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(54) **ACOUSTIC DOOR**

(57) An acoustic door (2) comprises a first metallic panel (6) forming a first side of the door, a second metallic panel (8) forming a second side of the door, and a thermal break element (14) of glass fibre joining the first panel to the second panel and extending around a periphery of the door, such that there is no direct contact between the first (6) and second (8) metallic panels.

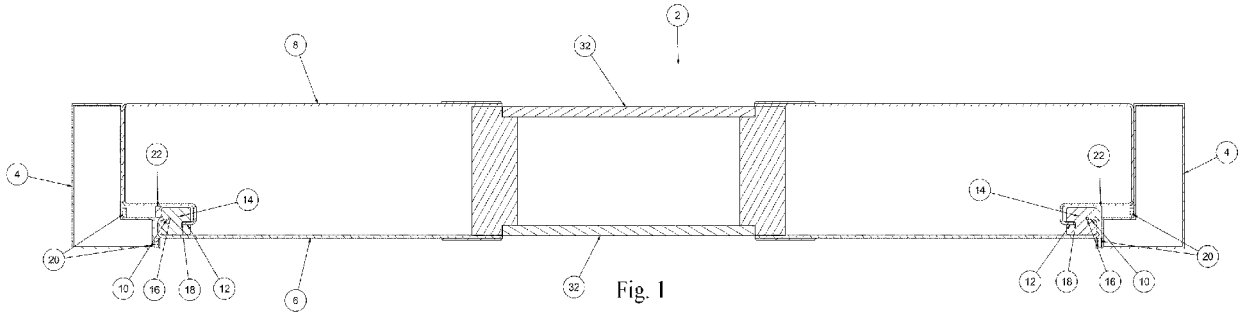

Fig. 1

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Description

[0001] This invention relates to an acoustic door and in particular to an acoustic fire door, i.e. a door having sound-insulating properties as well as fire resistant properties.

[0002] It is known to provide an acoustic door that also functions as a fire door, preventing or delaying the transfer of flames and heat. Sound insulation is generally enhanced when a door is stiff and formed from metallic materials. It is therefore difficult to provide an acoustic door that also inhibits heat transfer, as metals are notoriously good conductors of heat.

[0003] It is an aim of the invention to provide an acoustic door that has improved heat insulating properties compared to a known acoustic fire door.

[0004] The invention provides an acoustic door comprising a first metallic panel forming a first side of the door, a second metallic panel forming a second side of the door, and a thermal break element of glass fibre joining the first panel to the second panel and extending essentially around a periphery of the door. As there is no direct contact between the first and second metallic panels, heat is not readily transferred between them.

[0005] It has been found that such a thermal break element usefully enhances the sound insulating properties of the door.

[0006] In an embodiment of the invention, each of the first metallic panel and the second metallic panel has a re-entrant rim that extends into a recess of the thermal break element. For this purpose, the thermal break element can have an S-shaped cross-section to provide the recesses, one of the re-entrant rims of the first and second panels extending inwardly and the other of the re-entrant rims extending outwardly. In this way edge elements of the first and second panels can overlap in a direction perpendicular to the panels. Alternatively, the thermal break element can have an E-shaped cross-section to provide the recesses, the re-entrant rims extending in the same direction.

[0007] The door may be provided with a strip of intumescent material at an edge of the door. This expands when heated, to stop the passage of fire and smoke.

[0008] The door may be provided with at least one magnetic sealing element at an edge of the door that is arranged to contact a ferromagnetic frame, to provide an effective seal.

[0009] Thermally activated bolts may be situated within the door leaf which activate under specific thermal conditions to further secure the door within the frame in a fire. In an alternative arrangement, the invention provides a combination of an acoustic door as set out above, and a frame for the door, thermally activated bolts being provided within the frame to secure the door to the frame in a fire.

[0010] In one embodiment, two layers of fire-resistant glass can be fitted within the door, one parallel to each of the metallic panels, to provide a fire resistant window.

[0011] The invention will now be described in more detail, by way of example only, with reference to the accompanying drawings, in which:,

Figure 1 is a transverse section through a door according to an embodiment of the invention;

Figure 2 is a fragmentary section in the plane of the door shown in Figure 1;

Figure 3 is a further fragmentary section in the plane of the door shown in Figure 1; and

Figure 4 is a fragmentary transverse section through the door at a different location from Figure 1.

[0012] The drawings show a door 2 and a frame 4, against which the door 2 is arranged to close. The door is hinged to the frame by hinges, not shown here.

[0013] The door 2 includes a first metallic panel 6 and a second metallic panel 8, formed in this example from steel. The first metallic panel 6 has an inwardly directed re-entrant rim 10 and the second metallic panel has an outwardly directed re-entrant rim 12. These rims 10, 12 are lodged in a thermal break element 14, which is S-shaped in cross section to provide recesses 16, 18 receiving the respective rims 10, 12. The edge elements of the first and second panels from which the rims 10,12 depend overlap in a direction perpendicular to the panels.

[0014] Magnetic seals 20 are provided at peripheral locations on the first and second panels 6, 8, that will contact the frame 4, which is of ferromagnetic material, and provide an airtight seal.

[0015] An intumescent strip 22 is provided around the edge of the door 2. In this example the strip 22 is provided on a side of the thermal break element 14. The intumescent strip is of a known intumescent material, for example comprising mineral wool fibre, exfoliating graphite and an organic binder.

[0016] It will be appreciated that the rims 10, 12, the thermal break element 14, the magnetic seals 20, the intumescent strip 22 and the frame 4 extend around the entire rectangular periphery of the door 2.

[0017] As shown in Figures 2, 3 and 4, dog bolts 24 are located along the periphery of the door 2, at the hinged side and the top of the door - Figure 4 showing alternative locations for these. The dog bolts are paired with dog bolt receiver holes 28 within the frame 4.

[0018] Thermally activated bolts 26 are secured within the frame 4 at specific locations and once thermal activation parameters are met, activate and extend a metallic bar away from the frame and into a thermal bolt receiver slot 30 found in the door. In the embodiment depicted, the thermally activated bolts are located in the frame, but they could alternatively be secured within the door and extend into receivers in the frame when activated. The thermally activated bolts are spring loaded and retained by a low-melting-point substrate that melts at the activa-

tion temperature.

[0019] Two panes of thermal resistant glass 32 will be secured within the door 2 spaced with an airgap in between acting as a vision panel.

[0020] By changing the impedance in the edge of the door leaf, the ease of travel for the vibrations from the front of the leaf to the back where they would be reradiated out as acoustic noise is hindered. The glass-reinforced plastic thermal break element offers a change in impedance whilst maintaining structural stability.

Claims

1. An acoustic door (2) comprising a first metallic panel (6) forming a first side of the door, a second metallic panel (8) forming a second side of the door, and a thermal break element (14) of glass fibre joining the first panel to the second panel and extending around a periphery of the door, such that there is no direct contact between the first (6) and second (8) metallic panels.

2. An acoustic door according to claim 1, wherein the first metallic panel (6) and/or the second metallic panel (8) has a re-entrant rim (10,12) that extends into a recess (16,18) of the thermal break element (14).

3. An acoustic door according to claim 2, wherein each of the first metallic panel (6) and the second metallic panel (8) has a re-entrant rim (10, 12) that extends into a recess (16, 18) of the thermal break element (14), the thermal break element having an S-shaped cross-section to provide the recesses (16, 18), one (10) of the re-entrant rims of the first (6) and second (8) panels extending inwardly and the other (12) of the re-entrant rims extending outwardly.

4. An acoustic door according to claim 3, wherein edge elements of the first (6) and second (8) panels overlap in a direction perpendicular to the panels.

5. An acoustic door according to any preceding claim, provided with a strip of intumescent material (22) at an edge of the door (2).

6. An acoustic door according to any preceding claim, the door being provided with at least one magnetic sealing element (20) at an edge of the door that is arranged to contact a frame (4).

7. An acoustic door according to any preceding claim, including thermal locking bolts fixed in the door, which bolts activate under thermal conditions to secure the door to a frame (4).

8. An acoustic door according to any preceding claim, including first and second layers of fire-resistant glass (32) secured parallel to the first (6) and second (8) metallic panels respectively, within the door (2).

9. A combination of an acoustic door (2) according to any preceding claim and a frame (4) for the door, wherein thermal locking bolts (26) are fixed in the frame, which bolts (26) activate under thermal conditions to secure the door (2) to the frame (4).

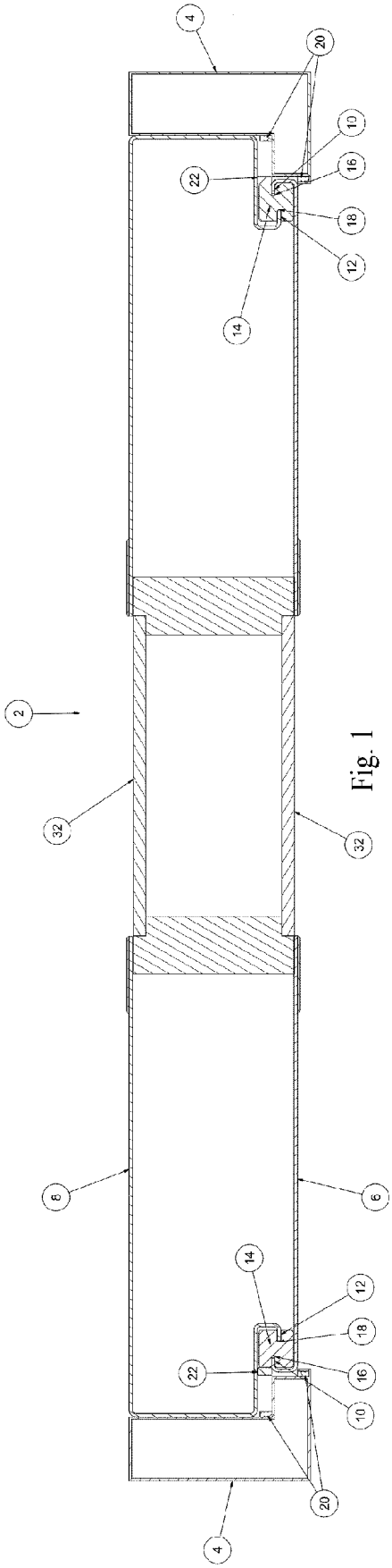

Fig. 1

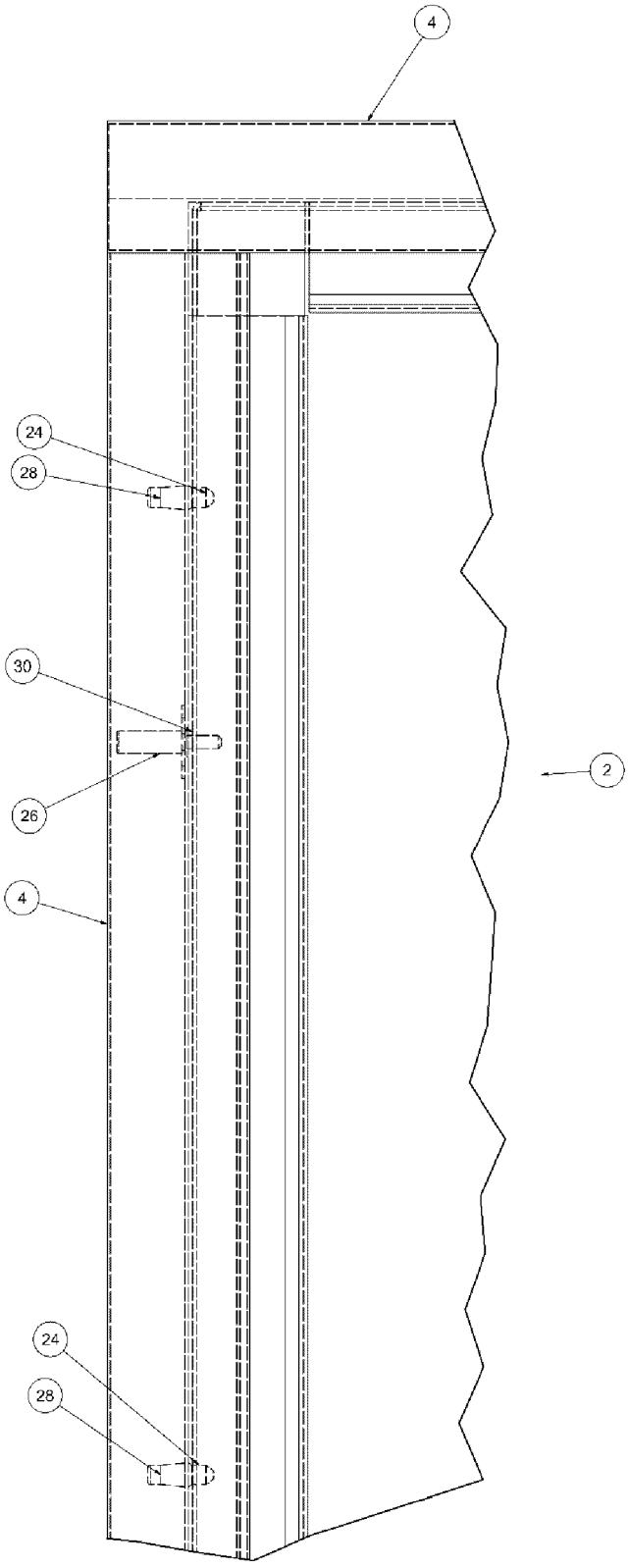

Fig. 2

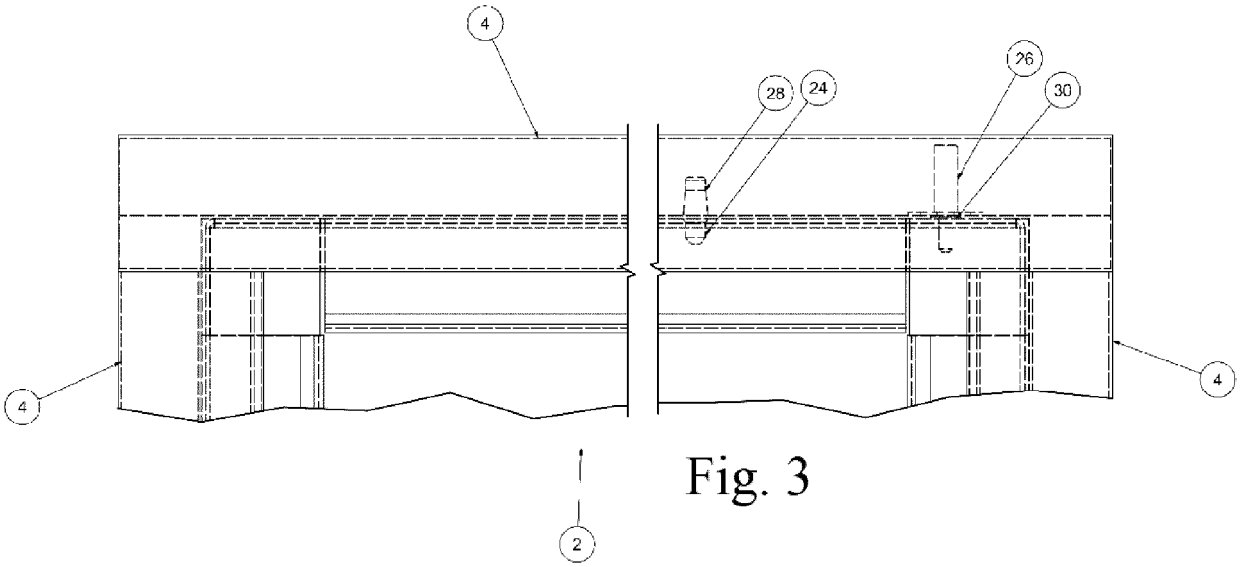
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Fig. 3

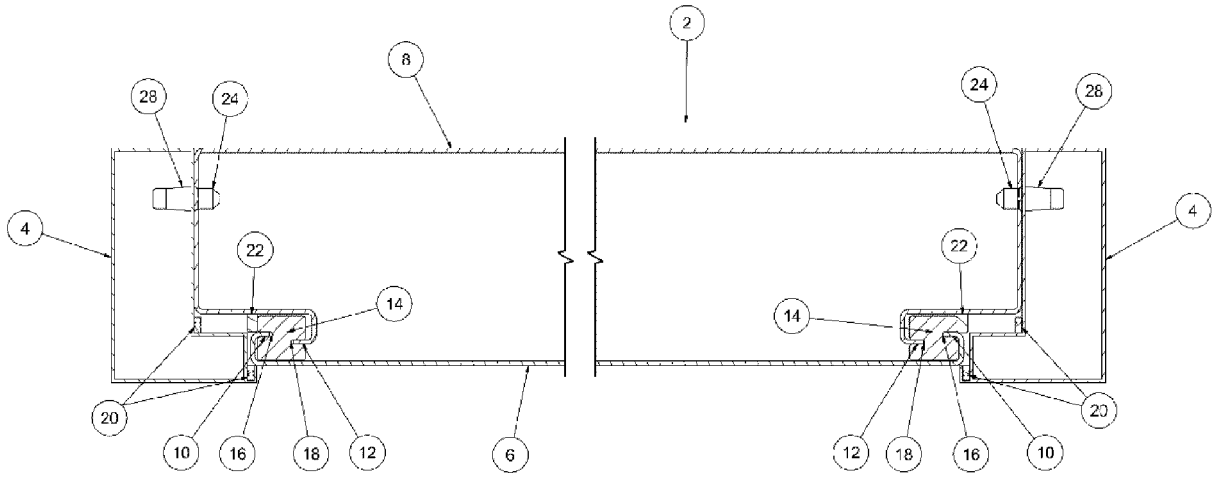
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Fig. 4

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EUROPEAN SEARCH REPORT

Application Number
EP 21 19 8170

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	FR 2 864 571 B1 (SERRURERIE ET MECANIQUE SAINT [FR]) 26 October 2007 (2007-10-26) * figures 1-9 * * claims 1,2,18 * * page 5, line 19 - page 13, line 2 *	1-9	INV. E06B5/16 E06B3/273 E06B3/82
X	KR 102 073 911 B1 (CHOI KANG JIN [KR]) 5 February 2020 (2020-02-05) * the whole document *	1-9	ADD. E06B5/20 E06B3/263 E06B3/58
A	US 2014/265355 A1 (TIEN HUNG-JEN [TW]) 18 September 2014 (2014-09-18) * figures 1-11 * * claim 1 *	7,9	

TECHNICAL FIELDS SEARCHED (IPC)
E06B

1 The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	16 December 2021	Blancquaert, Katleen

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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16-12-2021

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KR 102073911 B1	05-02-2020	NONE	
US 2014265355 A1	18-09-2014	NONE	

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82