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(71) Applicant: **Locher, Gebhard Meinrad**
39058 Sarentino BZ (IT)

(72) Inventor: **Locher, Gebhard Meinrad**
39058 Sarentino BZ (IT)

(74) Representative: **Modiano, Micaela Nadia et al**
Modiano & Partners (IT)
Via Meravigli, 16
20123 Milano (IT)

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(54) **Two-leaf fire door with improved fire resistance**

(57) A two-leaf fire door with improved fire resistance comprising a first leaf (4) and a second leaf (5) which are hinged to a fixed frame and define respectively an abutment wing (10) on the first leaf (4) and a contact edge (11) on the second leaf (5), the two-leaf fire door further

comprising mating means which act between the leaves when, due to the presence of flames, relative sliding occurs between the abutment wing (10) and the contact edge (11), along a direction which is substantially perpendicular to the pivoting axes of the leaves.

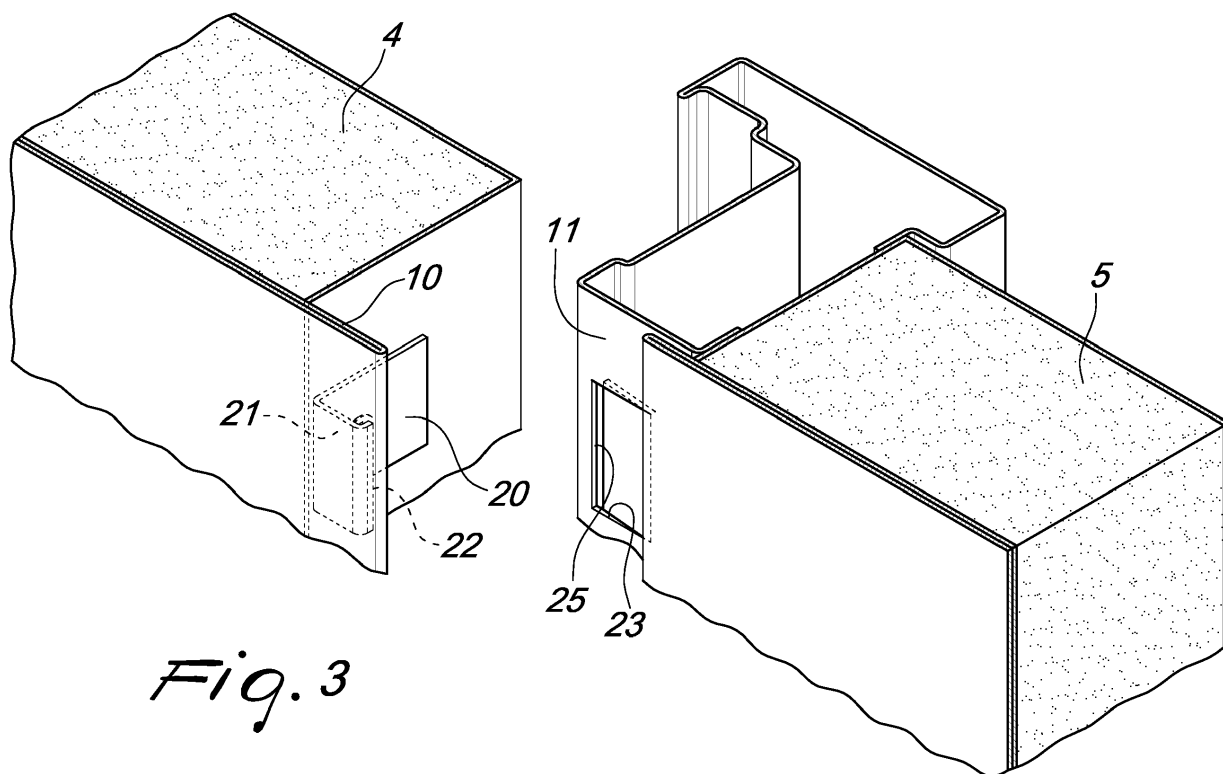


Fig. 3

Description

[0001] The present invention relates to a two-leaf fire door with improved fire resistance.

[0002] As is known, fire doors are made with a fixed metal frame within which are hinged the leaves, which are made with metal paneling on the two sides, front and back.

[0003] With the current solutions, if the flames approach from the side on which the leaves have the edge that abuts against the fixed frame, the dilation, which comes about because of the heat, tends in practice to press the door against the fixed frame, thus not creating gaps through which flames would pass.

[0004] But if the flames approach on the other side of the leaves from the side with the edge, then, at the vertical battens between the two leaves, what happens is that the vertical edges of the leaves tend to move towards the hinged region, which is fixed, thus detaching the vertical battens from each other, and so it is possible that a dangerous gap will be created through which the flames can pass.

[0005] The current solutions for solving the problem involve using metal sheets with the application of plasterboard, thus increasing the thicknesses and so making the leaves considerably heavier, as well as considerably increasing the production costs, but without actually solving the problem with certainty because, while the measures adopted make it possible to increase the resistance time, they do not give absolute certainty that the battens will not move apart and allow the flames to pass through.

[0006] The aim of the invention is to solve the problem explained above, by providing a two-leaf fire door with improved fire resistance which makes it possible to maintain, even under the heaviest conditions, a mutual coupling between the mating upright members between the leaves, thus preventing their mutual moving apart.

[0007] Within this aim, an object of the invention is to provide a fire door in which it is possible to obtain an optimal closing, while at the same time having a door that is relatively light and has a low cost.

[0008] Another aim of the present invention is to provide a fire door that, owing to its distinctive implementation features, is capable of offering the widest guarantees of reliability and safety in use.

[0009] Another object of the present invention is to provide a fire door that can be easily implemented using elements and materials that are readily available on the market and which, moreover, is competitive also from a merely economical viewpoint.

[0010] This aim and these and other objects which will become better apparent hereinafter, are achieved by a two-leaf fire door with improved fire resistance, according to the invention, comprising a first leaf and a second leaf, which are hinged to a fixed frame and define, respectively, an abutment wing, on said first leaf, and a contact edge, on said second leaf, characterized in that it comprises mating means which act between said leaves

when, due to the presence of flames, relative sliding occurs between said abutment wing and said contact edge along a direction which is substantially perpendicular to the pivoting axes of said leaves.

[0011] Further characteristics and advantages of the present invention will become better apparent from the description of a preferred, but not exclusive, embodiment of a two-leaf fire door with improved fire resistance, illustrated by way of non-limiting example in the accompanying drawings wherein:

Figure 1 is a schematic view of the door according to the invention, in a front view;

Figure 2 is a sectional view taken along line II-II in Figure 1;

Figure 3 is a perspective view of the leaves at the region where the mating means are positioned;

Figure 4 is a sectional view of the mutual positioning of the leaves and of the mating means when a fire breaks out;

Figure 5 is a perspective cutaway view of the mating means during the propagation of a fire.

[0012] With reference to the figures, the two-leaf fire door with improved fire resistance, according to the invention, which is generally designated with the reference numeral 1, comprises a fixed frame 2 to which are connected, by means of hinges 3, a first leaf 4 or principal leaf, and a second leaf 5 or secondary leaf.

[0013] The first leaf 4 defines an abutment wing 10 at the region of mating with a contact edge 11, which is formed on the central upright member of the second leaf 5.

[0014] The distinctive feature of the invention consists in that, at the mating upright members of the leaves 4 and 5, where the abutment wing 10 and the contact edge 11 are provided, mating means are provided which act between the leaves when, due to the presence of flames, relative sliding occurs between the abutment wing 10 and the contact edge 11 along a direction which is substantially perpendicular to the pivoting axes of the leaves 4 and 5.

[0015] In more detail, the mating means have an L-shaped element 20 which is fixed to the edge of the first leaf 4 below the abutment wing, where a connecting portion 21 is provided, which ends in a mating tooth 22 accommodated in a slot 23 which is obtained, for example by cutting, directly on the contact edge 11.

[0016] The slot 23 is delimited, in the direction of the first leaf, by an engagement portion 25 which hooks with the tooth 22 when, due to the propagation of flames, mutual sliding begins between the abutment wing and the contact edge; this sliding is permitted only for a reduced portion, after which it is prevented, since the tooth 22, by engaging the engagement portion 25 does not allow the mutual separation between the abutment wing and the contact edge.

[0017] With the arrangement described, a further mat-

ing is obtained, which prevents the mutual moving apart of the abutment wing and the contact edge, thus preventing the creation of areas where it is possible for flames to pass through.

[0018] The L-shaped elements 20 are spaced at a pre-established distance longitudinally along the mating region between abutment wing 10 and contact edge 11, so as to create a plurality of mutual mating regions which render the overall structure particularly stable.

[0019] To the above should be added the fact that the solution illustrated, i.e. the presence of the L-shaped element with the tooth 22 that engages the slot 23, can be easily applied also to existing doors.

[0020] Moreover it should be noted that the solution adopted, i.e. a tooth, which extends substantially perpendicular to the abutment wing, does not create any hindrance during the normal steps of using the leaf, since the tooth is inserted in the slot 23 during the normal mating between the first and second leaves.

[0021] From the foregoing it can be seen how the invention achieves the intended aims and, in particular, attention is drawn to the fact that, with particularly simple measures, the solution according to the invention makes it possible to prevent the first and second leaves from moving apart at the area of the central upright members, thus completely preventing the propagation of flames.

[0022] The invention, thus conceived, is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims.

[0023] In addition, all the details may be replaced by other technically equivalent elements.

[0024] In practice the materials employed, provided they are compatible with the specific use, as well as the dimensions and the contingent shapes, may be any according to requirements.

[0025] The disclosures in Italian Patent Application No. MI2010A001029 from which this application claims priority are incorporated herein by reference.

[0026] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

contact edge (11) along a direction which is substantially perpendicular to the pivoting axes of said leaves (4, 5).

- 5 2. The fire door according to claim 1, **characterized in that** said mating means have an L-shaped element (20), which can be fixed to the edge of said first leaf (4), below said abutment wing (10), and a connecting portion (21) arranged below said abutment wing (10) and ends with a mating tooth (22) which can be accommodated in a slot (23) formed on said contact edge (11).
- 10
- 15 3. The fire door according to the preceding claims, **characterized in that** said slot (23) has, on the side directed toward said first leaf (4), an engagement portion (25) engageable by said mating tooth (22).
- 20
- 25 4. The fire door according to one or more of the preceding claims, **characterized in that** it comprises a plurality of mating means (20, 21, 22) distributed along the longitudinal extension of the mating region between said abutment wing (10) and said contact edge (11).
- 30
- 35 5. The fire door according to one or more of the preceding claims, **characterized in that** said mating tooth (22) enters said slot (23) frontally.
- 40
- 45

Claims

1. A two-leaf fire door with improved fire resistance, comprising a first leaf (4) and a second leaf (5), which are hinged to a fixed frame (2) and define respectively an abutment wing (10), on said first leaf (4), and a contact edge (11), on said second leaf (5), **characterized in that** it comprises mating means (20, 21, 22), which act between said leaves (4, 5) when, due to the presence of flames, relative sliding occurs between said abutment wing (10) and said

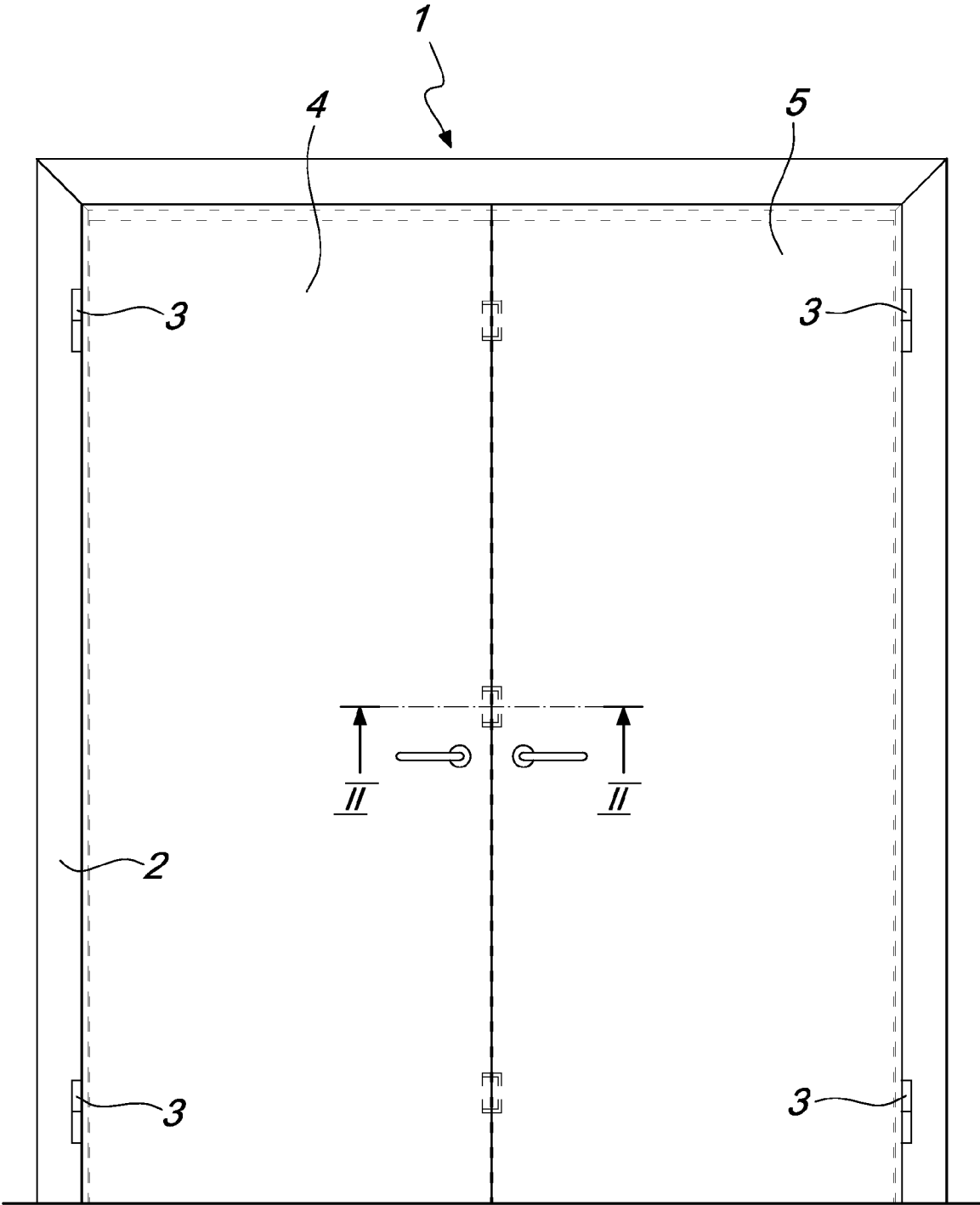


Fig. 1

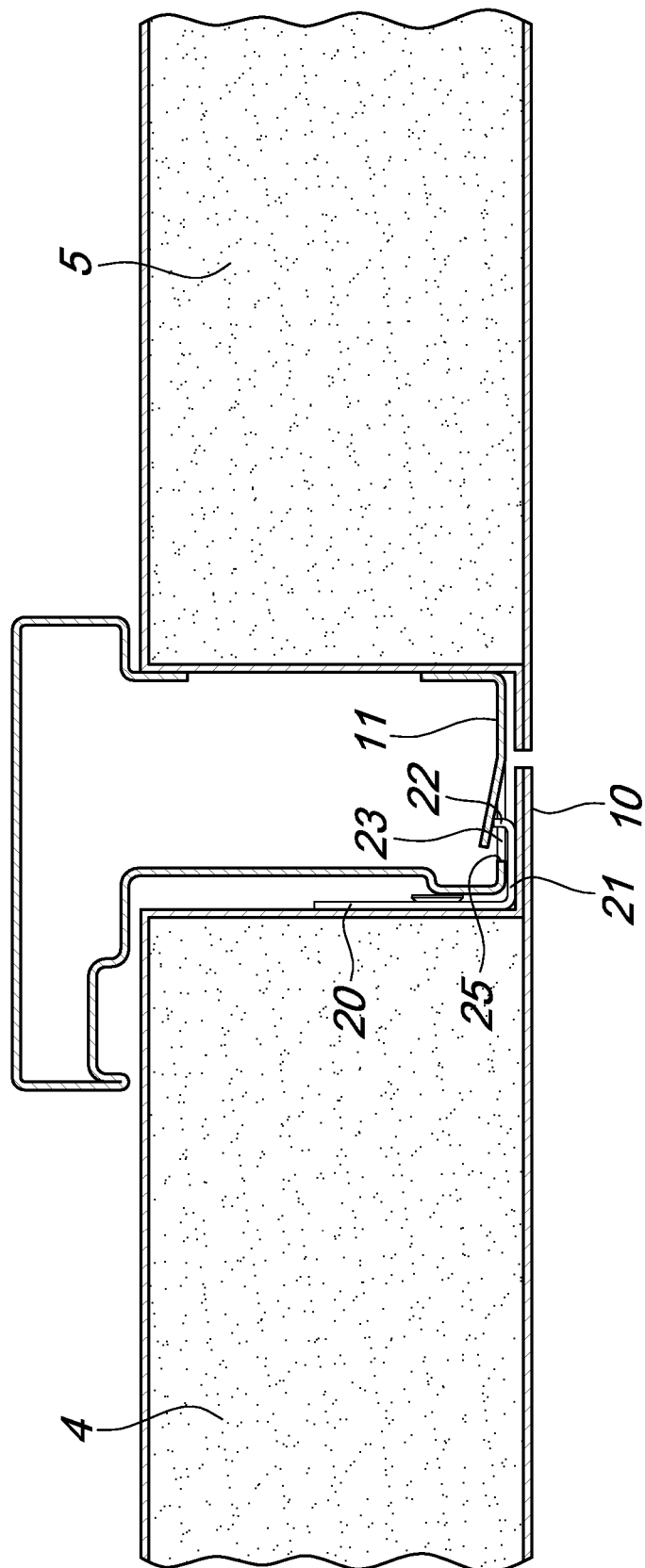


Fig. 2

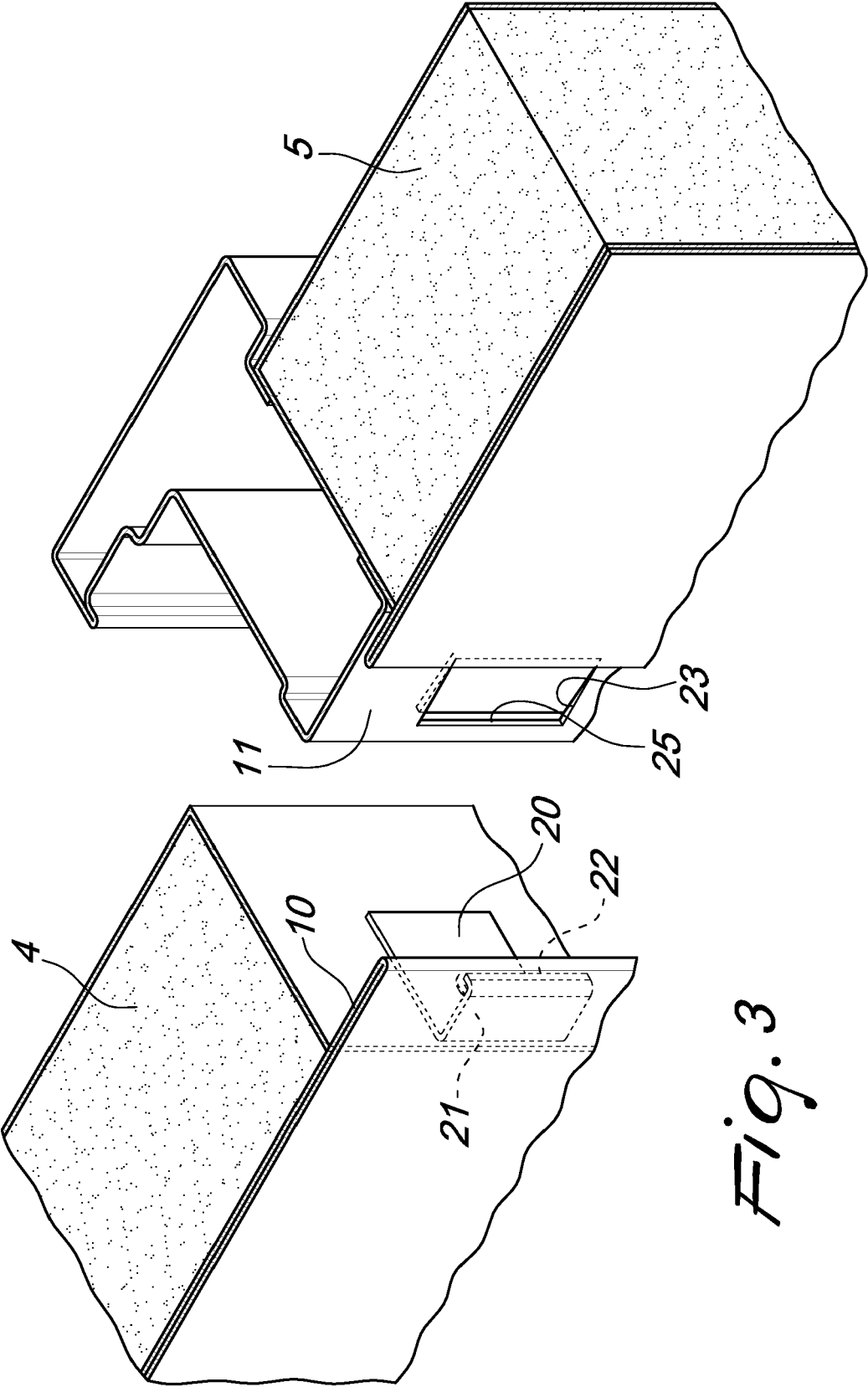


Fig. 3

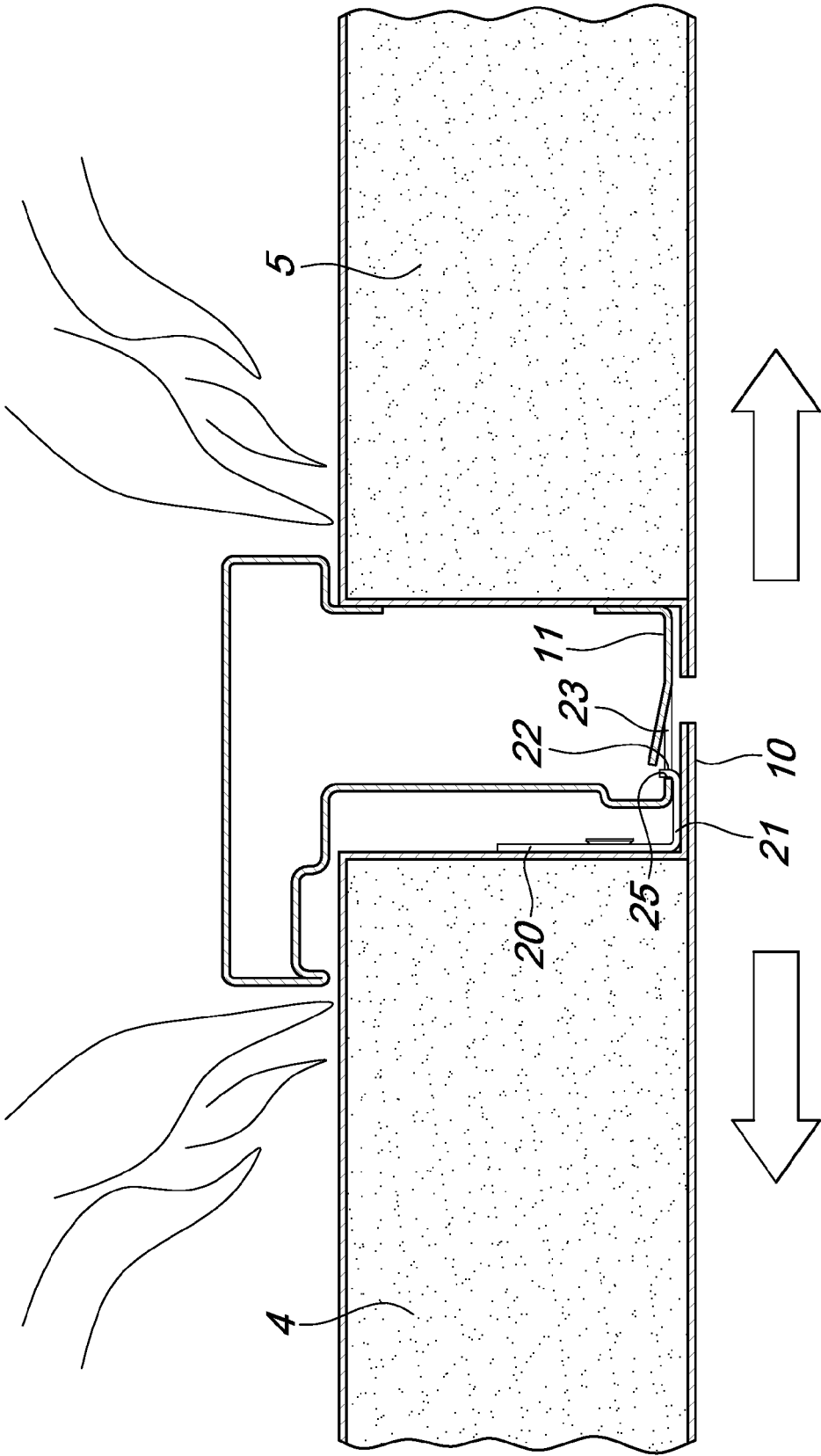
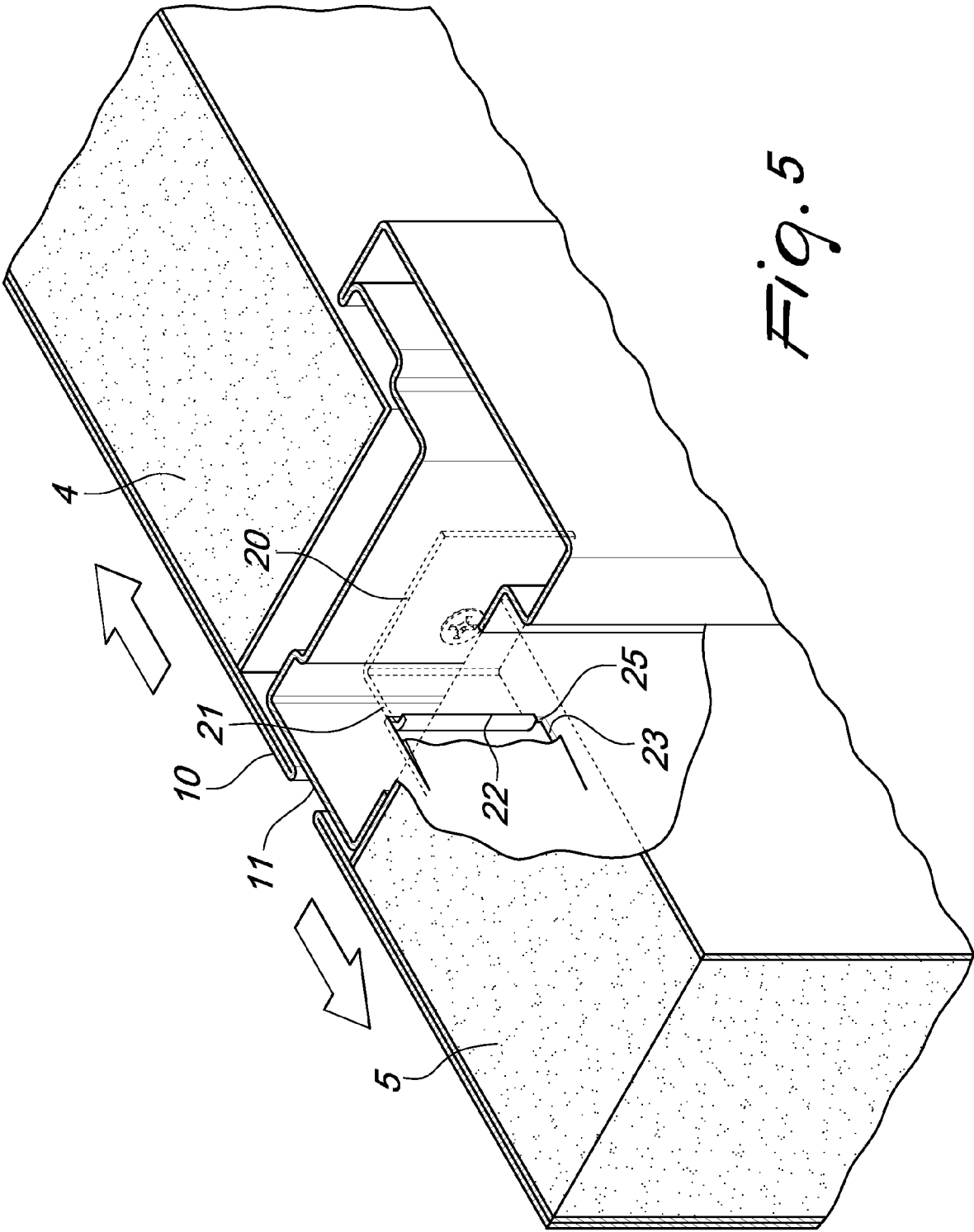


Fig. 4





EUROPEAN SEARCH REPORT

Application Number
EP 11 16 6476

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	AT 403 498 B (STEBA BRANDSCHUTZTORE GES M B [AT]) 25 February 1998 (1998-02-25) * figures 2a,2b,3a,3b * -----	1	INV. E06B3/36 E06B5/16
			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 1 September 2011	Examiner Verdonck, Benoit
CATEGORY OF CITED DOCUMENTS 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 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			

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

EP 11 16 6476

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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01-09-2011

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
AT 403498	B	25-02-1998	NONE

EPO FORM P0459

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

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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