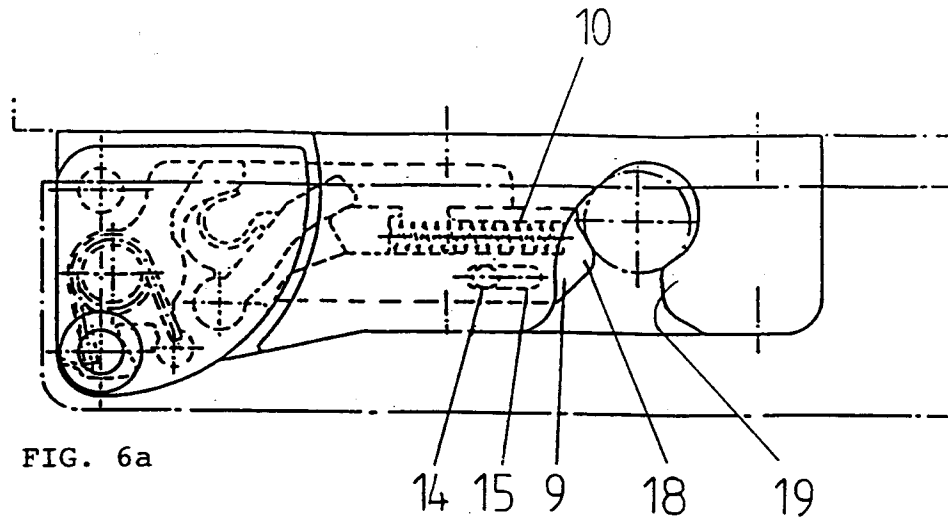


FIG. 5



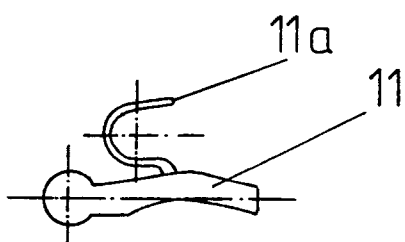


FIG. 7

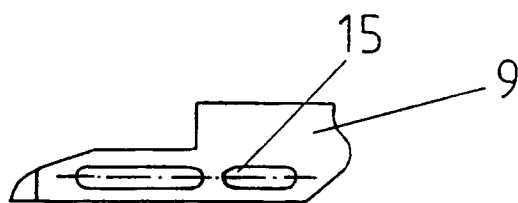


FIG. 8