(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 470 309 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
05.12.2007 Bulletin 2007/49

(21) Application number: **02787561.6**

(22) Date of filing: **01.11.2002**

(51) Int Cl.:
E05D 3/06 *(2006.01)* ***A47L 15/42*** *(2006.01)*
F24C 15/02 *(2006.01)*

(86) International application number:
PCT/EP2002/012317

(87) International publication number:
WO 2003/038219 (08.05.2003 Gazette 2003/19)

(54) **HINGE STRUCTURE**

GELENKKONSTRUKTION

STRUCTURE DE CHARNIERE

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LU MC NL PT SE SK TR

(30) Priority: **02.11.2001 SE 0103665**

(43) Date of publication of application:
27.10.2004 Bulletin 2004/44

(73) Proprietor: **Electrolux Home Products Corporation N.V.**
1930 Zaventem (BE)

(72) Inventor: **ANDERSSON, Ingemar**
S-591 72 Motala (SE)

(74) Representative: **Svahn, Göran**
AB Electrolux
Group Intellectual Property
105 45 Stockholm (SE)

(56) References cited:
EP-A- 0 702 122
EP-A- 0 859 197
DE-U- 9 000 217
GB-A- 1 329 936
US-A- 2 698 957
US-A- 2 800 128
US-A- 3 842 542

EP 1 470 309 B1

Printed by Jouve, 75001 PARIS (FR)

Description

[0001] The present invention generally relates to hinge arrangements and more specifically the invention refers to a hinge structure for a cooking oven door adapted to be pivoted at its lower end between a first vertical position in which it closes an oven compartment and a second horizontal position in which access is offered to said oven compartment, said hinge structure being mounted in a casing secured to a housing enclosing the oven compartment, said hinge structure further comprising a link mechanism including an upper and a lower link arm each having a first end rotatably connected to the lower side of the door at spaced locations, opposite ends of the upper and lower arms being interconnected by a further link arm so as to form a hinged parallellogram link system.

[0002] In cooking ovens for built-in purposes or included in a free-standing cooker there is a more and more expressed wish to reduce the temperature of the outer surface of the door which calls for thicker door constructions comprising three or even four or more oven panes. In connection with a free-standing cooker, for example, such door will have an extensive thickness causing problems when the door is to be pivoted between its closed and open positions, respectively. Often, the door is surrounded by side walls, control panels or a door for a second oven compartment making impossible for a thick door to be pivoted between closed and open position without contacting the surrounding surfaces.

[0003] A solution to the problem is disclosed in GB 758932 which describes a hinged door for a cabinet in which the door is pivotably mounted at the lower end thereof and a hinge structure operates the pivot axis to move away from an oven compartment at the same time as the door is pivoted about the same axis. Similar arrangements are shown in GB 1056631, US 2698957 and US 2800128.

[0004] Another problem associated with cooking oven doors is that spring means arranged to counterbalance the door during its movement between closed and open positions are used also to assist in pressing the door against a sealing or the like surrounding the oven compartment. Normally, the hinge structure is disposed at the lower side of the door which means that special measures have to be taken to secure that the upper part of the oven door is pressed against the sealing in the same way as the lower part of the door. EP-A-0 859 197 discloses an oven door parallellogram hinge with counterbalancing spring.

[0005] Accordingly, it is a first object of the invention to provide a hinge structure for a cooking oven door which permits the door to be moved between its open and closed positions without being obstructed by surrounding panels, doors or the like. Moreover, it is a second object of the invention to provide an arrangement which can assist the counterbalance spring arrangement in pressing the upper part of the oven door against the oven compartment sealing.

[0006] A further object with the invention is to provide means which permit the door, in addition to the closed and open positions, to take a further position in which the door is partly open. The latter position can then be used for ventilation of the oven compartment.

[0007] The objects indicated above are achieved by a hinge structure which has got the features indicated in the appending claim 1. Preferred embodiments are included in the accompanying sub-claims.

[0008] The invention will now be described more in detail in connection with an embodiment with reference to the drawings, in which:

Fig. 1 shows a side view of a hinge structure according to the invention;
Fig. 2a shows a rear view of a supporting element to be fixed to the oven door;
Fig. 2b shows a top view of the supporting element of Fig. 2a with parts remote from the door omitted;
Fig. 3 shows part of the hinge structure of Fig. 1 seen from the opposite side, and
Fig. 4 shows a simplified view of the hinge structure of Fig. 1 with the door in open position.

[0009] With reference to Figs. 1-4 an embodiment is shown of a hinge structure intended to support a cooking oven door permitting it to move between a first vertical position in which ist closes an oven compartment and a second horizontal position in which acess is offered to said oven compartment. The cooking oven with its door has not been shown in the drawings and the positions of the door can be imagined by study of the positions of a support member included in the hinge structure and secured to the inside of the door.

[0010] The hinge structure 10 is mounted in a casing 12 intended to be secured to a housing enclosing the oven compartment. The hinge structure comprises an elongate supporting member 14 intended to be fixedly secured to the inner side of the cooking oven door at the lower end thereof. The member 14 has a U-shaped section with a front wall 16 secured to the door and two side walls 18, 20 extending therefrom. An upper link arm 22 is rotatably mounted to the member 14 by a joint 24 and, correspondingly, a lower link arm 26 is rotatably mounted to the member 14 by a joint 28. The two joints 24, 28 are disposed at spaced locations along the elongate supporting member 14. At the opposite end the upper link arm 22 is rotatably connected to the lower link arm 26 by a further link arm 30 rotatably mounted to the upper link arm 22 by a joint 32 and to the lower link 26 arm by a joint 34. The upper link arm 22, the lower link arm 26, the supporting member 14 and the further link arm 30 form together a hinged parallellogram link system.

[0011] The lower link arm 26 has an extension 36 the free end of which is rotatably mounted in the casing 12 by a joint 38. As best seen in Fig. 3, the further link arm 30 has the shape of a lever having an extension 31 which is rotatably connected to an additional link arm 42 the

opposite end of which is rotatably mounted in the casing by a joint 46.

[0012] With reference to Figs. 2a and 2b the connection of the upper and lower link arms 22, 26 to the elongate supporting member 14 is shown more in detail.

[0013] The upper link arm 22 comprises two parallell legs 48, 50 which are joined to the member 14 so as to form an open space between the two legs 48, 50. In this open space the lower link arm 26 is allowed to move in a way unobstructed by the upper link arm 22. The lower ends 52, 54 of the member 14 are bent inwards to provide lateral guidance for the lower link arm 26 which has the shape of a single bar and is joined to the member 14 centrally in the space between the legs 48, 50.

[0014] In order to counterbalance the cooking oven door during its movements between the closed and open positions a spring arrangement 56 is provided. The arrangement comprises a rod 58 at one end rotatably connected to the lower link arm 26 by a joint 60. The rod 58 is slidably guided in a bracket 62 formed by a lug extending laterally from the casing and provided with a suitable hole. A helical spring 63 is disposed on the rod 58 and biased between the bracket 62 and a washer 64 disposed at the free end of the rod 62 and locked in place by a locking pin 66.

[0015] The spring arrangement 56 also serves to provide a force acting to secure that the door in the closed position is sealingly pressed against a gasket surrounding the access opening of the oven compartment. In order to give further assistance a door holding mechanism 68 is provided which is effective to press the upper part of the door towards the gasket, not shown, and in addition to provide a further position for the door in which it is left partly open for ventilation purposes.

[0016] The door holding mechanism 68 comprises a rod 70 slidingly guided in a bracket 71 and supporting a helical spring 72. The spring 72 is biased between the bracket 71 and a washer 74 rotatably cooperating with a trip arm 76 pivotably journalled in the casing 12 by a joint 78. The rotational movement of the trip arm 76 is limited by a stop 80. The door holding mechanism has two working positions one of which is shown in Fig. 1. In this position the spring 72 acts to press the trip arm 76 in a counter-clockwise direction assisting the spring arrangement 56 in pressing the upper part of the oven against the oven compartment sealing, the door holding mechanism also has a second operating position in which the door is left partly open. This second working position is shown in fig. 4. As appears in this figure the door holding mechanism 68 is connected to the upper link arm 22 via an recess 77 provided on the trip arm 76 which cooperates with a suitable pin provided on the upper link arm 22 concentric with the joint 32.

[0017] The hinge structure described above operates in the following way.

[0018] Assuming that the door is in its closed position the various parts of the hinge structure have taken the positions indicated in Fig. 1. When the door is to be moved to its open position a handle provided on the upper part of the oven door, not shown, is operated and the lower part of the door is moved away from the oven compartment in a horizontal direction as much as needed for the following turning movement to take place without any obstruction caused by adjacent panels or the like. At the same time the door is slightly rotated and the upper link arm 22 operates the trip arm 76 to rotate in clockwise direction pushing the spring and rod assembly 70, 72 upwards beyond an intermediate trip point to the second working position in which the spring and rod assembly 70, 72 of the door holding mechanism 68 is made inactive. In this position the door holding mechanism only acts to define the further position of the door in which it is left partly open for ventilation purposes.The further movement of the door towards its fully open position, shown in Fig. 4, involves a turning movement and an upward movement of the joint 28 to cause the outer door surface to align with the upper edge of an additional door or other panel situated below the cooking oven door. During the movement of the door to its fully open position the link arms 22, 26, 3 0, 42 cooperate to effect the desired movement of the door to said open position. To this end the arms 30 and 42 has got the shape indicated in Fig. 3. During this movement the spring arrangement 56 operates to counterbalance the door weight to make the movement easier for the user.

[0019] When the door is to be moved from open to closed position the handle is again operated and the door lifted to the further position in which the door is left partly open. In order to complete the movement to fully closed position the handle is pushed so that the holding mechanism 68 is operated to move the spring and rod assembly 70, 72 downwards to rotate the trip arm 76 in counterclockwise direction. When the trip position has been passed the spring 72 will act to move the trip arm 76 to the first operating position of the door holding mechanism 68 and the door has then been returned to its closed position shown in Fig. 1.

Claims

1. A hinge structure (10) for a cooking oven door adapted to be pivoted at its lower end between a first vertical position in which it closes an oven compartment and a second horizontal position in which access is offered to said oven compartment, said hinge structure (10) being mounted in a casing (12) secured to a housing enclosing the oven compartment, said hinge structure (10) further comprising a link mechanism including an upper (22) and a lower link arm (26) each having a first end rotatably connected to the lower side of the door at spaced locations, opposite ends of the upper and lower arms (22, 26) being interconnected by a further link arm (30) so as to form a hinged parallellogram link system, said hinge structure effecting the door to move in a direc-

tion away from the oven compartment before being rotated to its second horizontal position, spring means (56) being provided to counterbalance the door during its movement between the first and second positions, whereby, at its opposite end, said lower link arm (26) has an extension (36) the free end of which is rotatably mounted in the casing (12), and that the further link arm (30) has the shape of a lever provided with an extension (31) rotatably connected to an additional link arm (42) the opposite end of which being rotatably connected to the casing (12), and a door holding mechanism (68) being provided having a first working position in which the door is biased against the oven compartment and a second working position in which the door is left partly open, said door holding mechanism (68) being operatively connected to the upper link ann (22), wherein the spring means (56) comprises a rod member (58) slidably guided in a bracket (62) formed in the casing or joined thereto, at one end said rod (58) being pivotably joined to the lower link ann (26) and at the opposite end provided with a stop member (64, 66), a helical spring (63) being mounted on the rod (62) to be clamped between the stop member (64, 66) and the bracket (62), and wherein the door holding mechanism comprises a pivot arm (76) biased by a spring arrangement (70, 71, 72, 74) towards either working position of the mechanism, which are defined by suitable stop members (80), said pivot arm (76) having a recess (77) cooperating with a suitable pin (79) provided on the upper link arm (22).

2. Hinge structure according to claim 1, **characterized in that** the pin (79) is mounted concentric with the connecting point (32) between the upper link arm (22) and the further link arm (30).

3. Hinge structure according to claim 1 or claim 2, **characterized in that** the pivot arm (76) is adapted during movement from one working position to the other to pass a trip point in which the biasing force changes direction from said first working position to said other working position.

Patentansprüche

1. Gelenkkonstruktion (10) für eine Backofentür, die geeignet ist, an ihrem unteren Ende zwischen einer ersten, vertikalen Position, in der sie einen Ofenraum verschließt, und einer zweiten, horizontalen Position, in der Zugang zu dem Ofenraum geboten wird, geschwenkt zu werden, wobei die Gelenkkonstruktion (10) in einem Gehäuse (12) montiert ist, das an einem Mantel befestigt ist, der den Ofenraum umgibt, wobei die Gelenkkonstruktion (10) darüber hinaus einen Gelenkmechanismus mit einem oberen (22) und einen unteren Gelenkarm (26) umfasst, die jeweils ein erstes Ende aufweisen, das an voneinander beabstandeten Stellen drehbar mit der Unterseite der Tür verbunden ist, wobei die entgegengesetzten Enden der oberen und unteren Arme (22, 26) durch einen zusätzlichen Gelenkarm (30) miteinander verbunden sind, um ein Anlenksystem in Form eines Gelenkparallelogramms zu bilden, wobei die Gelenkkonstruktion die Tür veranlasst, sich in einer Richtung weg vom Ofenraum zu bewegen, bevor sie in ihre zweite, horizontale Position gedreht wird, wobei Federmittel (56) vorgesehen sind, um während ihrer Bewegung zwischen der ersten und zweiten Position ein Gegengewicht zur Tür zu bilden, wobei der untere Gelenkarm (26) an seinem entgegengesetzten Ende einen Ansatz (36) aufweist, dessen freies Ende drehbar im Gehäuse (12) montiert ist, wobei der zusätzliche Gelenkarm (30) die Form eines Hebels mit einem Ansatz (31) aufweist, der drehbar mit einem zusätzlichen Gelenkarm (42) verbunden ist, dessen entgegengesetztes Ende drehbar mit dem Gehäuse (12) verbunden ist, wobei ein Türhaltemechanismus (68) vorgesehen ist, der aufweist: eine erste Arbeitsposition, in der die Tür gegen den Ofenraum vorgespannt ist, und eine zweite Arbeitsposition, in der die Tür teilweise offen steht, wobei der Türhaltemechanismus (68) operativ mit dem oberen Gelenkarm (22) verbunden ist, wobei das Federmittel (56) ein Stabelement (58) umfasst, das gleitend in einer Halterung (62) geführt wird, die in dem Gehäuse gebildet ist oder daran angefügt ist, wobei der Stab (58) an einem Ende schwenkbar mit dem unteren Gelenkarm (26) verbunden ist und am entgegengesetzten Ende mit einem Stoppelement (64, 66) versehen ist, wobei eine Schraubenfeder (63) an dem Stab (62) montiert ist, um zwischen dem Stoppelement (64, 66) und der Halterung (62) eingeklemmt zu werden, und wobei der Türhaltemechanismus einen Schwenkarm (76) umfasst, der durch eine Federanordnung (70, 71, 72, 74) zu jeder der Arbeitspositionen des Mechanismus vorgespannt wird, die durch geeignete Stoppmittel (80) definiert werden, wobei der Schwenkarm (76) eine Vertiefung (77) aufweist, die mit einem geeigneten Stift (79) zusammenarbeitet, der am oberen Gelenkarm (22) vorgesehen ist.

2. Gelenkkonstruktion nach Anspruch 1, **dadurch gekennzeichnet, dass** der Stift (79) konzentrisch mit dem Verbindungspunkt (32) zwischen dem oberen Gelenkarm (22) und dem zusätzlichen Gelenkarm (30) montiert ist.

3. Gelenkkonstruktion nach Anspruch 1 oder 2, **dadurch gekennzeichnet, dass** der Schwenkarm (76) geeignet ist, während der Bewegung von einer Arbeitsposition zur anderen einen Haltepunkt zu passieren, in der die Vorspannungskraft die Richtung von der ersten Arbeitsposition zur anderen Ar-

beitsposition ändert.

Revendications

1. Structure de charnière (10) pour une porte de four de cuisson conçue pour être pivotée à son extrémité inférieure entre une première position verticale dans laquelle elle ferme un compartiment de four et une seconde position horizontale dans laquelle un accès est offert audit compartiment de four, ladite structure de charnière (10) étant montée dans un carter (12) fixé à un logement enfermant le compartiment de four, ladite structure de charnière (10) comprenant, en outre, un mécanisme de tringle incluant un bras de tringle supérieur (22) et inférieur (26), chacun comportant une première extrémité raccordée, de manière tournante, au côté inférieur de la porte, à des emplacements espacés, les extrémités opposées des bras supérieur et inférieur (22, 26) étant interconnectés par un autre bras de tringle (30) de manière à former un système de tringle en parallélogramme articulé, ladite structure de charnière amenant la porte à s'éloigner du compartiment de four avant de tourner autour de sa seconde position horizontale, des moyens à ressort (56) étant prévus pour contrebalancer la porte au cours de son déplacement entre les première et seconde positions, grâce à quoi, à son extrémité opposée, ledit bras de tringle inférieur (26) comporte un prolongement (36) dont l'extrémité libre est montée, de manière tournante, dans le carter (12), et l'autre bras de tringle (30) présente la forme d'un levier pourvu d'un prolongement (31) raccordé, de manière tournante, à un bras de tringle additionnel (42) dont l'extrémité opposée est raccordée, de manière tournante, au carter (12), et un mécanisme de blocage de porte (68) étant prévu en ayant une première position opérationnelle dans laquelle la porte est sollicitée contre le compartiment de four et une seconde position opérationnelle dans laquelle la porte est laissée partiellement ouverte, ledit mécanisme de blocage de porte (68) étant raccordé, en fonctionnement, au bras de tringle supérieur (22), dans laquelle les moyens à ressort (56) comprennent un élément de tige (58) guidé, de manière coulissante, dans une patte (62) formée dans le carter ou qui y est réunie, à une extrémité ladite tige (58) étant réunie, de manière pivotante, au bras de tringle inférieur (26), et à l'autre extrémité munie d'un élément de butée (64, 66), un ressort hélicoïdal (63) étant monté sur la tige (62) de manière à être bloqué entre l'élément de butée (64, 66) et la patte (62), et dans laquelle le mécanisme de blocage de porte comprend un bras formant pivot (76) sollicité par un agencement de ressorts (70, 71, 72, 74) en direction de chaque position opérationnelle du mécanisme, qui sont définies par des éléments de butée appropriés (80), ledit bras formant pivot (76) présentant un évidement (77) qui coopère avec une broche appropriée (79) disposée sur le bras de tringle supérieur (22).

2. Structure de charnière selon la revendication 1, **caractérisée en ce que** la broche (79) est montée concentriquement au point de raccordement (32) entre le bras de tringle supérieur (22) et l'autre bras de tringle (30).

3. Structure de charnière selon la revendication 1 ou 2, **caractérisée en ce que** le bras formant pivot (76) est adaptée, au cours du déplacement d'une position opérationnelle à l'autre, pour passer par un point de déclenchement auquel la force de sollicitation change de direction, de ladite première position opérationnelle à ladite autre position opérationnelle.

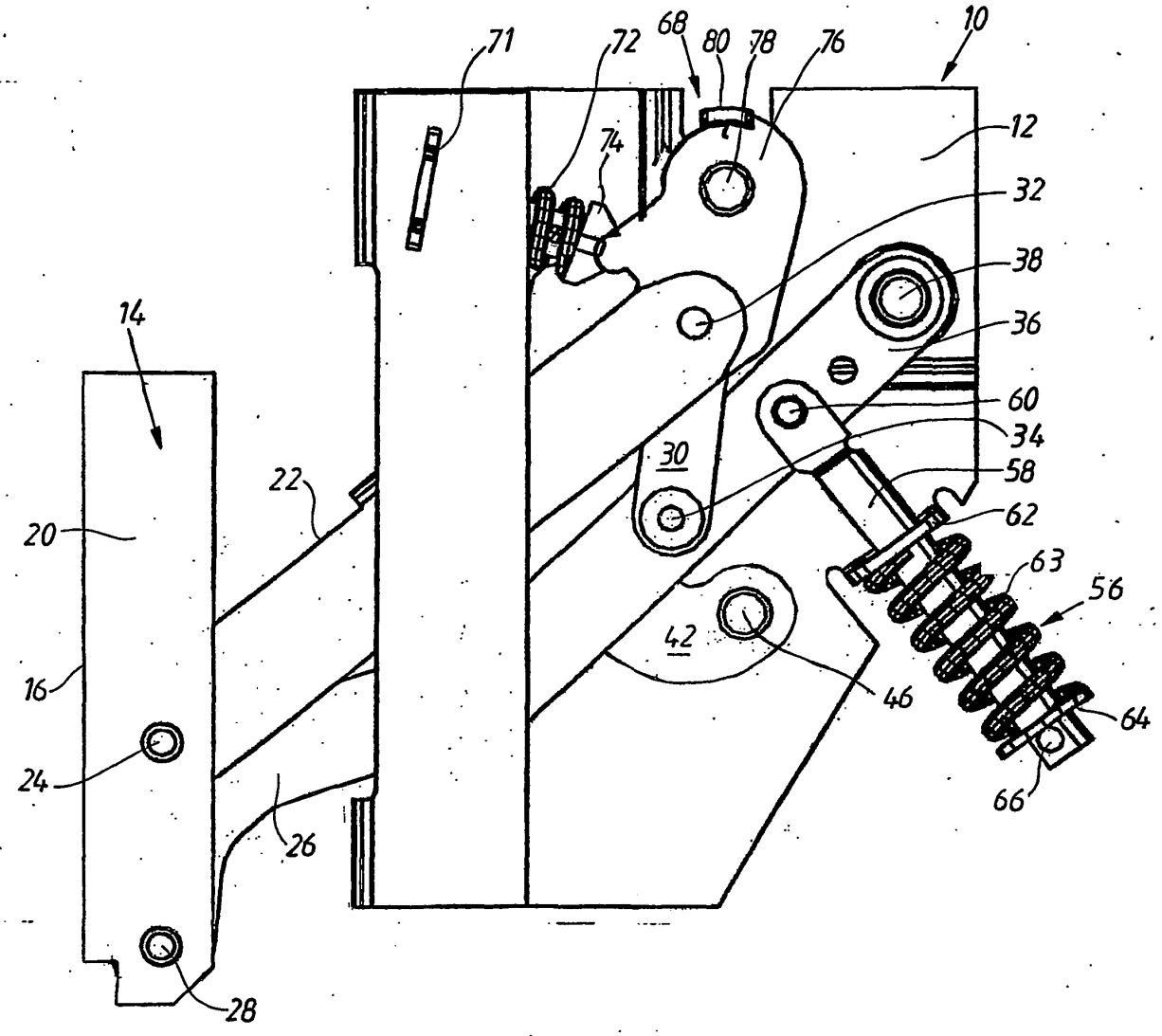
71
72
68
80
78
76
10
12
74
32
38
14
36
60
34
30
58
22
62
20
63
56
42
46
64
16
24
66
26
28

FIG.1

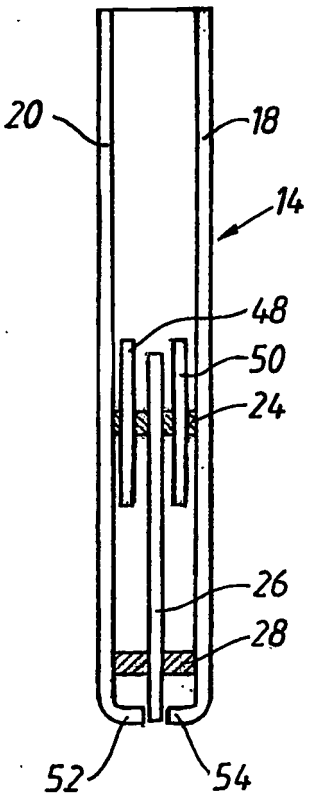

FIG. 2a

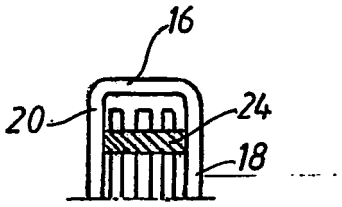

FIG. 2b

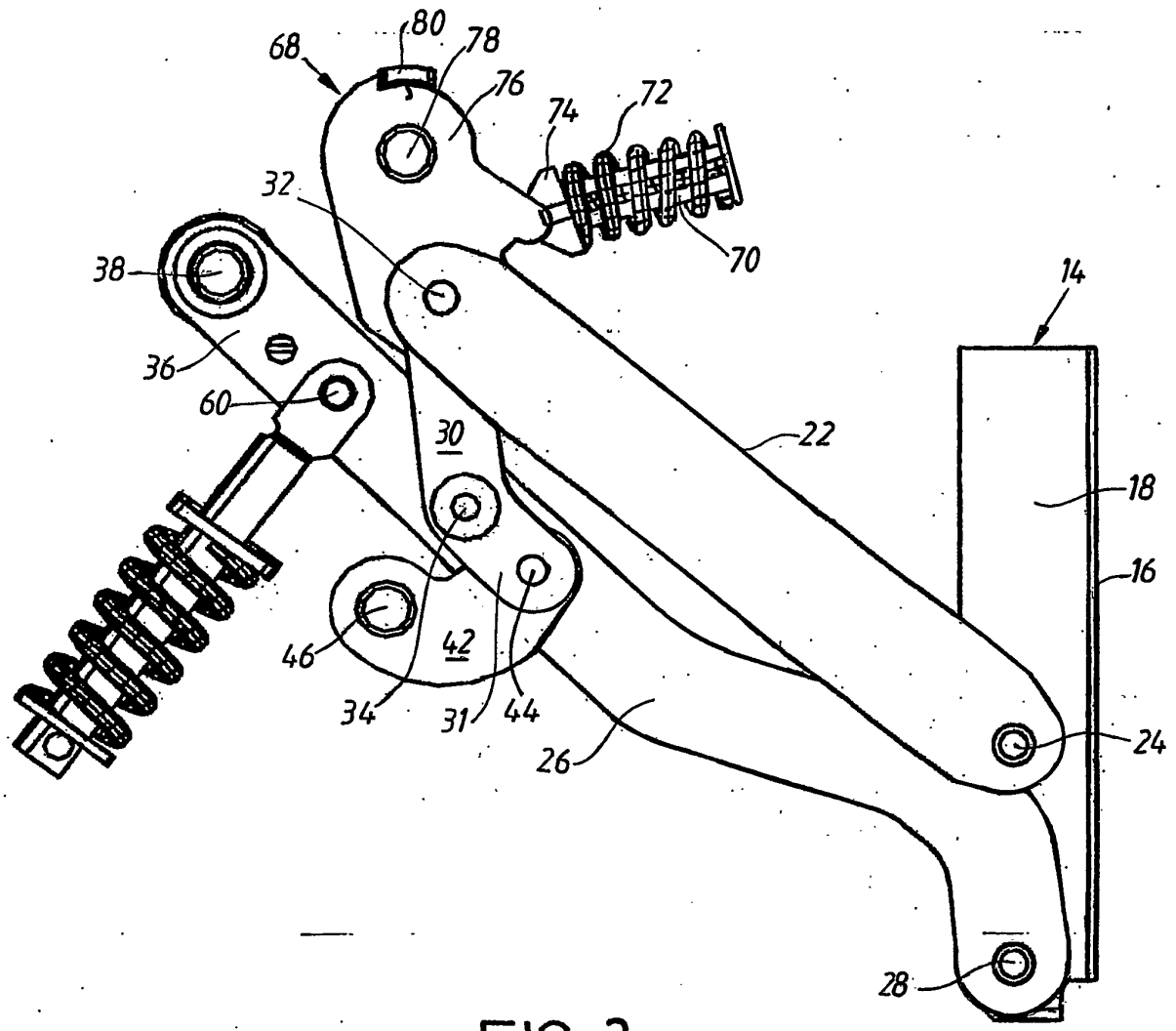

FIG. 3

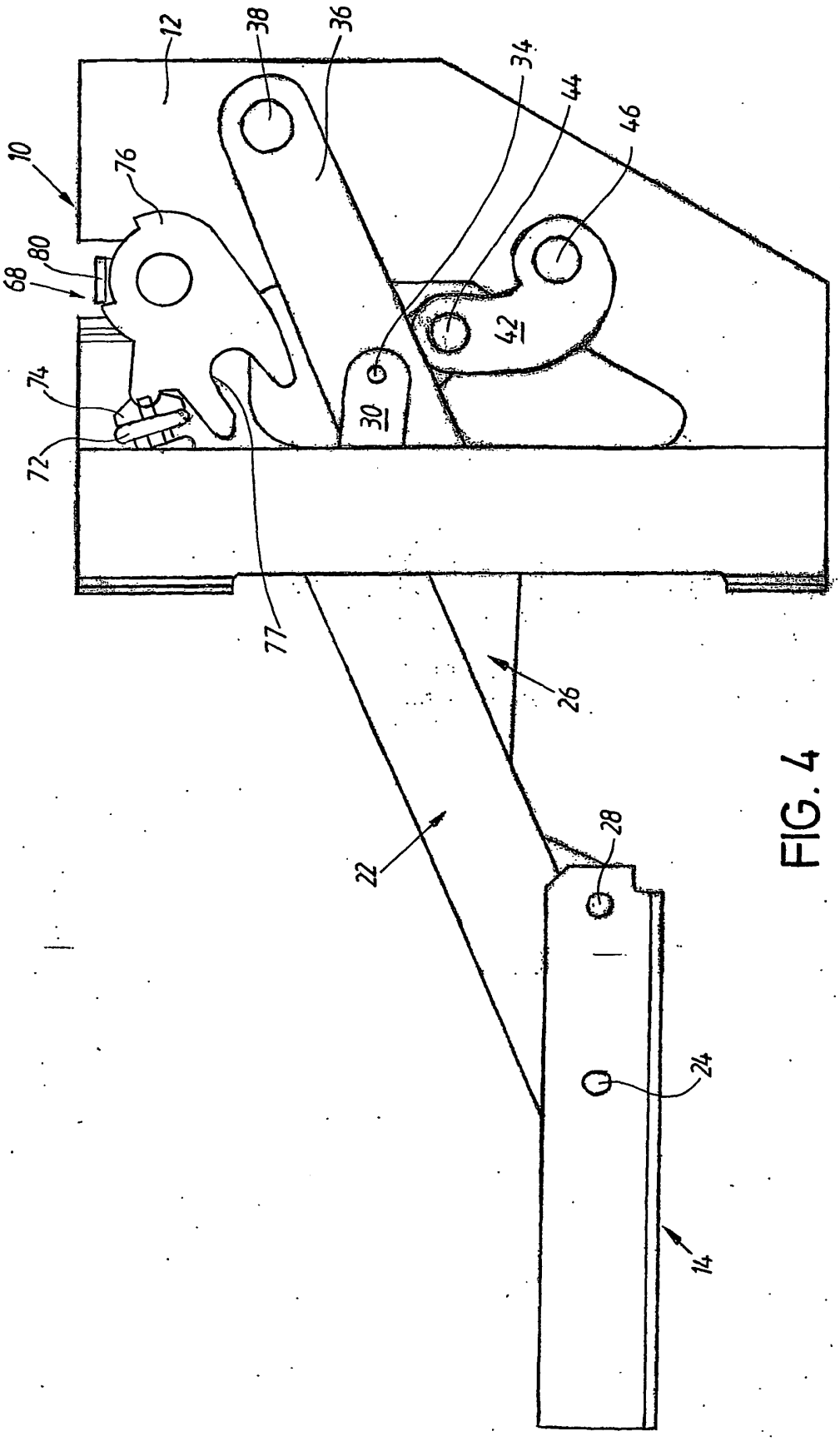

FIG. 4

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

- GB 758932 A **[0003]**
- GB 1056631 A **[0003]**
- US 2698957 A **[0003]**
- US 2800128 A **[0003]**
- EP 0859197 A **[0004]**