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(54) **Seal and sealing device for door and window leaves**

(57) A seal for doors and windows (S), comprising a profile (2) made of a flexible material which is designed to be applied to an edge (B) of a door or window leaf (A), the profile (2) having an elongate connecting portion (3) with a longitudinal axis (L) from which at least one lower lip projection extends (4) to interact with the floor (P) or the threshold of the leaf (A). The lip projection (4) has a

first series of substantially transverse cuts (5) uniformly arranged along the entire longitudinal extent (l₄) thereof, and defining a plurality of independent flexible segments (6), which are adapted to allow the seal (1) to fit the irregularities of the floor (P) or the threshold (A) with low friction.

A sealing device for door and window leaves.

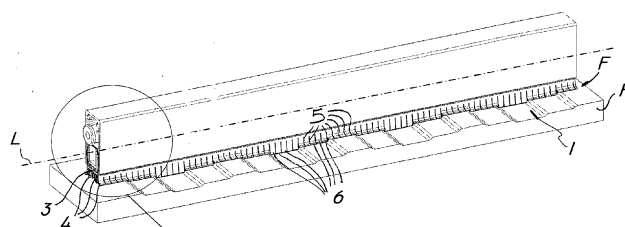


FIG. 2

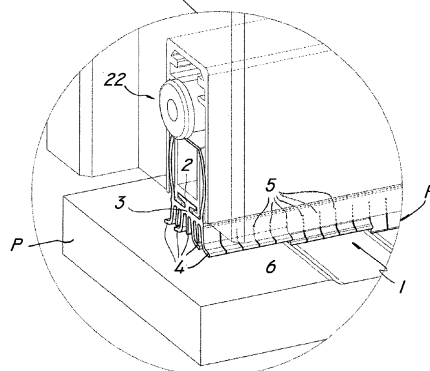


FIG. 3

Description

Field of the Invention

[0001] The present invention generally finds application in the field of heat and sound insulating devices for doors and windows, and particularly relates to a seal for door or window leaves.

[0002] The invention also relates to a sealing device for door and window leaves which incorporates such seal.

Background art

[0003] Seals are known to be used in door and window leaves for closing off any gap occurring between the leaf and either the floor or the threshold.

[0004] Particularly, insulating seals are generally adapted to be applied to the upper and/or lower edges of the leaf.

[0005] Thus, for example, these seals are typically applied to the lower edges of the doors to prevent the passage of air through the gap and enhance heat and sound insulation in the environment.

[0006] Furthermore, insulating seals are often designed to interact with appropriate actuator means which are adapted to cause vertical translation thereof, as the leaf is opened and closed.

[0007] Particularly, these actuator means keep the seal away from the floor as the leaf is opened and cause the seal to contact the floor when the leaf is closed.

[0008] A strong need in the art is that of providing seals for door and window leaves that ensure high insulation even when they have to close off gaps with irregular or indented profiles.

[0009] For this purpose, seals for door or window leaves have been provided, whose sealing edge is specially designed to fit the irregularities in the floor or the threshold.

[0010] For example, EP1905938 discloses an insulating seal for doors comprising a rail that is designed to fit into a longitudinal channel formed in the lower edge of the door, and a longitudinal sealing member held within the rail, and adapted to close off the gap between the floor and the door edge.

[0011] Particularly, the sealing member is flexible and has one or more continuous downwardly extending lip projections with respective free end edges designed to contact the floor or the threshold.

[0012] The relatively small thickness of the lip projections allows the end edge to fit the profile of the floor or the threshold even when the latter are uneven or irregular.

[0013] While this arrangement considerably improves the sealing action of the seal, it still suffers from certain drawbacks.

[0014] Particularly, a first drawback of this arrangement is that the continuous end edge of the lip projection

cannot fully conform to the profile of any type of floor or threshold.

[0015] Thus, the sealing effect of the lip projection is considerably reduced when the floor profiles to be insulated comprise tile joints extending to great lengths, of having particularly deep concavities or convexities.

[0016] A further drawback of this arrangement is that extended use of the seal may lead to a permanent alteration of the shape of the lip projections.

[0017] This occurs because the end edge of the latter tends to conform to the profile of the irregularities of the floor or the threshold, thereby affecting the sealing action of the seal.

[0018] Also, not last serious drawback of this arrangement is that the sealing member can be hardly removed from the rail, whereby no quick replacement thereof is possible, in case of wear or damage to the lip projections.

Disclosure of the invention

[0019] The object of the present invention is to obviate the above drawbacks, by providing a seal for door and window leaves that is highly efficient and relatively cost-effective.

[0020] A particular object of the present invention is to provide a seal for door and window leaves that has high insulation and soundproofing properties irrespective of floor or threshold conformations.

[0021] A further object of the present invention is to provide a seal for door and window leaves that provides high and substantially consistent efficiency.

[0022] Another object of the present invention is to provide a seal for door and window leaves that is easily replaceable when worn or damaged.

[0023] These and other objects, as better explained hereinafter, are fulfilled by a seal for doors and windows, particularly for hinged doors, sliding doors, windows or frames, comprising a profile made of a flexible material, which is designed to be applied to the lower edge of a door or window leaf, said profile having an elongate connecting portion with a longitudinal axis from which at least one lower lip projection extends to interact with the floor or the threshold of the leaf.

[0024] The seal is characterized in that said at least one lip projection has a plurality of substantially transverse cuts uniformly arranged along the entire longitudinal extent of the projection, and defining a plurality of independent flexible segments, which are adapted to allow the seal to fit the irregularities of the floor or the threshold with low friction.

[0025] These features will provide a weather and sound proofing seal for door and window leaves that allows insulation of gaps formed with irregular or uneven floors or thresholds and maintains a high degree of insulation even after a relatively great number of cycles of use.

[0026] In a further aspect, the invention relates to a sealing device for door and window leaves as defined in

claim 10.

[0027] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief Description of the Drawings

[0028] Further features and advantages of the invention will be more apparent upon reading of the detailed description of a few preferred, non-exclusive embodiments of a seal and a sealing device for door and window seals according to the invention, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIG. 1 is a perspective view of a sealing device applied to a door or window seal and interacting with a tiled floor;

FIG. 2 is a perspective view of a sealing device applied to a door or window seal and interacting with an irregular floor;

FIG. 3 is an enlarged view of a detail of Fig. 2;

FIG. 4 is a perspective view of a seal according to a first configuration;

FIG. 5 is a top view of the seal of Fig. 4, sectioned along the plane V-V;

FIG. 6 is a perspective view of a seal according to a second configuration;

FIG. 7 is a lateral view of the seal of Fig. 6, interacting with two different areas of an uneven floor.

FIGS. 8a to 10b show respective sectional top views of different forms of lip segments for the seals of Fig. 4 and Fig. 6;

FIGS. 11 and 12 are broken-away lateral views of the sealing device comprising the seals of Fig. 6 and Fig. 4 respectively;

FIG. 13 is a perspective view of a sliding door having a pair of seals of Fig. 6 installed therein.

Detailed description of a preferred embodiment

[0029] The above mentioned figures show a seal for door and window leaves, generally designated by numeral 1, which is designed to be applied to a door or a window S to act as a door bottom seal for weather proofing and for improved heat and sound insulation in the environment.

[0030] Namely, the seal 1 may be advantageously applied to an end edge B of a leaf A of a door or window S, to provide a sealing effect at a gap F with the floor P or a threshold that may have shape irregularities, due to the presence of joints K between tiles T, or flatness or tilt errors.

[0031] Furthermore, the seal 1 may be used to provide insulation and lateral protection in sliding doors Z or may be alternatively used to provide a sealing action on windows or other frames.

[0032] In its basic form, the seal 1 of the invention comprises a profile 2 made of a flexible material, which is

designed to be applied to the lower edge B of the leaf A, and has an elongate connecting portion 3 defining a longitudinal axis L, from which at least one lower projection 4 extends to interact with the floor P or the threshold of the leaf A.

[0033] Particularly, the profile 2 may be made of a flexible material selected from the group comprising elastomers and polymeric materials.

[0034] The profile 2 may be as long as or longer than the leaf A of the door or window S, such as to partially or entirely close off the gap F.

[0035] Conveniently, the lip projection 4 may extend downwards from the upper portion 3 along a substantially vertical transverse direction V.

[0036] According to a peculiar feature of the invention, the lip projection 4 has a plurality of substantially transverse cuts 5 uniformly arranged along the entire longitudinal extent 14 of the projection 4, thereby defining a plurality of independent lip segments 6, which are adapted to impart greater flexibility to the seal 1 and to allow it to fit the irregularities of the floor P or the threshold with low friction.

[0037] Due to this feature, each segment 6 may be elastically deformed in the vertical direction to fit the local profile of the floor P or the threshold, independently of the other profiles. Conveniently, the lip projections 4 may have equal longitudinal extents 14.

[0038] The cuts 5, as best shown in the figures, may be substantially vertical and perpendicular to the longitudinal axis L.

[0039] Furthermore, the cuts 5 may be longitudinally arranged with a substantially constant pitch p, to define segments 6 having substantially equal longitudinal extents.

[0040] For example, the cuts 5 may be arranged with a pitch p ranging from 1 mm to 10 mm, preferably of about 3 mm.

[0041] Conveniently, as best shown in the figures, the cuts 5 may have an extent w corresponding to part of the maximum height h of the lip projection 4 and the flexible segments 6 may be connected together at the remaining part of the maximum height h of at least one lip projection 4.

[0042] Furthermore, cuts 5 may have equal transverse extents w.

[0043] Nevertheless, it should be understood that the cuts 5 may be arranged with a variable pitch p and have different transverse extents w to define segments 6 of different sizes.

[0044] Conveniently, as best shown in FIGS. 4 and 5, the elongate body 3 may comprise a central tubular body 7 whose bottom face 8 is designed to contact the floor P or the threshold.

[0045] Also, the seal 1 may have a pair of lip projections, referenced 4, 4' in the figures, extending downwards from the sides of the central tubular body 7.

[0046] Each lip projection 4, 4' may have a respective plurality of independent segments 6 which are designed

to contact the floor P or threshold.

[0047] Thus, the seal 1 will provide an overall sealing action, resulting from the superimposed sealing actions of the tubular body 7 and each of the lip projections 4, 4' on the floor P or threshold.

[0048] Advantageously, the tubular body 7 may have a plurality of additional substantially transverse cuts 9, not shown, similar to those of the lip projections 4, 4'.

[0049] Cuts 9 are adapted to define a plurality of independent longitudinal tubular portions 10 in the tubular body 7, for helping the tubular body to fit the irregularities of the floor P or the threshold.

[0050] Particularly, the tubular portions 10 may undergo differentiated vertical compression to fit the irregularities and inclinations in the floor P or the threshold.

[0051] Conveniently, as best shown in FIGS. 2 and 3, the seal 1 may comprise a plurality of substantially parallel lip projections 4, extending downwards from the connecting portion 3.

[0052] The lip projections 4 may be composed of respective pluralities of lip segments 6, adapted to contact the floor P or threshold.

[0053] Here, the overall sealing action of the seal 1 results from the sum of the sealing actions of the individual lip projections 4 on the floor P or threshold.

[0054] Conveniently, as shown in FIG. 7, the lip projections 4 may have differentiated heights f for selective thereof with the floor P or threshold, upon downward translation of the seal 1, occurring as the leaf A is being closed.

[0055] Conveniently, as shown in FIGS 8a to 9b, the corresponding cuts 5 of the individual lip projections 4 may lie on substantially vertical and longitudinally staggered planes n.

[0056] Namely, as shown in FIG. 8a, the cuts 5 may lie on planes n perpendicular to the longitudinal axis L.

[0057] Such arrangement of the cuts, as schematically shown in FIG. 8b, provides respective sequences of segments 13 aligned in respective horizontal directions X, perpendicular to the longitudinal axis L.

[0058] Alternatively, as shown in FIG. 9a, the cuts 5 may lie on planes π perpendicular to the longitudinal axis L, such that the lip segments 6 of the individual projections 4 may be arranged in staggered relationship to respective horizontal directions X perpendicular to the longitudinal axis L, as schematically shown in FIG. 9b.

[0059] Furthermore, as shown in FIG. 10a, the cuts 5 may lie on planes ψ that are substantially vertical and inclined to the longitudinal axis L, at a predetermined inclination angle α .

[0060] Such arrangement of the cuts 5, as schematically shown in FIG. 10b, provides respective sequences 13 of segments 6 aligned in respective directions Y inclined to the longitudinal axis L at said inclination angle α .

[0061] In a further aspect, the invention also relates to a sealing device 14 for leaves A of doors and windows S, as best shown in FIGS. 11 and 12, comprising an elongate support 15, which is adapted to fit into a channel

C formed in the lower edge B of the leaf A.

[0062] The elongate support 15 holds therein a weather and sound proofing type of seal 1 as described above.

[0063] According to a peculiar feature of the device 14, the seal 1 comprises at least one lip projection 4 having a plurality of substantially transverse cuts 5 uniformly arranged along the entire longitudinal extent of the projection 4, thereby defining a plurality of independent lip segments 6, which are adapted to allow the seal 1 to fit the local irregularities of the floor or the threshold with low friction.

[0064] The seal 1 may comprise a plurality of longitudinal lip projections 4 in substantially uniformly staggered arrangement, as shown in FIG. 11, or may comprise a tubular body 7 and a pair of lip projections 4, 4', as shown in FIG. 12.

[0065] Conveniently, the elongate support 15 may be substantially U-shaped, to define an inner housing 16 for the seal 1.

[0066] The latter comprises a substantially longitudinal elongate connecting portion 3, which has a pair of transverse arms 19, 20 at the ends 17, 18, for interaction with the inner wall 21 of the compartment 16 and easier friction fit of the seal 1 therewith.

[0067] Conveniently, the device 14 may comprise actuator means 22, which are located within the support 15 and act upon the seal 1 to cause vertical translation t thereof, and compression of the lip projection 4 against the floor P or threshold.

[0068] Particularly, the actuator means 22 may be designed to cause vertical translation t of the seal from an inoperative position at least partially retracted in the compartment 16 to an operative position at least partially projecting from the compartment 16.

[0069] In the inoperative position the lip projection 4 may be spaced from the floor P or the threshold for the leaf A of the door or window S to be opened.

[0070] On the other hand, in the operative position, the lip projection 4 may be compressed onto the floor P or the threshold to provide weather and sound proofing.

[0071] Particularly, the operative position may be assumed when the user causes the leaf A of the door or window S to close.

[0072] Conveniently, as best shown in FIG. 11, the actuator means 22 may comprise a substantially U-shaped longitudinal interface element 23 having an outer edge 24 at least partially in contact with the seal 1.

[0073] Furthermore, the actuator means 23 may comprise a pushing member, not shown, which is vertically movable and adapted to interact with the inner edge 25 of the interface element 23 or with the upper wall 26 of the seal to cause translation t thereof between the inoperative position and the operating position.

[0074] The seal 1 may be stably connected with the interface element 23 through appropriate mutual coupling means 27.

[0075] Particularly, the mutual coupling means 27 may be of interlocking type and may comprise a first coupling

member 28 formed in the connecting portion 3 of the seal 1 and a second coupling member 29, whose shape is substantially complementary to that of the first coupling member 28, formed in the outer edge 24 of the interface element 23.

[0076] The presence of interlocking means 27 will afford very quick and simple removal or replacement of the seal 1 of the device 14.

[0077] Conveniently, as best shown in FIG. 13, at least one seal of the invention, preferably a pair of seals 1, 1' may be applied to the side leaves A, A' of a sliding door Z for lateral protection thereof and for providing weather proofing and improving heat and sound insulation in the environment.

[0078] Particularly, the seals 1, 1' may have a specially shaped connecting portion 3, 3', which is designed to slidably fit into dedicated channels C, C' formed on the mutually facing edges of the leaves A, A'.

[0079] Conveniently, the lip portions 4 of the seals 1, 1' may extend in longitudinal directions L, L' substantially orthogonal to the sliding direction R of the door Z.

[0080] The above disclosure clearly shows that the invention fulfills the intended objects and particularly meets the requirement of providing a seal and a sealing device affording a high weatherproofing effect regardless of the type of floor or threshold.

[0081] The seal and sealing device of this invention are susceptible to a number of changes or variants, within the inventive concept disclosed in the annexed claims. All the details thereof may be replaced by other technically equivalent parts, and the materials may vary depending on different needs, without departure from the scope of the invention.

[0082] While the seal and the device have been described with particular reference to the accompanying figures, the numerals are only used for the sake of a better intelligibility of the invention and shall not be intended to limit the claimed scope in any manner.

Claims

1. A seal for doors and windows, particularly for door shutters, sliding doors, windows or frames, comprising a profile (2) made of a flexible material designed to be positioned to an edge (B) of a door or window leaf (A), said profile (2) having an elongate connection portion (3) with a longitudinal axis (L) from which at least one lower lip projection (4) extends to interact with the floor (P) or the threshold of the leaf (A);
characterized in that said at least one lip projection (4) has a first series of substantially transverse cuts (5) uniformly distributed along the whole longitudinal extent (l_4) of said at least one lip projection (4) and defining a plurality of flexible segments (6) independent from each other and adapted to allow the seal (1) to fit the irregularities of the floor (P) or of the threshold (A) with low friction.

2. Seal as claimed in claim 1, **characterized in that** said cuts (5) extend over part of the maximum height (h_4) of said at least one lip projection (4), said flexible segments (6) being connected to each other in correspondence to the remaining part of the maximum height (h_4) of said at least one lip projection (4).
3. Seal as claimed in claim 1, **characterized in that** said elongate connection portion (3) comprises a central tubular body (7) with a lower face (8) designed to contact engage the floor (P) or the threshold.
4. Seal as claimed in claim 3, **characterized by** comprising a pair of lip projections (4) arranged at the sides of said central tubular body (7).
5. Seal as claimed in claim 3, **characterized in that** said central tubular body (7) has a series of substantially transverse further cuts (9) defining in said body (7) a plurality of tubular portions (10) independent from each other adapted to allow said body (7) to fit the irregularities of the floor (P) or of the threshold.
6. Seal as claimed in any preceding claim, **characterized by** comprising a substantially parallel plurality of lip projections (4) which extend from said connection portion (3).
7. Seal as claimed in any preceding claim, **characterized in that** said cuts (5) are placed on respective substantially vertical and longitudinally staggered planes (π).
8. Seal as claimed in claim 6, **characterized in that** said planes (π) are substantially orthogonal to said longitudinal axis (L).
9. Seal as claimed in any preceding claim from 1 to 4, **characterized in that** said cuts (5) are located on substantially vertical planes (ψ) inclined with respect said longitudinal axis (L) with a predetermined inclination angle (α).
10. A sealing device (14) for door or window (S) leaf (A), comprising an elongate supporting member (15) adapted to be inserted into a channel (C) formed on the edge (B) of the door or window (S) leaf (A), said supporting member having an inner seat (16) designed for housing one airtight and sound-proof seal (1) in accordance with one or more the preceding claims.
11. Device as claimed in claim 10, **characterized by** comprising actuator means (22) located in said seat (16) of said supporting member (15) and acting on said seal (1) to promote the vertical translation (t) thereof with respect the floor (P) or the threshold.

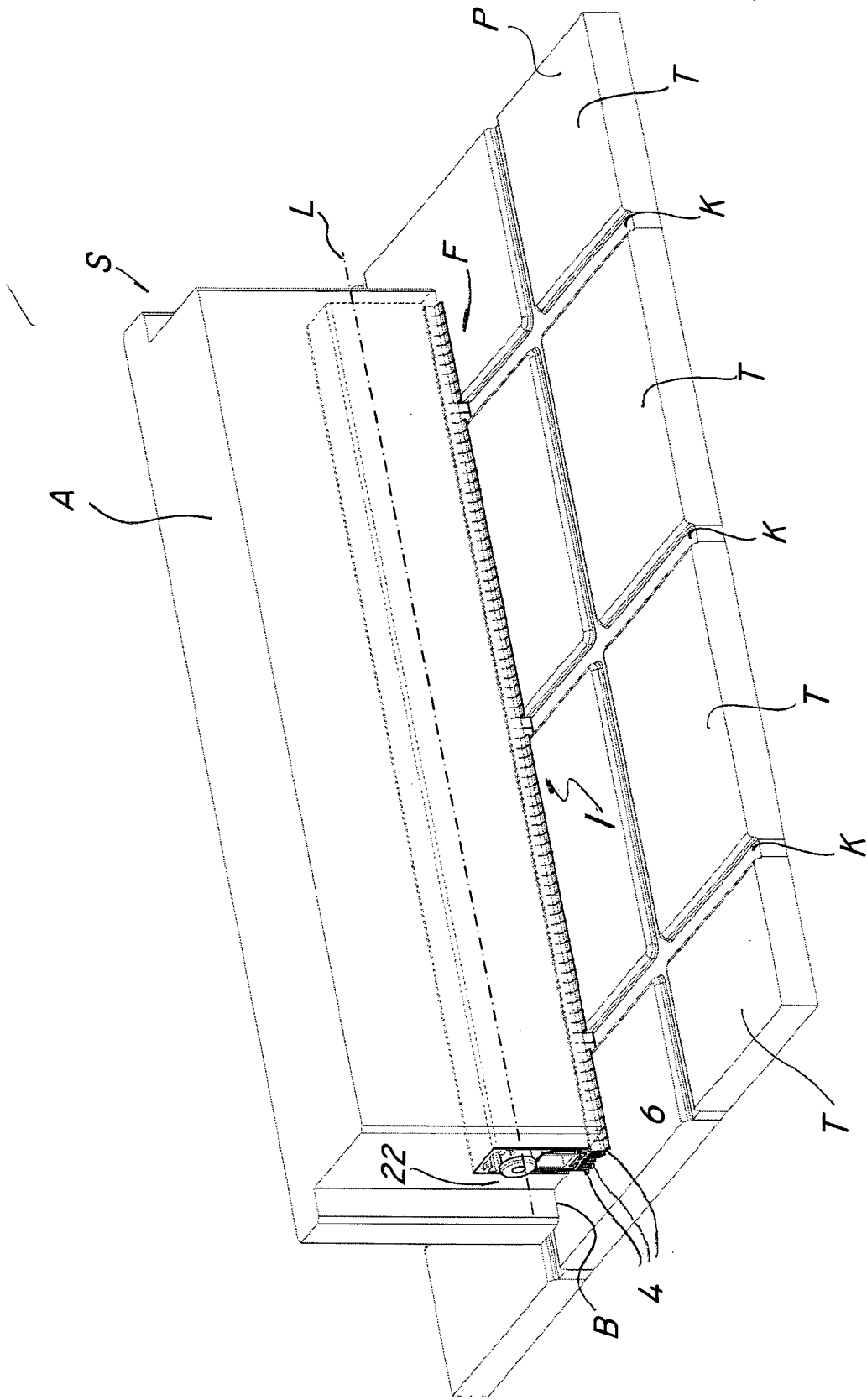


FIG. 1

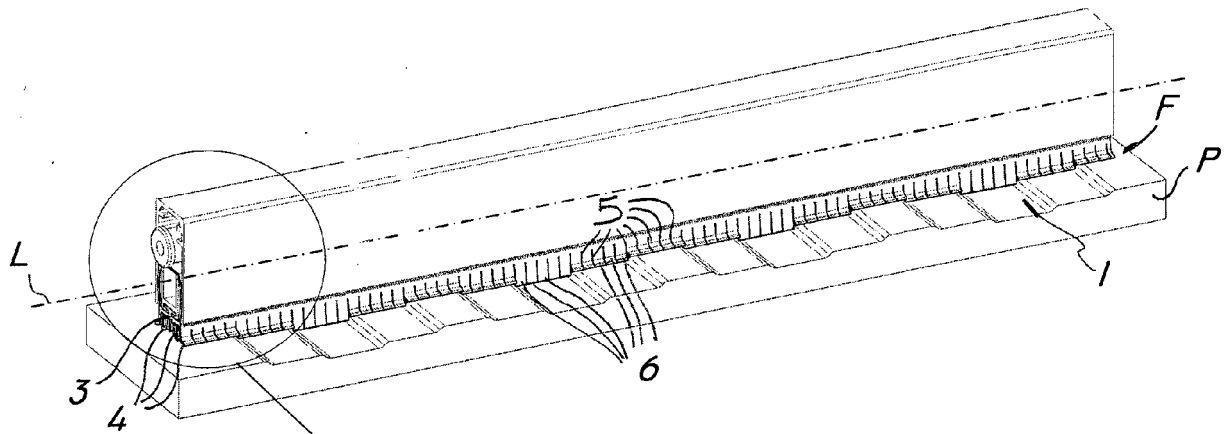


FIG. 2

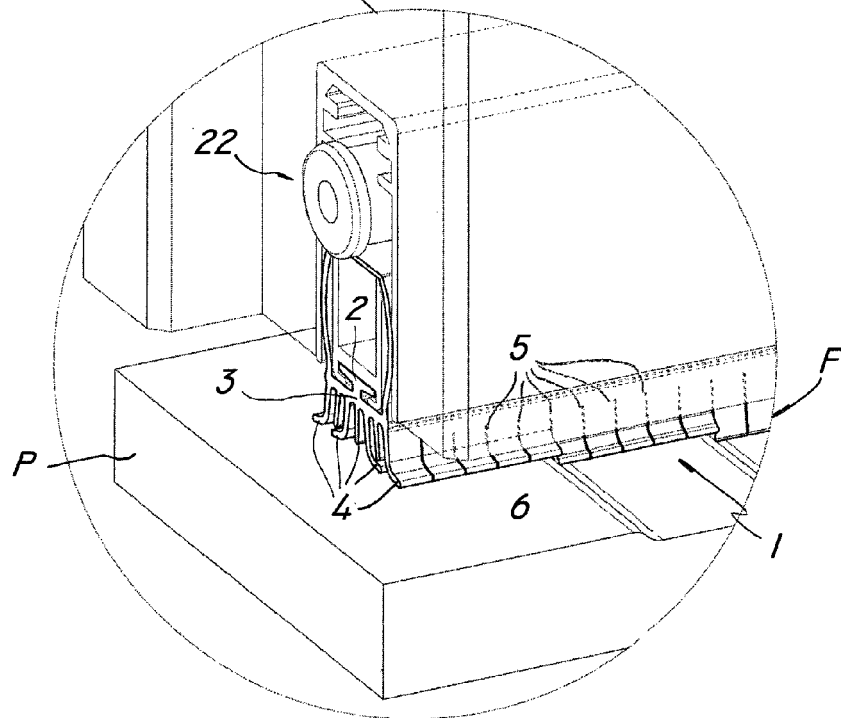


FIG. 3

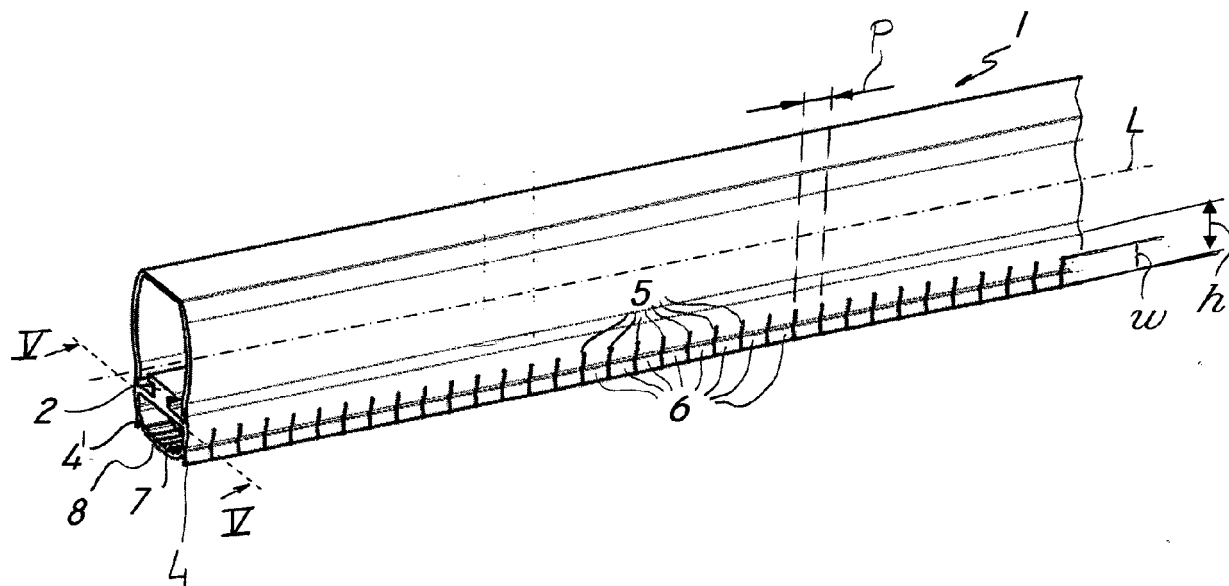


FIG. 4

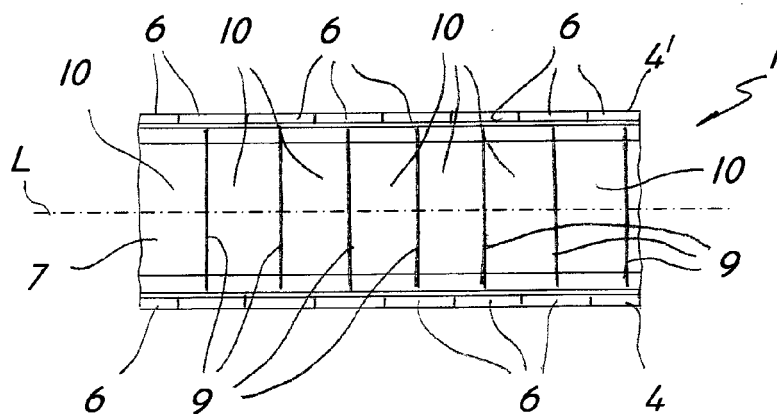


FIG. 5

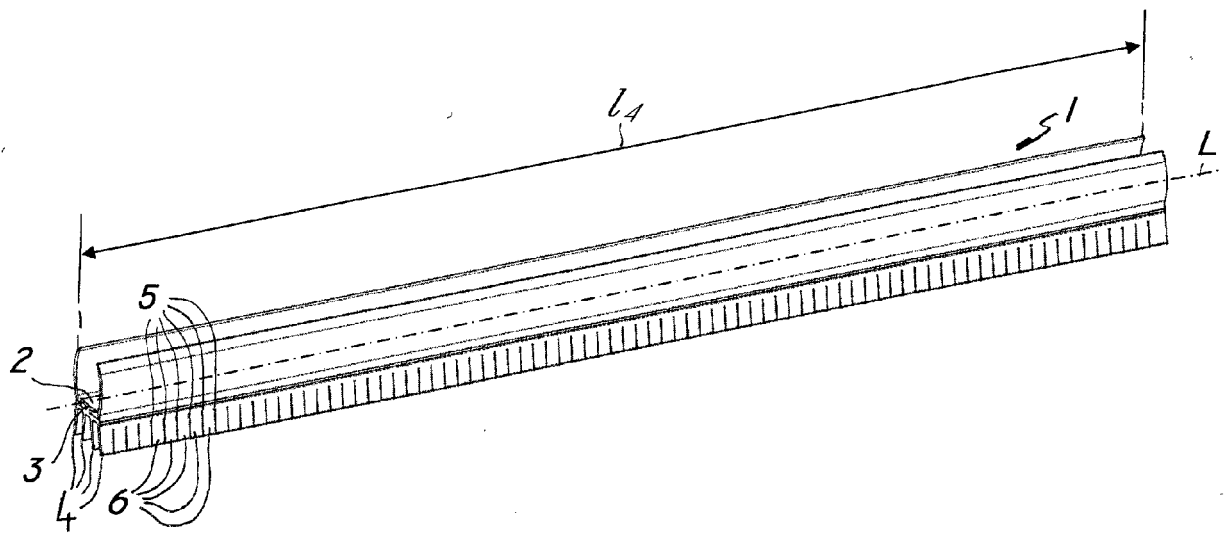


FIG. 6

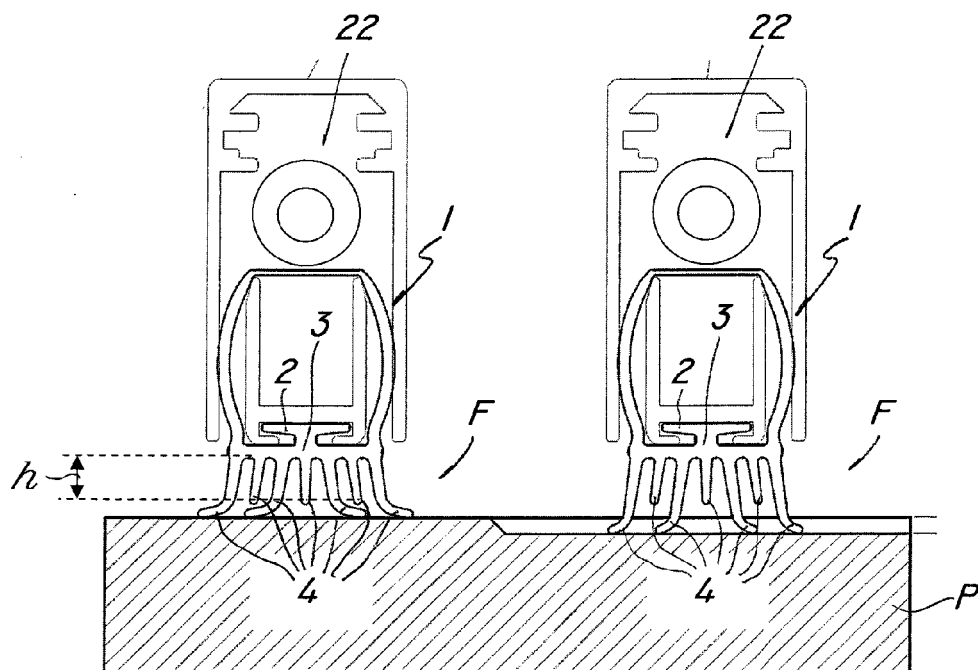
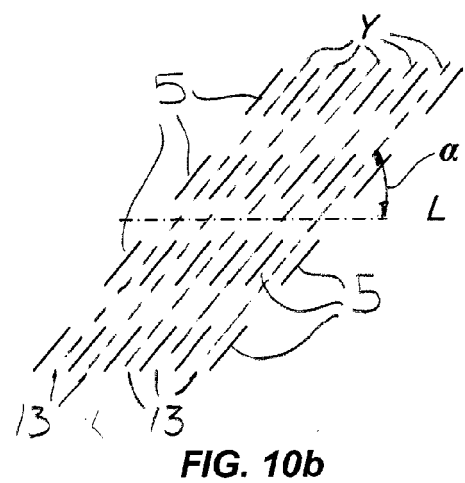
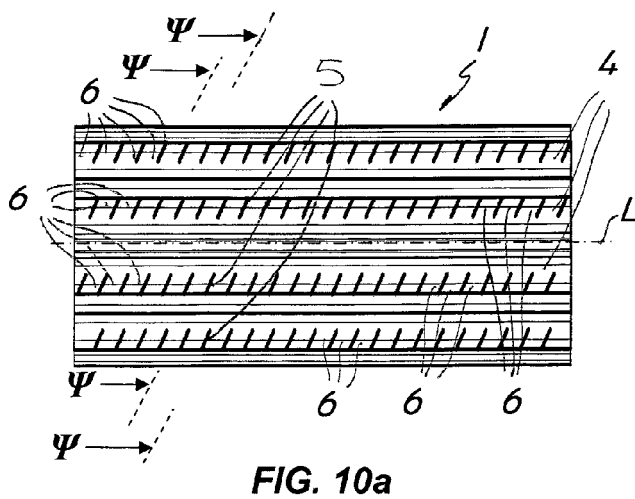
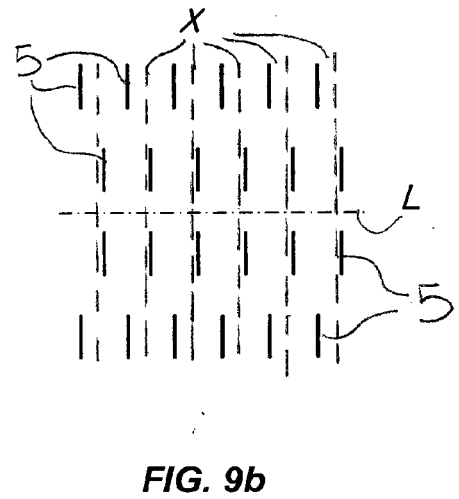
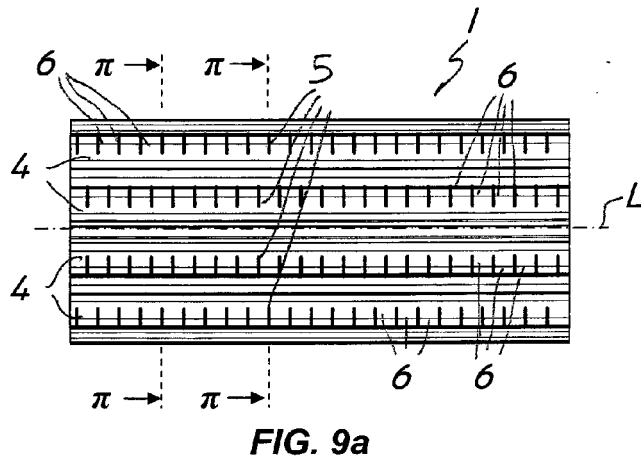
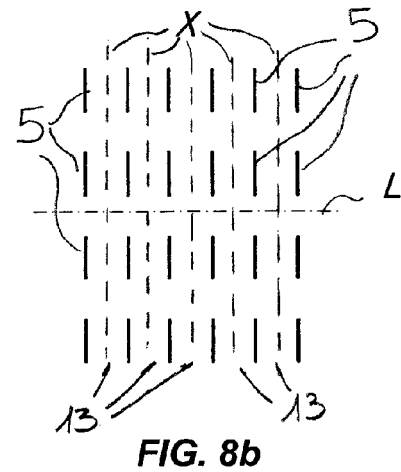
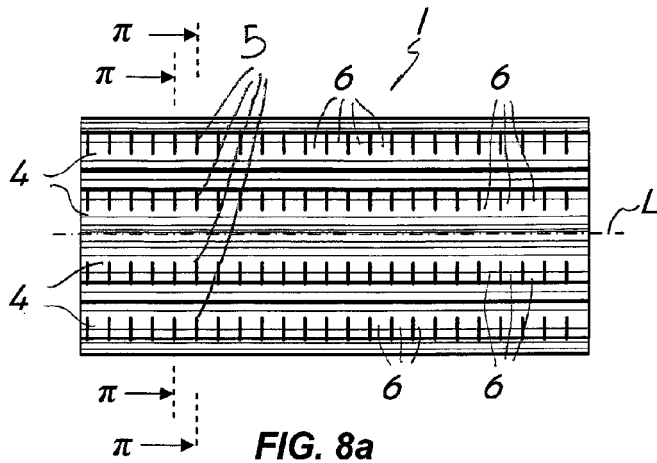


FIG. 7



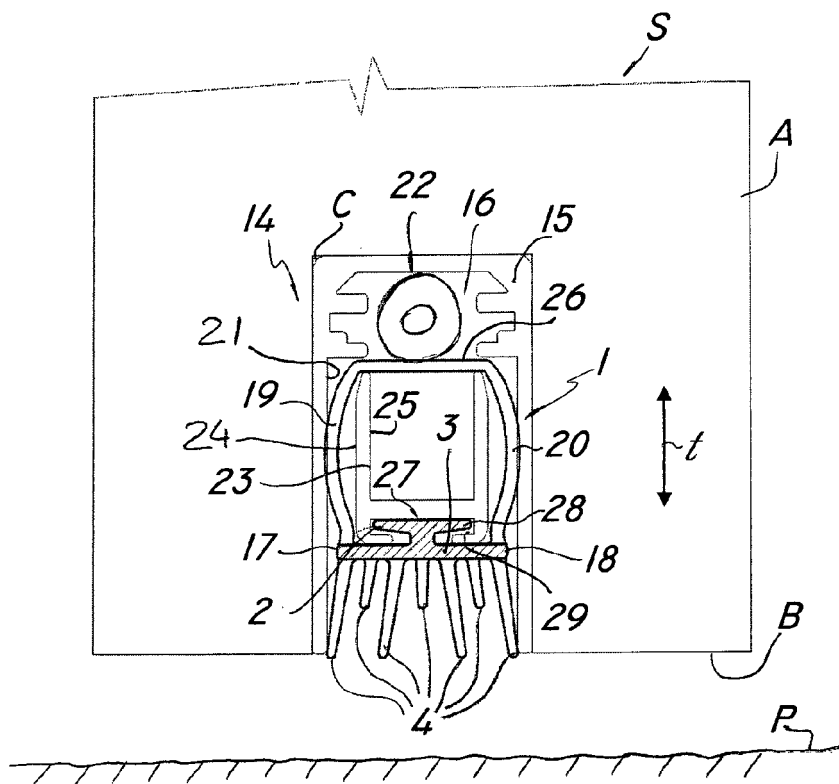


FIG. 11

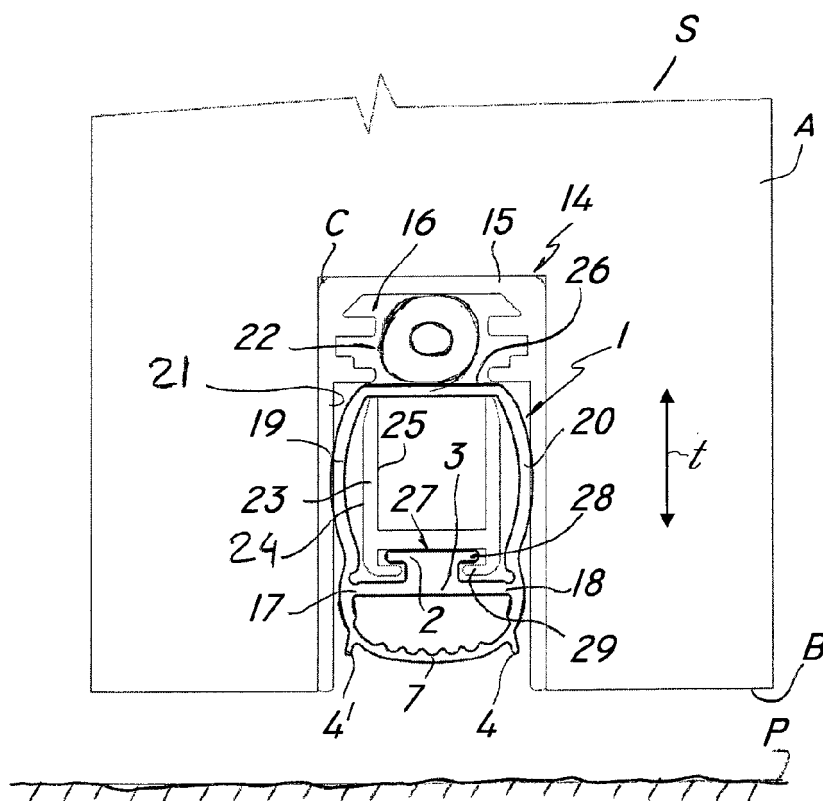


FIG. 12

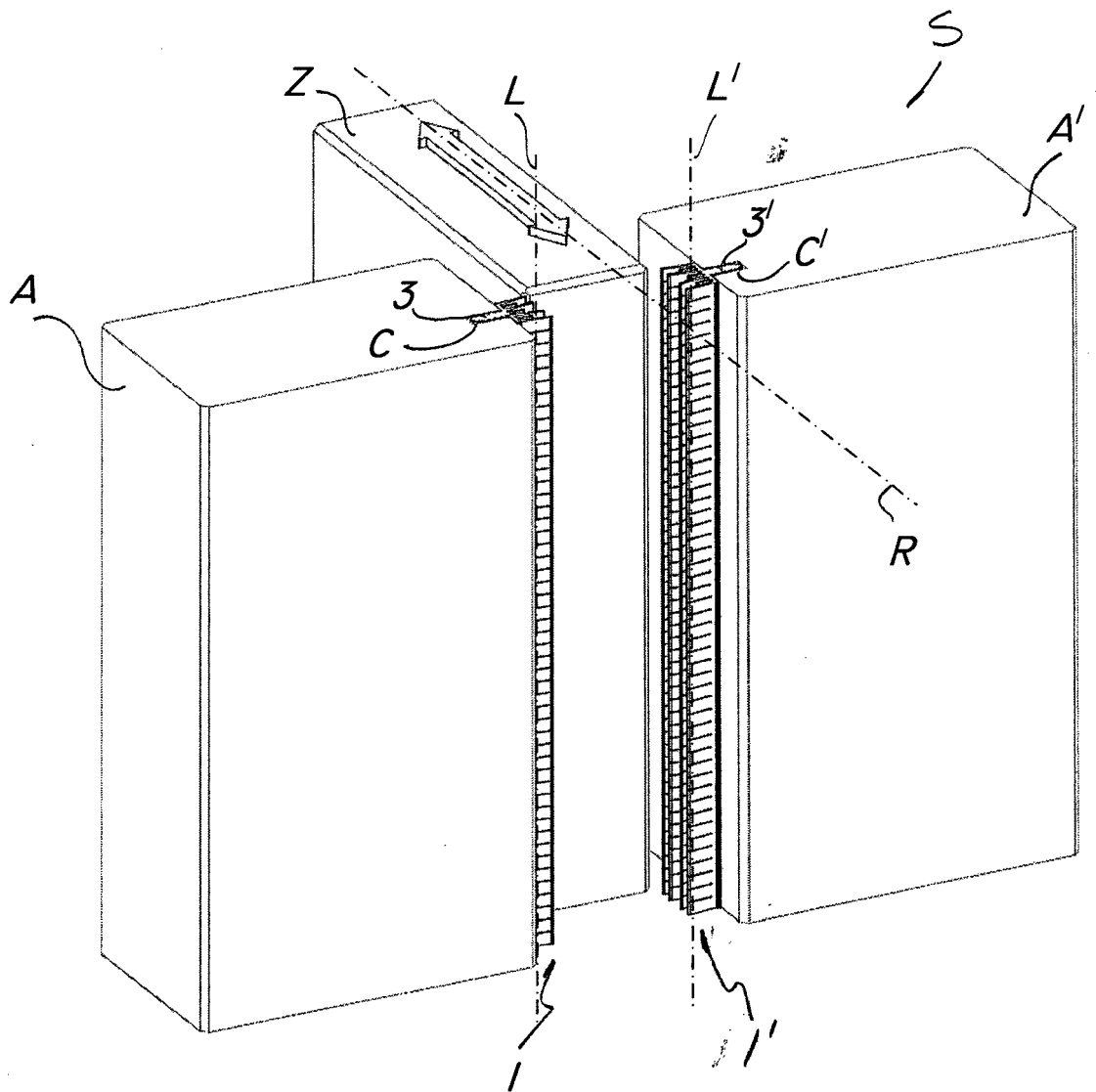


FIG. 13



EUROPEAN SEARCH REPORT

Application Number
EP 14 00 0531

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			E06B
The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 23 May 2014	Examiner Kofoed, Peter
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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 14 00 0531

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

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