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

(11) Publication number: **0 170 337**
A1

(12) # EUROPEAN PATENT APPLICATION

(21) Application number: **85201229.3**

(51) Int. Cl.[4]: **A 62 C 3/14**

(22) Date of filing: **23.07.85**

(30) Priority: **26.07.84 NL 8402361**

(43) Date of publication of application:
05.02.86 Bulletin 86/6

(84) Designated Contracting States:
BE CH DE FR GB LI NL SE

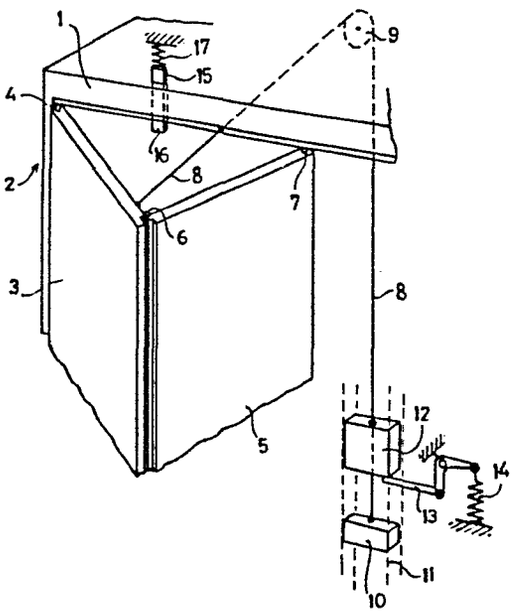
(71) Applicant: **Pielkenrood-Vinitex B.V.**
Industrieweg 13
NL-1566 JN Assendelft(NL)

(72) Inventor: **van Galen, Piet**
81, Vlietlaan
NL-1566 WE Assendelft(NL)

(74) Representative: **Mommaerts, Johan Hendrik, Dipl.-Phys.**
Octrooibureau Lux Willem Witsenplein 4
NL-2596 BK Den Haag(NL)

(54) **Fire resistant cabinet.**

(57) A fire-resistant cabinet (1) with at least one door (3, 5) which can be quickly closed by a driving means when a temperature sensor (13) senses an inadmissible temperature rise near the cabinet. Said driving means, (12) is normally locked and not in engagement with the door, so that under normal circumstances the latter can be closed and opened. When the temperature sensor (13) becomes operative, the driving means (12) is unlocked for closing the door (3, 5). In particular the door is provided with a pulling cable (8) and said driving means (12), in particular a drop-weight, is adapted to co-operate with said cable (8), the latter being provided with a tensioning weight (10) for being kept taut. In case of a folding door a latch (16), is provided which is adopted to press against the hinged middle part thereof after the door has been closed.



EP 0 170 337 A1

The invention relates to a fire-resistant cabinet, comprising internally insulated rigid walls consisting of a material resisting, during a given time, heat and flame effects, and an access opening adapted to be closed by at least one door, the latter being driven towards the closed position under the influence of a closing means as soon as a heat-sensitive latching means is released.

Such cabinets serve, inter alia, for storing easily inflammable or explosive substances in a laboratory. The doors can normally remain open, but at an inadmissible temperature rise or rising rate the latching means is released, and the door is forcibly closed. Such cabinets have satisfied as such very well, and satisfy the current safety regulations, but have some disadvantages. In such cabinets the closing means is continuously in engagement with the door. If the cabinet is to be closed under normal conditions, the latching means keeping the door open is to be released, so that the door will be forcibly closed in the same manner as in the case of an inadmissible temperature rise, and, if the door is to be opened again, the driving means has to be brought in the active conditon again, which requires much force. This has appeared to be objectionable in practice.

The invention provides such a cabinet which, while maintaining the safety, does not show the above-mentioned disadvantages. To that end the cabinet of the invention is characterised in that the driving means is not fixedly coupled with the door, and the latching means co-operates with the driving means so that, after releasing said latching means, the driving means will engage a catch connected to the door, and in the latched condition of the driving means the door can be freely opened and closed.

The door does not distinguish itself from an ordinary door which can be opened and closed without exerting much force, and

the driving means will remain normally latched, also in the closed condition of the door.

Whereas, in the case of a sliding door, a simple catch will suffice which is fixed on the door and is adapted to be engaged by the driving means after releasing the latter, in the case of a hinged door the driving means should engage the door at a distance from the hinge axis, and a pulling cable is used with which the driving means in in engagement. According to the invention the pulling cable is provided with a catch adapted to be engaged by the driving means after the latter is released, said cable being, furthermore, provided with a tensioning weight which is not heavier than is required for keeping the cable taut. Thus it is avoided that, when closing the door under normal conditions, the cable will sag and gets jammed.

If the closing means is a drop-weight, the latter can be movable along the same path as the latter tensioning weight, and the former is retained in the latched condition above said tensioning weight so that, after being released, the drop-weight will fall on the tensioning weight, and will entrain the latter for closing the door.

Especially in the case of hinged doors which will be pushed outwards on the occurrence of an outwardly directed force, e.g. as a consequence of an internal overpressure or because of expansion of gap seals expanding on being heated, an additional locking bolt for fully closing and latching the closed door may be advantageous, said locking bolt being adapted to be pushed outwards under the influence of a heat-sensitive element as soon as the door is closed. In order to avoid that said locking bolt becomes operative already before the door is closed, it is advisable to adjust the heat-sensitive element of said locking bolt at a higher response temperature than the latching means of the door closing means.

In the known cabinets bi-metallic elements are used as heat-sensitive elements. A disadvantage thereof is, however, that,

because of the desired relatively small dimensions thereof, the force exerted thereby is relatively small, so that the latching means is sensitive for vibrations and impacts, and, moreover, the deformation thereof uniformly increases with the temperature, so that means which sharply respond to exceeding a limit cannot be obtained thereby. In order to obtain a sufficiently safe latching, often complicated assemblies are required.

It is, therefore, proposed to use, instead of bi-metallic elements, elements with a so-called shape memory, which, for example, consist of a metallic alloy showing within a relatively narrow temperature range a reversible and so-called martensitic transition at which a substantial shape variation and/or force development occurs. The transition temperature range can be adjusted in a very well reproducible manner, which is favourable when using additional locking bolts which should respond to a slightly higher temperature so as to ensure that the door is closed before said bolts are released. Such elements can directly act on the locking bolts since the force developed thereby is sufficient, which, moreover, provides a good protection against an untimely release by vibrations and the like. A further advantage is that the response temperature is fixed by the alloy so that tempering with the adjustment of the cabinet is impossible.

If the cabinet is provided with a suction or ventilation aperture with a closure valve, the latter can be coupled with the door closing means, or can be provided with a separate temperature-sensitive driving means of the kind specified above, in order to ensure that, in the case of an inadmissible temperature rise, this aperture is closed in time.

The invention will be elucidated below in more detail by reference to a drawing, showing a diagrammatical representation of the principal parts of a cabinet of the invention.

The shown portion of a cabinet of the invention comprises a header 1 and a jamb 2 of a door frame. On the jamb 2 a first door

panel 3 is rotatably supported by means of hinges 4. A second door panel 5 is connected, by means of hinges 6, to the panel 3, and is, at the other end, guided in or on the header 1 by means of a guiding pin 7 or the like.

Near the hinge connection 6 a cable 8 is connected to one of the panels 3 or 5, said cable being guided over one or more guiding wheels 9, and, at the other end, is connected to a tensioning weight 10 which is movable in a guide 11. The latter is, for example, formed by a hollow channel beam of the cabinet. This tensioning weight provides for keeping the cable 8 tensioned, but is insufficient for overcoming the friction in the hinges 4 and 6 and at the guiding pin 7, so that the door remains stationary in any desired position.

In the upper part of guide 11 a drop-weight 12 is arranged which is retained by a latch 13. The latter is connected to a heat-sensitive element 14, in particular an element consisting of an alloy with shape memory which, within a given narrow temperature range, undergoes a reversible martensitic phase transition accompanied by a substantial change of shape and/or force development. Such elements are commercially available.

The door can be opened or closed without effort under normal conditions. When, however, the temperature rises above the fixed limit, the latch 13 is released, and the weight 12 will drop downwards, the tensioning weight 10 then being dragged along so that the door will be closed.

The position of the latch 13 is indicated only diagrammatically. In practice the drop-weight 12 is suspended on a second cable which, itself, is retained by a latch of the above-mentioned kind. It is, then, possible to arrange the heat-sensitive element 14 in the most suitable point. Furthermore it is also possible to use a drop-weight or an other suitable driving means which does not directly engage the tensioning weight 10, but, instead thereof, acts on an other catch which is fixed on the cable 8 in a suitable point.

In the case of sliding doors a cable which is directly fixed on the door and on which the driving means is adapted to act is sufficient. In the case of double hinged doors of the kind shown, the guiding pin 7 might be used as such for this purpose, but then it is not possible to pull the hinge portion 6 completely inside the outer frame. In the case of sliding doors the tensioning weight 10 is superfluous, since, if a cable is used, the latter is only connected to the driving means and not to the door.

It will be clear that, instead of a drop-weight, any other driving means can be used; however drop-weights have the advantage that a driving force can be supplied which is substantially constant within the whole displacement path thereof.

In the case of hinged doors the weight 12 or an equivalent driving means will not provide an unambiguous closing since, when exerting a sufficient force on the door, the latter can be opened again. This will, in particular, be the case when, in the gaps, sealing strips which swell on being heated are provided, or an overpressure occurs within the cabinet. In order to keep the door closed as long as possible also then, a locking bolt 15 can be used which, in particular, is provided with a bevelled surface 16 which, if the door would not have been completely closed, presses the latter into the closed position. This locking bolt is connected to a heat-sensitive driving element 17 of the above-mentioned kind. This element is, however, adjusted at a higher temperature than the element 14 of the latch 13, so as to ensure that the door will be completely closed before the latch 16 is becoming operative. This has, moreover, the advantage that, if the door is closed by an accidental temperature rise above the limit value, the door can be easily opened again. The limit value for closing the door is, for instance, 40 °C, and the limit value for the locking bolt can be chosen at, for example, 70 °C.

If the door has been closed by a temperature rise, and the cause of the latter has been removed, the door can be opened again after releasing the lock bolt 15 (provided that the cabinet has not

been seriously damaged by fire), and, at the same time, the drop-weight 12 is moved upwards again, and will be retained in the uppermost position by the latch 13 which has returned, in the meantime, in the active position.

If the cabinet is provided with a suction aperture (not shown), which, for instance, is connected to a suction duct, said aperture will generally be provided with a valve to be closed in case of fire. To that end the valve can be coupled with the cable 8 or the drop-weight 12, so that, on closing the door after the latch 13 has become operative, also the valve will be closed. It is also possible to provide the valve with a separate temperature-sensitive driving element of the above-mentioned kind, which is adjusted at a suitable temperature for ensuring a timely closing thereof. Of course means can be provided which also switch off the suction fan on closing said valve.

Claims

1. A fire-resistant cabinet, comprising internally insulated rigid walls consisting of a material resisting, during a given time, heat and flame effects, and an access opening adapted to be closed by at least one door (3, 5), which door will be driven towards the closed position under the influence of a closing means (12) as soon as a heat-sensitive latching element (13, 14) is released, characterised in that the driving means (12) is not fixedly coupled with the door (3, 5), the latching means (13, 14) co-operating with the driving means (12), so that, after releasing said latching means (13, 14), the driving means (12) will engage a catch (10) connected to the door (3, 5), said door (3, 5) being adapted to be freely opened and closed in the latched condition of said driving means (12).

2. The cabinet of claim 1, in which the door (3, 5) is connected to a pulling cable (8), adapted to be engaged by the driving means (12), characterised in that the pulling cable (8) is provided with a catch adapted to be engaged by the driving means (12) after being released, which cable (8) being, furthermore, provided with a tensioning weight (10) which is not heavier than is required for keeping taut said cable (8).

3. The cabinet of claim 2, characterised in that the driving means is a drop-weight (12), which is movable along the same path (11) as the tensioning weight (10), and is retained in the latched condition above said tensioning weight (10).

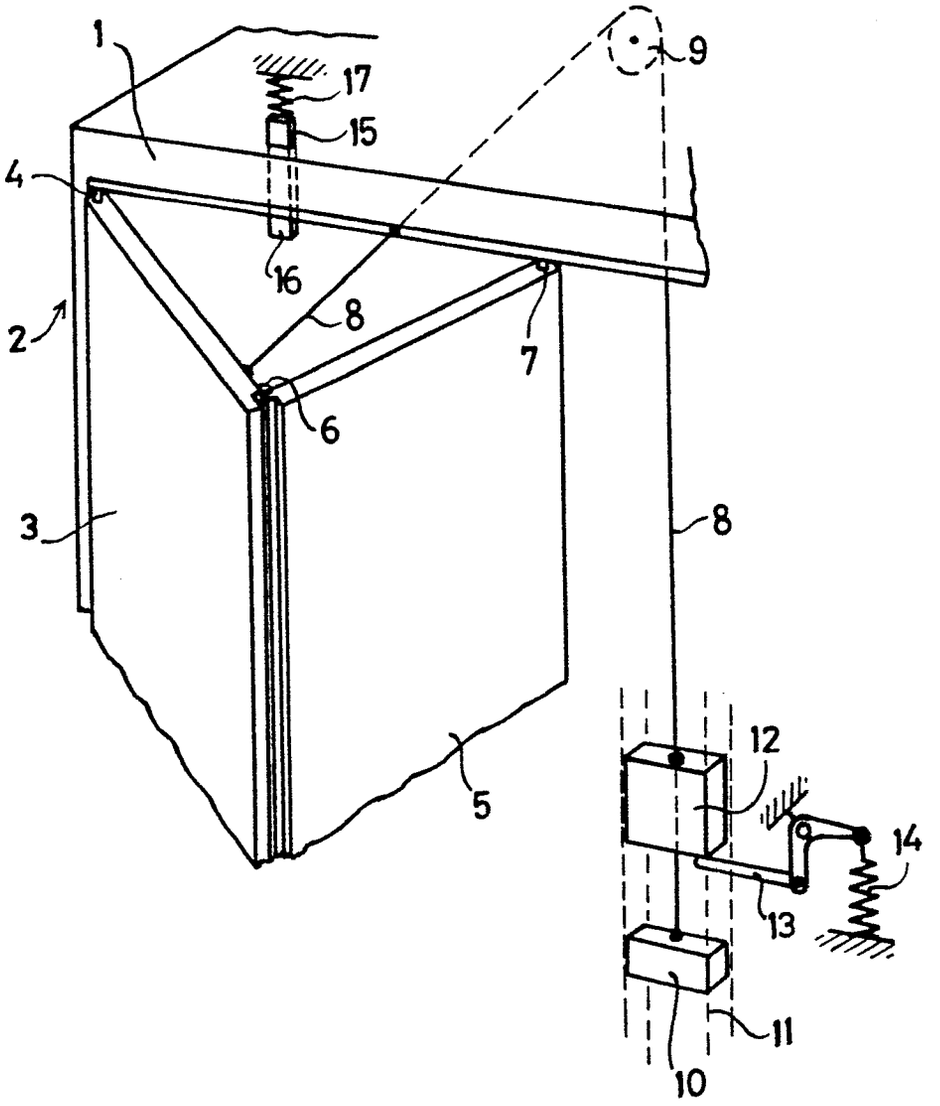
4. The cabinet of any one of claims 1..3, the door being a hinged door (3, 5), characterised in that an additional locking bolt (15) is provided, which is dapted to be pushed outwards under the influence of a heat-sensitive element (17) as soon as the door (3, 5) is closed.

5. The cabinet of claim 4, characterised in that the heat-sensitive element (17) of the locking bolt (15) is adjusted at a higher response temperature than the latching means (13, 14) of the door driving means (12).

6. The cabinet of any one of claims 1..5, characterised in that the or each heat-sensitive elements (14, 17) is an element with a shape memory, showing a substantial shape variation and/or force development within a narrow temperature range.

7. The cabinet of any one of claims 1..6, provided with a suction or ventilation aperture with a closing valve, characterised in that said valve is coupled with the door closing means (8, 12).

8. The cabinet of any one of claims 1..6, provided with a suction or ventilation aperture with a closing valve, characterised in that said valve is provided with a heat-sensitive driving means, in particular a driving means according to claim 6.


1
17
15
9
4
16
8
2
7
6
3
8
12
14
13
5
11
10

European Patent Office

EUROPEAN SEARCH REPORT

Application number

EP 85 20 1229

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int Cl 4)
Y	FR-A- 612 402 (THERMOSONUS) * Page 4, line 27 - page 5, line 21; figures 5,6 *	1-6	A 62 C 3/14
Y	US-A-4 191 412 (W.R. LEKANDER) * Column 3, line 30 - column 5, line 25; figures 1,2,4; column 6, line 48 - column 7, line 27 *	1-6	
Y	NL-A-7 705 175 (DELTA MATERIALS) * Whole document *	1-6	

TECHNICAL FIELDS SEARCHED (Int Cl 4)

A 62 C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	29-10-1985	WOHLRAPP R.G.

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

EPO Form 1503 03 82