

(19)



(11)

EP 3 473 795 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
24.04.2019 Bulletin 2019/17

(51) Int Cl.:
E06B 1/70 (2006.01) **E06B 7/23 (2006.01)**
E06B 1/20 (2006.01)

(21) Application number: **18201794.7**

(22) Date of filing: **22.10.2018**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB
GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO
PL PT RO RS SE SI SK SM TR
 Designated Extension States:
BA ME
 Designated Validation States:
KH MA MD TN

(71) Applicant: **Geron, Luca**
31033 Castelfranco Veneto (TV) (IT)

(72) Inventor: **Geron, Luca**
31033 Castelfranco Veneto (TV) (IT)

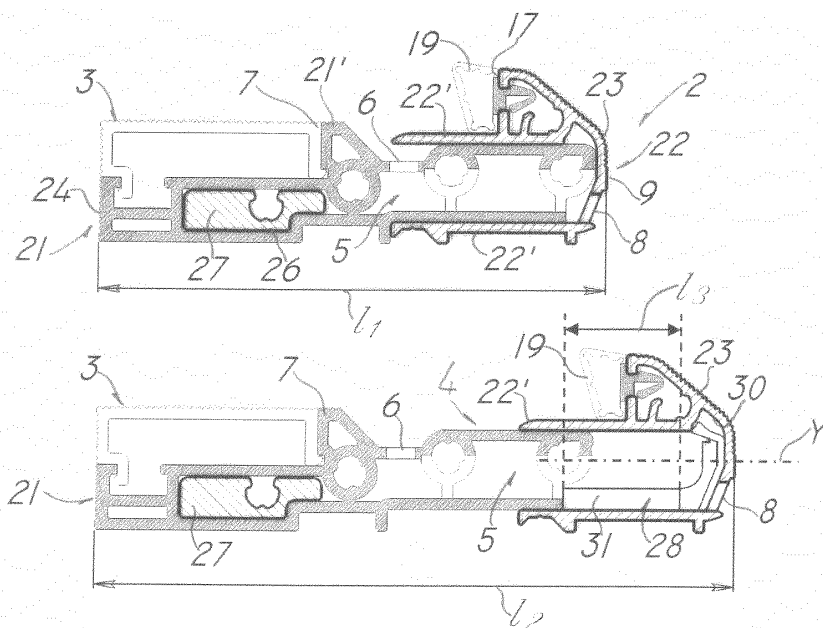
(74) Representative: **Maroscia, Antonio**
Maroscia & Associati Srl
Piazza del Castello, 26
36100 Vicenza (IT)

(30) Priority: **23.10.2017 IT 201700119699**

(54) ANTI-WATER SEEPAGE SYSTEM FOR A DOOR FRAME

(57) An anti-water seepage system (1) for a door/window (S), such as a door or a gate, wherein the door/window (S) comprises a frame (T) with a pair of substantially vertical posts (M), a leaf (L) having one side (L₁) facing outwards (O) and one side (L₂) facing inwards in the room (R) in which it is installed. The leaf (L) comprises a substantially horizontal bottom edge (B_{INF}) with an inner corner (V₂) and an outer corner (V₁). The system (1) comprises a raised threshold (2), which is longitudinally attached to the ground (F) and has a predetermined transverse dimension (l₁) and a drip member (10) adapted to

be fixed to the leaf (L) at its outer corner (V₁), and designed to abut the raised threshold (2) to convey water to the exterior (O) and prevent seepage into the room (R). The raised threshold (2) and drip member (10) comprise respective mutually facing surfaces (17, 18) with a first longitudinal seal (19) interposed therebetween to provide a seal against seepage. The threshold (2) has a telescopic structure which is adapted to change the transverse dimension (l₁) to fit the transverse dimensions of the posts (M) and the leaf (L).

**FIG. 6****EP 3 473 795 A1**

Description

Field of The Invention

[0001] The present invention generally finds application in the field of doors and windows and particularly relates to an anti-water seepage system.

Background art

[0002] Systems have been long known to be installed in the door/window leaves, to prevent water seepage between outside and inside environments.

[0003] These systems are provided in different forms depending on how the doors/windows are to be closed and the position thereof with respect to the outside environment.

[0004] Generally, these systems include a seal mounted to a raised threshold installed at the floor or ground and adapted to abut the bottom edge of the leaf.

[0005] These systems, which are adapted to be used in windows and doors having a frame with vertical posts, must have a seal whose length coincides with the width of the leaf and has a high anti-water sealing properties at the threshold.

[0006] However, such systems are not easily installed and the posts often have sizes and shapes that prevent the raised threshold from ensuring a continuous seal against water seepage of water over the entire width of the leaf.

[0007] In order to at least partially obviate these drawbacks, anti-seepage systems have been developed, which comprise connection devices which are adapted to join a raised threshold to the posts of a door/window frame in such a position as to ensure a sealing effect even at the lower portions the latter.

[0008] EP3014041 discloses an anti-water seepage system comprising a raised threshold having an aluminum section and a corner adapter installed at the bottom of each post and adapted to connect the raised threshold to the door/window frame.

[0009] In addition, the adapter comprises a plurality of seals adapted to prevent water seepage between the threshold and the post, an elongate portion which is adapted to be attached to the raised threshold and a vertical portion whose shape matches the shape of the outer profile of the post to facilitate attachment to the door/window frame.

[0010] A first drawback of this arrangement is that the seals only partially act on the posts of the door/window frame and on the raised threshold, thereby limiting the overall sealing efficiency of the system.

[0011] A further drawback is that the seals create a barrier against water seepage of water whose height is equivalent to that of the threshold and therefore limited to use with water levels of reduced height.

[0012] A further drawback of this arrangement is that the raised threshold has no passage for discharge of con-

densation water collected in the gap between the bottom edge of the leaf and the raised threshold to the outside environment.

[0013] In order to at least partially obviate these drawbacks systems have been developed that can drain the water collected between the door/window frame and the leaf.

[0014] EP2246513 discloses an adapter device for a raised threshold comprising a substantially L-shaped profile with a horizontal portion whose shape matches that of the raised threshold and a vertical portion for installation on the inner surface of the post.

[0015] In addition, the adapter comprises at least one opening adapted to collect any seeping water and drain it underneath the raised threshold.

[0016] A first drawback of this arrangement is that the raised threshold can be fitted on the post of the door/window frame only by means of adapter that allows seeping water drainage. This drawback prevents the raised threshold from being mounted to an existing door/window frame.

[0017] A further drawback is that the adapter device and the raised threshold can be installed on doors/windows having predetermined shapes and sizes and cannot therefore be adapted to doors/windows whose shapes and sizes differ from the standard.

[0018] US5345722 discloses an anti-water seepage system in a door/window as defined in the preamble of claim 1.

Technical Problem

[0019] In light of the prior art, the technical problem addressed by the present invention is to provide an anti-water seepage system that can be mounted to types of doors or frames having different shapes and sizes and able to effectively block water seepage and ensure a stable sealing effect over time.

Disclosure of the invention

[0020] The object of the present invention is to solve the above mentioned problem, by providing an anti-water seepage system for a door or window that is highly efficient and relatively cost-effective.

[0021] A particular object of the present invention is to provide a system as described hereinbefore that can be installed on and adapted for use with different types of doors and windows, having different shapes and sizes.

[0022] Another object of the present invention is to provide a system as described hereinbefore that can block seepage even at the posts of the door/window frame.

[0023] A further object of the present invention is to provide a device as described hereinbefore that can effectively prevent massive water seepage.

[0024] Another object of the present invention is to provide a system as described hereinbefore that can drain the collected condensation water.

[0025] A further object of the present invention is to provide a system as described hereinbefore that is robust and simple to use.

[0026] Yet another object of the present invention is to provide a system as described hereinbefore that does not alter the exterior appearance of the door or window on which it is installed.

[0027] A further object of the present invention is to provide a system as described above that has a high thermal efficiency.

[0028] The above mentioned objects, as well as others that will be more clearly explained hereinafter, are fulfilled by an anti-water seepage system for a door/window, such as a door or a gate, as defined in claim 1, wherein the door/window comprises a frame with a pair of substantially vertical posts, a leaf having one side facing outwards and one side facing toward the interior of the room in which it is installed, the leaf having a substantially horizontal bottom edge with an inner corner and an outer corner.

[0029] The system comprises a raised threshold, which is longitudinally attached to the ground and has a predetermined transverse dimension and a drip member adapted to be fixed to the leaf at its outer corner, and designed to abut the raised threshold to convey water to the exterior and prevent seepage into the room.

[0030] Moreover, the raised threshold and drip member comprise respective mutually facing surfaces with a first longitudinal seal interposed therebetween to provide a seal against seepage and the threshold has a telescopic structure which is adapted to change the transverse dimension to fit the transverse dimensions of the posts and the leaf.

[0031] Advantageous embodiments of the invention are obtained in accordance with the dependent claims.

Brief Description of The Drawings

[0032] Further features and advantages of the invention will be more apparent from the detailed description of one or more preferred, non-exclusive embodiments of an anti-water seepage system for a door or window, which is described as a non-limiting example with the help of the annexed drawings, in which:

FIGS. 1 to 2 are perspective views of the inventive system, installed in the door/window frame;
FIGS. 3 to 4 are perspective views of the system of Figs. 1 and 2 without door/window frame;
FIG. 5 is a sectional view with two respective enlarged portions of the inventive system.
FIG. 6 is a sectional view of a detail of the system of Fig. 5 in two different operating configurations;
FIG. 7 is a top sectional view of the system of the previous figures;
FIGS. 8A to 8C are sectional side views of three different embodiments of a first detail of the system of the invention;

FIGS. 9 and 10 are perspective and sectional views of a second detail of the system of the invention.

Detailed description of a preferred exemplary embodiment

[0033] Particularly referring to the figures, an anti-water seepage system is described, generally designated by numeral 1, for a door/window S. For example, water seepage may result from heavy rain on the door/window S or from internal condensation.

[0034] The door/window S may be of the door or gate type, made of an impermeable material such as PVC, aluminum or wood treated with waterproof paints.

[0035] As best shown in FIGS. 1 and 2, the door/window S comprises a frame T having a pair of substantially vertical posts M and a leaf L hinged to one of its posts M, to pivot about a substantially vertical axis.

[0036] Alternatively, the door/window S may comprise a pair of leaves L, each hinged to the vertical posts M and comprising a respective contact surface which is adapted to seal one leaf against the other.

[0037] The posts M and the leaf L each comprise a transverse dimension based on the thickness of the wall of the room R in which the door/window S is installed.

[0038] In addition, the leaf L comprises one side L_1 facing outwards O, and one side L_2 facing inwards toward the interior R of the room and comprises a substantially horizontal bottom edge B_{INF} with an outer corner V_1 and an inner corner V_2 .

[0039] As best shown in FIG. 7, the leaf L and the posts M may comprise a plurality of substantially vertical seals G placed along their lateral edges B_{LAT} and facing the leaf L and its respective post M respectively.

[0040] Each post M may comprise an auxiliary section A, also known in the art as "renovation profile" and shown in greater detail in FIGS. 1 and 2, which has a predetermined width and is adapted to be placed at the front of the wall to cover any defects or damage thereof caused by replacement or renovation of the door or window S.

[0041] In a preferred embodiment of the invention, the system 1 comprises a raised threshold 2 located underneath the leaf L and defining a longitudinal axis X. Furthermore, the threshold 2 is longitudinally attached to the ground F between the posts M.

[0042] As is known per se, the raised threshold 2 may have a predetermined transverse dimension I_1 which is adapted to provide stability to the frame T and block water seepage into the door/window S.

[0043] The raised threshold 2 may be coupled to a slip-resistant metal section 3 facing toward the interior of the room R and adapted to enhance friction as people walk from the room R to the exterior O thereof.

[0044] Advantageously, the raised threshold 2 may comprise a central portion 4 having a path 5 for drainage of seeping condensed water generated between the leaf L and the threshold 2.

[0045] This drainage path 5 may comprise an inlet

opening 6 formed on the top surface 7 of the threshold 2 and a discharge opening 8 formed on the front surface 9 thereof level with the ground F.

[0046] Furthermore, the system 1 comprises a drip member 10 which is adapted to be fixed to the leaf L at its outer corner V_1 , and is designed to abut the raised threshold 2 to convey water to the exterior O and prevent seepage into the room R.

[0047] The drip member 10 may comprise a substantially V-shaped aluminum section with a substantially horizontal flat internal wall 11 secured to the bottom edge of the leaf B_{INF} and an inclined outer wall 12 that contacts the outer side L_1 of the leaf L and adapted to convey water.

[0048] The flat inner wall 11 of the drip member 10 may comprise a plurality of holes 13 for receiving fastener means 14 to fix the drip member 10 to the outer corner V_1 of the leaf L.

[0049] Furthermore, the inclined outer wall 12 may comprise, at its bottom edge 15 facing the threshold 2, a brush with flexible bristles 16 adapted to block the draft directed toward the room R when the leaf L rests on the raised threshold 2.

[0050] The inclined outer wall 12 may be formed with different shapes, as shown in FIGS. 8A to 8C, to facilitate installation of the drip member 10 on outer corners V_1 of leaves having different sizes and allowing extension toward the raised threshold 2. In addition, the drip member 10 may have a longitudinal dimension selected to entirely cover the outer corner V_1 of the leaf L.

[0051] Advantageously, the raised threshold 2 is attached to the ground in a vertically offset position and at a predetermined distance h_1 from the drip member 10, as shown in FIG. 5.

[0052] Furthermore, the threshold 2 and the drip member 10 comprise respective mutually facing vertical surfaces 17, 18 with a first longitudinal seal interposed therebetween 19 to provide a seal against seepage of water when the leaf L is in the closed position, abutting the threshold 2.

[0053] The first seal 19 may be made of a flexible material, selected from the group comprising elastomers or polymeric materials and may have the same length as the leaf L or the pair of leaves to seamlessly maintain sealing properties against water seepage.

[0054] As shown in FIG. 5, the vertical surface 18 of the drip member 10 is rigidly joined to the flat inner wall 11 thereof and is also joined to the bottom edge 15 of the inclined outer wall 12 by means of a connecting portion 18', which is also inclined.

[0055] Furthermore, the vertical surface 18 that faces the threshold 2 is oriented toward the exterior O, and is coplanar with the outer side L_1 of the leaf L along a substantially vertical plane π .

[0056] By this arrangement, when the leaf L is in the closed position, the system 1 may ensure that the door/window S will have a seal class "9A" by providing peripheral continuity between the door/window S and the

raised threshold 2.

[0057] In a first embodiment, the drip member 10 may comprise at least one pair of end-closing caps 20 which are interposed between the lateral edge B_{LAT} of the leaf L at the outer corner V_1 and a vertical seal G of the corresponding post M.

[0058] Furthermore, in a second embodiment, not shown in the figures, and comprising a door/window S having a pair of leaves L, the drip member 10 may comprise a pair of end-closing caps 20 at the opening between the two leaves L.

[0059] The closing caps 20 can ensure seamless peripheral sealing against water seepage between the seals G of the posts M and the first longitudinal seal 19 of the threshold 2 by forming an extension of the drip member 10.

[0060] According to a peculiar aspect of the invention, the threshold 2 has a telescopic structure which is adapted to change the transverse dimension l_1 to fit the transverse dimensions of the posts M and the leaf L.

[0061] Namely, the threshold 2 may comprise an elongate section having an inner portion 21 that can be secured to the ground F and an outer portion 22 that is slidably fitted on the inner portion 21 in the transverse direction Y to telescopically change the transverse dimension l_1 of the threshold 2.

[0062] The inner portion 21 may be made of a plastic material whereas the outer portion 22 may be made of a metal material such as aluminum.

[0063] As shown in FIGS. 5 and 6, the front edge 23 of the outer portion 22 may be hollow and projecting out of to the outer corner V_1 of the leaf L and comprises the vertical surface 17 with the first seal 19 facing the drip member 10.

[0064] Furthermore, the outer portion 22 of the threshold 2 may comprise a pair of transverse arms 22' which are rigidly joined to the front edge and are adapted to slidably receive the inner portion 21 therein.

[0065] The rear edge 24 of the inner portion 21 of the raised threshold 2 may define an abutment surface for the inner corner V_2 of the leaf L with the interposition of a second longitudinal seal 25.

[0066] By this arrangement, the condensation water generated between the leaf L and the threshold 2 can be blocked by the second longitudinal seal 25 and will be able to flow to the exterior O through the drainage path 5 of the raised threshold 2.

[0067] Advantageously, the top surface 7 of the threshold 2 with the inlet opening 6 of the drainage path 5 formed therein corresponds to the top face 21' of the inner portion 21. Furthermore, the surface 9 of the threshold 2 in which the discharge opening 8 is formed corresponds to the front edge 23 of the outer portion 22.

[0068] The inner portion 21 may comprise at least one elongate receptacle 26, for receiving a rigid reinforcement member 27 which is adapted to allow introduction of anchor means, not shown, for securing the threshold 2 to the ground F and prevent undesired deformations

of the latter.

[0069] As shown in FIG. 6, the system 1 comprises at least one first spacer 28 that is adapted to be fitted between the inner portion 21 and the outer portion 22 to telescopically change the transverse dimension l_1 of the threshold 2 to a desired value l_2 .

[0070] The first spacer 28 may comprise a substantially continuous end part 29 which is designed to abut an inner face 30 of the front edge 23 of the outer portion 22, with a plurality of transverse appendages 31 extending therefrom to abut the facing edge 32 of the inner portion 21.

[0071] Advantageously, the first spacer 28 may have a predetermined transverse width l_3 , and may be selected from a plurality of first spacers 28 having different transverse widths l_3 to set the desired value l_2 of the transverse dimension of the raised threshold 2.

[0072] By this arrangement, the raised threshold 2 will be configured to transversely extend upon introduction of the first spacer 28 and to have a transverse dimension l_2 that is greater than the predetermined dimension l_1 by a value corresponding to the transverse width l_3 selected from the different widths.

[0073] Namely, the different transverse widths l_3 of the first spacers 28 depend on the transverse dimensions of their transverse appendages 31, whereas the size of the end part 29 remains constant.

[0074] These transverse appendages 31 may allow the raised threshold 2 to discretely cover all possible transverse dimensions of the posts M and transverse widths between the inner corner V_2 and the outer corner V_2 of the leaves L, or at least a range from a minimum of 70 mm to a maximum of 90 mm.

[0075] Conveniently, a plurality of first spacers 28 having the same transverse width l_3 may be simultaneously received in the outer portion 22.

[0076] In addition, a second spacer 33 may be provided, which is adapted to fit into the drip member 10 between the outer corner V_1 of the bottom edge B_{INF} of the leaf L and the flat inner wall 11 to change the predetermined distance h_1 to a desired distance h_2 .

[0077] Namely, the second spacer 33 may comprise a flat portion 34 that contacts the flat inner wall 11 of the drip member 10 and has a plurality of substantially vertical appendages 35 extending therefrom, for abutment against the outer corner V_1 of the leaf L.

[0078] Advantageously, the second spacer 33 may have a predetermined height h_3 and may be selected from a plurality of second spacers 33 having different heights h_3 , to selectively adjust the predetermined distance h_1 between the threshold 2 and the drip member 10. Particularly, each second spacer 33 may have vertical appendices 35 having different heights.

[0079] The second spacers 33 may comprise one or more fixation holes 36 for receiving the fastener means 14 that fix the drip member 10 to the leaf L, so that may be stably placed therein.

[0080] In addition, the drip member 10 may comprise a third longitudinal seal 37 interposed between the in-

clined wall 12 and the outer side L_1 of the leaf L to further block seepage.

[0081] Any seepage of condensation water formed between the leaf L and the raised threshold 2 may be blocked by a fourth longitudinal seal 38 interposed between the flat inner wall 11 of the drip member 10 and the bottom edge B_{INF} of the leaf L.

[0082] It will be appreciated that the position of the drip member 10 relative to the outer portion 22 of the threshold 2, due to the interposition of the second spacer 33, and the position of the inner portion 21 of the threshold 2 relative to the inner corner V_2 of the leaf L due to the interposition of the first spacer 28 is essentially for to entirely block water seepage into the door/window S.

[0083] The first 28 and second 33 spacers may be made of a rigid plastic material plastic or may be selected from the group comprising low-elasticity rubbers having a high skin friction coefficient.

[0084] Preferably, the system 1 may comprise a pair of substantially prismatic blocks 39 laid at the end zones 40 of the raised threshold 2 and installed at the bottom of the bases of the posts M.

[0085] As shown in FIGS. 9 and 10, these blocks 39 may have a peripheral shape that matches the shape the post M and a bottom surface 41 that is adapted to sealingly interact with the raised threshold 2 and with the posts M to prevent water seepage therebetween.

[0086] The bottom surface 41 of each block 39 may have a shape that substantially mates the shape of the top surface 7 of the raised threshold 2 and a substantially flat top surface 42 that contacts the base of the posts M.

[0087] Namely, each of the prismatic blocks 39 may comprise a substantially rectangular lateral plate 43 and a lateral seal 44 for facilitating attachment thereof to the post M by means of appropriate lock means 45.

[0088] Each prismatic block 39 may be coupled to vent element 46 having a substantially Z-shaped cross-section and adapted to be mounted to the post M at the front surface 9 of the threshold 2.

[0089] In addition, a compensating member 47, as best shown in FIGS 1 to 4, may be provided for each prismatic block 39, which is fixed in a transverse position relative to the block 39 and under the auxiliary section A of the post M.

[0090] The compensating member 47 will be adapted to block the wall gap between the bottom edge of the auxiliary section A and the threshold 2 and may have adjustable dimensions to fit the width of the auxiliary section A.

[0091] It will be appreciated from the foregoing that the system of the invention fulfills the intended objects and particularly provides effective anti-water seepage properties, may be installed in a plurality of doors and windows and provides effective anti-water seepage properties while ensuring a stable sealing effect over time.

Industrial Applicability

[0092] The present invention may find application in industry, because it can be produced on an industrial scale in factories for production of sealing elements for doors and windows and may be used for various applications, e.g. for commercial, industrial and private purposes.

Claims

1. An anti-water seepage system (1) for a door/window (S), such as a door or a gate, wherein the door/window (S) comprises a frame (T) with a pair of substantially vertical posts (M), a leaf (L) having one side (L₁) facing outwards (O) and one side (L₂) facing inwards, toward the interior of the room (R) in which it is installed, the leaf (L) having a substantially horizontal bottom edge (B_{INF}) with an inner corner (V₂) and an outer corner (V₁), which system (1) comprises a raised threshold (2) which is longitudinally attached to the ground (F) and has a predetermined transverse dimension (I₁), wherein said threshold (2) has a telescopic structure and comprises an elongate section having an inner portion (21) that can be secured to the ground (F) and an outer portion (22) that is slidably fitted on said inner portion (21) in the transverse direction (Y) to telescopically change the transverse dimension (I₁) to adapt said threshold (2) to the transverse dimensions of the posts (M) and the leaf (L); **characterized in that** it comprises at least one first spacer (28) that is adapted to be fitted between said inner portion (21) and said outer portion (22) to change the transverse dimension (I₁) of the threshold (2) to a desired value (I₂).
2. System as claimed in claim 1, **characterized in that** the front edge (23) of said outer portion (22) is hollow and projects out of the outer corner (V₁) of the leaf (L), the rear edge (24) of said inner portion (21) defining an abutment surface for the inner corner (V₂) of the leaf (L) with the interposition of a second longitudinal seal (25).
3. System as claimed in claim 1, **characterized in that** said at least one first spacer (28) comprises a substantially continuous end part (29) which is designed to abut an inner face (30) of the front edge (23) of said outer portion (22), with a plurality of transverse appendages (31) extending therefrom to abut the facing edge (32) of said inner portion (21), said first spacer (28) having a predetermined transverse width (I₃).
4. System as claimed in claim 1, **characterized in that** said at least one first spacer (28) may be selected from a plurality of first spacers (28) having different transverse widths (I₃) to set said desired value (I₂) of the transverse dimension of the threshold (2).
5. System as claimed in claim 1, **characterized in that** it comprises a drip member (10) which is adapted to be fixed to the leaf (L) at its outer corner (V₁), and is designed to abut said raised threshold (2) to convey water to the exterior (O) and prevent seepage into the room (R).
6. System as claimed in claim 5, **characterized in that** said raised threshold (2) and said drip member (10) comprise respective mutually facing surfaces (17, 18) with a first longitudinal seal (19) interposed therebetween to provide a seal against seepage.
7. System as claimed in claim 5, **characterized in that** said drip member (10) comprises an aluminum section with a flat inner wall (11) and an inclined outer wall (12) for conveying water, a third longitudinal seal (37) being interposed between said inclined wall (12) and the outer side (L₁) of the leaf (L).
8. System as claimed in claim 5, **characterized in that** said threshold (2) is attached to the ground (F) in a vertically offset position and at a predetermined distance (h_i) from said drip member (10), at least one second spacer (33) being provided, which is designed to be fitted into said drip member (10) between the outer corner (V₁) of the bottom edge (B_{INF}) of the leaf (L) and said flat inner wall (11) of said drip member (10) to adjust said predetermined distance (h_i).
9. System as claimed in claim 8, **characterized in that** said at least one second spacer (33) comprises a flat portion (34) that contacts the flat inner wall (11) of said drip member (10) and has a plurality of substantially vertical appendages (35) extending therefrom for abutment against the outer corner (V₂) of the Leaf (L), said second spacer (33) having a predetermined height (h₃).
10. System as claimed in claim 8, **characterized in that** said at least one second spacer (33) may be selected from a plurality of second spacers (33) having different heights (h₃) to selectively change said predetermined distance (h_i).
11. System as claimed in claim 1, **characterized in that** it comprises a pair of substantially prismatic blocks (39) placed at the end zones (40) of said raised threshold (2) under the bases of the posts (M), said blocks (39) having a bottom surface (41) that is adapted to sealingly interact with said raised threshold (2) and said posts (M) to block water seepage therebetween.

12. System as claimed in claim 11, **characterized in that** each of said prismatic blocks (39) is coupled to vent element (46) having a substantially Z-shaped cross-section and adapted to be mounted to the post (M) at the front surface (9) of said threshold (2).

5

10

15

20

25

30

35

40

45

50

55

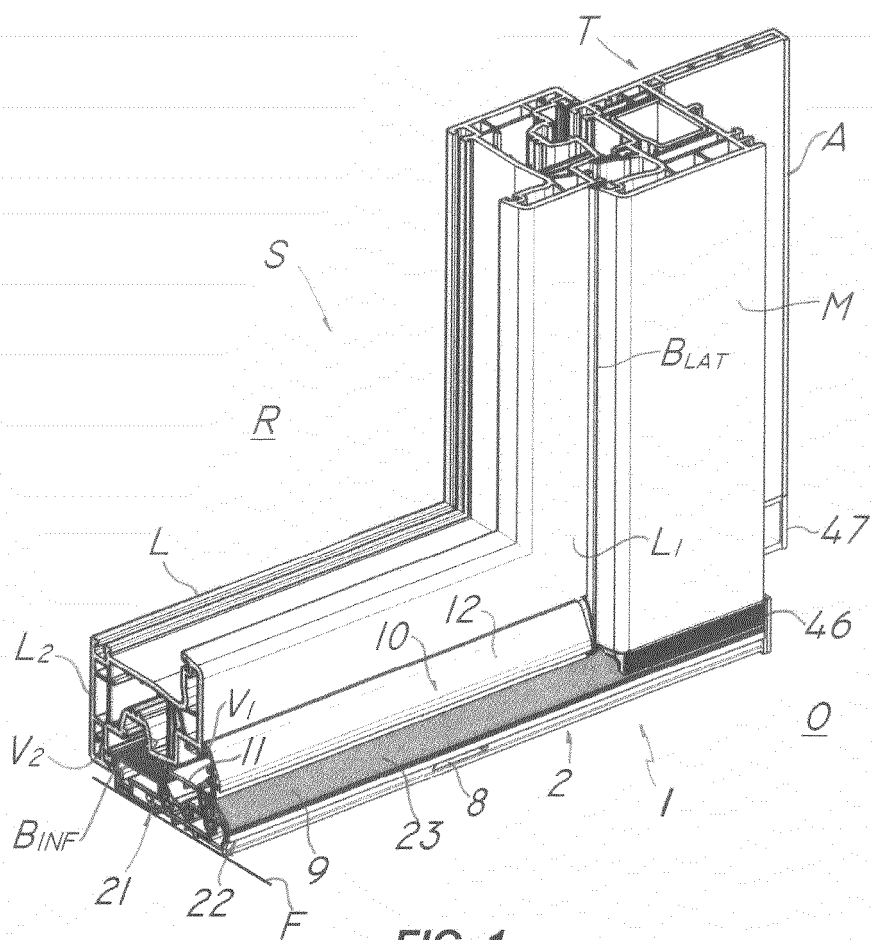


FIG. 1

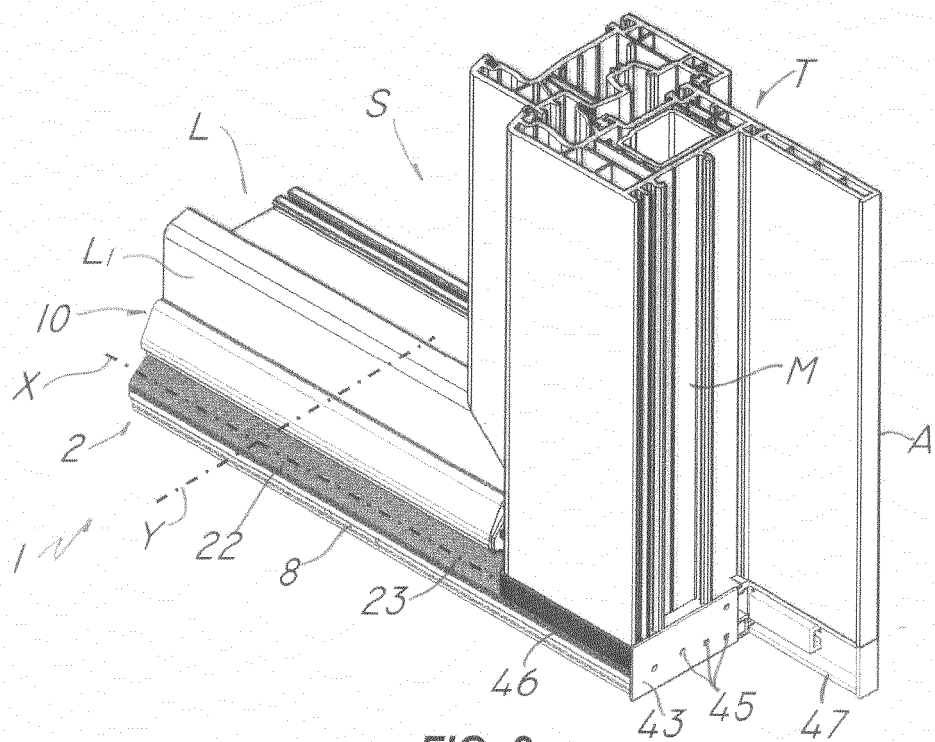


FIG. 2

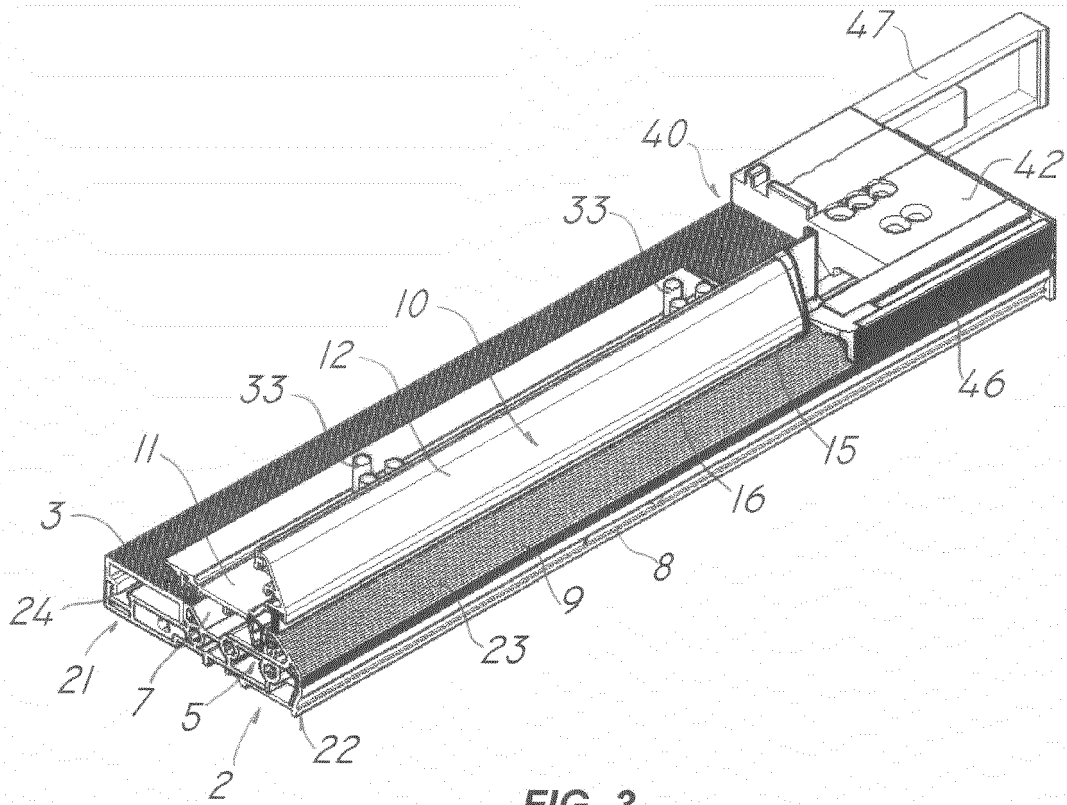


FIG. 3

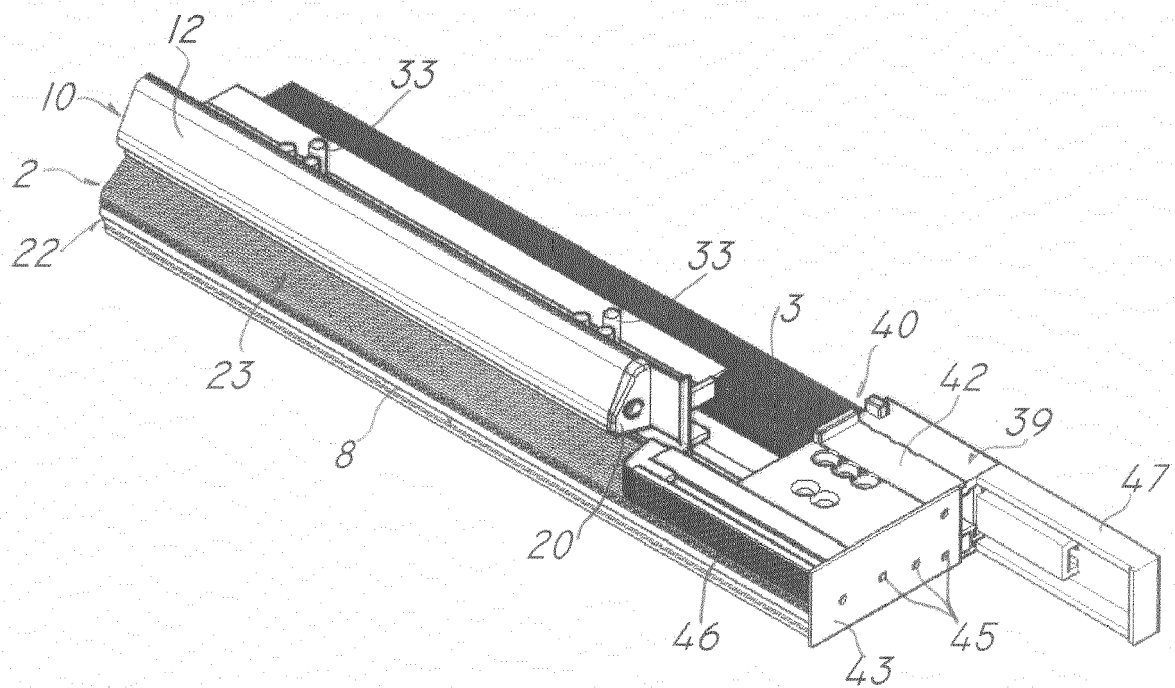


FIG. 4

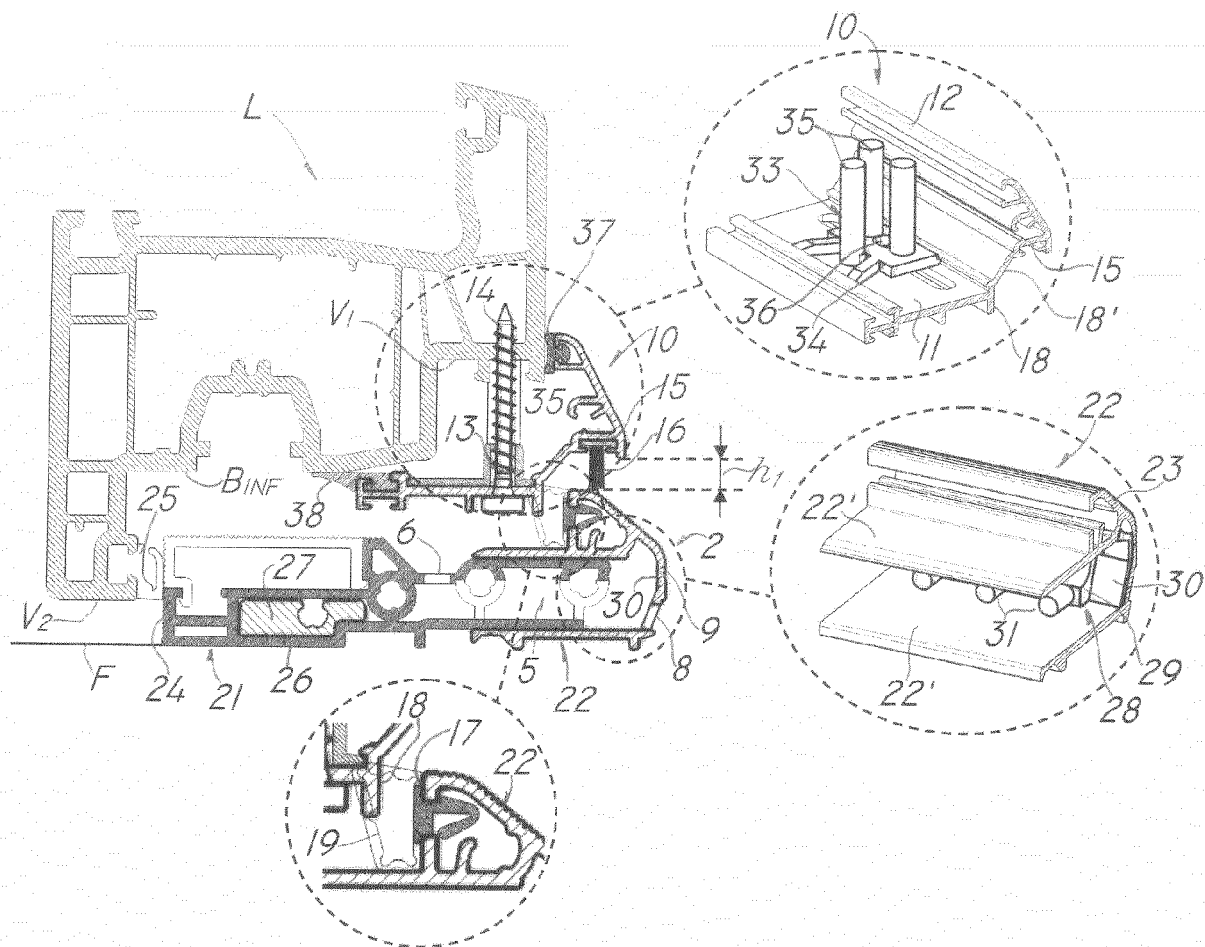


FIG. 5

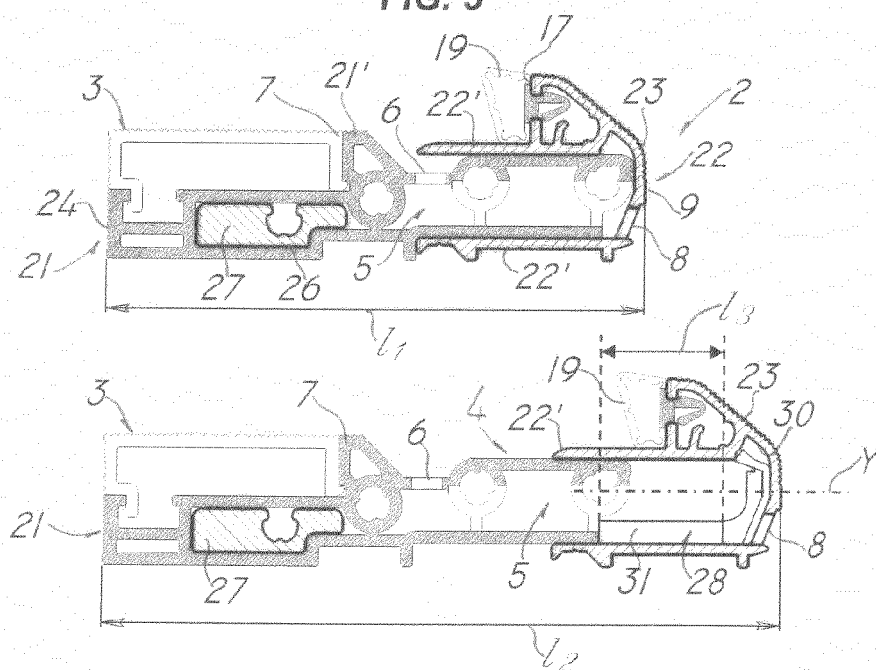


FIG. 6

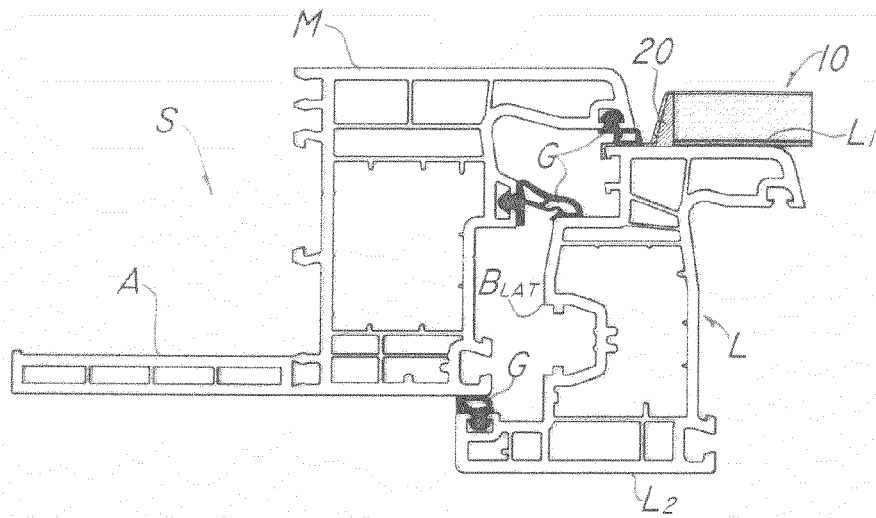


FIG. 7

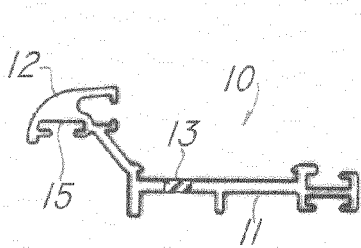


FIG. 8A

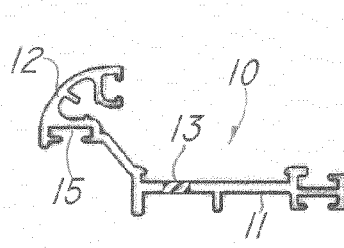


FIG. 8B

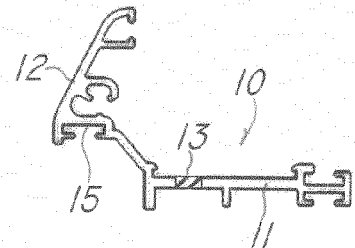


FIG. 8C

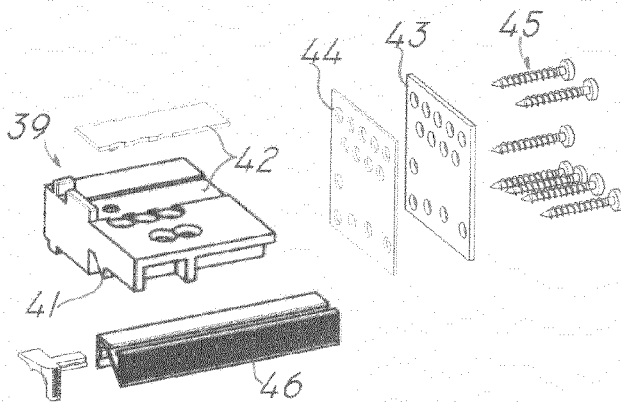


FIG. 9

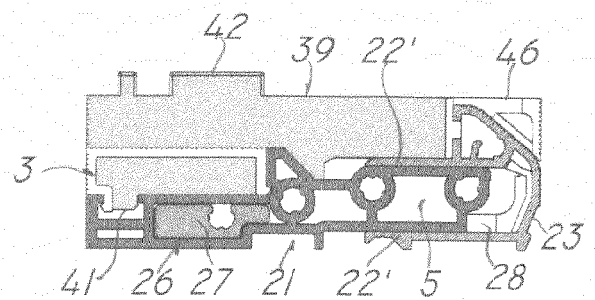


FIG. 10



EUROPEAN SEARCH REPORT

Application Number
EP 18 20 1794

5

10

15

20

25

30

35

40

45

50

55

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
A	US 5 345 722 A (MCKANN H SMITH [US]) 13 September 1994 (1994-09-13) * figure 1 * -----	1-12	INV. E06B1/70 E06B7/23 E06B1/20
			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 5 February 2019	Examiner Crespo Vallejo, D
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			

 1
EPO FORM 1503 03.02 (P04C01)

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

EP 18 20 1794

5 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.

05-02-2019

10	Patent document cited in search report	Publication date	Patent family member(s)	Publication date
	US 5345722	A	13-09-1994	NONE
15	-----			
20				
25				
30				
35				
40				
45				
50				
55				

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

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- EP 3014041 A [0008]
- EP 2246513 A [0014]
- US 5345722 A [0018]