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(54) Flood barrier and method of flood protection

(57) This invention relates to a flood barrier and method of flood protection. According to the invention there is provided a flood barrier comprising a plurality of pillars adapted to be secured adjacent to a doorway of a building. Each pillar has a first sealing member for its bottom surface, and a second sealing member for its longitudinal surface. The pillars can be separable, or they can be interconnected to form a unitary structure by a flexible and resilient securing beam.

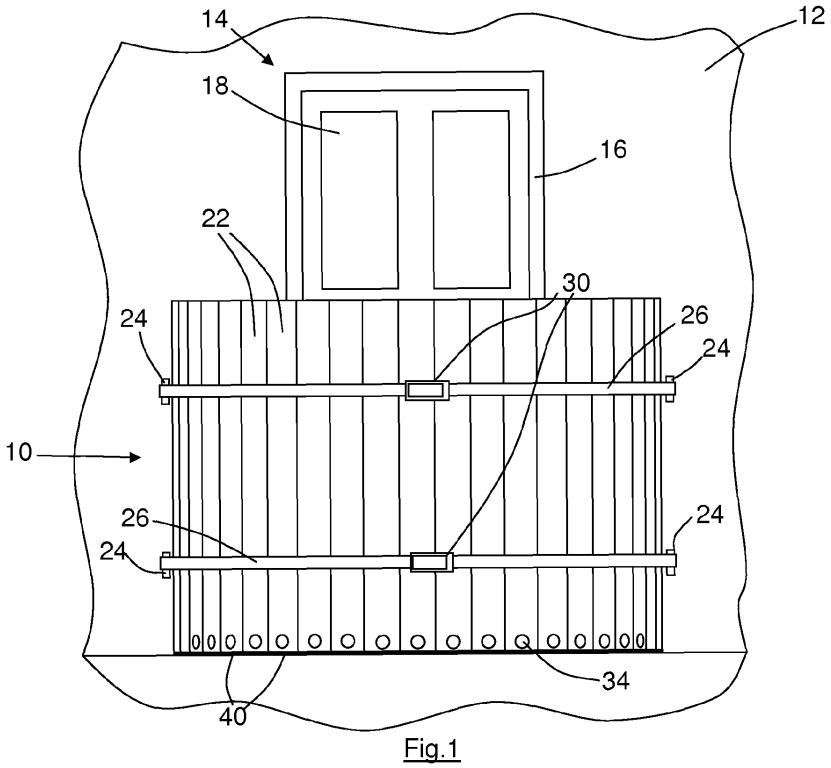

Fig.1

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Description

FIELD OF THE INVENTION

[0001] This invention relates to a flood barrier and method of flood protection.

[0002] Throughout this specification, unless otherwise indicated all directional and orientational terms (such as "bottom", "side" etc. refer to the flood barrier in its normal orientation of use, as shown in Fig.1).

BACKGROUND TO THE INVENTION

[0003] During recent times, particularly in the U.K., it has seemingly become more commonplace for homes and other buildings to become flooded by water overflowing the banks of a nearby river or rivers. It has been suggested that the increased incidence of buildings becoming flooded is caused by "global warming", and that this trend will continue. In addition, it is believed that many buildings, particularly new homes, are being built on land which is more prone to flooding.

[0004] Once a building has become flooded, it is almost always necessary to replace all of the carpeting or other floor covering from the ground floor, as well as much of the furniture. This represents a considerable financial cost, quite apart from the personal grief suffered. In particularly bad cases, flooding can undermine the foundations and/or structure of the building, so that lengthy structural repairs are needed. It is known, for example, that some flooded homes are not suitable for occupation for many months after the flooding has occurred.

DESCRIPTION OF THE PRIOR ART

[0005] It is recognised that the major cause of buildings becoming flooded is water passing through doorways, i.e. passing between the door frame and the door fitted therein. Thus, whilst doors are designed to fit sufficiently well to reduce draughts, they are not designed to be water tight, and water present outside the door will quickly pass under or around the door and into the building.

[0006] One known flood barrier comprises a pile of sand bags around the doorway. The intention is that the bags of sand provide a substantially impermeable barrier through which little or no water can pass. Any flood water that does pass the sand bags can hopefully be mopped up or bailed out beyond the sand bags before it enters the building. Clearly, the use of sand bags requires a supply of both the bags and the sand, and these materials are not always readily available, at least in the quantities required.

[0007] Even if readily available, it might be necessary to share the available bags and sand between many buildings, so that each building receives less protection than might be desired. In addition, filled sand bags are heavy and take up a lot of space; they are therefore usually only provided during times of flooding or expected flooding, even to buildings which are regularly flooded. If inadequate warnings are given the building might become flooded before the filled sand bags are available.

[0008] Another known flood barrier comprises an impermeable panel which is fitted around the doorway. One such panel is described in GB 2 406 819. The panel is removable so as to not impair access to and egress from the building when there is no flooding, the door frame being prepared for fitment of the panel by providing suitably located holes or apertures in the door frame.

BACKGROUND TO THE INVENTION

[0009] It is a feature of the flood barriers utilising removable panels that the panel must fit the particular doorway. Not all doorways are the same width, and not all door frames are the same width, so that it is necessary to provide the panel in a number of different sizes. Also, some doorways have a step immediately adjacent to the door and others do not; the panel must either accommodate both types of doorway, or different forms of panel must be provided for each. Furthermore, some doors are fitted with a projecting weather rail along the bottom edge of the door, which the panel must accommodate.

[0010] The present inventor wishes to provide a flood barrier which avoids the disadvantages of filled sand bags, and also avoids the complexity of removable panels and the increased cost associated with that complexity.

SUMMARY OF THE INVENTION

[0011] According to the invention there is provided a flood barrier comprising a plurality of pillars which can be secured adjacent to a doorway, each pillar having a first sealing member for its bottom surface, and a second sealing member for its longitudinal surface.

[0012] The pillars are arranged upright (ideally substantially vertical) in use. When a number of pillars are placed side by side the first sealing members act to reduce or prevent the flow of flood water underneath the barrier, whilst the second sealing members act to reduce or prevent the flow of flood water between neighbouring pillars.

[0013] The number of pillars which provide a flood barrier may be varied so as to alter the length of the flood barrier, and thereby to adjust the flood barrier to fit a particular doorway.

[0014] The pillars may be discrete and separable and secured together (and secured adjacent to the doorway) by way of releasable securing straps when in use. Alternatively, the pillars may be substantially permanently interconnected together and be moved to and from the site of use as a unitary structure. In the alternative embodiments the pillars are preferably interconnected by at least one securing beam which serves to secure the pillars together. The securing beam(s) can also provide reinforcement for the pillars.

[0015] The provision of a unitary structure of interconnected pillars allows the use of a continuous first sealing member for a number of pillars, preferably a continuous first sealing member for all of the pillars. The continuous first sealing member is preferably provided along the bottom of the pillars; the continuous first sealing member may be fitted to the bottom of the pillars.

[0016] Ideally, the end-most pillars in the flood barrier are secured to the wall of the building rather than to the door frame. The flood barrier can therefore provide an arcuate wall which surrounds the doorway and is ideally spaced from the doorway by a significant distance (perhaps around 1 metre for example). The flood barrier can therefore avoid the step or steps which may be located adjacent to the doorway.

[0017] Also, an area is provided between the flood barrier and the doorway within which the building occupier can work to mop up, bail out and/or pump out any flood water which does pass the flood barrier. Thus, sufficient space can be provided between the flood barrier and the building in which to locate a pump whereby flood water can be pumped (ideally automatically pumped) from the doorway side of the barrier to the flood side of the barrier.

[0018] Preferably, the pillars are at least partly hollow and have an opening to permit the ingress of flood water. It is thereby arranged that the pillars fill with flood water to substantially the same height as the flood, so that the weight of the pillars increases as the level of flood water rises, so as to increase the weight upon the first sealing member(s) as the force exerted by the flood water increases.

[0019] In embodiments utilising separable pillars, the pillars are desirably secured together in the assembled flood barrier. Suitable brackets can be fitted to the wall of the building to either side of the doorway and removable straps can be fixed to the brackets when flooding is expected. The straps can be passed around each of the pillars in the flood barrier, the pillars being forced together as the straps are tightened. Forcing the pillars together acts to compress the second sealing members between the adjacent pillars and thereby increases the seal therebetween. In addition, forcing the pillars together results in the pillars acting as a single integrated barrier rather than a set of separate barriers.

[0020] In embodiments utilising at least one securing beam, the securing beam(s) preferably pass(es) through each of the pillars. Preferably also the securing beam spans all of the pillars except the end-most pillars. The end-most pillars are desirably spanned by a tensile member connected to the end of the securing beam. The tensile members at each end of the securing beam(s) act to hold all of the pillars together, and to compress the second sealing members between the adjacent pillars.

[0021] The securing beam is ideally flexible and resilient so that it can be bent in order to permit the set (or line) of pillars to bend to the required shape around the doorway, it being understood that as the line of pillars is bent the second sealing members will be slightly further compressed, improving the seal between adjacent pillars.

[0022] The resilience of the securing beam(s) acts to align the set of pillars, i.e. when not in use the set of pillars will assume a substantially linear array.

[0023] The securing beam is preferably of polycarbonate, ideally with an outside diameter of 16 mm. Such a beam will provide significant reinforcement to the set of pillars, i.e. it will resist any tendency of one or more of the pillars to move out of alignment under the pressure of flood water. Such a beam is also sufficiently flexible that the set of pillars can be bent around the doorway.

[0024] Thicker securing beams can be used if desired, and a polycarbonate beam having a thickness of 25 mm could for example provide sufficient support that a substantially linear array of pillars could provide flood protection, i.e. there is no need to arrange the set of pillars in a convex array facing the flood water.

[0025] Thus, whilst the set of pillars may be arranged in an arc around the doorway, in an alternative arrangement a substantially straight line of pillars may be located between rigid columns. The rigid columns may for example be brick or concrete columns adjacent to the doorway of a building.

[0026] The flood barrier can therefore comprise a plurality of pillars secured in a substantially linear array adjacent to the doorway, the pillars ideally being interconnected by at least one securing beam and at least one positioning beam.

[0027] The securing beam preferably passes through each of the pillars and includes a tensile member to hold the pillars together and to compress the second sealing members between adjacent pillars.

[0028] The positioning beam is ideally substantially linear and is adapted to act in opposition to the tensile member, and specifically to extend the line of pillars. It is arranged that the positioning means separates adjacent pillars sufficiently so that they can become secured between the rigid columns and can provide a seal against the rigid columns, and yet does not reduce significantly the seal between adjacent pillars.

[0029] Thus, it will be understood that in order to fit a linear array of pillars between two rigid columns, the line of pillars must initially be slightly shorter than the opening between the pillars. The securing beam and tensile member can act to compress the sealing members so that the line of pillars adopts a first (shorter) length. Fitment of the positioning beam(s) acts to extend the line of pillars to a second length which is longer than the first length. It is arranged that the second length is sufficiently close to the separation between the rigid columns that the line of pillars can form a flood-proof seal with the rigid columns. Also, it is arranged that the difference between the first length and the second length is sufficiently small that the seal between adjacent pillars is not compromised, i.e. the extension provided is less than the compression of the second sealing member between adjacent pillars.

[0030] Ideally the second sealing member is fitted to the pillar. Preferably there are two second sealing members for each pillar, each second sealing member engaging the second sealing member of a neighbouring pillar in the assembled flood barrier. It is therefore not necessary to provide a second sealing member covering the whole of the longitudinal surface of the pillars, and the second sealing member(s) can be located only in those areas where adjacent pillars interengage.

[0031] The first sealing member may be provided separately on each pillar, or a common first sealing member can be arranged along the aligned bottom ends of a line of interconnected pillars. In embodiments utilising a positioning beam along the bottom of an interconnected line of pillars, the first sealing member can be provided upon the positioning beam as well as (or instead of) upon the pillars.

[0032] Desirably, the pillars are tubular, ideally of an impermeable plastic material, or alternatively aluminium or another metallic material. The pillars can contain baffles to provide structural rigidity, and if so the baffles are apertured so as to permit the pillar to fill at least partially with flood water.

BRIEF DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0033] The invention will now be described in more detail, by way of example, with reference to the accompanying drawings, in which:

Fig.1 shows a front view of a building having a flood barrier according to a first embodiment of the present invention;

Fig.2 shows a plan view of the flood barrier of Fig.1, prior to fitment of the securing straps;

Fig.3 shows an enlarged plan view of a pillar which is used in the flood barrier of Fig.1;

Fig.4 shows a plan view of part of the flood barrier according to a second embodiment of the present invention;

Fig.5 shows a plan view of a flood barrier according to a third embodiment of the present invention, and

Fig.6 shows a side sectional view of part of the endmost pillars of the embodiment of Fig.5 during assembly of the flood barrier.

DETAILED DESCRIPTION

[0034] The flood barrier 10 of the first embodiment of the present invention is designed for use with a building 12, and specifically to surround a doorway 14. It will be understood that the doorway 14 comprises a frame 16 and door 18, and whilst the door is designed to be a sufficiently close fit within the frame 16 to prevent significant draughts, the doorway 14 is not watertight.

[0035] Unlike the removable panel described in the prior art document identified above, and other flood barriers using removable panels, the flood barrier 10 is not designed to cover just the doorway 14, but rather to surround the doorway and to cover a significant area of the wall of the building 12 also. In particular, as shown in Fig.2 this permits the flood barrier to surround the step 20.

[0036] Also, the flood barrier 10 is not directly related to the width of the doorway 14. Accordingly, the flood barrier 10 can be fitted to a range of different sizes and styles of doorway.

[0037] The flood barrier 10 comprises a number of pillars 22. In this embodiment the flood barrier 10 comprises fifteen pillars 22, it having been determined that fifteen pillars is the ideal number for the particular doorway 14. It will be understood, however, that since the pillars 22 are discrete and separable other flood barriers can utilise more or fewer pillars 22, as desired or required. For example, more pillars 22 can be used if the doorway has more than one step 20.

[0038] The wall of the building 12 is fitted with four brackets 24. The brackets 24 are fitted in pairs, one of each pair being located at approximately the same height to each side of the doorway 14. Each pair of brackets 24 is designed to accommodate the ends of a securing strap 26. The securing strap 26 is ideally a flexible packing strap, and has a handle 30 by which it may be tightened around the pillars 22.

[0039] In this embodiment there are two securing straps 26, one located towards the bottom of the pillars 22, the other located towards the top of the pillars. It will be understood that other embodiments could utilise a single securing strap, or three or more securing straps, as desired or required for a particular flood barrier.

[0040] Each of the pillars 22 is preferably identically formed, and an enlarged plan view of a single pillar is shown in Fig.3. The pillars 22 are of substantially circular cross section, and have two sealing members 32 fitted to (ideally adhered to) respective parts of their (curved) longitudinal surface (or side surface).

[0041] The sealing members 32 each extend along an arc α, which in this embodiment is approximately 30°. One of the longitudinal edges of each of the sealing members 32 lies upon a diameter d of the pillar. It will be understood that in other embodiments the sealing members can extend beyond the diameter d, and can for example extend by the same distance to both sides of the diameter d. However, it is preferred to minimise the cost of the pillars 22 by providing the sealing members 32 only where required, and the embodiment shown reflects the fact that when the pillars are arranged in the curve shown in Fig.2 the sealing members 32 of adjacent pillars 22 will interengage.

[0042] It would alternatively be possible to fit a sealing

member only to one side of the pillar, taking advantage of the fact that the seal to the other side of the pillar could be provided by the sealing member of the adjacent pillar. However, it is preferred to provide two discrete sealing members 32 on each pillar 22.

[0043] It will be understood that the end-most pillars 22a and 22b are required to form a flood tight seal with the wall of the building 12. Though not seen in the drawings, the wall adjacent to the brackets 24 can be made suitably flat, or can be fitted with a flat beam against which the end-most pillars 22a,b can form the required seal.

[0044] Each of the pillars 22 has an opening 34 near its bottom edge. The pillars 22 are hollow, and the opening 34 allows the ingress of flood water as the level of the flood water increases (the pillars 22 also have a small hole 36 in their top surface, to allow the escape of air as the flood water enters through the opening 34.

[0045] The bottom surface (or bottom end) of each of the pillars 22 has a sealing member 40 fitted thereto. Whilst each sealing member 40 is separate from the sealing members 40 of the neighbouring pillars 22, the sealing members 40 together span the full width of the pillars 22 and so form a continuous seal along the bottom edge of the flood barrier 10 as shown in Fig.1.

[0046] Ideally, the sealing members 32 and 40 are formed of neoprene (although other materials are also suitable). It will be understood that the seal provided by the sealing members 40 is dependent primarily upon the weight of the pillars 22 (although the pillars 22 may also be forced towards the ground by the straps 26).

[0047] The weight of the pillars 22 increases as they fill with flood water, so that the seal increases commensurate with the height of the flood.

[0048] It will be seen from Fig.2 that the flood barrier 10 provides an area 42 between the flood barrier 10 and the doorway 14, and this is particularly advantageous. The building occupier can work within the area 42 to mop up and/or bail out any flood water which passes the flood barrier 10 without having to open the door 18. Also, in this preferred embodiment an automatic pump 44 is located within the area 42, the pump 44 being connected to a source of electrical power and being adapted to switch on automatically when it becomes submerged or partially submerged, the pump having an outlet pipe (not shown) which passes over the flood barrier 10. Since the door 18 can be kept closed whilst the occupier is working within the area 42 (or whilst the pump 44 automatically removes any encroaching flood water) the door can provide a second line of defence against the flood water.

[0049] In one embodiment the pillars 22 are made from plastic drainage pipe, having an outside diameter D of 110 mm and an inner diameter of 103 mm. The pillars are approximately 1 m tall. It will be understood that the pillars are therefore relatively light and since each pillar is only secured to its neighbours by the strap 26, when the strap is loosened each pillar 22 can easily be carried to and from storage. If it is believed to be necessary the pillars can include internal baffles to provide additional structural rigidity. Also, if it is believed necessary to increase the weight of the pillars so as to provide a better seal at the bottom of the pillars, suitable weights or inserts can be added (perhaps similar to the weights 64 shown in Fig.4).

[0050] Furthermore, if it is believed that 1 meter is too low for a particular flood barrier, the pillars 22 can be made longer, or it can be arranged that supplementary pillars 22 are fitted on top of each of the pillars 22 in the flood barrier 10. The height of the flood barrier can thereby be increased incrementally, as required. It can in some embodiments be arranged that the top of each pillar is fitted with a removable cap, the caps being removed prior to the location of the row of supplementary pillars.

[0051] It will be understood that a building owner or occupier can safeguard the building 12 against future flooding by purchasing a flood barrier 10 comprising a set of brackets 24, two straps 26, and a number of pillars 22. The number of pillars 22 can be determined by deciding upon the length of the flood barrier which is required (taking account of any steps 20 and the local conditions). The brackets 24 are fitted to the wall of the building 12, and the wall is flattened or otherwise prepared so as to enable the required seal. If necessary, the ground can also be prepared along the line of the flood barrier 10 so as to smooth out any steps or discontinuities, for example between adjacent paving slabs or the like.

[0052] When a flood warning is received, the pillars 22 may be retrieved from storage and lined up along the line of the flood barrier 10. The straps 26 are fitted to the brackets 24, and the handles 30 are used to tighten the straps and secure all of the pillars 22 together. It will be understood that a conventional operating handle 30 for a packing strap can be used to impart substantial tension into the strap 26, thereby firmly securing the pillars 22 together and compressing the second sealing members 32 sufficiently to form a good seal.

[0053] If it is intended to use a pump 44 this can also be positioned in advance (and if desired a small depression may be prepared to locate the pump, the depression being the low point for the area 42 and thereby the first region to be filled by any flood water which passes the flood barrier 10.

[0054] The second embodiment of Fig.4 is somewhat similar to the first embodiment and only the relevant features will be described, to avoid unnecessary repetition. Only two of the pillars 122 are shown in Fig.4, an end-most pillar 122a and its neighbouring intermediate pillar 122. It will be understood that in practice the set of pillars will typically comprise many intermediate pillars 122 arranged between two end-most pillars 122a, as in the arrangement of Figs. 1 and 2.

[0055] In common with the first embodiment, the pillars 122, 122a each have a second sealing member 132 fitted to their longitudinal surface, which surface will be substantially vertical in use.

[0056] In this embodiment, the pillars 122 are interconnected by one or more securing beams 126, each of

which is located within the pillars 122. Each securing beam passes through aligned openings in the side wall of the pillars 122 and spans all of the intermediate pillars 122. The number of securing beams 126 will depend upon the height of the flood barrier, i.e. upon the length of the pillars 122, it being intended to locate a securing beam at desired intervals (for example approximately 200mm) throughout the height of the pillars 122.

[0057] Each securing beam 126 projects into both of the end-most pillars 122a, but does not span the end-most pillars. Instead, the end-most pillars 122a are spanned by a tensile member 50. One end of the tensile member 50 is secured to the end of the securing beam 126 and the other end is secured to a stop 52. The tensile member 50, which is suitably a tension spring for example, provides significant tension between the end-most pillar 122a and the securing beam 126. Since a similar tensile member is located at the other end of the set of pillars 122 the tensile members 50 and securing beam 126 together act to press the line of pillars 122, 122a together. It is arranged that the pressure provided is large enough to compress the second sealing members 132 so as to create a seal between each pair of neighbouring pillars.

[0058] The securing beam 126 is preferably a 16 mm thick bar or rod of polycarbonate (although other thickness and/or other materials such as carbon fibre can be used if desired). It will be understood that such a securing beam is deformable, so that the line of pillars 122 can be bent around a doorway into an arc similar to that of Fig.2. When bent in this way, the compression of the second sealing members 132 is increased slightly, enhancing the seal provided.

[0059] Ideally, each securing member 126 is resilient and therefore seeks to return the set of pillars 122 to a substantially linear array. The wall brackets 124 (only one of which is seen in Fig.4) are therefore of modified form to resist the force exerted by the securing member(s) 126. Specifically, the brackets 124 comprise a first wall 54 and a second wall 56, the walls 54, 56 being substantially vertical in use and in this embodiment being continuous, preferably along the full height of the pillars 122a. The wall 56 has screw holes (not seen) by means of which it may be secured (with a suitable intervening seal) to the wall of the building adjacent to the doorway. The wall 54 is integral with the wall 56, and directly resists the tendency of the set of pillars 122 to assume their linear array.

[0060] The brackets 124 may be left in position even when the flood barrier is not required, or they may be removable. If removable, a flat mating surface and suitably drilled securing holes will typically be provided in the wall to permit the rapid fitment of the brackets when a flood is expected.

[0061] The end-most pillar 122a includes a larger second sealing member 132a which can engage both of the walls 54, 56 (though separate second sealing members for each wall could be provided if desired). The end-most pillar 122a is secured to the bracket 124 by way of releasable tensile members 60, ideally tension springs, which are fitted between upstanding pegs 62 of the end-most pillar 122a and the respective wall 54, 56. The tension of the tensile members 60 is sufficient to compress the second sealing member 132a in order to provide a seal between the end-most pillar 122a and the wall bracket 124.

[0062] The first sealing member is not seen in Fig.4 but can be similar to that described in relation to the first embodiment. Alternatively, since the pillars 122,122a are all interconnected into a unitary structure by the securing beam(s) 126, it will be understood that a common (continuous) first sealing member can be provided along the bottom of the pillars 122, avoiding the possibility that flood water might leak between discrete first sealing member provided for each pillar.

[0063] The intermediate pillar 122 includes optional ballast, in the form of a solid material located within respective bags 64. Each bag 64 is sized to fit within the pillar alongside the reinforcing beam(s) 126. The ballast acts to compress the first sealing member(s) along the bottom of the pillars 122. Locating the ballast in bags 64 allows the bags to be inserted (and removed) individually, i.e. they do not need to increase the weight of the flood barrier during transportation and fitment/removal. One or two ballast bags 64 could be located also within the end-most pillars 122a if desired, as well as within some or all of the intermediate pillars 122.

[0064] Though not shown in the drawings, the pillars 122,122a can include a reinforcing ring at the height of each securing beam 126. For example, a ring of aluminium or the like can be fitted inside the pillars 122,122a and can reduce the likelihood that the pillars will deform or distort adjacent to the securing beam(s).

[0065] Whilst the flood barrier of the first and second embodiments has been designed primarily for use adjacent to a doorway, with the set of pillars arranged in a convex array facing the flood water, it is possible to use the flood barrier in other locations, such as surrounding a manhole. Such an arrangement would enable a person to work within the manhole despite the presence of nearby flood water. Also, if the reinforcing beams of the second embodiment are sufficiently strong (e.g. 25mm thick bar(s) of polycarbonate) they can provide structural support to the flood barrier without requiring the pillars to be arranged in a convex array.

[0066] Notwithstanding that the pillars 122 are interconnected together, they can nevertheless be separated for maintenance or repair if desired. Thus, the tensile members 50 can be released and the pillars 122 slid off the reinforcing bar(s) 126 It would be expected that such disassembly (and reassembly) would be carried out only at specialised locations.

[0067] Whilst the cross-section of the pillars 22, 122 is shown to be circular, it would be possible to use non-circular pillars. Pillars having a trapezoidal cross-section, for example, would tend to form a curved shape suitable

for surrounding a doorway.

[0068] In the third embodiment of Figs. 5 and 6 the line of pillars 222 is shown to be substantially linear and is located within an opening between two rigid columns 70. In the assembled flood barrier of Fig.5 a second sealing member 232 is provided between each pair of pillars 222, and also between the end-most pillars 222 and the rigid columns 70. The second sealing member 232 which lie between the adjacent pillars, and between the end-most pillar and the rigid columns, are not seen in Fig.5 but are shown in Fig.6.

[0069] As with the second embodiment, the line of pillars 222 is provided as a unitary structure, with the pillars 222 all being held together by one or more securing beam(s) 226. The (or each) securing beam 226 is located within the line of pillars and so is only visible in the sectional view of Fig.6. The securing beam 226 is substantially linear and defines the linear array of the pillars 222. A second sealing member 232 is located between each pair of adjacent pillars 222, the sealing member being compressed by a tensile member 250 connected to the securing beam 226. It will be understood that the securing beam 226 can have a tensile member at one end, or at both ends, as desired.

[0070] When compressed by the securing beam 226 and tensile member 250, the line of pillars 222 has a first length which is slightly smaller than the width of the opening which this particular flood barrier has been designed to span, the opening being defined by rigid columns 70 having a separation S. The linear array of pillars may therefore be inserted into the opening between the rigid columns 70 when a flood is expected, with a small gap G being present at one or both ends of the line of pillars 222.

[0071] After the linear array of pillars has been inserted between the rigid columns 70, a positioning beam 70 is fitted into the top of the linear array of pillars 222. It will be seen from Fig.6 that the top of each pillar has a recess 74 which can accommodate one of the series of rigid pegs 76 which are securely mounted upon the positioning beam 72.

[0072] In the compressed state of the linear array of pillars 222 as shown in Fig.6 there is a spacing S_1 between each pair of adjacent recesses 74. The projecting pegs 76 are separated by a distance S_2, the separation S_2 being slightly greater than the separation S_1 (as represented in Fig.6). Accordingly, when the projecting pegs 76 are forced into their respective recesses 74, the effect is to extend (stretch) the linear array of pillars 222 slightly, and thereby also extend the tensile member 250.

[0073] It is arranged that the extension of the linear array of pillars 222 which is provided by the positioning beam 72 is sufficient to eliminate the gap G, and also to compress the second sealing member 232 of the end-most pillar 22 against the rigid column 70. The extension is, however, not sufficient to avoid the second sealing member 232 between adjacent pillars, so that the seal between each pair of adjacent pillars 222 merely partially expands slightly, but remains an effective seal between the pillars.

[0074] The projecting pegs 76 have tapered leading ends so as to facilitate their insertion into the respective recesses 74.

[0075] It will be understood that a positioning beam similar or identical to the positioning beam 72 should ideally be located along the bottom ends of the pillars 222, and should preferably be positioned between the rigid columns 70 before the linear array of pillars 222 is positioned. A preferred sequence of operations is as follows.

[0076] When a flood is expected a positioning beam similar or identical to the positioning beam 72 is laid upon the ground between the rigid columns 70. The positioning beam will preferably have a first sealing member along its bottom edge so as to provide a seal with the ground, and another sealing member along its upper edge to provide a seal with the pillars 222 (the pillars can have a sealing member along their bottom edges in addition to (or as an alternative to) the sealing member along the upper edge of the positioning beam)..

[0077] The linear array of pillars 222 is then positioned above the positioning beam, and the pillars are pressed downwardly so that the projecting pegs of the bottom positioning beam enter the respective recesses (similar to the recesses 74) in the bottom ends of the pillars 222. The top positioning beam 72 is then located above the line of pillars and is pressed downwardly so that the projecting pegs 76 enter the respective recesses 74.

[0078] It will be appreciated that the force required to extend the linear array of pillars 222 into sealing engagement with the rigid columns 70 may be considerable, and it may be difficult to remove the positioning beams from an assembled flood barrier. The bottom positioning beam can carry an extension upon which the user can place his or her foot to facilitate forced removal of the pillars 222 from the bottom positioning beam, and/or the pillars and positioning beams can be fitted with reinforced recesses permitting the introduction of a suitable lever to separate the positioning beams from the pillars.

[0079] Whilst the present invention is directed to a flood barrier for a doorway, it will be understood that a similar barrier may be used around windows. Also, it will be necessary to seal the air bricks or other ventilation accesses for the building, but there are many panels already available for that purpose.

Claims

1. A flood barrier comprising a plurality of pillars adapted to be secured adjacent to a doorway of a building, each pillar having a first sealing member for its bottom surface, and a second sealing member for its longitudinal surface.

2. A flood barrier according to claim 1 in which the second sealing member of one pillar engages an adja-

cent pillar in the assembled flood barrier.

3. A flood barrier according to claim 1 or claim 2 in which the pillars are separable and are secured together in use by at least one releasable securing strap.

4. A flood barrier according to claim 1 or claim 2 in which the pillars are substantially permanently interconnected together and comprise a unitary structure.

5. A flood barrier according to claim 4 in which the pillars are interconnected by at least one securing beam.

6. A flood barrier according to claim 5 in which one or both of the pillars at the ends of the flood barrier have a tensile member which is connected to the end of the securing beam.

7. A flood barrier according to any one of claims 4-6 in which the securing beam is flexible and resilient.

8. A flood barrier according to any one of claims 4-7 having a removable positioning beam which is engageable with at least two of the pillars.

9. A flood barrier according to claim 8 having two removable positioning beams, one of the removable positions beams engaging the top surfaces of the pillars and the other of the removable positioning beams engaging the bottom surfaces of the pillars, each of the removable positioning beams being engageable with all of the pillars of the flood barrier.

10. A flood barrier according to claim 8 or claim 9 in which the or each positioning beam is substantially linear and is adapted to increase the length of the flood barrier.

11. A flood barrier according to claim 9 in which the first sealing member is fitted to the other of the removable positioning beams.

12. A flood barrier according to any one of claims 1-11 in which the pillars are at least partly hollow and have an opening to permit the ingress of water.

13. A flood barrier according to any one of claims 1-12 in which the second sealing member is adhered to the pillar.

14. A flood barrier according to any one of claims 1-13 in which there are two separate second sealing members for each pillar.

15. A method of flood protection comprising the steps of:

{a} providing a flood barrier comprising a plurality of pillars, each pillar having a first sealing member for its bottom surface, and a second sealing member for its longitudinal surface;
{b} locating the pillars adjacent to a doorway of a building, with the pillars being aligned substantially vertically, with the first sealing members engaging the ground, and with a second sealing member lying between each pair of adjacent pillars;
{c} securing the pillars to the building.

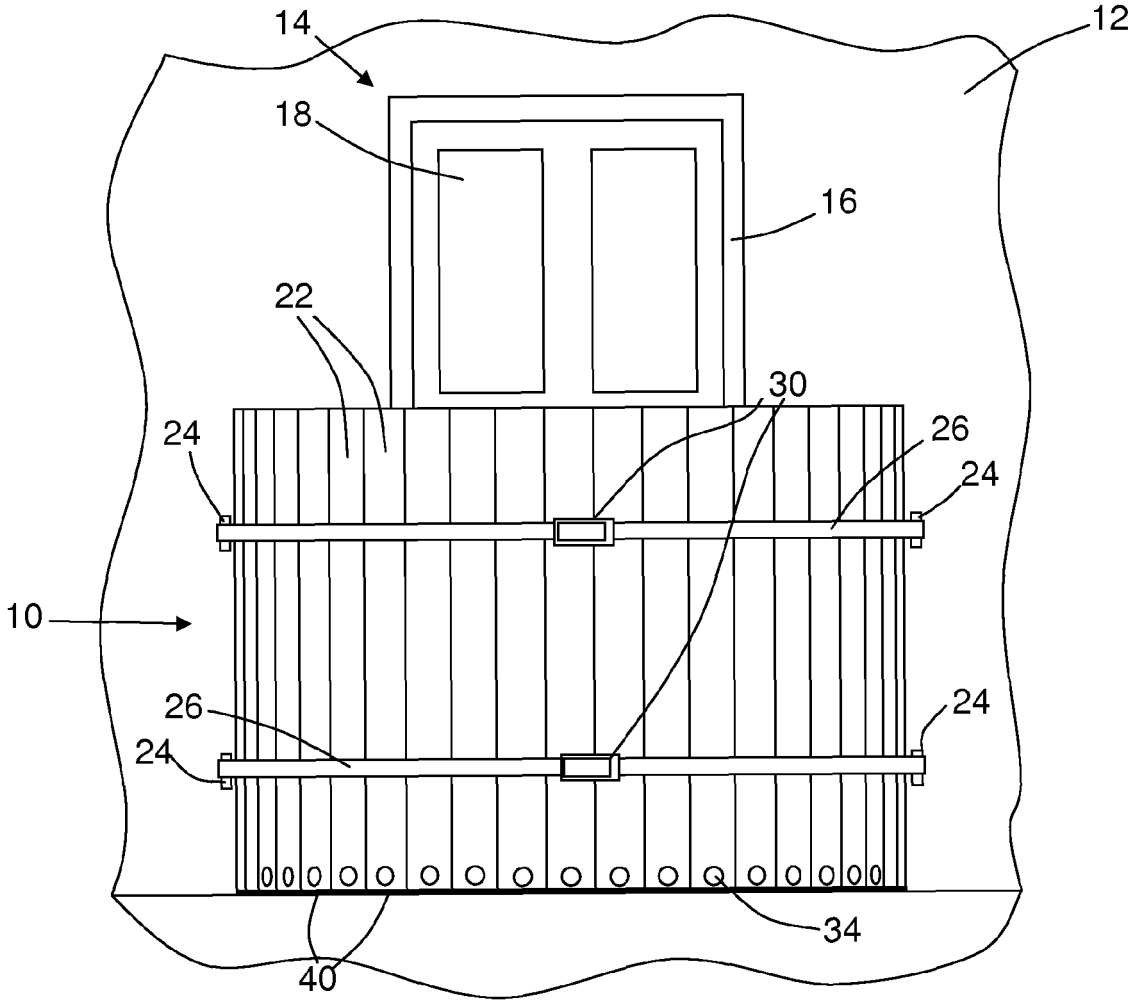
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Fig.1

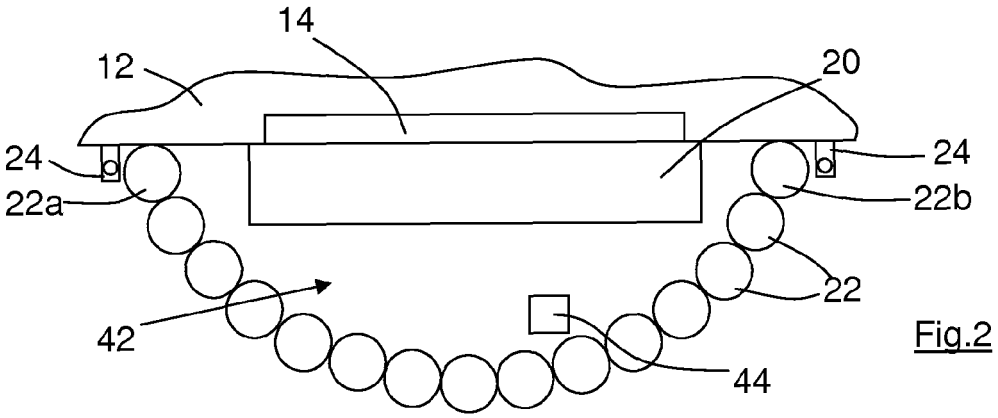
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Fig.2

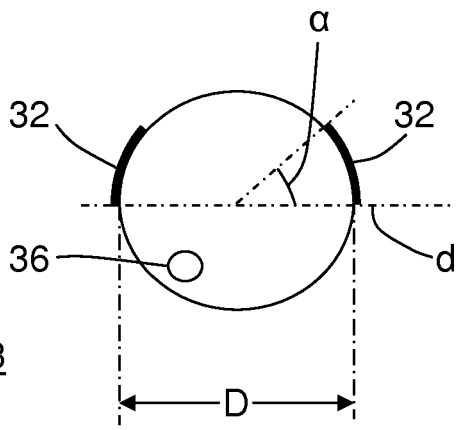

Fig.3

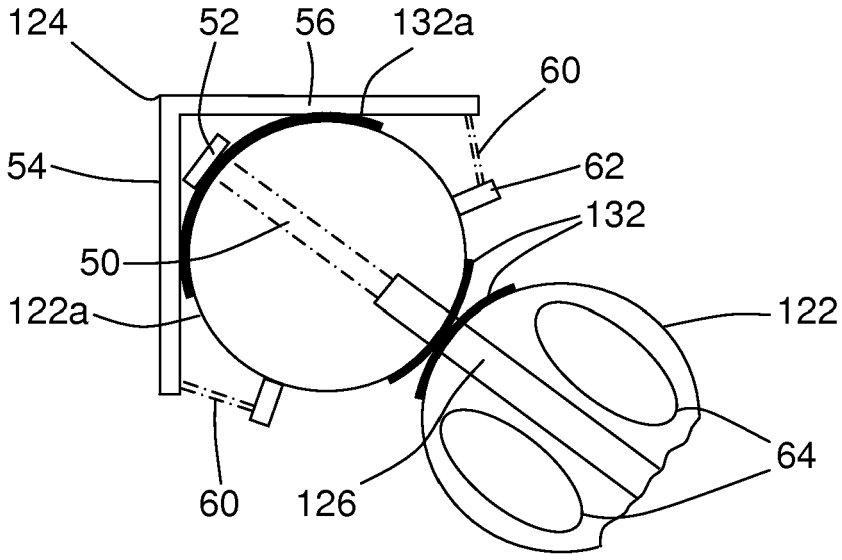

Fig.4

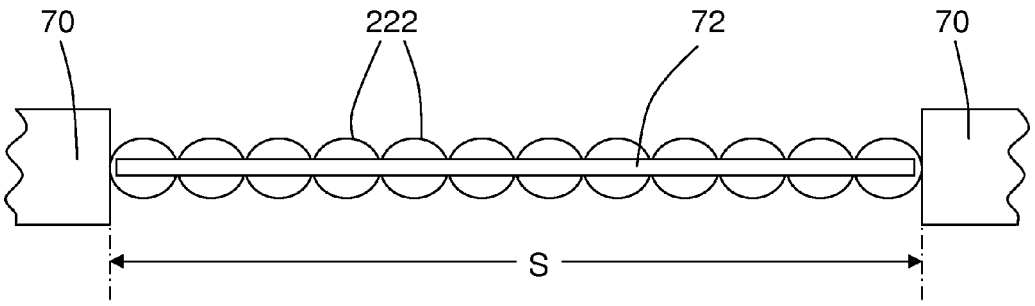

Fig.5

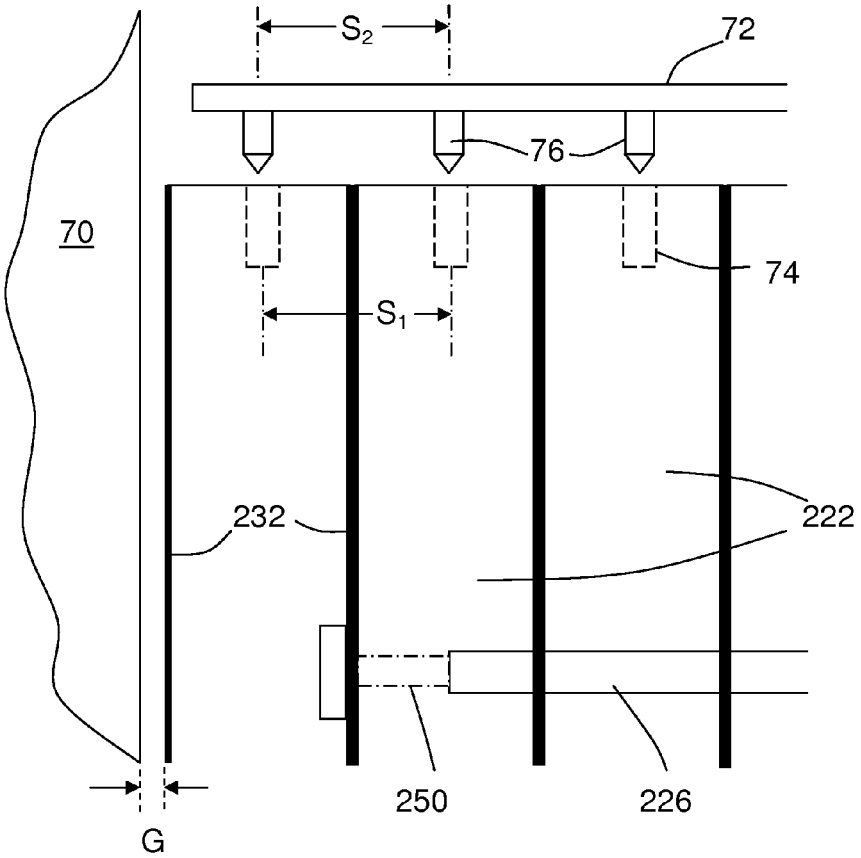

Fig.6

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EUROPEAN SEARCH REPORT

Application Number
EP 14 15 2621

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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	7 May 2014	Weißbach, Mark

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07-05-2014

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