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

(11) EP 2 412 911 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
18.03.2015 Bulletin 2015/12

(21) Application number: **11175073.3**

(22) Date of filing: **22.07.2011**

(51) Int Cl.:
E06B 3/72 *(2006.01)* ***E06B 7/23*** *(2006.01)*
E05C 9/06 *(2006.01)* ***E06B 9/04*** *(2006.01)*

(54) **Flood-proof doors**

Überschwemmungssichere Türen

Portes anti-inondation

(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

(30) Priority: **27.07.2010 GB 201012548**

(43) Date of publication of application:
01.02.2012 Bulletin 2012/05

(73) Proprietor: **Flash Flood Doors Limited**
Northampton
NN3 3ET (GB)

(72) Inventor: **Hoskins, John**
Northampton NN3 3ET/GB (GB)

(74) Representative: **Cadman, Timothy Paul**
Serjeants LLP
25 The Crescent
King Street
Leicester LE1 6RX (GB)

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EP 2 412 911 B1

Printed by Jouve, 75001 PARIS (FR)

Description

Field of Invention

[0001] The present invention relates to the flood-proofing of buildings, In particular, the present invention provides doors that, closed, make a building flood-proof and thereby prevent ingress of water into a building through doorways,

Background

[0002] Many buildings are located in positions where they are vulnerable to flooding. For example, there are an increasing number of houses being constructed on flood plains that are susceptible to flash floods. During floods buildings can be damaged by the ingress of water. This damage can affect the contents of the building, can be costly to repair and can put a building out of use for several weeks or months.

[0003] Typically, the most vulnerable part of a building during Hoods are the external doorways. Doorways are not watertight and, as such, even if a door within a doorway is closed, substantial amounts of water can enter a building through the gaps between the doors and the doorframes within which they are mounted. There are various water-tight doors that are currently available (such as those present within sea vessels) but these doors can be expensive, unsightly and are generally not suitable for residential or standard commercial properties. As a result, current flood-proof doors are rarely if ever fitted to typical residential or commercial buildings. Therefore, during floods the doorways of these buildings remain vulnerable and, if protected at all, are protected by the placing of sandbags or similar items on the external side of the door. However, sandbags and other similar items are relatively ineffective at preventing water ingress and can only be positioned if the relevant person has prior warning of a flood.

[0004] From GB 2 418 953 A, DE 20 2009 010049 U1, WO 01/61138 A1 and GB 2 451 238 A relevant flood protections are known.

[0005] Importantly, sandbags and other similar items for protecting buildings against flooding can not be positioned if a flood develops rapidly, for example a flash flood, or the relevant person is not warned for any other reason. Currently, protection of buildings against flash floods is generally not possible.

[0006] In light of the above, there is a need for flood-proof doors that are capable of preventing water entering a building during a flood and that are suitable for use on normal residential and commercial buildings. The doors should either be permanently flood-proof when closed or should be able to be made flood-proof substantially instantly in order to allow them to protect a property against flash flooding. Preferably any such doors should be cheap to manufacture and install, The doors should have substantially the same appearance and operation as conventional doors such that they may be used unobtrusively and normally during the long periods when a building is not within a flood.

Summary of Invention

[0007] The present invention provides a flood-proof door for a building comprising:

a door frame with a first sealing member provided around an outer periphery;
a hinged door pivotally mounted to the door frame and with a second sealing member provided around an outer periphery; wherein:

the hinged door comprises an outer frame formed of PVCu enclosing one or more door panels also formed of PVCu;
the outer frame of the hinged door defines an internal volume;
within a lower portion of the hinged door free space within the internal volume of the outer frame is substantially filled with a waterproof foam; and
the outer frame of the hinged door further comprises an internal reinforcing member located within the internal volume; and

a locking system substantially formed along a closing side, lower side and hinged side of the hinged door and comprising at least one locking means in a closing side of the hinged door, at least one locking means in a lower side of the hinged door and at least one locking means in a hinged side of the hinged door, wherein all of the locking means of the locking system are operated by a single locking mechanism through a system of cams and sliders;

wherein, when the hinged door is in a closed position within the door frame, the first sealing member provides a first watertight seal between the hinged door and the door frame and the second sealing member provides a separate second watertight seat between the hinged door and the door frame.

[0008] The door of the present invention is advantageous over conventional doors as, instead of having only one locking means that may be engaged to Sock a hinged door to a door frame substantially at a mid-point of an outer side of the hinged door, the locking system of a door according to the present invention comprises a plurality of locking means that may be engaged to lock the hinged door to the door frame substantially around an outer side, a lower side and a hinged side of the hinged door. A locking system formed in this manner is advantageous as it may securely lock a hinged door in place within a door frame and thereby help the door resist buckling or opening under the action of flood water on as outer face of the door. Additionally, locking the hinged door in

position within the door frame about an outer side, a lower side and a hinged side ensure that the first and second watertight seals are held in position and no leaks can be formed between the hinged door and the door frame about the locked sides of the flood-proof door. The locking system of the present invention is particularly advantageous for inwardly opening doors as it ensures that during a flood event the hinged door of an inwardly opening flood-proof door according to the present invention is not forced open by the force of the flood water acting on an external face of the hinged door.

[0009] The presence of a first and a second watertight seal between the hinged door and the door frame is advantageous because, as there are two substantially separate watertight seals between the hinged door and the door frame that may be securely locked in position by the locking system of the present invention, it is not possible for flood water to enter any building in which the flood-proof door is fitted between the hinged door and the door frame. As will be readily appreciated, the presence of two watertight seals is advantageous over a single seal as it provides a degree of redundancy in the flood-proofing of the door. In particular, if a portion of one of the sealing members is damaged such that seal is no longer completely watertight then the other of the sealing members will still high degree of water tightness between the hinged door and the door frame and the door may continue to be substantially flood-proof.

[0010] The hinged door of the present invention is formed of art outer frame enclosing one or more door panels wherein the outer frame of the hinged door defines an internal volume. The outer frame of the hinged door is formed of PVCu in a conventional manner such that it has an internal volume.

[0011] During a flood there may be significant force acting on an outer side of a closed flood-proof door due to the weight of water, In order to resist this force the outer frame of the hinged door is reinforced by an internal reinforcing member located within the internal volume of the outer frame. A suitable internal reinforcing member may be formed in any manner apparent to a person skilled in the curt, In a preferred embodiment of the present invention the internal reinforcing member may comprise a plurality of stainless steel locations that are located within the internal volume of the outer frame and suitably shaped to provide strength and rigidity to the outer frame. However, it is to be appreciated that the internal reinforcing member may be made of any suitably resident material or combination of materials.

[0012] Free space in the internal volume of the hinged door of a flood-proof door according to the present invention is substantially filled with waterproof foam. Filling the free space of the internal volume with a waterproof foam ensures that water cannot pass through the door through any cracks or gaps that may be present in the outer frame. Preferably, all of the free space in the internal volume of an outer frame will be filled with a waterproof material. However, in embodiments of the invention only a lower portion of the flood-proof door will be watertight. In such embodiments only the part of the outer frame that forms part of the lower portion of the flood-proof door may be filled with a waterproof material.

[0013] The one or more door panels of a flood-proof door according to the present invention are also formed of PVCu, They may either be substantially solid or may each define an internal volume, In the same manner as the outer frame, if the one or more door panels each define an internal volume the one or more door panels may be reinforced with an internal reinforcing member and/or any free space within the one or more door panels may be filled with a waterproof foam.

[0014] The first sealing member and the second sealing member may be formed of any suitable material. The material should have suitable physical properties such as hardness, elongation, tensile strength, tear strength and compression. The material should also be resistant to heat and ageing and should not substantially increase in weight when wet, or increase in volume when exposed to oil, The material should also be resistant to ozone degradation. In a preferred embodiment of the invention the first and second sealing members are formed of vulcanised rubber. However, other alternative materials may also be suitable. For example, the skilled person will be aware of synthetic elastomers which are suitable alternatives to vulcanised rubber. One particularly suitable synthetic elastomer from which the first and second sealing members of a door according to the present invention may be formed is Vitaprene ® as sold by Vita Thermoplastics Polymers.

[0015] As will be appreciated, it is necessary for many doors to have drainage holes. However, drainage holes cannot be present in a door that is entirely flood-proof as flood water would be able to pass through the door through the drainage holes. Therefore, in flood-proof doors according to the present invention, drainage holes are not provided if the whole of the door is intended to be flood-proof. However, embodiments of the present invention may not be entirely flood-proof but may instead only have a lower portion that is flood-proof such that if the external water level remains below the height of the flood-proof lower portion water cannot pass through the door. In such embodiments drainage holes may be provided through the door and may be located above the lower portion of the hinged door of the flood-proof door.

[0016] Provided the locking system comprises at least one locking means in a closing side of the hinged door, at least one locking means in a lower side of the hinged door and at least one locking means in a hinged side of the hinged door, the locking system may comprise any number of locking means that the skilled person thinks appropriate. In a preferred embodiment of the invention the locking system comprises at least two locking means in the hinged side of the hinged door. In a flood-proof door according to the present invention that is only flood-proof in a lower portion it is preferable that these at least two locking means are located in the lower portion of the

hinged door. It may also be preferable that the locking system comprises at least two locking means in the lower side of the hinged door. It may also be preferable that the locking system comprises at least three locking means in the closing side of the hinged door: a central locking means located substantially in the middle of the closing side, an upper locking means located adjacent an upper end of the closing side and a lower locking means located adjacent a lower end of the closing side.

[0017] The locking means of the locking system of the present invention may be any locking means apparent to a person skilled in the art. It is generally anticipated that the locking means will comprise bolts. However, it is to be understood that alternative locking means, such as latches, books or any other similar locking means may be used for one or more of the locking means of a locking system of a flood-proof door according to the present invention.

[0018] The locking means of the locking system is operated by a single locking mechanism using a combination of sliders and cam looks in a conventional manner,

[0019] Flood-proof doors according to the present invention may be either outwardly opening or inwardly opening, Flood-proof doors according to the present invention are particularly suitable for use as inwardly opening doors because the locking system of the doors will secure a door from opening inwardly under the action of flood water acting on an outer face of the door.

[0020] An embodiment of the present invention comprises a double outwardly flood-proof door comprising an outwardly opening flood-proof door according to the present invention and an outwardly opening door comprising: a door frame with a first sealing member provided around an outer periphery; and a hinged door pivotally mounted to the door frame and with a second sealing member provided around an outer periphery; wherein, when the hinged door is in a closed position within the door frame, the first sealing member provides a first watertight seal between the hinged door and the door frame and the second sealing member provides a separate second watertight seal between the hinged door and the door frame. That is, an embodiment of a double outwardly opening door may comprises a first door according to the present invention and a second door substantially according to the present invention but lacking the locking system of a door according to the present invention.

[0021] Alternative embodiments of a double outwardly opening door according to the present invention may substantially comprise two individual outwardly opening doors according to the present invention in a manner that will be immediately understood by a person skilled in the art.

[0022] Further features and advantages of the present invention will be apparent from the specific embodiments that are illustrated in the drawings and are described below.

Drawings

[0023]

Figure ! 1 is a schematic drawing of a preferred embodiment of a single outwardly opening flood-proof door according to the present invention;

Figure 2 is a second schematic drawing of the flood-proof door of Figure, 1;

Figure 3 is a schematic drawing of a hinged door of a preferred embodiment of a single inwardly opening flood-proof door according to the present invention;

Figure 4 is a schematic drawing of a door frame of a preferred embodiment of the flood-proof door of Figure 3.

Figure 5 is a further schematic drawing of the flood-proof door of Figures 3 and 4;

Figure 6 is a schematic drawing of preferred embodiment of double outwardly opening flood-proof doors according to the present invention;

Figure 7 is a schematic drawing of the locking system of the double outwardly opening flood-proof doors of Figure 6; and

Figure 8 is an exploded schematic drawing of a locking system of a single inwardly or outwardly opening door according to the present invention.

[0024] An outwardly opening flood-proof door 1 according to a preferred embodiment of the present invention is shown in Figure 1. The flood-proof door 1 comprises a hinged door 2 and a door frame 3. A second sealing member 4 is provided around a periphery of an inner face of the hinged door 2 and first sealing member 5 is provided around a periphery of the door frame 3. The first and second sealing members 4, 5 are substantially formed of rubber gaskets formed of vulcanised rubber.

[0025] The hinged door 2 comprises an outer frame 6 surrounding two door panels 7. The outer frame 6 and the door panels 7 are formed out of a PVCu shell which defines an internal volume. The outer frame 6 of the hinged door 2 is reinforced with stainless steel reinforcing members (not shown) positioned within the internal volume to provide sufficient resilience to resist the force of flood water acting upon its outer face. The free space within the internal volume of the outer frame 6 and the door panels 7 is fined with waterproof foam up to a height of approximately 900mm from the bottom side of the hinged door 2.

[0026] Similarly, the door frame 3 is also formed of a PVCu shell which defines an internal volume. The door frame 3 is reinforced with stainless steel reinforcing members (not shown) positioned within the internal volume to provide sufficient resilience to resist the force of flood water acting upon its outer face. The free space within the internal volume of the door frame 3 is filled with waterproof foam (indicated by heavy dotted lines in Figure 2) up to a height of approximately 900mm from the bottom side of the door frame 3.

[0027] As can be seen in Figure 2, drainage holes 8 are formed in a horizontal portion of the hinged door 2 that is between the door panels 7. The drainage holes 8 are located more than 900mm above the bottom side of the hinged door 2. The flood-proof door has a locking system 9 substantially formed along a closing side, lower side and hinge side of the hinged door 2. The locking system 9 comprises a single locking mechanism (not shown) and a plurality of bolts 10 that are located along the closing side of the hinged door, one bolt 11 located at an end of a upper side of the hinged door adjacent the closing side, three bolts 12 located along the lower side of the hinged door and two bolts 13 located at a lower portion of the closing side of the hinged door. The locking mechanism acts to operate all of the bolts 10, 11 of the locking system 9 through a system of cams and sliders (not shown), When the locking system 9 is in the locked position the bolts of the locking system 9 extend into co-operatively formed recesses in the door frame 3.

[0028] When the hinged door 2 is closed within the door frame 3 the first sealing member 4 forms a first watertight seal between an inner face of the hinged door and the door frame and the and the second sealing member 5 forms a second watertight seal between the inner face of the hinged door and the door frame. In this manner the hinged door 2 is tightly sealed within the door frame 3 and the lower portion of the flood-proof door 1 (the portion below the drainage holes) is substantially flood-proof.

[0029] An inwardly opening flood-proof door 20 according to the present invention is shown in Figures 3 to 5. Other than the orientation in which the door 20 opens, the features of the inwardly opening flood-proof door 20 are substantially identical to the features of the outwardly opening flood-proof door 1 shown in Figures 1 and 2 and discussed above. Therefore, the same reference numerals have been used to indicate features of the inwardly opening door 20 as have been used for the outwardly opening door 1.

[0030] In both the outwardly and inwardly opening doors 1, 20, when locked, the bolts 10, 11, 12, 14 act to resist the action of flood water operating on an external face of the hinged door. Bolts 12, 13 are located on the lower side of the hinged door 2 and the lower portion of the hinged side of the hinged door 2 as the closing side of the hinged door is already bolted by the bolts 10 and it is only the lower portion of the hinged door that would be acted upon by flood waters during a normal flash flood event. Having bolts 10, 12, 13 positioned completely around a lower portion of the doors 1, 20 acts to ensure that the seals 4, 5 of the doors 1, 20 are properly engaged and water-tight about this portion of the doors as well as ensuring that the lower portion of the doors are securely locked.

[0031] Figures 6 and 7 show a double outwardly opening door 30 according to the present invention. The double outwardly opening door 30 comprises a single unitary door frame 3 extending around two hinged doors 2, 31. The right-hand of the hinged doors 2 is substantially identical to the hinged door of the single outwardly opening door I illustrated in Figures 1 and 2. The left-hand of the hinged doors 31 is substantially the same as the right hand of the hinged doors 2 but has a different locking system 32. In particular, the locking system 32 of the left-hand door comprises only three bolts 33, 34, 35: one bolt 33 on the lower side of the hinged door, one bolt 35 at an upper side of the hinged door and one bolt 34 centrally located on a closing side of the hinged door. However, it is to be appreciated that a double outwardly opening door 30 could comprise two hinged doors 2 substantially identical to the hinged doors 2 of Figures 1 and 2.

[0032] A locking system 9 for a further embodiment of a single inwardly or outwardly opening door according to the present invention is shown in Figure 8. The locking system 9 comprises a number of cams and sliders 40 that operate a plurality of bolts 10,12, 13 and latches 41 located around the periphery of the locking system.

[0033] Specifically the locking system 9 comprises two bolts 13 that are located on a lower portion of the hinge side of a door, a single bolt 12 located on the lower side of the door, three bolts 10 located on the closing side of the hinge door on the door and three hook latches 41 located on the closing side of the closed door. All of the bolts 10, 12, 13 and latches 41 are operated and locked by the locking mechanism comprising a locking cylinder 42 and a door handle 43, which are located in the conventional position for an inwardly or outwardly opening door. The bolts 10, 12, 13 are all mounted on cams and sliders 40 that are operated by the locking mechanism such that locking the locking mechanism moves each of the bolts 10, 12, 13 in a direction along a side of the door from an unlocked position to a locked position and unlocking the locking mechanism moves each of the bolts 10, 12, 13 in an opposite direction along a side of the door from the locked position to an unlocked position. The hook latches 41 are operated by the locking mechanism in a conventional manner. That is, when the locking mechanism is locked the hook latches 41 are moved to the position shown in the Figure and when the locking mechanism is unlocked the hook latches 41 are retracted within the door. The cams and sliders 40 are substantially conventional components that will be known to the person skilled in the art,

[0034] In order to allow the bolts 10, 12, 13 and the hook latches 41 to lock a door a plurality of cooperatively positioned and formed apertures 44 are formed in the door frame (not shown). The apertures 44 for the bolts 10, 12, 13 and the hook latches 41 are formed in a conventional manner.

Claims

1. A flood-proof door (1; 20) for a building comprising:

a door frame (3) with a first sealing member (5)

provided around an outer periphery;
a hinged door (2) pivotally mounted to the door frame (3) and with a second sealing member (4) provided around an outer periphery; wherein:

the hinged door (2) comprises an outer frame (6) formed of PVCu enclosing one or more door panels (7) also formed of PVCu;
the outer frame (6) of the hinged door (2) defines an internal volume;
within a lower portion of the hinged door (2) free space within the internal volume of the outer frame (6) is substantially filled with a waterproof foam; and
the outer frame (6) of the hinged door (2) further comprises an internal reinforcing member located within the internal volume; and

a locking system (9) substantially formed along a closing side, lower side and hinged side of the hinged door (2) and comprising at least one locking means (10) in a closing side of the hinged door (2), at least one locking means (12) in a lower side of the hinged door (2) and at least one locking means (13) in a hinged side of the hinged door (2), wherein all of the locking means (10, 13, 13) of the locking system (9) are operated by a single locking mechanism through a system of cams and sliders;
wherein, when the hinged door (2) is in a closed position within the door frame (3), the first sealing member (5) provides a first watertight seal between the hinged door (2) and the door frame (3) and the second sealing member (4) provides a separate second watertight seal between the hinged door (2) and the door frame (3).

2. A flood-proof door (1; 20) according to claim 1, wherein the locking system (9) comprises at least one locking means (11) in an upper side of the hinged door (2).

3. A flood-proof door (1; 20) according to claim 1 or claim 2, wherein the locking system (9) comprises at least two locking means (13) in the hinged side of the hinged door (2) located in a lower portion of the door (1).

4. A flood-proof door (1; 20) according to any of claims 1 to 3, wherein the locking system (9) comprises at least two locking means (12) in the lower side of the hinged door (2).

5. A flood-proof door (1; 20) according to any of claim 1, wherein the locking system (9) comprises at least three locking means (10) in the closing side of the hinged door (2): a central locking means (10) located substantially in the middle of the closing side, an upper locking means (10) located adjacent an upper end of the closing side and a lower locking means (10) located adjacent a lower end of the closing side.

6. A flood-proof door (1; 20) according to any preceding claim, wherein the locking means (10, 11, 12, 13) of the locking system (9) are bolts.

7. A flood-proof door (1; 20) according to any preceding claim, wherein the internal reinforcing member is formed of stainless steel.

8. A flood-proof door (1; 20) according to any preceding claim, wherein the first sealing member (5) and the second sealing member (4) are substantially formed of vulcanised rubber.

9. A flood-proof door (1; 20) according to any preceding claim, having a plurality of drainage holes (8) are formed through the hinged door (2) above the lower portion of the hinged door (2).

10. An outwardly opening flood-proof door (1; 20) according to any preceding claim.

11. An inwardly opening flood-proof door (1; 20) according to any of claims 1 to 10.

12. A double outwardly flood-proof door (30) for a building comprising an outwardly opening flood-proof door (1) according to claim 10 and an outwardly opening door comprising:

a door frame (3) with a first sealing member (5) provided around an outer periphery; and
a hinged door (31) pivotally mounted to the door frame (2) and with a second sealing member (4) provided around an outer periphery;
wherein, when the hinged door (31) is in a closed position within the door frame (2), the first sealing member (5) provides a first watertight seal between the hinged door (31) and the door frame (2) and the second sealing member (4) provides a separate second watertight seal between the hinged door (31) and the door frame (3).

Patentansprüche

1. Hochwassersichere Tür (1; 20) für ein Gebäude, die Folgendes umfasst:

einen Türrahmen (3) mit einem ersten Dichtungselement (5), das um einen Außenumfang vorgesehen ist;
eine angelenkte Tür (2), die an dem Türrahmen

(3) schwenkbar angebracht ist und mit einem zweiten Dichtungselement (4) versehen ist, das um einen Außenumfang vorgesehen ist; wobei:

die angelenkte Tür (2) einen aus PVCu gebildeten Außenrahmen (6) umfasst, der eine oder mehrere Türverkleidungen (7) umschließt, die ebenfalls aus PVCu gebildet sind;
der Außenrahmen (6) der angelenkten Tür (2) ein Innenvolumen definiert;
in einem unteren Abschnitt der angelenkten Tür (2) ein freier Zwischenraum in dem Innenvolumen des Außenrahmens (6) im Wesentlichen mit einem wasserfesten Schaum gefüllt ist; und
der Außenrahmen (6) der angelenkten Tür (2) ferner ein inneres Verstärkungselement umfasst, das in dem Innenvolumen angeordnet ist; und
ein Verrieglungssystem (9), das im Wesentlichen längs einer schließenden Seite, einer unteren Seite und einer angelenkten Seite der angelenkten Tür (2) ausgebildet ist und wenigstens ein Verrieglungsmittel (10) in einer schließenden Seite der angelenkten Tür (2), wenigstens ein Verriegelungsmittel (12) in einer unteren Seite der angelenkten Tür (2) und wenigstens ein Verriegelungsmittel (13) in einer angelenkten Seite der angelenkten Tür (2) umfasst, wobei alle Verriegelungsmittel (10, 12, 13) des Verriegelungssystems (9) durch einen einzigen Verriegelungsmechanismus durch ein System aus Nocken und Gleitelementen betätigt werden;
wobei dann, wenn sich die angelenkte Tür (2) in einer geschlossenen Position in dem Türrahmen (3) befindet, das erste Dichtungselement (5) eine erste wasserdichte Abdichtung zwischen der angelenkten Tür (2) und dem Türrahmen (3) bereitstellt und das zweite Dichtungselement (4) eine getrennte zweite, wasserdichte Abdichtung zwischen der angelenkten Tür (2) und dem Türrahmen (3) bereitstellt.

2. Hochwassersichere Tür (1; 20) nach Anspruch 1, wobei das Verriegelungssystem (9) wenigstens ein Verriegelungsmittel (11) in einer oberen Seite der angelenkten Tür (2) umfasst.

3. Hochwassersichere Tür (1; 20) nach Anspruch 1 oder 2, wobei das Verriegelungssystem (9) wenigstens zwei Verriegelungsmittel (13) in der angelenkten Seite der angelenkten Tür (2) umfasst, die sich in einem unteren Abschnitt der Tür (1) befinden.

4. Hochwassersichere Tür (1; 20) nach einem der Ansprüche 1 bis 3, wobei das Verriegelungssystem (9) wenigstens zwei Verriegelungsmittel (12) in der unteren Seite der angelenkten Tür (2) umfasst.

5. Hochwassersichere Tür (1; 20) nach Anspruch 1, wobei das Verriegelungssystem (9) wenigstens drei Verrieglungsmittel (10) in der schließenden Seite der angelenkten Tür (2) umfasst: ein mittleres Verriegelungsmittel (10), das sich im Wesentlichen in der Mitte der schließenden Seite befindet, ein oberes Verriegelungsmittel (10), das sich angrenzend an ein oberes Ende der schließenden Seite befindet, und ein unteres Verriegelungsmittel (10), das sich angrenzend an ein unteres Ende der schließenden Seite befindet.

6. Hochwassersichere Tür (1; 20) nach einem der vorhergehenden Ansprüche, wobei die Verriegelungsmittel (10, 11, 12, 13) des Verriegelungssystems (9) Bolzen sind.

7. Hochwassersichere Tür (1; 20) nach einem der vorhergehenden Ansprüche, wobei das innere Verstärkungselement aus rostfreiem Stahl gebildet ist.

8. Hochwassersichere Tür (1; 20) nach einem der vorhergehenden Ansprüche, wobei das erste Dichtungselement (5) und das zweite Dichtungselement (4) im Wesentlichen aus vulkanisiertem Gummi gebildet sind.

9. Hochwassersichere Tür (1; 20) nach einem der vorhergehenden Ansprüche, bei dem mehrere Ablauflöcher (8) durch die angelenkte Tür (2) über dem unteren Abschnitt der angelenkten Tür (2) ausgebildet sind.

10. Nach außen zu öffnende hochwassersichere Tür (1; 20) nach einem der vorhergehenden Ansprüche.

11. Nach innen zu öffnende hochwassersichere Tür (1; 20) nach einem der Ansprüche 1 bis 10.

12. Doppelte nach außen zu öffnende, hochwassersichere Tür (30) für ein Gebäude, die eine nach außen zu öffnende hochwassersichere Tür (1) nach Anspruch 10 und eine nach außen zu öffnende Tür umfasst, die Folgendes umfasst:

einen Türrahmen (3) mit einem ersten Dichtungselement (5), das um einen Außenumfang vorgesehen ist; und
eine angelenkte Tür (31), die an dem Türrahmen (2) schwenkbar angebracht ist und mit einem zweiten Dichtungselement (4) versehen ist, das um einen Außenumfang vorgesehen ist, wobei:

wobei dann, wenn sich die angelenkte Tür (31) in einer geschlossenen Position in dem Türrahmen (2) befindet, das erste Dichtungselement (5) eine erste wasserdichte Abdichtung zwischen der angelenkten Tür (31) und dem Türrahmen (2) bereitstellt und das zweite Dichtungselement (4) eine getrennte zweite, wasserdichte Abdichtung zwischen der angelenkten Tür (31) und dem Türrahmen (3) bereitstellt.

Revendications

1. Porte anti-inondation (1 ; 20) pour un bâtiment, comprenant :

un cadre de porte (3) comportant un premier élément d'étanchéité (5) disposé autour d'une périphérie extérieure ;
une porte articulée (2) montée pivotante sur le cadre de porte (3) et comportant un deuxième élément d'étanchéité (4) disposé autour d'une périphérie extérieure ;
un système de verrouillage (9) sensiblement formé le long d'un côté de fermeture, d'un côté inférieur et d'un côté articulé de la porte articulée (2), et comprenant au moins un moyen de verrouillage (10) dans un côté de fermeture de la porte articulée (2), au moins un moyen de verrouillage (12) dans un côté inférieur de la porte articulée (2) et au moins un moyen de verrouillage (13) dans un côté articulé de la porte articulée (2), tous les moyens de verrouillage (10, 12, 13) du système de verrouillage (9) étant actionnés par un mécanisme de verrouillage unique par l'intermédiaire d'un système de cames et de coulisseau ;
dans laquelle :

la porte articulée (2) comprend un cadre extérieur (6) formé en poly(chlorure de vinyle) non plastifié renfermant un ou plusieurs panneaux de porte (7), également formés en poly(chlorure de vinyle) non plastifié ;
le cadre extérieur (6) de la porte articulée (2) définit un volume intérieur ;
à l'intérieur d'une partie inférieure de la porte articulée (2), un espace libre à l'intérieur du volume intérieur du cadre extérieur (6) est sensiblement rempli par une mousse étanche à l'eau ; et
le cadre extérieur (6) de la porte articulée (2) comprend de plus un élément de renfort intérieur disposé à l'intérieur du volume intérieur ; et
dans laquelle, quand la porte articulée (2) est dans une position fermée à l'intérieur du cadre de porte (3), le premier élément d'étanchéité (5) produit une première fermeture étanche à l'eau entre la porte articulée (2) et le cadre de porte (3), et le deuxième élément d'étanchéité (4) produit une deuxième fermeture étanche à l'eau et séparée entre la porte articulée (2) et le cadre de porte (3).

2. Porte anti-inondation (1 ; 20) selon la revendication 1, dans laquelle le système de verrouillage (9) comprend au moins un moyen de verrouillage (11) dans un côté supérieur de la porte articulée (2).

3. Porte anti-inondation (1 ; 20) selon la revendication 1 ou la revendication 2, dans laquelle le système de verrouillage (9) comprend au moins deux moyens de verrouillage (13) dans le côté articulé de la porte articulée (2) situé dans une partie inférieure de la porte (1).

4. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications 1 à 3, dans laquelle le système de verrouillage (9) comprend au moins deux moyens de verrouillage (12) dans le côté inférieur de la porte articulée (2).

5. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications 1 à 4, dans laquelle le système de verrouillage (9) comprend au moins trois moyens de verrouillage (10) dans le côté de fermeture de la porte articulée (2) : un moyen de verrouillage central (10) disposé sensiblement au milieu du côté de fermeture, un moyen de verrouillage supérieur (10) disposé au voisinage d'une extrémité supérieure du côté de fermeture et un moyen de verrouillage inférieur (10) disposé au voisinage d'une extrémité inférieure du côté de fermeture.

6. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications précédentes, dans laquelle les moyens de verrouillage (10, 11, 12, 13) du système de verrouillage (9) sont des boulons.

7. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications précédentes, dans laquelle l'élément de renfort intérieur est formé en acier inoxydable.

8. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications précédentes, dans laquelle le premier élément d'étanchéité (5) et le deuxième élément d'étanchéité (4) sont sensiblement formés en caoutchouc vulcanisé.

9. Porte anti-inondation (1 ; 20) selon l'une quelconque des revendications précédentes, comportant une pluralité de trous de drainage (8) qui sont formés à

travers la porte articulée (2) au-dessus de la partie inférieure de la porte articulée (2).

10. Porte anti-inondation s'ouvrant vers l'extérieur (1 ; 20) selon l'une quelconque des revendications précédentes.

11. Porte anti-inondation s'ouvrant vers l'intérieur (1 ; 20) selon l'une quelconque des revendications 1 à 9.

12. Double porte anti-inondation s'ouvrant vers l'extérieur (30) pour un bâtiment, comprenant une porte anti-inondation s'ouvrant vers l'extérieur (1) selon la revendication 10 et une porte s'ouvrant vers l'extérieur, comprenant :

un cadre de porte (3) avec un premier élément d'étanchéité (5) disposé autour d'une périphérie extérieure ; et
une porte articulée (31) montée de façon à pouvoir pivoter sur le cadre de porte (2), et avec un deuxième élément d'étanchéité (4) disposé autour d'une périphérie extérieure ;
dans laquelle, lorsque la porte articulée (31) est dans une position fermée à l'intérieur du cadre de porte (2), le premier élément d'étanchéité (5) produit une première fermeture étanche à l'eau entre la porte articulée (31) et le cadre de porte (2), et le deuxième élément d'étanchéité (4) produit une deuxième fermeture étanche à l'eau et séparée entre la porte articulée (31) et le cadre de porte (3).

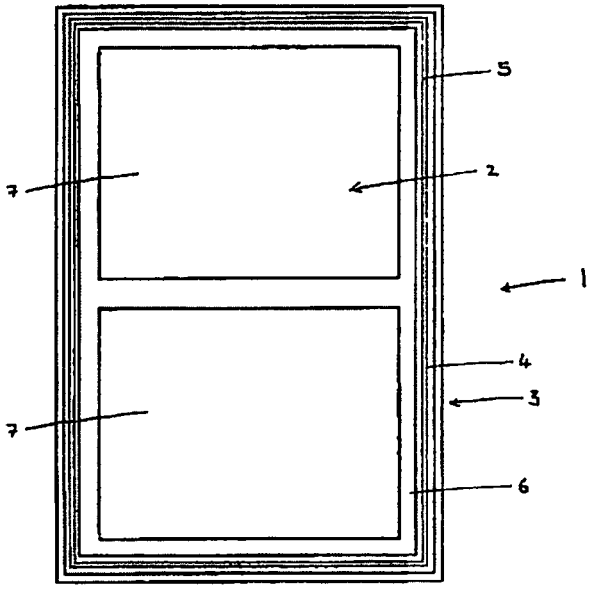


Figure 1

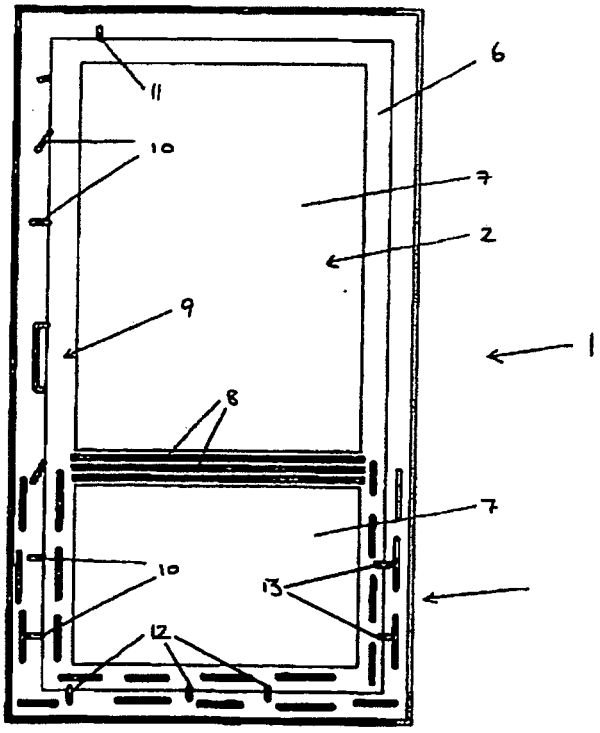


Figure 2

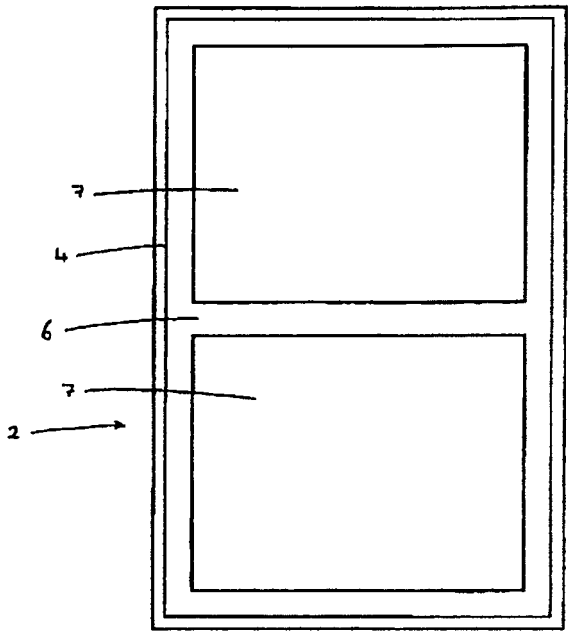


Figure 3

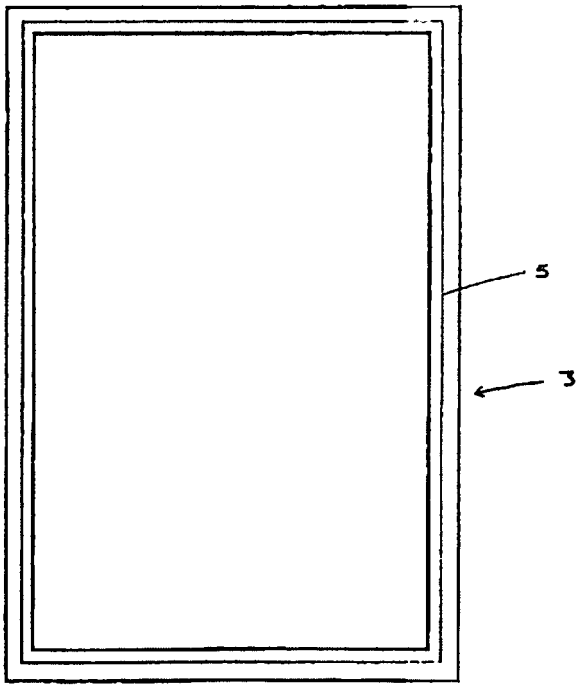


Figure 4

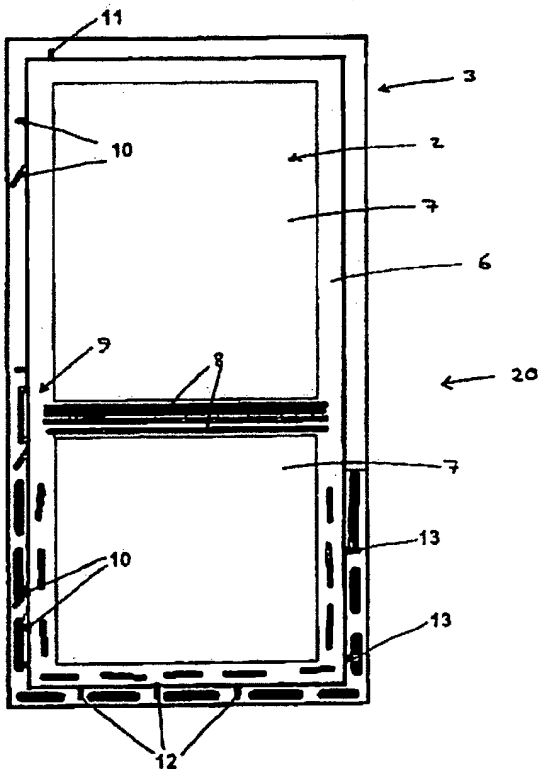


Figure 5

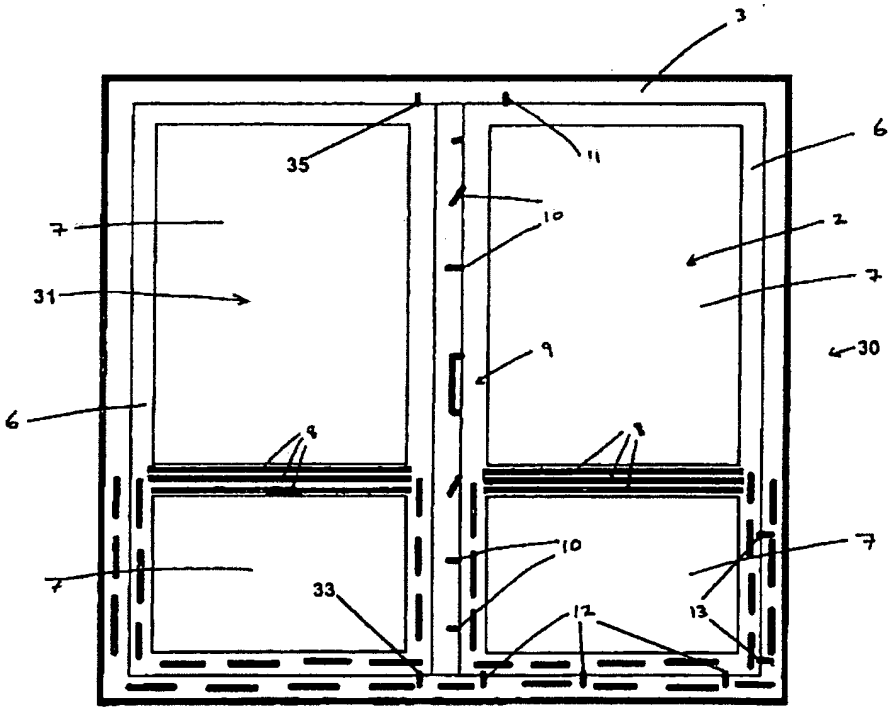


Figure 6

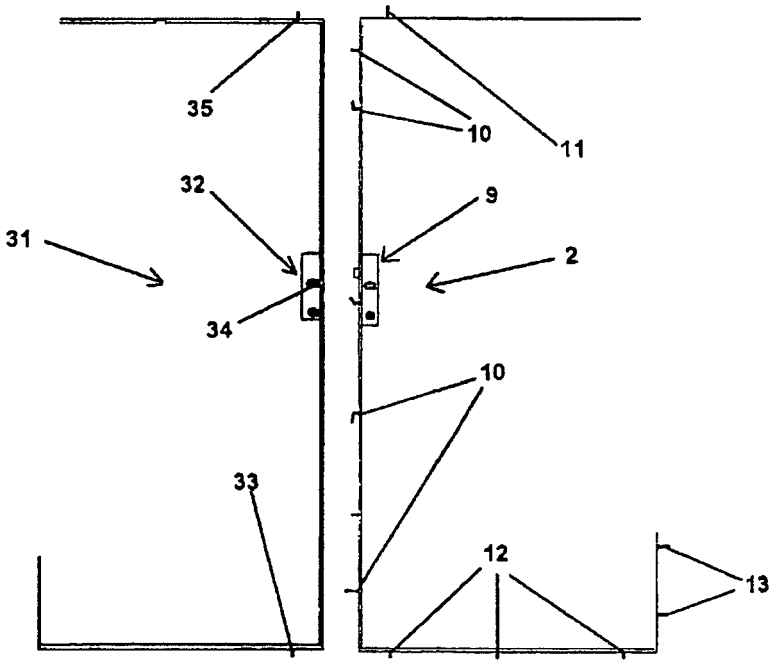


Figure 7

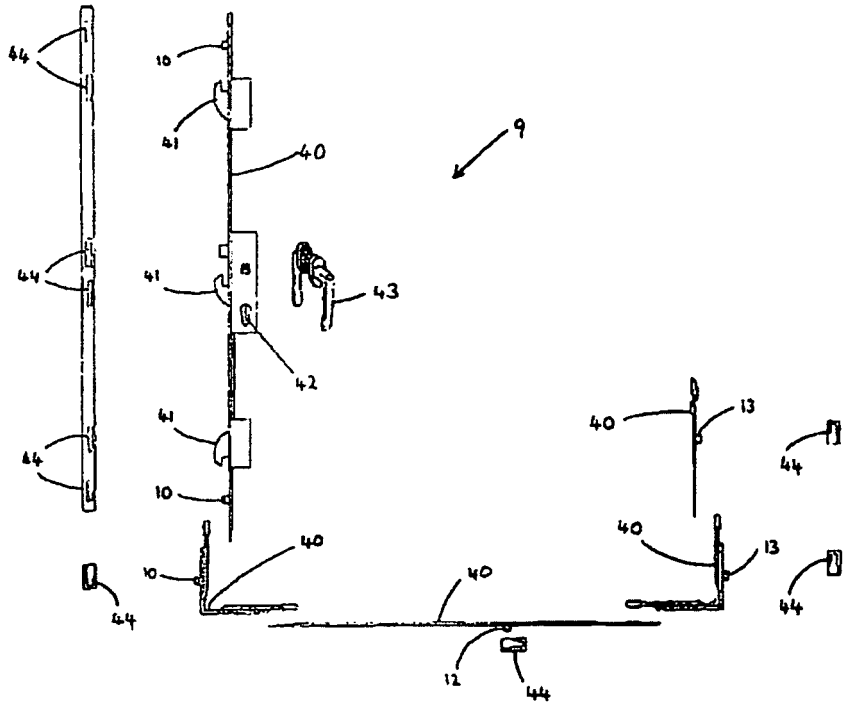


Figure 8

REFERENCES CITED IN THE DESCRIPTION

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