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(54) Title: HINGE FOR A CABINET SWING DOOR

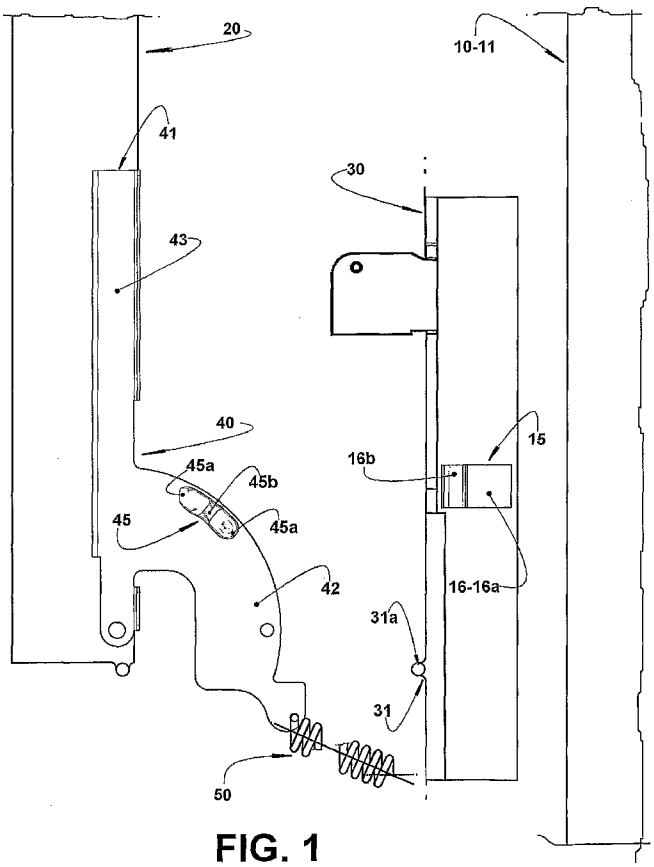


FIG. 1

(57) Abstract: Hinge for rocker door of a cabinet provided with a structure (11), said hinge comprising a support frame (30) fixed to the structure (11) of the cabinet (10) and defining a door hinge element (31); a retaining rod (40) having an anterior end (41) fixed to the door (20) and a posterior end (42) positioned on the interior of the structure (11) of the cabinet (10); and one spring (50) interconnecting the posterior end (42) of the retaining rod (40) with the structure (11) of the cabinet (10), in order to force the door (20) constantly to a closed position. The structure (11) of the cabinet (10) fixes an elastically deformable stop (15), the retaining rod (40) carrying a protuberance (45) which interferes with the stop (15) to elastically yield it in a respective displacement portion of the door (20) and to retain the latter one in a partial opening position, against the force of the spring (50).

WO 2009/076735 A1

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HINGE FOR A CABINET SWING DOOR

Field of the Invention

This invention refers to a hinge to be applied on a cabinet rocker door, more particularly to the cabinet of a kitchen oven where the front rocker door should be angularly moved around a horizontal lower axis, from a closed position to a fully open and substantially horizontal position, going through an intermediate position where the door should be kept stabilized in a fully open condition.

Previous art

Different constructing arrangements for the hinge type considered herein are known, and they basically comprise a support frame generally fixed on the interior of the structure of the kitchen oven, next to the respective side door of the anterior mouth of the oven and defining a lower hinge point of the door, a retaining rod being provided, which has an anterior end fixed to the door and an opposite posterior end defining a hook, which is coupled to a return spring provided for in the interior of the cabinet structure, said spring being sized in order to exert over the retaining rod and consequently over the door, a constant force, which has a tendency of closing it with a given compression pressure over the gasket provided in the region of the mouth of the oven defined by said cabinet.

In spite of providing a suitable operation of the door, including stopping the latter one in an intermediate opening position, required in some conditions of using the oven, the hinges of the previous art show drawbacks, among them a considerable constructing complexity can be mentioned, requiring a large number of component parts assembled on the support frame which makes the structure expensive, exaggeratedly in terms of cost, and which is inserted and fixed on the cabinet structure. One of the reasons related to the constructing complexity of the previous solutions regards the

construction of the elements required to guarantee stability of the door in an intermediate partially open position. In some of such previous constructions, the support frame has been built in order to carry a stop element, which can be comprised of a sphere constantly pressed by a spring to project partially outwardly of a surface, in order to exert a mechanic interference with one respective element incorporated in the retaining rod, when the door is brought to a given position in its displacement course between the closed and fully open positions. In spite of such known previous construction letting the stop element hold the door at the partially open intermediate position, against the action of the return spring which has the tendency of taking the door to the fully closed position, such known construction presents a serious drawback of requiring both a complex and expensive construction for providing the deformable stop means, in order to interfere mechanically in a projecting element carried by the retaining rod.

Another constructing solution of the previous art has been described on the document of patent MU7703260-8, where the intermediate stop of the door is achieved by means of a hinge construction even more complex than the one considered in this invention and which has mutual mechanic interference elements defined by a profile of a slot defined on one of the parts of the hinge and against which a came follower slides, which is incorporated to others of said parts of the door and cabinet structure, in order to guarantee the stability of the door in a partially open condition. In spite of providing such operational characteristic to the doors and cabinet, particularly to the doors of kitchen ovens, such solution of the previous art requires a multiplicity of elements for constructing the hinge, which makes the final product considerably more expensive, as well as causing difficulties for its suitability, in terms of cost, the requirements of the consumers to which the product is intended for.

Summary of the invention

Due to the drawbacks mentioned above, it is an object of this invention to provide a hinge for a rocker door of a cabinet, particularly a cabinet for a kitchen oven, having both a simple construction and relatively reduced cost, allowing the door to be displaced between closed and fully open positions, passing an intermediate partially open position, where it can be stabilized. It is also a further object of the invention to provide a hinge, as mentioned above, and which allows a smooth and noiseless operation during the movement of the rocker door between its closed and fully open positions.

As has already been mentioned, the hinge for the rocker door in question is applied on a cabinet, generally a cabinet of a kitchen oven, provided with a suitable structure, the hinge being of the type which comprises a support frame fixed to the cabinet structure and defining a hinge element of the door; a retaining rod having an anterior end fixed to the door and a posterior end positioned in the interior of the cabinet structure; and a spring interconnecting the posterior end of the retaining rod with the cabinet structure, in order to force the door constantly to a closed position.

According to this invention, to the structure of the cabinet there is fixed an elastically deformable stop, the retaining rod carrying a protuberance which interferes with the stop to elastically deform it in a respective portion of displacing the door and to retain the latter one in a partial open position, against the force exerted by the spring.

The above construction allows a hinge having an extremely simple construction and well known in the art, to be provided with elements which permit a mutual mechanic interference, in a determined position of rocker displacement of the door, in order to maintain the latter one on the desired intermediate partially open position, where the mechanic interference elements are constructed in a practical and extremely simple way, without inter-

fering on the production costs of the apparatus to be presented to the end consumer.

Brief description of the drawings

The invention will be described as follows, making reference to the annexed drawings, given as an example of a possible construction of the hinge in question and wherein:

Figure 1 depicts a simplified, exploded, schematic side view of the elements constituting the hinge in relation to a part of the door of the oven, partially illustrated;

Figure 1A depicts a view similar to figure 1, but illustrating a constructive variant for the protuberance and for the stop;

Figure 2 depicts an upper plan view of the retaining rod of the hinge;

Figure 3 depicts a side view, in an enlarged detail, of the region of the retaining rod of figure 2, provided with a protuberance;

Figure 3A depicts a view similar to figure 3, but illustrating a constructive view for the protuberance;

Figure 4 depicts a side view of the protuberance of figures 1, 2 and 3, said view being taken according to arrow IV in figure 3;

Figure 5 depicts a schematic and simplified side view of the hinge illustrated in figures 1, 2, 3 and 4 in question in an assembled condition, the door of the cabinet being in a closed condition and the laying plan of the rocker door against the cabinet is shown by line X;

Figures 6 and 7 depict views similar to figure 5, but illustrating the door of the oven in an intermediate opening condition, after its rotation of about 15 degrees, and in a fully open condition, after rotating around 85 degrees respectively;

Figure 8 depicts a schematic cross section view of the hinge shown in figures 1, 2, 3, 4, 5, 6 and 7, illustrating the mechanic interference between

the protuberance incorporated to the retaining rod and the stop fixed on the structure of the cabinet;

Figure 9 depicts a partial perspective view of the structural frame, fixing the stop; and

Figure 9A depicts a view similar to figure 9, but illustrating a constructing variant for the stop.

Detailed description of the invention

As has been previously mentioned and illustrated on the annexed drawings, the invention in question is applied to a cabinet 10, generally a cabinet 10 for a kitchen oven, provided with a structure 11 which carries, by means of a hinge, a rocker door 20, angularly displaceable around a lower horizontal axis, between a closed position illustrated on figure 5 and a fully open position illustrated on figure 7.

The structure 11 of the cabinet 10 carries a support frame 30, generally formed in a single stamped metallic part, which is fixed, by means of screws or any other suitable means, in the interior of one of the side walls of the cabinet structure, next to an anterior side edge of the latter one, arranged externally to a respective anterior opening of the cabinet, to be closed by said rocker door 20.

It should be understood that the structural frame 30 can be incorporated in a single part to the structure 11 of the cabinet 10, without constituting a separate part of the latter one, as has been illustrated on the drawings in annex. It should be further understood that both the structure 11 of the cabinet 10 and the support frame 30 should be generally constructed in a duly stamped metallic plate or conformed in another way, in order to attend the design requirements.

The support frame 30 defines a door hinge element 31, usually an ear provided with a hole 31a through which a hinge pin (not illustrated)

passes, cooperating with respective elements provided for in the region of the lower edge of the door so that the latter one can oscillate angularly around a single horizontal axis, defined by said door hinge element 31.

The hinge in question further comprises a retaining rod 40, having an anterior end 41 fixed to the door 20 and a posterior end 42, generally shaped as a hook and positioned in the interior of the structure 11 of the cabinet 10, to connect an anterior end of a spring 50 which posterior end is coupled to the cabinet 10, the spring 50 being sized and calibrated to force the door 20 constantly to a closed position, as has been illustrated on figure 5.

In the construction illustrated, the anterior end 41 of the retaining rod 40 further incorporates an extension 43, which has the function of easing the fixation of such end to the door 20. However, it should be understood that different modifications could be made on the shape of the anterior end 41 of the retaining rod 40, so it can adapt better to the design characteristics of the door 20 to be assembled by means of the hinge in question.

As can be seen by the drawings, the retaining rod 40 is obtained in a generally stamped metallic plate, which is arranged in a vertical plan and orthogonal to the X laying plan of the door 20 against the front region of the cabinet 10.

According to this invention, the structure 11 of the cabinet 10, or optionally the support frame 30 fixed to the latter one, carries in a fixed way, an elastically deformable stop 15 and which, in the configuration illustrated on figures 1, 5, 6, 7, 8 and 9, is defined by a metallic material laminar spring 16, having an end portion 16a to be fixed, for example by means of screws, on the structure 11 of the cabinet 10 or on the structural frame 30, and a latch portion 16b arched in a substantially cylindrical way, having a parallel axis to the displacement plan of the retaining rod 40 and still orthogonal to the dis-

placement direction of the retaining rod 40 during the rocking movement of the door 20.

In the configuration illustrated on figures 1A and 9A, the stop 15, also defined by the metallic material laminar spring 16, has its end portion 16a, formed by an angle iron to be fixed, for example, by means of screws, to the structure 11 of the cabinet 10 or to the structural frame 30, and a latch portion 16b arched in a substantially cylindrical way, having an axis orthogonal to the displacement plan of the retaining rod 40 and to the displacement direction of the retaining rod 40 during the rocking movement of the door 20.

The construction of the stop 15, as has been mentioned above, allows that, when it is pressed by any element during the displacement of the door, it can elastically yield, in order to let any interference element carried by the door, pass from one side to the other of said stop 15, during full rocking of the door 20 between its closed and fully open positions, illustrated on figures 5 to 7 respectively.

The hinge in question further comprises a protuberance 45 incorporated to the retaining rod 40 and sized to interfere with the stop 15, in order to elastically deform it in a respective displacement portion of the edge 20, and to retain the latter one at a partial opening position, illustrated on figures 3 and 5, against the force of the spring 50. On the solutions illustrated, the protuberance 45 shows an elongated shape, having two extreme ramps 45a and a median recess 45b. It should be mentioned that the extreme ramp 45a, facing the structure 11 of the cabinet 10, shows an inclination slightly smoother than the one on the end ramp 45a opposed to and facing away from the structure 11 of the cabinet 10. The difference in the inclination of both extreme ramps 45a is due to the force already exerted by the spring 50 over the door 20, with the aim of closing it, that is, of forcing the stop 15 against the end ramp 45a facing away from the cabinet 10.

The above mentioned construction allows, with the displacement of the door 20 from the closed position to a fully open position, the protuberance 45 to reach the stop 15, forcing it to elastically yield, by means of the manual force exerted by the user over the door, allowing the protuberance 45, together with the door, to continue its descending displacement in the direction of the fully open position. However, in case the user wants to maintain the door 20 stabilized in an intermediate partially open position, he just needs to displace the door, against or towards the force of the spring 50, until the median recess 45b of the protuberance 45 meets the stop 15 again, stabilizing the door 20 in the partially open position, as the return force of the spring 50 is insufficient to cause the elastic yield of retraction of the stop 15 by the proper protuberance 45 incorporated on the return rod 40 of the hinge.

To fully close the door 20, it is only necessary for the user to exert a manual effort in the same direction of actuation of the spring 50, so that the protuberance 45 causes a new elastic yield of the stop 15, allowing all the extent of the protuberance 45 to pass to the other side of the stop 15 and the door 20 can, thus, be fully closed.

According to the construction illustrated on figures 1,2, 3, 4, 5, 6, 7, 8 and 9, the protuberance 45 projects from a side surface of the retaining rod 40, according to a direction orthogonal to the displacement plan of the retaining rod 40. In spite of different constructing solutions being possible within the concept herein described, the retaining rod 40 is generally formed in a metallic plate, the protuberance 45 behind thus defined by a deformation of the retaining rod 40, for example by countersink. Such constructing solution allows the formation of the protuberance 45 on the proper material of the retaining rod 40 and during the proper process of forming the latter one, for example also by stamping. The protuberance 45 can assume the rough shape of a nervure with ends 45a in ramp, in order to ease its actuation over

the stop 15, which, as has already been mentioned, shows preferably an interference region arched in a substantially cylindrical shape.

According to another configuration illustrated on figures 1A and 3A, the protuberance 45 takes the shape of a flap projecting from a side edge of the retaining rod 40, preferably in a coplanar way to this latter one. Such constructing solution also allows the formation of the protuberance 45 on the proper material of the retaining rod 40 in a single part and during the proper formation process of this latter one, for example, by stamping, without requiring the countersink of the configuration illustrated on figures 1, 2, 3, 4, 5, 6, 7, 8 and 9. The protuberance 45, in a flap shape, has its contoured outer edge showing opposite ends 45a in a ramp shape and median recess 45b.

In spite of having illustrated herein only a possible constructing way for the hinge in question, it should be understood that different alterations could be carried out on the way and arrangement relating to the elements without departing from the constructing principle defined in the claims, which accompany this specification.

CLAIMS

1. Hinge for rocker door of a cabinet provided with a structure (11), said hinge comprising a support frame (30) fixed to the structure (11) of the cabinet (10) and defining a door hinge element (31); a retaining rod (40) having an anterior end (41) fixed to the door (20) and a posterior end (42) positioned on the interior of the structure (11) of the cabinet (10); and one spring (50) interconnecting the posterior end (42) of the retaining rod (40) with the structure (11) of the cabinet (10), in order to force the door (20) constantly to a closed position, the hinge is characterized by the structure (11) of the cabinet (10) fixing a elastically deformable stop (15), the retaining rod (40) carrying a protuberance (45) which interferes with the stop (15) to elastically yield it in a respective displacement portion of the door (20) and to retain the latter one in a partial opening position, against the force of the spring (50).

2. Hinge, according to claim 1, characterized in that the protuberance (45) projects itself from a side surface of the retaining rod (40), according to a direction orthogonal to the displacement plan of the retaining rod (40).

3. Hinge, according to claim 2, characterized in that the retaining rod (40) is formed in a metallic plate, the protuberance (45) being defined by a deformation of the retaining rod (40).

4. Hinge, according to claim 3, characterized in that the protuberance (45) takes the rough shape of a nervure having opposite ends (45a) in a ramp shape and a median recess (45b).

5. Hinge, according to any one of the claims 1, 2, 3 or 4, characterized in that the stop (15) is defined by a laminar spring (16) having a latch portion (16b) arched in a way substantially parallel to the displacement plan of the retaining rod (40) and orthogonal to the direction of displacement of the protuberance (45) when interfering with the stop (15).

6. Hinge, according to claim 1, characterized in that the stop (15) is fixed on the support frame (30).

7. Hinge, according to claim 7, characterized in that the protuberance (45) projects itself from a side edge of the retaining rod (40).

8. Hinge, according to claim 1, characterized in that the protuberance (45) takes the rough shape of a flap coplanar to the retaining rod (40), with its contoured outer edge presenting opposite ends (45a) in a ramp shape and median recess (45b).

9. Hinge, according to claim 7 or 8, characterized in that the stop (15) is defined by a laminar spring (16) having a latch portion (16b) arched, around an axis orthogonal to the displacement plan of the retaining rod (40) and to the direction of displacement of such latter one during the rocking movement of the door (20).

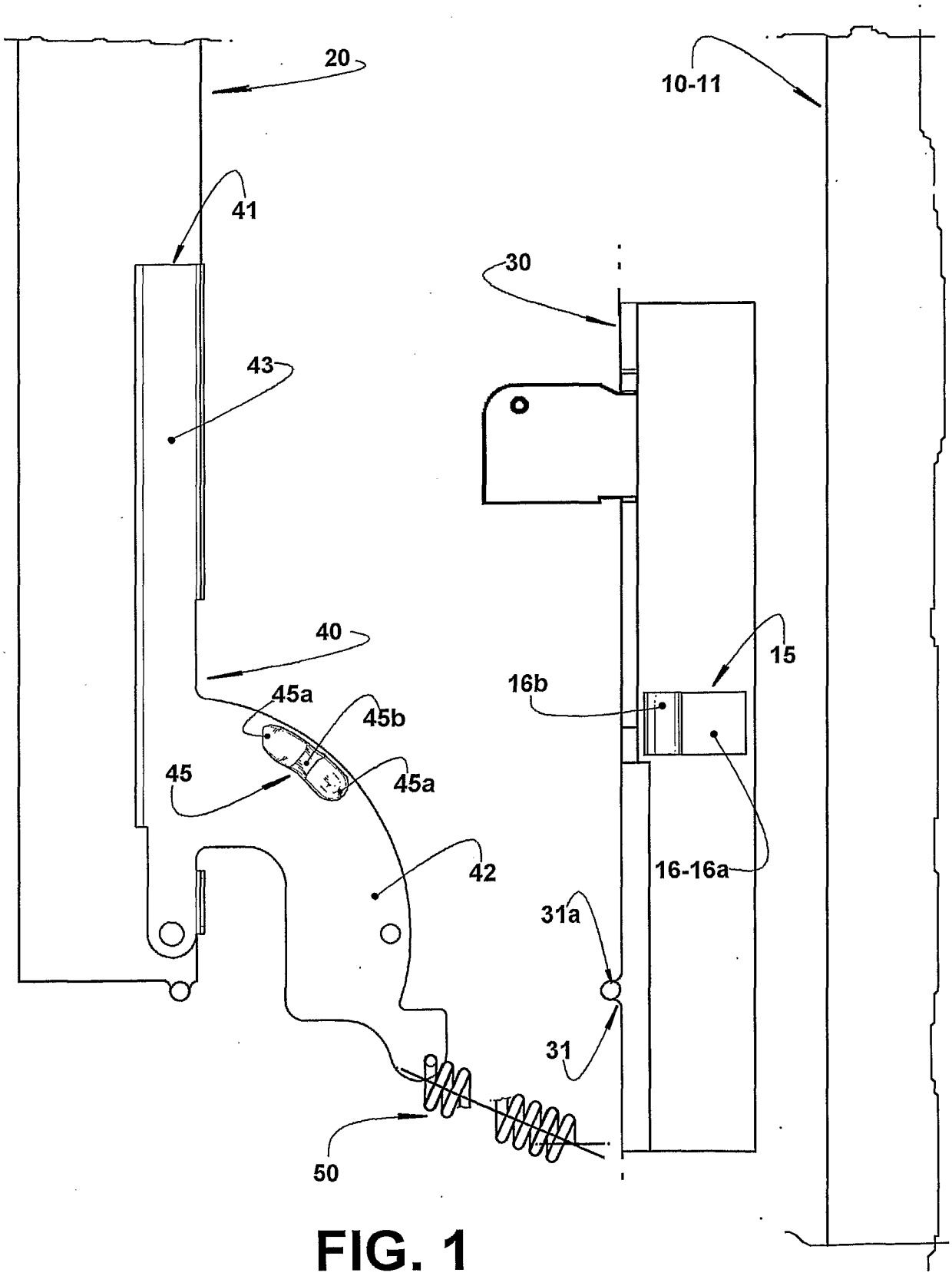


FIG. 1

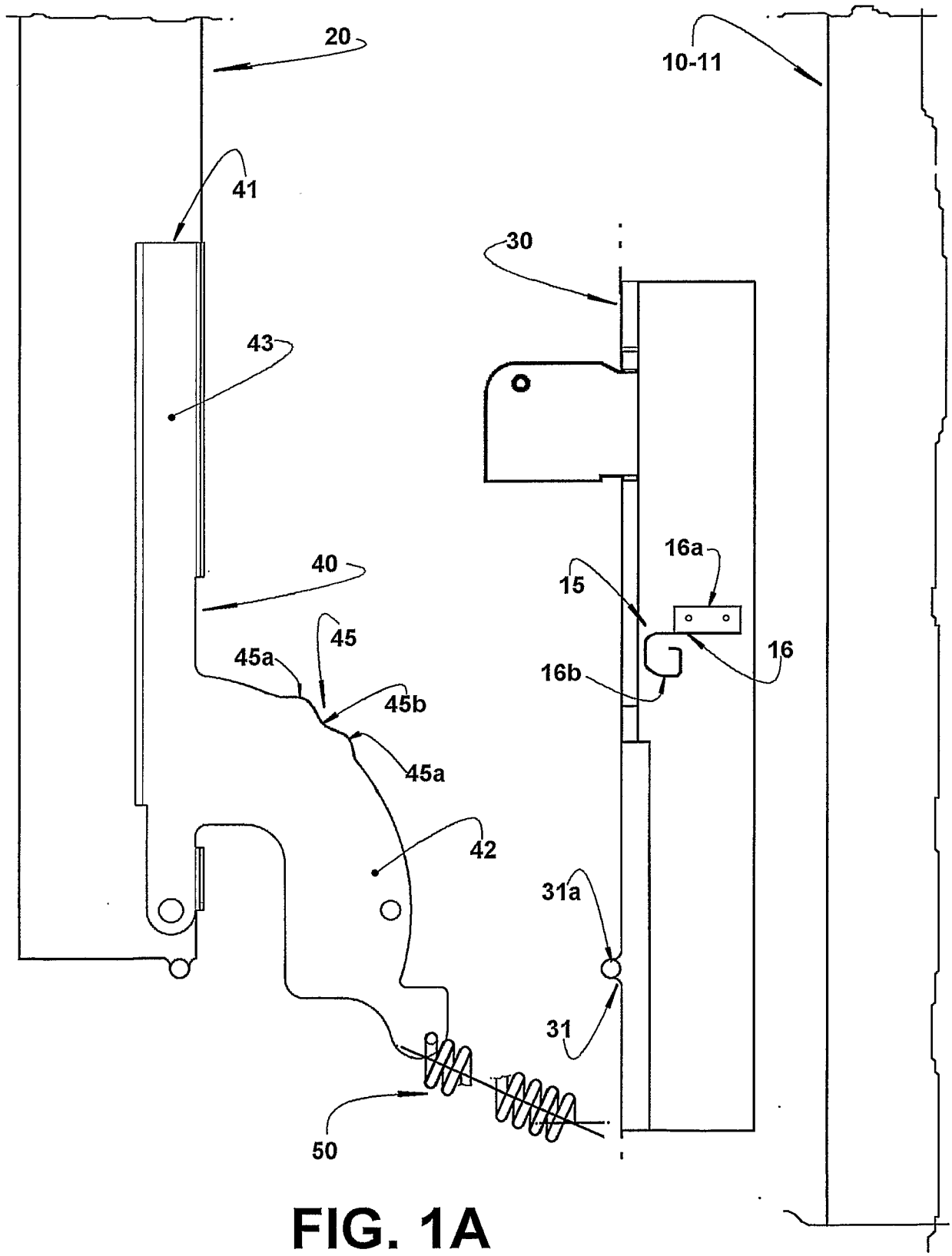


FIG. 1A

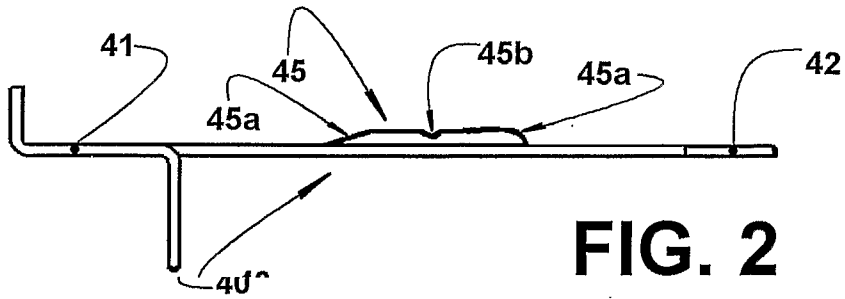


FIG. 2

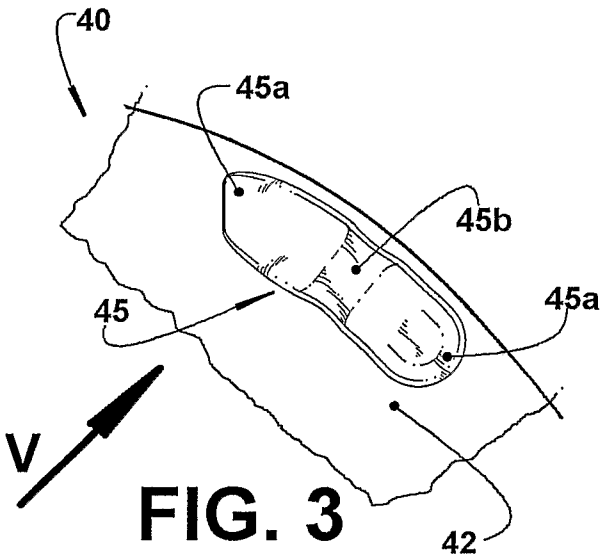


FIG. 3

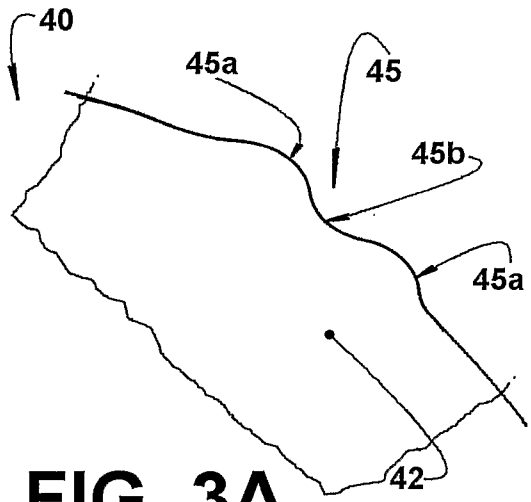


FIG. 3A

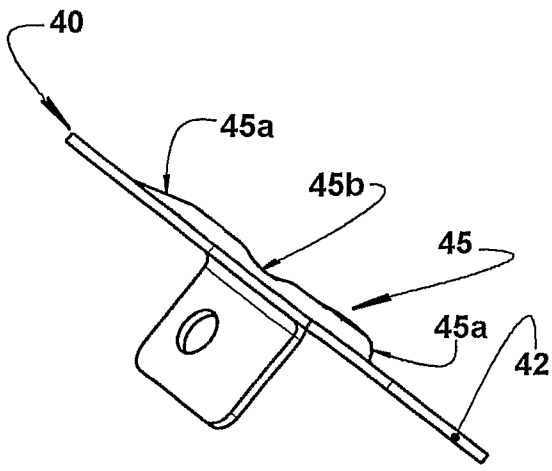


FIG. 4

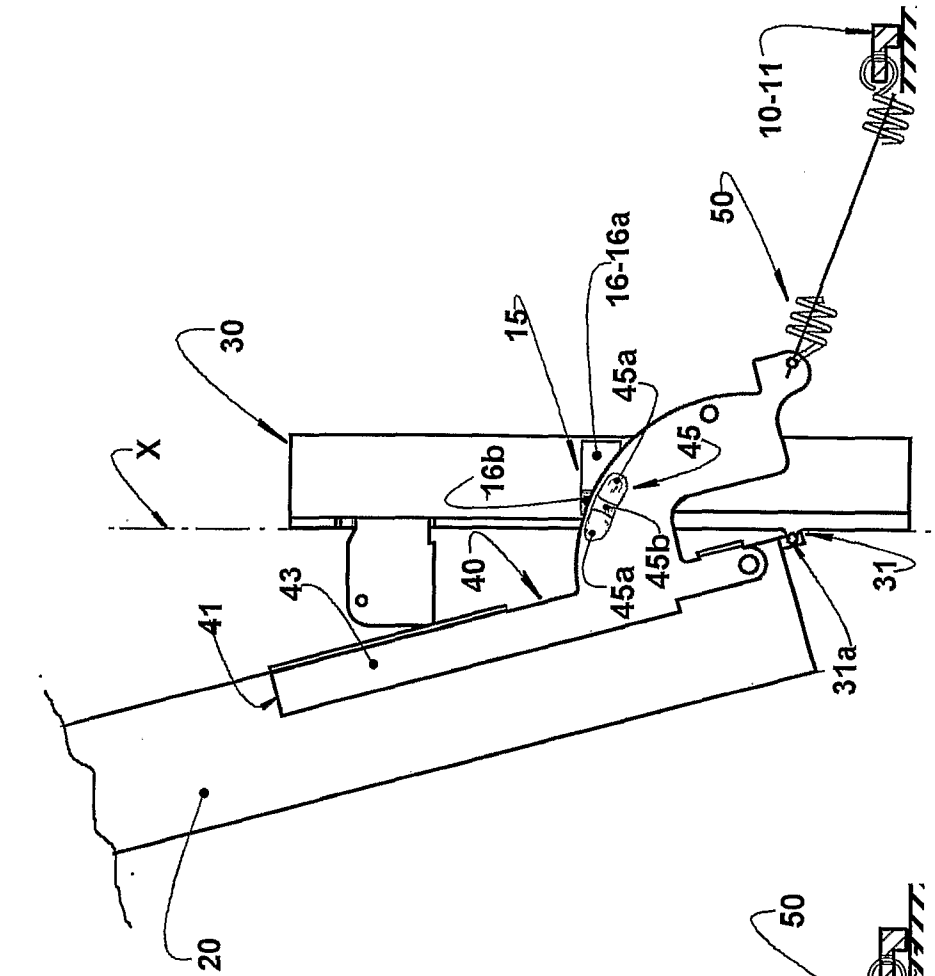

X
30
15
16-16a
45a
45
50
10-11
16b
45b
40
43
41
31
31a
20

FIG. 6

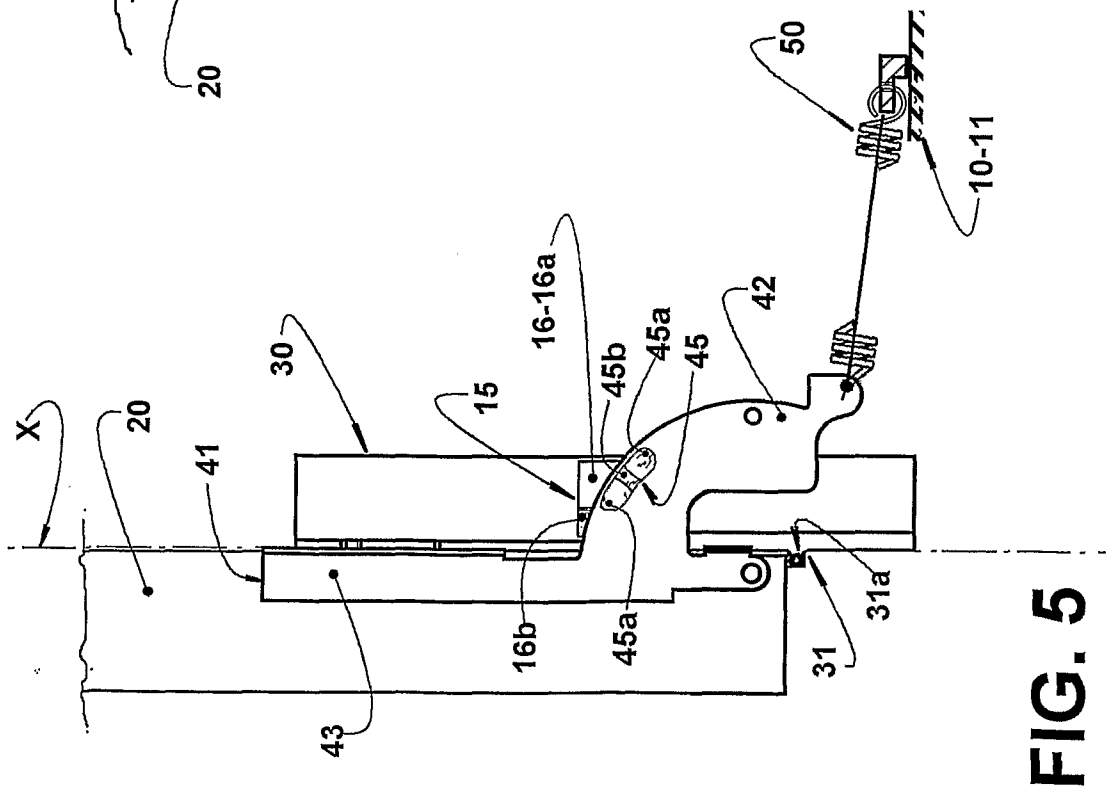

X
20
41
30
15
16-16a
45b
45a
45
42
50
10-11
16b
45a
43
31
31a

FIG. 5

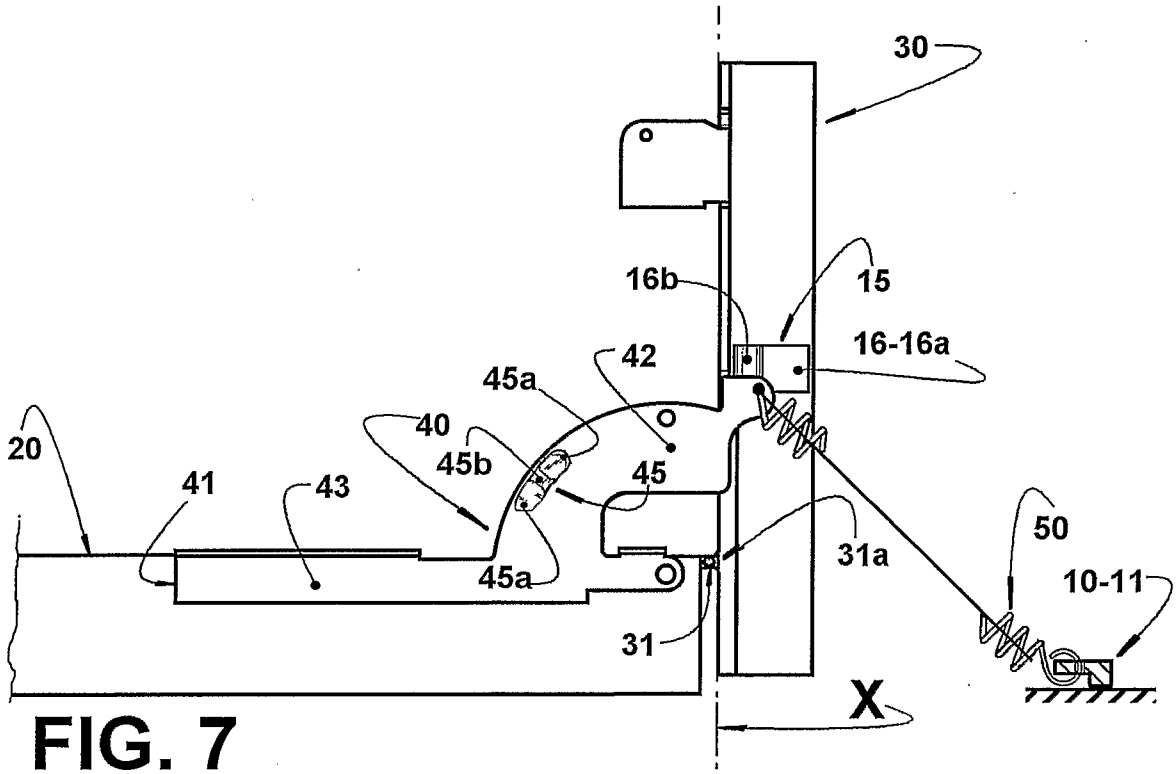

30
16b
15
16-16a
42
45a
40
45b
45
20
41
43
45a
31a
50
10-11
31
X

FIG. 7

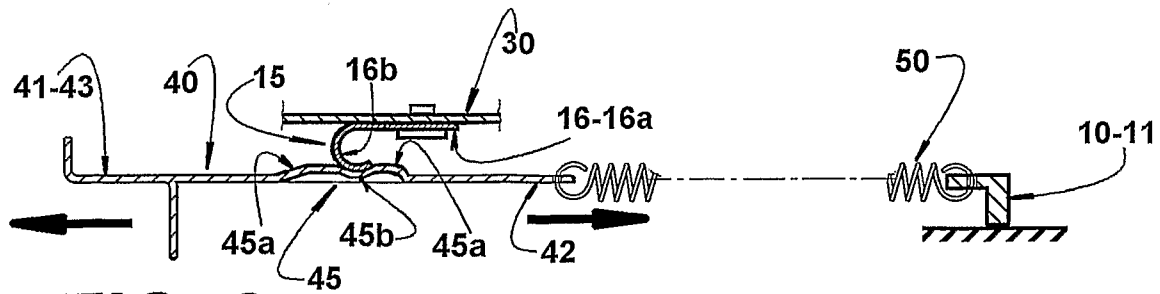

41-43
40
15
16b
30
16-16a
50
10-11
45a
45b
45a
42
45

FIG. 8

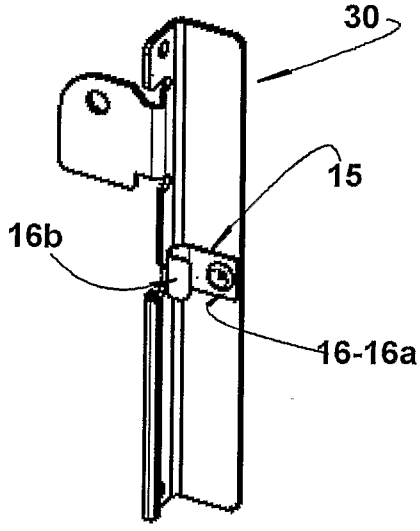


FIG. 9

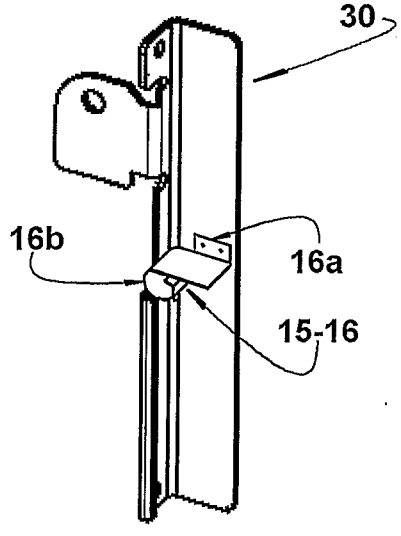


FIG. 9A

INTERNATIONAL SEARCH REPORT

International application No
PCT/BR2008/000370

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05D11/10 F24C15/02

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F42C E05C E05D E05F F24C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 378 421 A (MCCORMICK FRANCIS H) 19 June 1945 (1945-06-19)	1,6
Y	page 1 - page 2; claim 1; figures 1-3	1,6
A		2-5,7-9
X	GB 765 266 A (WESTINGHOUSE ELECTRIC INT CO) 9 January 1957 (1957-01-09)	1,6
Y	page 4, line 55 - page 5, line 51; claim 1; figures 5-8	1,6
A		2-5,7-9
Y	US 3 203 031 A (YOUNGDALE TED L ET AL) 31 August 1965 (1965-08-31)	1,6
A	the whole document	2-5,7-9

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
12 March 2009	23/03/2009

Name and mailing address of the ISA/	Authorized officer
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/BR2008/000370

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2378421 A	19-06-1945	NONE	
GB 765266 A	09-01-1957	NONE	
US 3203031 A	31-08-1965	NONE	