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(54) Access door and access door frame

(57) The invention relates to an access door (40), its frame (20) and a combination thereof. The heat insulation

of said access door (40) is composed of at least two different insulation materials (32, 33), and the frame (20) is perforated in order to reduce thermal conductivity.

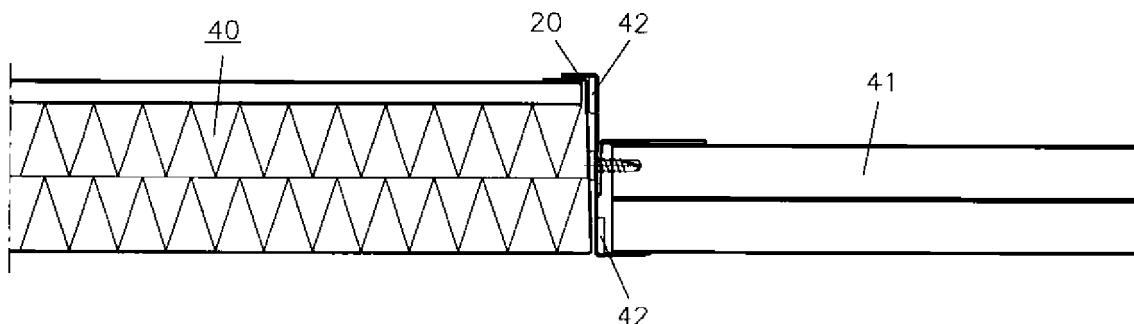


Fig. 4

Description

[0001] The invention relates to an access door and its frame. More precisely, the invention covers the scope defined in the independent claims.

[0002] An access door is installed in a wall or ceiling, and as for fire resistance and thermal conductivity, it must fulfill the fire safety requirements effective at each point of time. Access doors are used in buildings for maintenance, locking and other such purposes. An access door comprises a mounting rack that is attached in a wall or ceiling, and a lid element hinged in the mounting rack. The lid element and the mounting rack are conventionally metallic in structure, and the lid element also includes an insulation material layer. The conventional shape of the access door is either a square or a rectangle.

[0003] With access doors, it is a continuous objective to achieve an improved fire safety without remarkably increasing the door thickness. At the same time, the thermal conductivity of the access door frame, and the reducing of said conductivity, becomes all the more important in the big picture.

[0004] The objective of the present invention is to introduce a new access door with frame, which fulfill all the more stricter requirements for fire resistance and thermal conductivity. Said objective is achieved according to the characterizing features of the independent claims.

[0005] In the specification below, the invention is described in more detail with reference to the appended drawings, where:

Figure 1 is a side-view illustration of a prior art access door frame,

Figure 2 is a side-view illustration of an access door frame according to a preferred embodiment of the invention,

Figure 3 is a cross-sectional illustration of an access door lid element with frame according to an embodiment of the invention, and

Figure 4 is a cross-sectional illustration of an access door lid element with frame according to an embodiment of the invention, as mounted on a wall or ceiling.

[0006] Figure 1 illustrates part of an access door frame 1 according to the prior art. The center part of the frame 1 is completely cut off, apart from those points of the frame where the frame is attached to a wall or ceiling, and the frame corners 2, so that apertures 3 are formed in the frame. Said fastening points 4 are located at the center of the frame sides, so that each frame side includes two large holes 2. The purpose of the performed cut-offs is to reduce heat transfer through the frame 1. However, as the center part is completely removed by forming apertures 3, heat is explicitly conducted through

the uniform areas of the frame, said areas being located at the frame corners 2 and the fastening points. With this kind of arrangement, the temperature distribution of the frame 1 becomes extremely uneven.

[0007] Figure 2 illustrates a preferred embodiment of an access door frame 20 according to the invention. In this arrangement, the frame 20 is perforated, so that in the perforated area, heat has partial access through the frame. This is facilitated by preparing the perforation in two or more rows, in which case the holes 21 of separate rows are centered, so that the passage of the heat transferred through the frame 20 becomes longer than the direct measure through the frame in the direction of the wall thickness. Thus heat is distributed more evenly through the frame 20. At the same time, the frame 20 includes more material, and it is capable of binding more heat than the arrangement according to the prior art. There is no perforation at the fastening points 11, but the perforation arranged in several rows can, according to Figure 2, also extend to the fastening area for one or more rows. This is not possible in the prior art arrangement. This in part slows down heat transfer at the fastening point. As for the corners 23, the frame according to the invention corresponds to the prior art arrangement. In shape the holes 21 illustrated in Figure 2 are rectangular, but for a person skilled in the art, it is obvious that a similar effect for thermal conductivity is also achieved by holes with another shape. The essential point is that in a perforated area, the passage of heat through the frame 20 is longer than in a non-perforated area. In a perforated area, the number of hole rows is anything up from two, and in each row, the number of holes 21 is anything up from one. Typically the number of hole rows is 3-5, and the number of holes 21 in each row is 2-10 by average.

[0008] Access doors are typically manufactured for square apertures with the size of 20x20, 30x30, 40x40, 50x50 or 60x60 cm. When necessary, it is also naturally possible to manufacture different sizes of doors, for instance with a rectangular shape.

[0009] Figure 3 illustrates in partial cross-section a preferred embodiment of an access door lid element 30 according to the invention. The access door lid element 30 is attached to the access door frame 20. The access door lid element 30 comprises a metallic surface plate 31 and insulation materials 32 and 33. In prior art arrangements, only one insulation material has been used together with a metallic surface plate 31. Among said insulators, there are typically included fireproof mineral wools and fireproof plates. One solution applied in prior art access doors is vermiculite plate.

[0010] In the embodiment of Figure 3, there is used one gypsum board 32 and two fireproof mineral wool plates 33 (for example Isover Ultimate KPV 100). For a person skilled in the art, it is obvious that the number and thickness of the wool plates 33 is chosen among the readily available alternatives according to the thickness of the access door. Thus it is possible to use one or several

wool plates 33 with identical or different thicknesses. The essential point is that two different materials are used. In this embodiment, they are gypsum board 32 and fireproof wool 33. Instead of fireproof wool 33, some other known fireproof material can be used with the gypsum board 32. The use of a gypsum board 32 in the access door structure is advantageous for example owing to the moisture released thereby as it is warmed up, in which case it, together with other fireproof material, very effectively prevents heat from being conducted through the access door. Gypsum board 32 can be used in the structure in a way illustrated in Figure 3, or so that the gypsum board is installed on the other side of the other fireproof material 33. Gypsum boards 32 can also be installed on both sides of the other fireproof material 33.

[0011] Typically the thickness of the access door corresponds to the material thickness of the mounting location (wall/ceiling). By employing an arrangement according to the invention, with two different materials in the door structure the door thickness is reduced, so that the usability (ease of opening) is improved. For instance, it is possible to manufacture a door comprising two 6.5 mm thick gypsum boards, with a 20 mm thick wool plate 33 in between. In that case the door thickness remains below 40 mm.

[0012] Figure 3 also illustrates a device 34 to be installed in the access door frame 20, such as a tack, screw, peg or the like, which supports the access door surface plate 31 so that it is not buckled owing to the thermal stress.

[0013] Figure 4 illustrates an arrangement according to the invention of the access door 40 and its frame 20, as mounted on a wall or ceiling 41. In between the access door 40 and the frame 20, as well as in between the access door and the wall/ceiling 41, there are installed sealings 42 for preventing a direct heat transfer through said gaps. The employed sealing material can be some known sealing. The sealing materials used in access doors 40 are strongly expansive owing to the effect of heat. Their volume may increase up to even 20-fold. When employing a frame 20 for an access door 40, the sealing 42 is expanded, so that it penetrates through the frame perforation and realizes a double sealing, as the sealing material protrudes to both sides of the frame and gets into contact with the door structures as well. Advantageously the sealing can be realized in a way described in Figure 4, so that the sealing strip 42 is mounted in between the frame 20 and the lid element 30 of the access door 40, as well as between the frame and the wall/ceiling 41.

[0014] An access door 40 and its frame 20 according to the invention are easily mounted, and they do not require any separate fitting pieces, as is the case with many prior art solutions.

[0015] In the above specification, various different embodiments of the invention are described with reference to examples. They are by no means restrictive, but the scope of the invention is defined according to the scope

restricted by the appended claims.

Claims

- 5 1. An access door (40) to be mounted on a wall/ceiling (41), comprising a metallic surface material (31) and heat insulation, **characterized in that** the heat insulation of the access door (40) is composed of at least two different insulation materials (32, 33).
- 10 2. An access door (40) according to claim 1, **characterized in that** the heat insulation employed in the access door (40) includes at least one gypsum board (32) and at least one plate (33) made of some other fireproof material.
- 15 3. An access door (40) according to claim 2, **characterized in that** the gypsum board (32) can be mounted on either side of the other fireproof material (33).
- 20 4. An access door (40) according to claim 2, **characterized in that** the heat insulation of the access door (40) is composed of two gypsum boards (32) and other fireproof material (33) placed in between said boards.
- 25 5. An access door (40) according to any of the claims 2-4, **characterized in that** the fireproof material used in addition to the gypsum board (32) is vermiculite, mineral wool or some other corresponding fireproof material.
- 30 6. A frame (20) for an access door (40), made of metal, **characterized in that** the frame (20) is provided with two or several rows of holes (21) placed in the wall depth direction **in that** area of the frame (20) that corresponds to the thickness of the wall/ceiling (41), said holes (21) being aligned so that the uniform metal surface in the perforated area forms a longer length of passage from one surface of the wall/ceiling (41) to the other than the thickness of the wall/ceiling (41).
- 35 7. A frame (20) according to claim 6, **characterized in that** the rows of holes do not extend as far as the frame corners (23).
- 40 8. A combination of access door (40) and access door frame (20), **characterized in that** the combination includes at least one of the arrangements according to claims 1 and 6.
- 45 9. A combination according to claim 8, **characterized in that** the access door frame (20) includes a tack, screw, peg or other such element (34) to be installed on the side of the access door (40), which element supports and protects the metal surface (31) of the

access door from being buckled.

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PRIOR ART

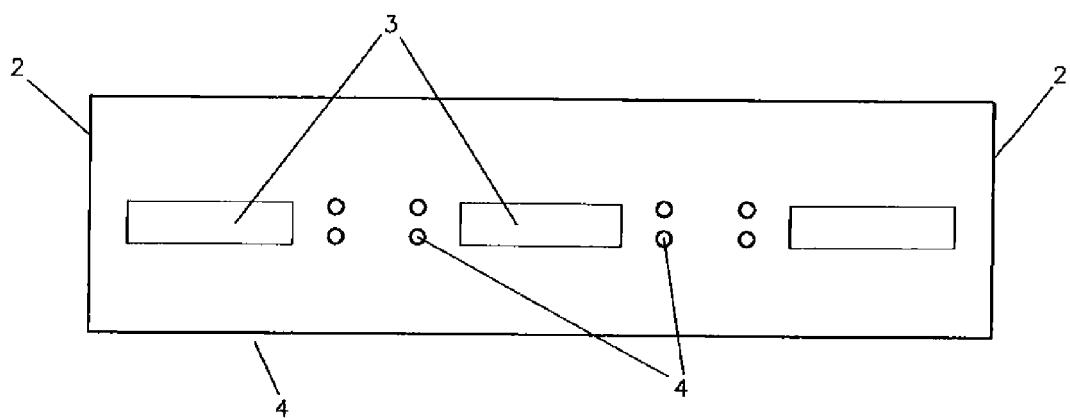


Fig. 1

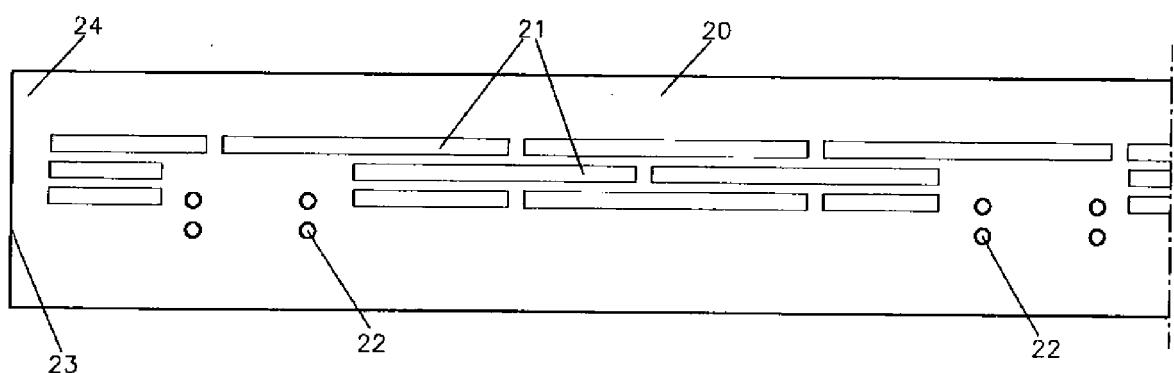


Fig. 2

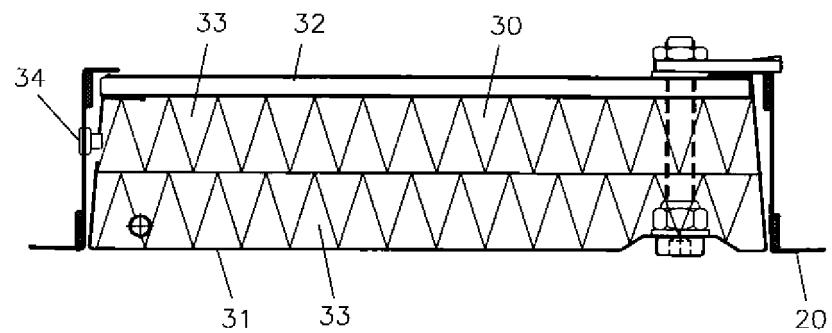


Fig. 3

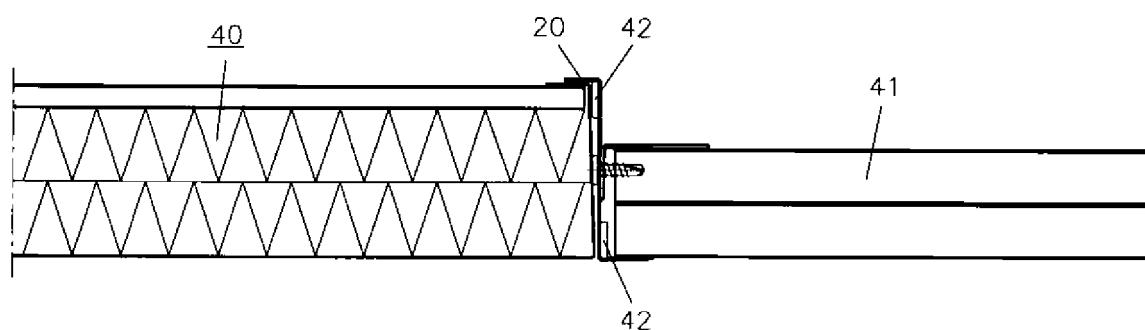


Fig. 4



EUROPEAN SEARCH REPORT

Application Number

EP 11 18 8347

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	EP 0 199 491 A2 (CHUBB & SONS LOCK & SAFE CO [GB]) 29 October 1986 (1986-10-29) * page 3, line 10 - page 5, line 19; figures 1,2 *	1-3,5,6, 8	INV. E06B3/70 E06B5/16 E06B1/14
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A	* paragraphs [0035] - [0038]; claims 2,4; figures 3-5 *	8,9	
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A	* abstract; figures 11-5 *	8	
		-/-	
The present search report has been drawn up for all claims			
2	Place of search	Date of completion of the search	Examiner
	Munich	9 January 2012	Kofoed, Peter
CATEGORY OF CITED DOCUMENTS		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	
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			



EUROPEAN SEARCH REPORT

Application Number
EP 11 18 8347

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (IPC)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
X	CH 496 153 A (FELIX ANDRE [CH]) 15 September 1970 (1970-09-15) * column 2, lines 1-22; figures 1-6,13 *	6	
Y		9	
A	-----	8	
TECHNICAL FIELDS SEARCHED (IPC)			
The present search report has been drawn up for all claims			
2	Place of search Munich	Date of completion of the search 9 January 2012	Examiner Kofoed, Peter
CATEGORY OF CITED DOCUMENTS		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	
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			



CLAIMS INCURRING FEES

The present European patent application comprised at the time of filing claims for which payment was due.

Only part of the claims have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due and for those claims for which claims fees have been paid, namely claim(s):

No claims fees have been paid within the prescribed time limit. The present European search report has been drawn up for those claims for which no payment was due.

LACK OF UNITY OF INVENTION

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

see sheet B

All further search fees have been paid within the fixed time limit. The present European search report has been drawn up for all claims.

As all searchable claims could be searched without effort justifying an additional fee, the Search Division did not invite payment of any additional fee.

Only part of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the inventions in respect of which search fees have been paid, namely claims:

None of the further search fees have been paid within the fixed time limit. The present European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims, namely claims:

The present supplementary European search report has been drawn up for those parts of the European patent application which relate to the invention first mentioned in the claims (Rule 164 (1) EPC).

**LACK OF UNITY OF INVENTION
SHEET B**Application Number
EP 11 18 8347

The Search Division considers that the present European patent application does not comply with the requirements of unity of invention and relates to several inventions or groups of inventions, namely:

1. claims: 1-5, 8, 9

1. An access door (40) to be mounted on a wall/ceiling (41), comprising a metallic surface material (31) and heat insulation, characterized in that the heat insulation of the access door (40) is composed of at least two different insulation materials (32, 33).
8. A combination of access door (40) and access door frame (20), characterized in that the combination includes at least one of the arrangements according to claims 1 and 6.

2. claims: 6, 7

6. A frame (20) for an access door (40), made of metal, characterized in that the frame (20) is provided with two or several rows of holes (21) placed in the wall depth direction in that area of the frame (20) that corresponds to the thickness of the wall/ceiling (41), said holes (21) being aligned so that the uniform metal surface in the perforated area forms a longer length of passage from one surface of the wall/ceiling (41) to the other than the thickness of the wall/ceiling (41).

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

EP 11 18 8347

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. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

09-01-2012

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