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(54) **Seal for mounting to door frame**

(57) A seal (102) for mounting to a door frame is disclosed. The seal comprises an elongate base member (104) and a resilient first seal member (106) extending from a first surface (114) of the base member such that the first seal member is adapted to be held in a deformed state by engagement with a first surface of a door frame by means of mounting of the support member to a second surface of the door frame, substantially perpendicular to the first surface of the door frame. At least one resilient

second seal member (108, 110) extends from the first surface of the support member, wherein the first seal member and the or each second seal member are adapted to be engaged by a door mounted to the door frame and when in a closed position. An elongate strip (112) of intumescent material is mounted in a fixed position relative to the first seal member and the or each second seal member and is adapted to expand as a result of contact with fire.

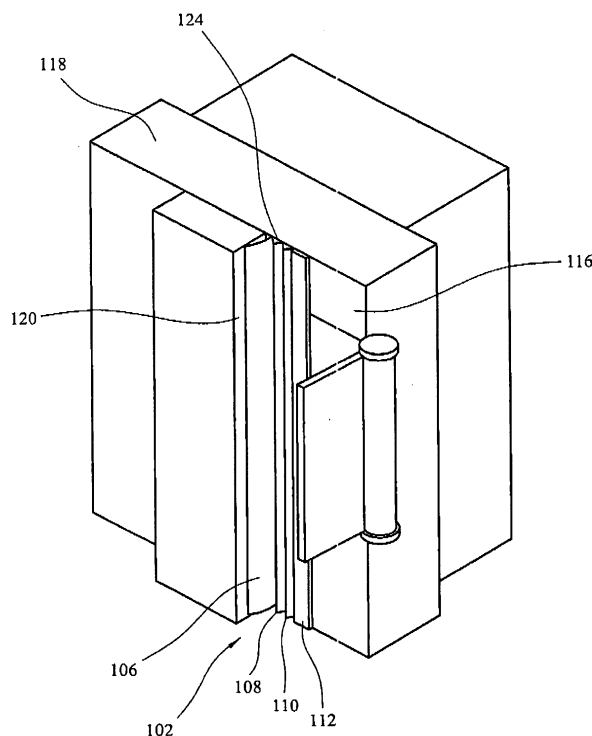


FIG. 5

Description

[0001] The present invention relates to a seal for mounting to a door frame, and relates particularly, but not exclusively, to a smoke and fire seal which also provides a barrier against noise.

[0002] Door seals, such as acoustic seals, fire seals or weather seals are typically attached to a door frame by mounting the seal into a recess in the door frame and are engaged by a door mounted to the frame when the door is in a closed position.

[0003] One known type of combined smoke and fire seal is disclosed in GB 2356885, the operation of which is described with reference to Figures 1 and 2. Referring to Figure 1, a combined fire and smoke seal 2 has an elongate body 4 extruded from intumescent material, which provides a large amount of expansion when it intumesces and which is angled to form two arms. Each arm has a terminal edge face to which a resilient seal lip 6, 8 is integrally connected to define a pair of smoke seals. When a door 10 mounted to a door frame 12 to which the seal 2 is mounted is in the closed position, the door 10 engages the pair of lip seals 6, 8 to provide a smoke seal. In the event of the seal 2 coming into contact with fire, the intumescent material expands to fill the gap between the door 10 and the door frame 12.

[0004] This known arrangement disclosed in GB 2356885 suffers from the drawback that in order to install the seal 2 on the side of the door frame 12 where the hinges are located, it is generally necessary to remove the door 10 to allow the seal 2 to be secured into a suitable recess in the door frame. It is sometimes also necessary to relocate the door hinges.

[0005] Preferred embodiments of the present invention seek to overcome one or more of the above disadvantages of the prior art.

[0006] According to an aspect of the present invention, there is provided a seal for mounting to a door frame, the seal comprising:

an elongate support member;

a resilient first seal member extending from a first surface of said support member such that said first seal member is adapted to be held in a deformed state by engagement with a first surface of a door frame by means of mounting of said support member to a second surface of said door frame, substantially perpendicular to said first surface of said door frame; at least one resilient second seal member extending from said first surface of said support member, wherein said first seal member and the or each said second seal member are adapted to be engaged by a door mounted to said door frame and when in a closed position; and

at least one member of intumescent material mounted in a fixed position relative to said first seal member and the or each said second seal member and adapted to expand as a result of contact with fire.

[0007] By providing a first resilient seal member and at least one second resilient seal member extending from a first surface of the support member and at least one member of intumescent material mounted in a fixed position relative to said first seal member and the or each said second seal member, this provides the advantage of providing a combined smoke and fire, and possibly also acoustic, seal which can be installed in a single recess in a door frame, without the necessity of removing the door from the door frame.

[0008] At least one said member of intumescent material may be mounted to said support member.

[0009] At least one said member of intumescent material may form at least part of said support member.

[0010] This provides the advantage of making the seal simpler to manufacture.

[0011] The intumescent material may include graphite and PVC.

[0012] The first seal member may extend in an undeformed state at an angle greater than 90° to said first surface of said support member.

[0013] The angle may be between 95° and 100°.

[0014] The first seal member may have tapered cross section in a direction extending away from said support member.

[0015] At least one said second seal member may extend from said first surface of said support member towards said first seal member.

[0016] At least one said second seal member may extend substantially perpendicularly to said first surface of said support member.

[0017] The seal may be provided with adhesive material on a second surface of said support member, opposite to said first surface.

[0018] The first seal member and/or at least one said second seal member may include PVC and/or acrylonitrile butadiene rubber.

[0019] The first seal member and/or at least one said second seal member may have a deflection recovery value of at least 40%.

[0020] The support member may be formed from PVC.

[0021] At least one said second seal member may extend from said first surface of said support member at an angle between 10° and 60°.

[0022] According to another aspect of the present invention, there is provided a door assembly comprising a door frame, a door adapted to be mounted to the door frame, and a seal as defined above.

[0023] According to a further aspect of the present invention, there is provided a method of manufacturing a seal for mounting to a door frame, the method comprising co-extruding:

an elongate support member;

a resilient first seal member extending from a first surface of said support member such that said first seal member is adapted to be held in a deformed state by engagement with a first surface of a door

frame by means of mounting of said support member to a second surface of said door frame, substantially perpendicular to said first surface of said door frame; at least one resilient second seal member extending from said first surface of said support member, wherein said first seal member and the or each said second seal member are adapted to be engaged by a door mounted to said door frame and when in a closed position; and at least one member of intumescent material mounted to said support member and adapted to expand as a result of contact with fire.

[0024] By co-extruding the various components of the seal, this provides the advantage of minimising the tendency of the intumescent material to become detached from the support member in the event of contact with fire.

[0025] A preferred embodiment of the invention will now be described, by way of example only and not in any limitative sense, with reference to the accompanying drawings in which:-

Figure 1 is a side cross-sectional view of a known combined smoke and fire seal;

Figure 2 is a schematic side cross-sectional view of the seal of Figure 1 in use on a door assembly

Figure 3 is a side cross-sectional view of a seal embodying the present invention;

Figure 4 is an enlarged view of part of the seal of Figure 3;

Figure 5 is a schematic perspective view of the seal of Figure 3 mounted to a door frame with the door removed; and

Figure 6 is a schematic perspective view of the door frame of Figure 5 with the door in place and in a closed position.

[0026] Referring to Figure 3, a fire and smoke seal 102 embodying the present invention comprises an elongate base member 104 of substantially rigid PVC material which is coextruded with a first seal member 106, a pair of second seal members 108, 110, the first and second seal members being formed from a PVC/acrylonitrile butadiene rubber compound, and an elongate strip 112 of intumescent material, such as graphite in a PVC matrix, and which is adapted to expand when it comes into contact with fire. As a result of the coextrusion of the intumescent material 112 with the base member 104, the intumescent material 112 is securely bonded to the base member 104 which has the advantage of minimising the tendency of the intumescent material 112 to become detached from the base member 104 as it expands.

[0027] The first seal member 106 extends from an edge of a first surface 114 of the base member 104 at an angle of more than 90°, typically 95° to 100°, such that the seal 102 can be mounted to a first surface 116 (Figure 5) of a door frame 118 and the first seal member 106 resiliently engage a second surface 120 of the door

frame 118 perpendicular to the first surface 116. This enables the first surface 116 to be maintained in a deformed state in contact with the second surface 120 of the door frame 118, without the necessity of fixing the seal 102 to the second surface 120 of the door frame 118, as shown in Figures 5 and 6.

[0028] The second seal members 108, 110 each extend from the first surface 114 of the support member 104 at an angle of approximately 40°, and are adapted to be engaged by a door 122 in its closed position such that the second seal members 108, 110 are not fully compressed against the first surface 114 of the support member 104. As a result, air, acoustic and smoke seals are formed by the second seal members 108, 110 extending between the door 122 and the first surface 116 of the door frame 118.

[0029] The seal 102 of the present invention is mounted to a single recess 124 in the door frame 118. As a result of this, the advantage is provided that it is not necessary to provide two recesses in the door frame to accommodate an acoustic seal and a smoke/fire seal. In addition, the fire retardant performance of the seal 102 of the present invention has been found to be surprisingly better than that of known fire seals.

[0030] It will be appreciated by persons skilled in the art that the above embodiment has been described by way of example only and not in any limitative sense, and that various alterations and modifications are possible without departure from the scope of the invention as defined by the appended claims.

Claims

1. A seal for mounting to a door frame, the seal comprising:

an elongate support member;
a resilient first seal member extending from a first surface of said support member such that said first seal member is adapted to be held in a deformed state by engagement with a first surface of a door frame by means of mounting of said support member to a second surface of said door frame, substantially perpendicular to said first surface of said door frame;
at least one resilient second seal member extending from said first surface of said support member, wherein said first seal member and the or each said second seal member are adapted to be engaged by a door mounted to said door frame and when in a closed position; and
at least one member of intumescent material mounted in a fixed position relative to said first seal member and the or each said second seal member and adapted to expand as a result of contact with fire.

2. A seal according to claim 1, wherein at least one said member of intumescent material is mounted to said support member.
3. A seal according to claim 1 or 2, wherein at least one said member of intumescent material forms at least part of said support member. 5
4. A seal according to any one of the preceding claims, wherein said intumescent material includes graphite and PVC. 10
5. A seal according to any one of the preceding claims, wherein said first seal member extends in an undeformed state at an angle greater than 90° to said first surface of said support member. 15
6. A seal according to claim 5, wherein said angle is between 95° and 100°. 20
7. A seal according to any one of the preceding claims, wherein said first seal member has a tapered cross section in a direction extending away from said support member. 25
8. A seal according to any one of the preceding claims, wherein at least one said second seal member extends from said first surface of said support member towards said first seal member. 30
9. A seal according to any one of the preceding claims, wherein at least one said second seal member extends substantially perpendicularly to said first surface of said support member. 35
10. A seal according to any one of the preceding claims, wherein said first seal member and/or at least one said second seal member may include PVC and/or acrylonitrile butadiene rubber. 40
11. A seal according to any one of the preceding claims, wherein said first seal member and/or at least one said second seal member has a deflection recovery value of at least 40%. 45
12. A seal according to any one of the preceding claims, wherein said support member is formed from PVC.
13. A seal according to any one of the preceding claims, wherein at least one said second seal member extends from said first surface of said support member at an angle between 10° and 60°. 50
14. A door assembly comprising a door frame, a door adapted to be mounted to the door frame, and a seal according to any one of the preceding claims. 55
15. A method of manufacturing a seal for mounting to a

door frame, the method comprising co-extruding:

an elongate support member;
 a resilient first seal member extending from a first surface of said support member such that said first seal member is adapted to be held in a deformed state by engagement with a first surface of a door frame by means of mounting of said support member to a second surface of said door frame, substantially perpendicular to said first surface of said door frame;
 at least one resilient second seal member extending from said first surface of said support member, wherein said first seal member and the or each said second seal member are adapted to be engaged by a door mounted to said door frame and when in a closed position; and
 at least one member of intumescent material mounted to said support member and adapted to expand as a result of contact with fire.

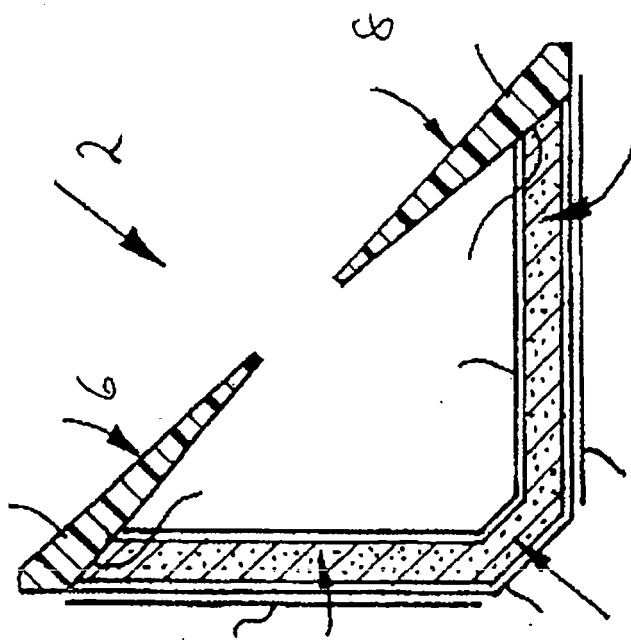


Fig. 1⁴

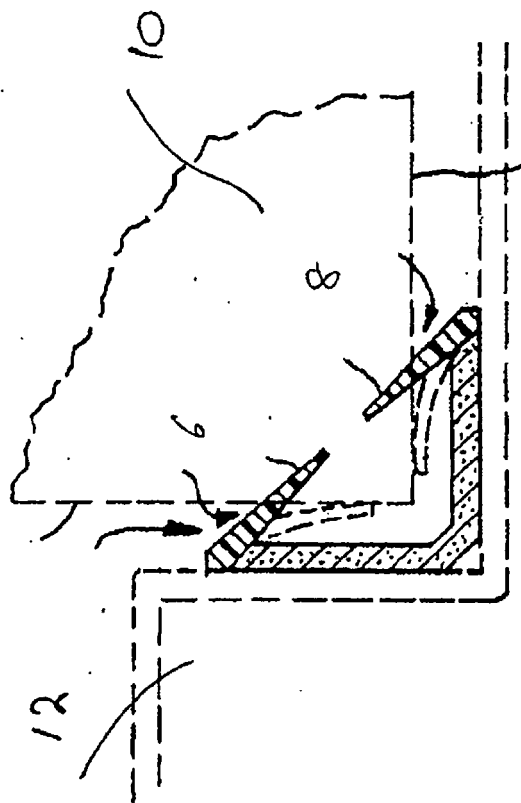
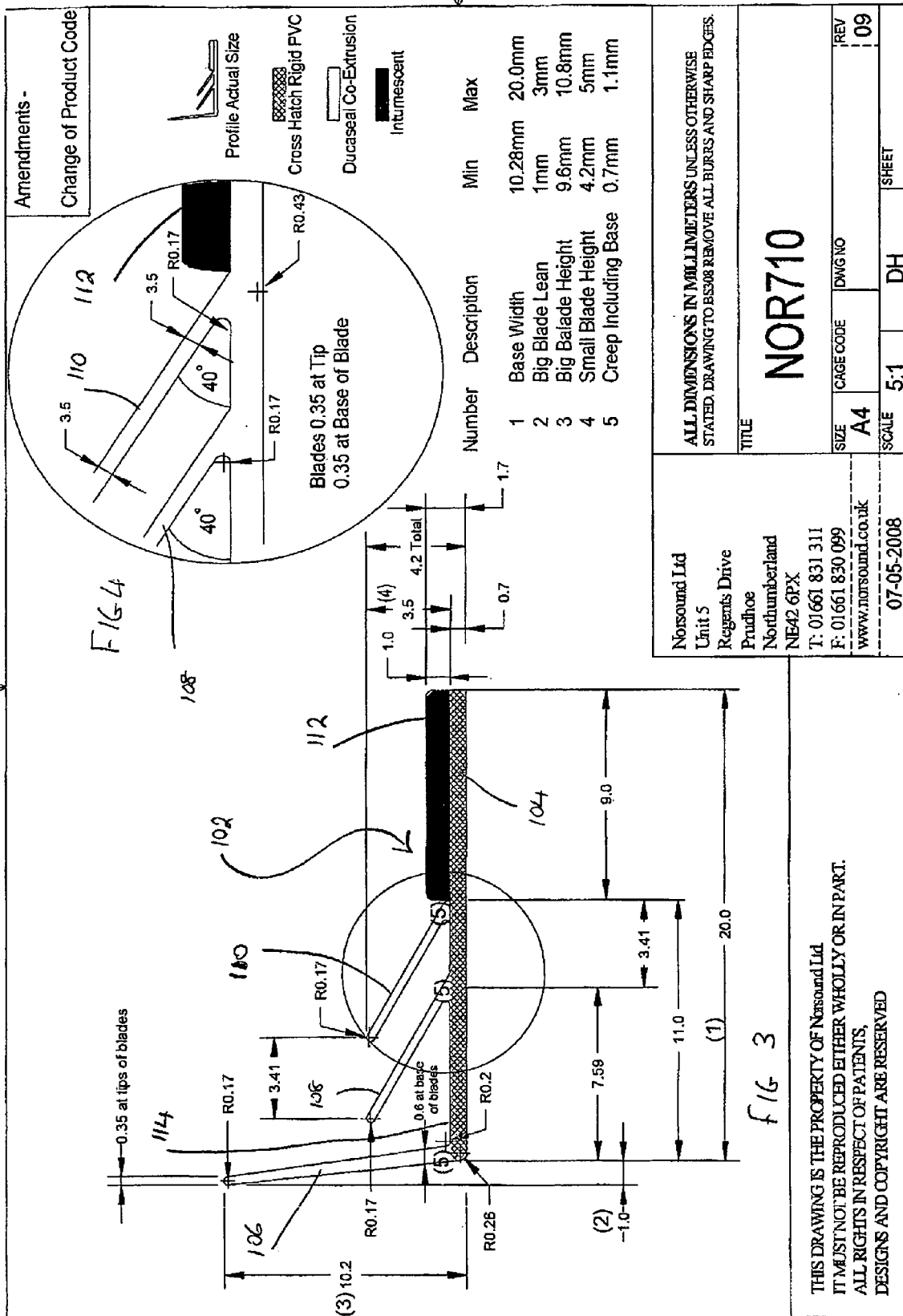


Fig. 2



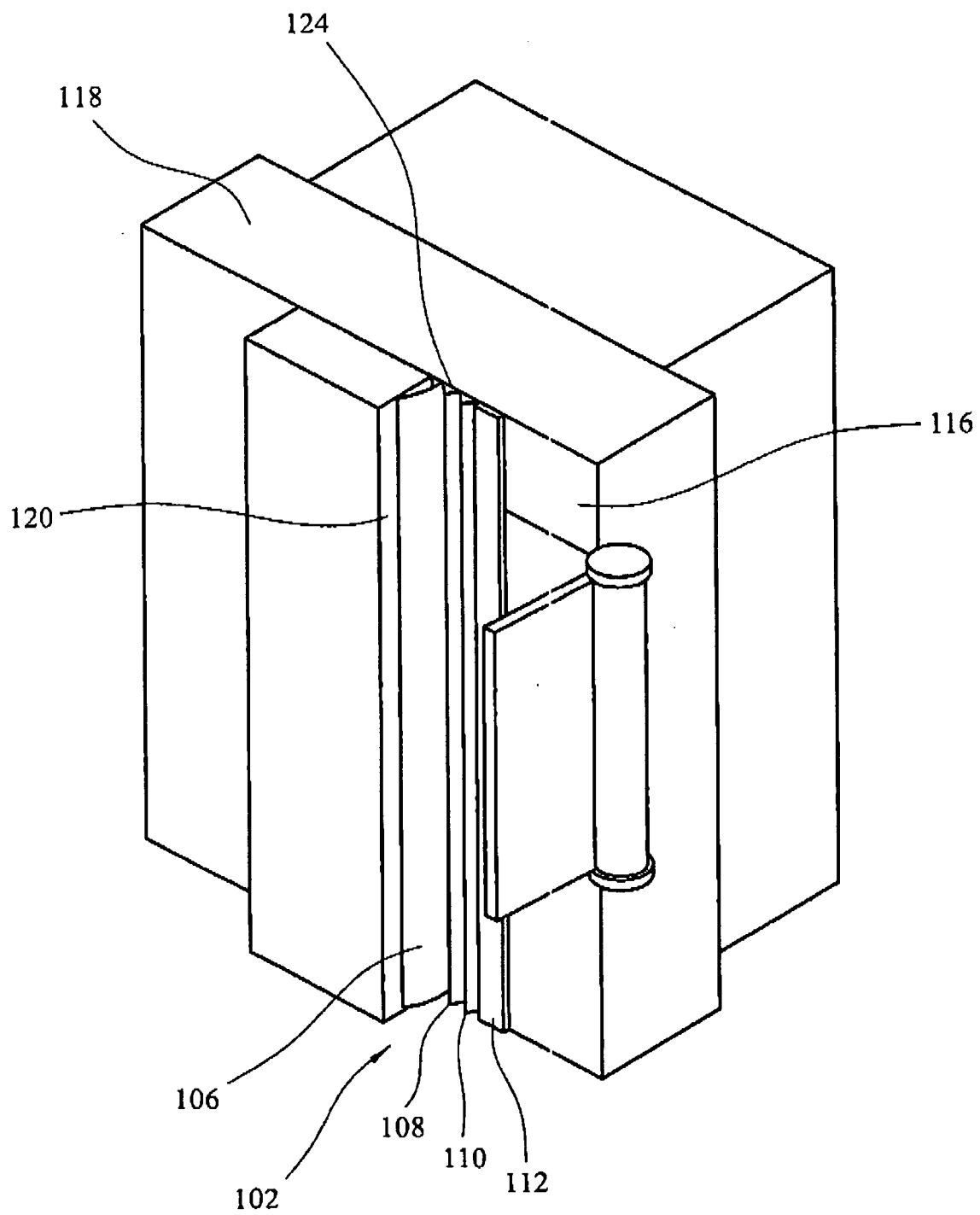


FIG. 5

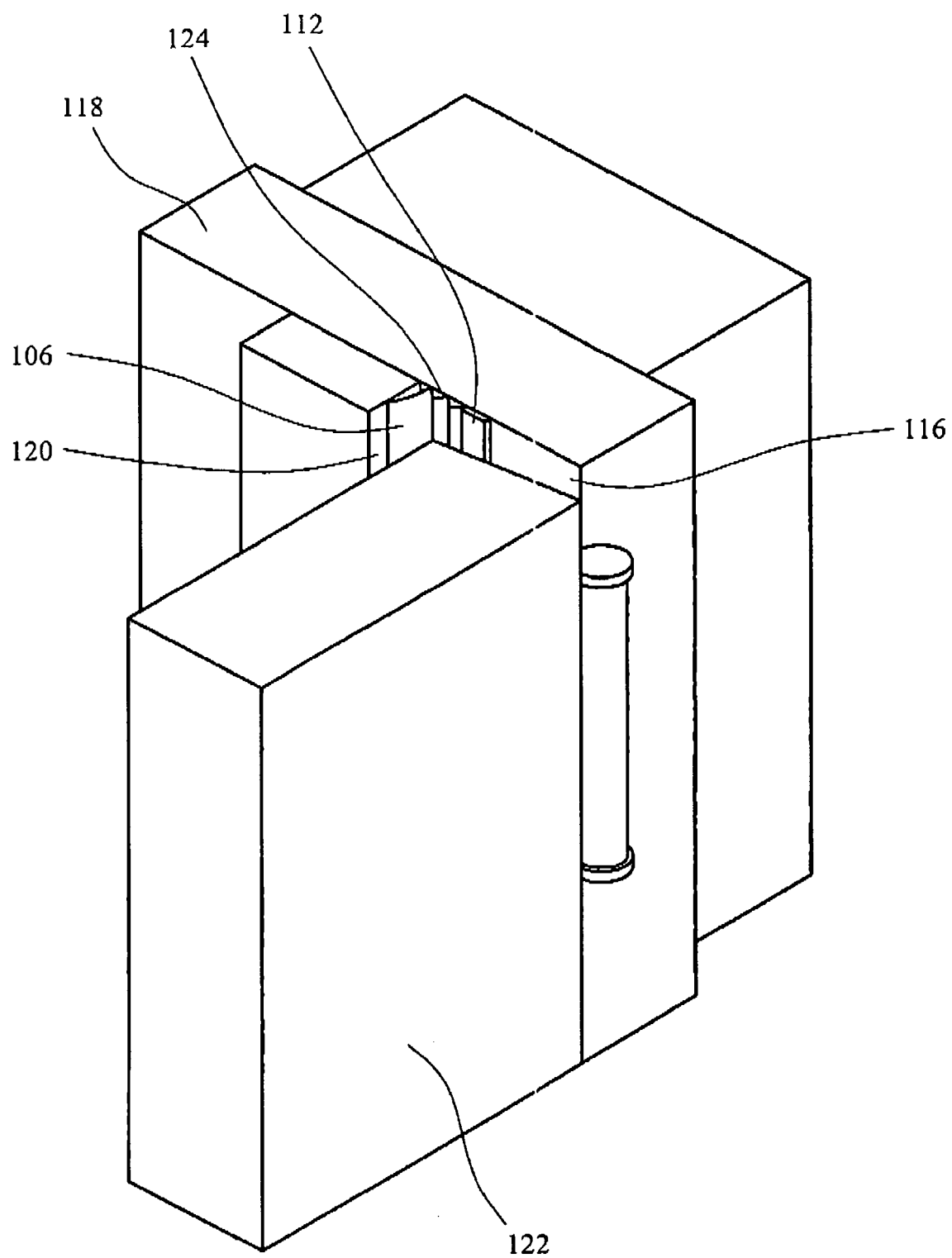


FIG. 6



EUROPEAN SEARCH REPORT

Application Number
EP 10 15 9986

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	GB 2 464 089 A (NORSEAL LTD [GB]) 7 April 2010 (2010-04-07) * figures 3,9 *	1-15	INV. E06B5/16
A	GB 2 371 827 A (LORIENT POLYPROD LTD [GB]) 7 August 2002 (2002-08-07) * page 3, paragraph 4 - page 4, paragraph 2; figure 2 *	1-4,15	
A	EP 2 103 769 A2 (POESIA AG [CH]) 23 September 2009 (2009-09-23) * paragraph [0007]; figure 1 *	1-3,15	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
Place of search		Date of completion of the search	Examiner
The Hague		19 November 2010	Jülich, Saskia
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p>			

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EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 10 15 9986

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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19-11-2010

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
GB 2464089	A	07-04-2010	NONE	
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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- GB 2356885 A [0003] [0004]