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(54) Device and method for water-draining connection of a window to a wall, and such assembly

(57) The present invention relates to a device for water-draining connection of a window frame to a first wall, comprising a first substantially stiff body which is suitable for extending in standing position at least along the first wall over substantially the whole width of the window frame, and a second substantially stiff body which connects watertightly to the first body and which is suitable for extending in lying position over substantially the whole width of the window frame into a second wall located opposite the first wall.

The invention also relates to an assembly of a cavity wall and a device for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, and to a method for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf.

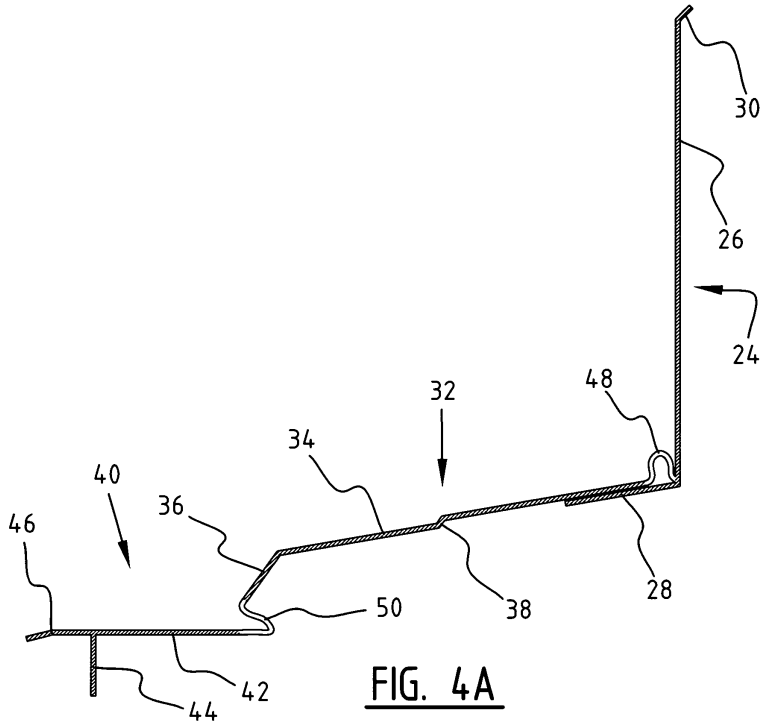


FIG. 4A

EP 2 003 281 A2

Description

[0001] The present invention relates to a device for water-draining connection of a window frame to a wall, connecting in particular to an inner wall of a cavity wall. The present invention also relates to an assembly of a cavity wall and a device for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, and to a method for water-draining connection of a window frame arranged in a cavity outer leaf to a cavity inner leaf.

[0002] When cavity walls - i.e. walls with an inner and outer wall (leafs) between which insulation material can be arranged - are applied in the construction of houses and buildings, it is necessary during construction to take into account ventilation of these cavity walls and the occurrence of (leak) water in the cavity wall. In order to guide to the outside (leak) water occurring in the cavity wall after construction and to not allow it to come into contact with the window frames arranged in the cavity wall in which the windows are placed, in practice a seal is arranged which is formed by so-called cavity slabs. Such conventional cavity slabs have the drawback that they are quickly prone to mechanical damaged - particularly when wall ties are inserted through the slabs - whereby holes occur which result in leakage of the moisture in the cavity wall onto the window frame place thereunder. In addition, the leak water often comprises nitric acid after construction and this results in damage, particularly in the case of aluminium window frames. Such cavity slabs are labour-intensive in arrangement, and also require the necessary craftsmanship in order to obtain a good non-leaking seal wherein ventilation in the cavity is maintained. The application of cavity slabs moreover results in an uncontrollable situation for maintaining the ventilation required in the cavity.

[0003] A further drawback is that the fixing method applied in the arranging of the cavity slabs is not always suitable for applying during all weather conditions. In very rainy conditions, and particularly when it is freezing, the arranging of the cavity slab by means of adhesive does not generally provide an adhesion which will last for a desired period, for instance 10 years or more.

[0004] An object of the present invention is to provide a device which is suitable for water-draining connection of a window frame to a wall, and wherein the above stated problems of conventional cavity slabs are prevented, and which is particularly robust and easy to arrange.

[0005] Said object is achieved with the device for water-draining connection of a window frame to a first wall according to the present invention, the device comprising a first substantially stiff body which is suitable for extending in standing position at least along the first wall over substantially the whole width of the window frame, and a second substantially stiff body which connects watertightly to the first body and which is suitable for extending in lying position over substantially the whole width of the window frame into a second wall located opposite the first wall.

[0006] By applying substantially stiff bodies which connect watertightly to each other and extend substantially over the whole width of the window frame, a device is provided which is robust and moreover easy to arrange. The width direction of the window frame is defined in the plane of the respective wall.

[0007] A further additional advantage of applying substantially stiff bodies is that water accumulating in the cavity wall above the water-draining device does not exert any water pressure on the window frame, as is the case with conventional cavity slabs.

[0008] In a preferred embodiment of the present invention the first body comprises a first substantially stiff plate part, and the second body comprises second and third substantially stiff plate parts which connect watertightly to each other. The stiff bodies each substantially have a form such that they connect to the respective part of the window frame construction against which they are placed. By embodying the bodies as substantially stiff plate parts a device is provided which is to some extent preformed and can therefore be readily placed in water-draining manner in the cavity wall. The watertight connection according to the present embodiment comprises individual parts which are for instance placed overlapping as well as plate parts which are physically connected to each other in watertight manner.

[0009] In a further preferred embodiment a first connecting piece connects the first and second plate parts, whereby the first and second plate parts together form an integral element. Mutual connection of the first and second plate parts results in fewer separate, individual elements, which enhances ease of handling of the device during placing in the cavity wall.

[0010] In a further preferred embodiment of the invention a second connecting piece connects the second and third plate parts, whereby - as described above - the ease of handling of the device is once again further enhanced.

[0011] It is noted particularly here that a combination of these embodiments, wherein a first connecting piece connects the first and second plate parts and a second connecting piece connects the second and third plate parts, is also the subject of the present invention. This results in a very advantageous preferred embodiment wherein the first, second and third plate parts together form one element, wherein a water-draining arrangement in the cavity wall is possible in simple and manageable manner.

[0012] In a preferred embodiment of the present invention the connecting piece comprises at least one flexible connection. A wide variation of solutions is applied in practice to provide cavity wall connections. The specifications applicable to carpentry works (carpentry quality specifications, KVT), the specifications in accordance with the Buildings Decree, legislation and standard reference details (Building Research Foundation, SBR) together allow great freedom in the construction of the cavity wall connection. Since connections do not have stand-

ard dimensions, it is advantageous to apply as connecting piece a flexible connection which makes it possible to compensate for a variation in dimensions. The flexible connection can fold when a small dimension is desired, and be extended when a large dimension is desired.

[0013] In a further preferred embodiment the connecting piece comprises at least one or more pivotable parts which enable the device to compensate for a variation in dimensions.

[0014] In yet another preferred embodiment the connecting piece comprises a substantially rigid connection. Although it is not possible in this embodiment to compensate for a variation in dimensions, due to its reduced complexity this embodiment is simple to manufacture and therefore suitable for mass production for one specific window frame construction.

[0015] In a preferred embodiment of the invention the first plate part comprises a first part which can be placed substantially elongated along the first wall and along which water located in the cavity is guided downward and drained from the first wall, or the cavity inner leaf.

[0016] In a further preferred embodiment the first plate part further comprises a second part arranged substantially at an angle of 90°-110° relative to the first part. The second part preferably lies at an angle of 100° relative to the first part, this corresponding to the 10° angle of inclination prescribed for the cavity wedge. By arranging the second part at an angle relative to the first part the first plate part is preformed substantially connecting to the building construction. The second part lying at an angle also ensures, in the case of contact with the second plate part which will be further elucidated below, a desired relative position between the first and second plate parts.

[0017] In a further preferred embodiment the first part which can be placed substantially elongated along the first wall comprises an outward bent outer end. Outward refers to a direction away from the cavity, i.e. in the placed position the outward bent outer end is directed toward the first wall.

[0018] According to a further embodiment, the second plate part comprises a first part which can be placed lying on a cavity wedge, and a second part arranged substantially at an angle relative to the first part. The first part which can be placed lying on a cavity wedge of the window frame construction will, because such cavity wedges comprise according to specifications a defined angle of inclination, in the Netherlands 10°, guide the water flowing along the first plate part in the direction of the second wall, or the cavity outer leaf. Because the second plate part comprises a second part arranged substantially at an angle relative to the first part, a chamfering is provided which guides the moisture from the first part of the second plate part which can be placed lying on a cavity wedge to the subsequent third plate part, which will be further elucidated below. The length of the first part of the second plate part which can be placed lying on a cavity wedge is such that it can span the whole width of the cavity wedge. It is noted for the sake of completeness that the width of the cavity wedge is defined here in the direction perpendicularly of the leafs of the cavity wall.

[0019] In a further preferred embodiment the second part is arranged substantially at an angle of 40°-45° relative to the first part, this providing an angle of inclination which, in practical applications within the limited space available between the front side of the cavity wedge and the inner side of the cavity outer leaf, in combination with the standing height of the cavity wedge, provides a good connection to the subsequent third plate part.

[0020] In a further preferred embodiment the third plate part comprises a first part which can be placed lying on an upper edge of the window frame, and a second part arranged substantially at a right angle relative to the first part. The first part of the third plate part which can be placed lying on an upper edge of the window frame guides the moisture coming to lie via the first and second plate part on the third plate part further to the outside, i.e. via an air gap out of the cavity wall, to the front side of the window frame situated in the cavity outer leaf. The second part arranged substantially at a right angle relative to the first part prevents moisture being able to pass between the upper edge of the window frame and the part of the third plate part which can be placed lying on the upper edge of the window frame.

[0021] In a further preferred embodiment the third plate part further comprises a third part which is arranged substantially in the line of the first part and which guides the moisture further outward.

[0022] A further preferred embodiment of the device is manufactured from plastic, which provides a device which is cheap to manufacture, light, corrosion-resistant and watertight.

[0023] The present invention also relates to an assembly of a cavity wall and a device for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, wherein a first substantially stiff plate part of the device is arranged extending substantially standing over substantially the whole width of the window frame along the cavity inner leaf, and a second substantially stiff plate part which connects watertightly to the first plate part and extends lying over substantially the whole width of the window frame into the cavity outer leaf located opposite the cavity inner leaf.

[0024] According to a further preferred embodiment of the assembly according to the present invention, it further comprises insulation material which is arranged between the cavity inner leaf and the cavity outer leaf and which also permanently positions the device for water-draining connection of a window frame to a wall as according to the present invention. This has the further advantage that the device does not need to be fixed by means of fixing means, such as nails, to the window frame construction.

[0025] The present invention also relates to a method for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, comprising the steps of arranging a first substantially stiff body extending standing over substantially the whole width of

the window frame along the cavity inner leaf, arranging a second substantially stiff body extending lying over substantially the whole width of the window frame into the cavity outer leaf located opposite the cavity inner leaf, wherein the second body connects watertightly to the first body.

[0026] According to a further preferred embodiment of the method, the first body comprises a first substantially stiff plate part, and the second body comprises second and third substantially stiff plate parts which connect watertightly to each other.

[0027] According to yet another preferred embodiment, the method comprises the further step of arranging the second plate part lying on a cavity wedge, and arranging the first plate part on an upper edge of the window frame.

[0028] According to yet another preferred embodiment, the method comprises the further step of arranging insulation material between the cavity inner leaf and the cavity outer leaf.

[0029] Preferred embodiments of the present invention are further explained in the following description on the basis of the drawing, in which:

Figure 1 is a perspective view of a cavity wall with a window frame;
Figure 2 is a cross-section of the building construction shown in Figure 1, wherein the device according to the present invention is shown in a first position;
Figure 3 is a cross-section of the building construction shown in Figure 1, wherein the device according to the present invention is shown in a second position;
Figure 4A shows a sectional view of the device according to the present invention;
Figure 4B shows a sectional view, wherein the device shown in Figure 4A is in a collapsed position;
Figure 5 is a detailed sectional view of a connection between two plate parts of the device shown in Figure 4;
Figure 6 is a detailed sectional view of an alternative connecting piece between two plate parts of the device;
Figure 7 shows a sectional view of an alternative preferred embodiment of the device;
Figure 8 shows a detailed sectional view of an alternative connection between the first and second plate parts of the present invention;
Figure 9 shows a sectional view of an alternative connection between the second and third plate parts according to the present invention;
Figure 10 shows a sectional view of a further alternative embodiment of the device;
Figure 11 shows a sectional view of yet another alternative embodiment of the device;
Figure 12A shows a sectional view of a preferred embodiment of the device according to the present invention;
Figure 12B is a sectional view wherein the device shown in Figure 12A is in a collapsed position;
Figure 13 is a perspective view of a connecting member; and
Figure 14 is a perspective detail view of the connection between the device and the connecting member shown in Figure 13.

[0030] The cavity wall 4 shown in Figure 1 comprises a cavity inner leaf 6 of concrete (or a material such as sandlime brick, wood, brickwork and the like) and a cavity outer leaf 8 constructed from bricks 10. A window frame 2 with a window 14 is placed in cavity wall 4. Situated in cavity wall 4 is a device for water-draining connection of window frame 2 to cavity inner leaf 6, which device 1 is held in place by the insulation material 12 arranged in the cavity between cavity inner leaf 6 and cavity outer leaf 8. The width of window frame 2 is defined in the plane of cavity wall 4.

[0031] Figures 2 and 3 both show a cross-section of the cavity wall shown in Figure 1, with cavity inner leaf 6 and outer leaf 8. A lintel 22 provides support for the bricks located above window frame 2. Window frame 2 has on its side directed toward window 14 a rebate 16 and on its side remote from the window an outer edge. On the top side of window 14 this outer edge is upper edge 3. A cavity wedge 18, which according to specifications has on its upper side an angle of inclination of 10°, spans the greater part of the distance between window frame 2 and cavity inner leaf 6. Owing to the lack of standard dimensions for cavity wall connections, there is in practice a great variation in dimensions. The present invention is able to compensate the variations in dimensions which occur in practice, so that the minimum dimension shown in Figure 2 as well as the maximum dimension shown in Figure 3, in addition to all intermediate dimensions, can be spanned in waterproofing manner by the present invention. It is noted for the sake of completeness that the view of Figure 2 shows the width direction of cavity wedge 18.

[0032] Figure 4 shows a detailed embodiment of a device according to the present invention, comprising a first plate part 24, a second plate part 32 and a third plate part 40. First plate part 24 comprises a first part 26 which can be placed substantially elongated along cavity inner leaf 6, and a second part 28 arranged at an angle relative to first part 26. This angle is preferably 100°, whereby first plate part 24, when its first part 26 lies against cavity inner leaf 6, lies with its second part 28 against cavity wedge 18 which, according to specifications, comprises an angle of inclination of 10°. The first part 26 which can be placed substantially elongated along cavity inner leaf 6 preferably comprises an outward bent outer end 30 to enable a good connection of plate part 26 to the wall and for the purpose of strengthening the top side thereof so that it forms a substantially straight line. The bent upper edge can moreover cover a fixing member present in relatively large window frames to fix the top edge, usually

to the wall. For the purpose of covering such a usually angular fixing member plate part 32 is also provided with a stepped portion 38.

[0033] Second plate part 32 comprises a first part 34 which can be placed lying on a cavity wedge 18, and a second part 36 arranged substantially at an angle relative to first part 34. By providing first part 34 in a preferred embodiment with a stepped portion 38 a space is created between first part 34 and cavity wedge 18 in which the second part 28 of first plate part 24 can be placed. The length of first part 34 of second plate part 32 preferably corresponds substantially to the minimum width dimension of cavity wedge 18, as shown in Figure 2.

[0034] Third plate part 40 comprises a first part 42 which can be placed lying on an upper edge 3 of window frame 2, and a second part 44 arranged substantially at a right angle to first part 42. In a preferred embodiment third plate part 40 further comprises a third part 46 arranged substantially in line with first part 42. First part 42 and the optional third part 46 lying in the line thereof guide water, which comes to lie on third plate part 40 via first plate part 24 and second plate part 32, further outward until it is outside the cavity wall. Second part 44 of third plate part 40 prevents water being able to pass between upper edge 3 of window frame 2 and third plate part 40.

[0035] Arranged between first plate part 24 and second plate part 32 is a first connecting piece 48 which mutually connects both plate parts 24, 32. In similar manner a second connecting piece 50 connects second plate part 32 to third plate part 40. Connecting pieces 48, 50 preferably comprise a flexible connection which, at a minimum dimension to be spanned, will fold to some extent (Figure 2) and, at a maximum dimension to be spanned, will lie in wholly extended position (Figure 3).

[0036] The flexible connecting pieces 48, 50 provide the option of folding down device 1 so that it can be stored in space-saving manner (Figure 4B).

[0037] The flexibility of connecting pieces 48, 50 can be obtained by manufacturing the connecting piece 48, 50 from another, more flexible material (Figure 5), or by modifying or reducing the wall thickness at the position of connecting pieces 48, 50 such that they have sufficient flexibility (Figure 6).

[0038] Figure 7 shows an adjusting frame 52 wherein cavity wedge 18 has a high standing height 19 and connecting piece 50 is substantially extended. Connecting piece 48 is in a folded state.

[0039] Figure 8 shows an alternative embodiment of first plate part 124, wherein the outer end of the first part 126 which can be placed substantially elongated along the cavity inner leaf 6 comprises close to it outer end a double-walled second part 128 arranged at an angle relative to first part 126. The first part 134 of second plate part 132 which can be placed lying on a cavity wedge 18 can be received between wall parts 128a, 128b. Such a connection between first plate part 124 and second plate part 132 provides a connection which is cheap to manufacture and which is watertight and can also compensate some variation in dimensions of the window frame construction.

[0040] In an alternative embodiment connecting pieces 48, 50 can be embodied from a plurality of intermediate pieces 248 mutually connected via hinges. Figure 9 shows a connection between a second plate part 232 and a third plate part 240, wherein the connection consists of five hinges 246 between which intermediate parts 248 are arranged. It is also noted that the third plate part 240 shown in Figure 9 is built up of a first part 242 which can be placed lying on an upper edge of the window frame and a second part 244 arranged substantially at a right angle to first part 242.

[0041] Figure 10 shows an adjusting frame with an alternative embodiment of the device according to the present invention, wherein the first part 326 of first plate part 324 which can be placed substantially elongated along cavity inner leaf 6 is connected via a rigid connection 348 to the first part 334 of second plate part 332 lying on a cavity wedge 318. Situated between second plate part 332 and third plate part 340 is a connecting piece 350 which need not be connected to either of the plate parts. A water-draining construction is provided by an overlapping placing (Figure 10), wherein second part 336 of second plate part 332 guarantees that third plate part 340 can no longer be removed after placing of the construction, since in this case connecting piece 350 hooks behind the second part 336 of second plate part 332.

[0042] Figure 11 shows an alternative embodiment wherein the device is constructed from two separate elements, wherein first plate part 424 and third plate part 440 together form the whole device. The function of the second plate part is fulfilled by first plate part 424 and third plate part 440, whereby the second plate part is per se no longer present in this embodiment. First plate part 424 comprises a first part 426 which can be placed substantially elongated along the cavity inner leaf and which is rigidly connected to a second part 428 which lies at an angle and which can also be conceived as a part of a now redundant second plate part which can be placed lying on a cavity wedge. Third plate part 440 comprises in this embodiment a first part 442 which can be placed lying on an upper edge of window frame 202 and which is connected by means of a rigid connecting piece 450 to a part 434 which can be seen as a part of a now redundant second plate part which can be placed lying on a cavity wedge 418.

[0043] A further preferred embodiment, which is particularly favourable in respect of the compact form into which the device can be collapsed and stored prior to use, is shown in Figures 12A and 12B. The device once again comprises a first plate part 524, a second plate part 532 and a third plate part 540. First plate part 524 differs however from the above described embodiments in that the second part 528 of first plate part 524 is situated between first part 526 of first plate part 524 and first part 534 (more specifically part 534a) of second plate part 532. A flexible connection 527 is situated between first

part 526 and second part 528 of first plate part 524. A flexible connection 529 is likewise situated between second part 528 of first plate part 524 and first part 534 of second plate part 532. Flexible connections 527 and 529 enable compact folding of the device prior to use on the one hand (Figure 12B) and flexible placing during use on the other (Figure 12A).

[0044] It is noted that, although after arranging insulation material between the cavity inner leaf and outer leaf the device for water-draining connection of a window frame to a wall according to the present invention is permanently positioned, it is sometimes desirable to already fix the device beforehand to the window frame construction. According to yet another preferred embodiment, which is also shown in Figures 12A and 12B, second plate part 532 and/or third plate part 540 are therefore provided with means for realizing a fixing, for instance by means of fixedly hooking or snapping. This has the advantage that it is possible to dispense with the use of screws and nails for fixing purposes. Particularly at low outside temperatures the material can be placed under tension as a result of the screws and/or nails being forced into the device such that damage to the plastic occurs due to the forming of cracks.

[0045] The means for realizing a fixing between second plate part 532 and the building construction comprise a third part 537 extending substantially in the line of first part 534b, or the part 534b of first part 534 which in the assembled position makes contact with cavity wedge 518 of the building construction (Figure 12A).

[0046] It is noted that in an alternative embodiment (not shown) an opening can be provided in the first part 542 of third plate part 540 into which can be hooked a bent element 564 of an element 554 of spring steel.

[0047] Figure 13 shows an embodiment of a connecting member in the form of an element 554 of spring steel. This element 554 of spring steel has a first part 556 and a third part 560. A second part 558 connect first part 556 and third part 560 and herein ensures that the first and third parts 556, 560 are stepped in height direction relative to each other. Arranged in first part 556 is a recess through which element 554 of spring steel can be fixed to the window frame construction, such as for instance a cavity wedge 518. Provided in third part 560 is a bent element 564 which provides for the connection to the device.

[0048] Although they showed preferred embodiments of the invention, the above described embodiments are intended only to illustrate the present invention and not in any way to limit the specification of the invention. The assembly and the method can for instance be combined with any described preferred embodiment of the device. The scope of the invention is therefore defined solely by the following claims.

Claims

1. Device for water-draining connection of a window frame to a first wall, comprising:

   - a first substantially stiff body which is suitable for extending in standing position at least along the first wall over substantially the whole width of the window frame; and
   - a second substantially stiff body which connects watertightly to the first body and which is suitable for extending in lying position over substantially the whole width of the window frame into a second wall located opposite the first wall.

2. Device as claimed in claim 1, wherein:

   - the first body comprises a first substantially stiff plate part; and
   - the second body comprises second and third substantially stiff plate parts which connect watertightly to each other.

3. Device as claimed in claim 1 or 2, wherein a first connecting piece connects the first and second plate parts.

4. Device as claimed in any of the claims 1-3, wherein a second connecting piece connects the second and third plate parts.

5. Device as claimed in claim 3 or 4, wherein the connecting piece comprises at least one flexible connection and/or at least one or more pivotable parts.

6. Device as claimed in claim 3 or 4, wherein the connecting piece comprises a substantially rigid connection.

7. Device as claimed in any of the claims 2-6, wherein the first plate part comprises a first part which can be placed substantially elongated along the first wall.

8. Device as claimed in claim 7, wherein the first plate part further comprises a second part arranged substantially at an angle of 90°-110° relative to the first part.

9. Device as claimed in claim 7 or 8, wherein the first part which can be placed substantially elongated along the first wall comprises an outward bent outer end.

10. Device as claimed in any of the claims 2-9, wherein the second plate part comprises:

    - a first part which can be placed lying on a cavity wedge; and

- a second part arranged substantially at an angle relative to the first part.

11. Device as claimed in claim 9, wherein the second part is arranged substantially at an angle of 40°-55° relative to the first part.

12. Device as claimed in any of the claims 2-6, wherein the third plate part comprises:

- a first part which can be placed lying on an upper edge of the window frame; and
- a second part arranged substantially at a right angle relative to the first part.

13. Device as claimed in claim 12, the third plate part further comprising a third part which is arranged substantially in the line of the first part.

14. Assembly of a cavity wall and a device for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, wherein:

- a first substantially stiff plate part of the device is arranged extending substantially standing over substantially the whole width of the window frame along the cavity inner leaf; and
- a second substantially stiff plate part connects watertightly to the first plate part and extends lying over substantially the whole width of the window frame into the cavity outer leaf located opposite the cavity inner leaf.

15. Method for water-draining connection to a cavity inner leaf of a window frame arranged in a cavity outer leaf, comprising the steps of:

- arranging a first substantially stiff body extending standing over substantially the whole width of the window frame along the cavity inner leaf;
- arranging a second substantially stiff body extending lying over substantially the whole width of the window frame into the cavity outer leaf located opposite the cavity inner leaf, wherein the second body connects watertightly to the first body.

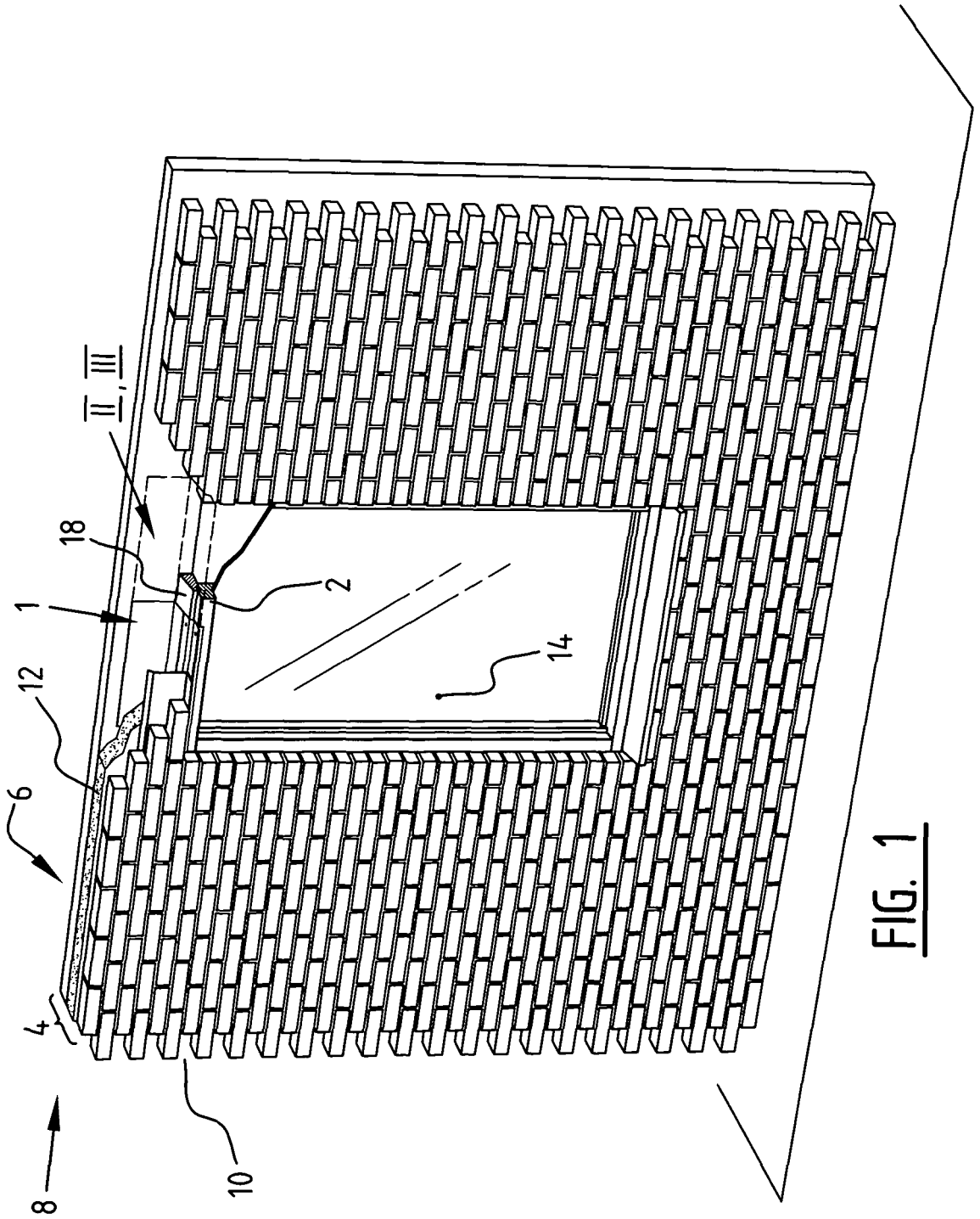


FIG. 1

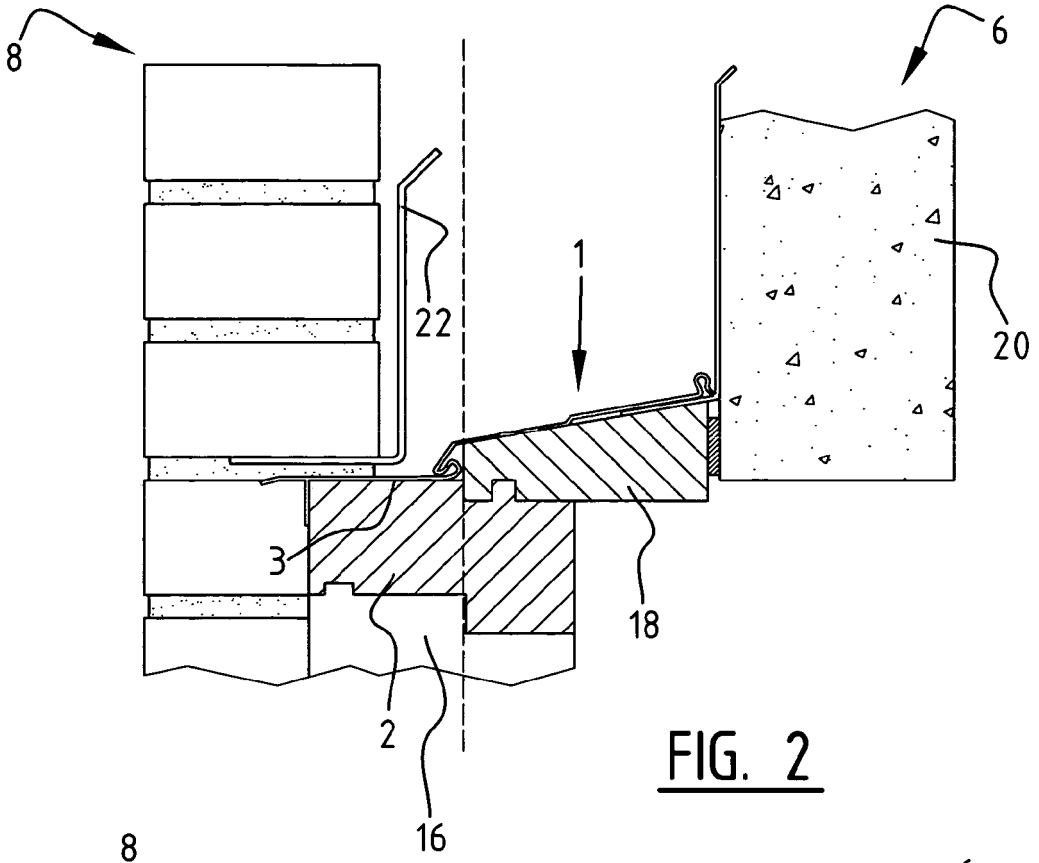


FIG. 2

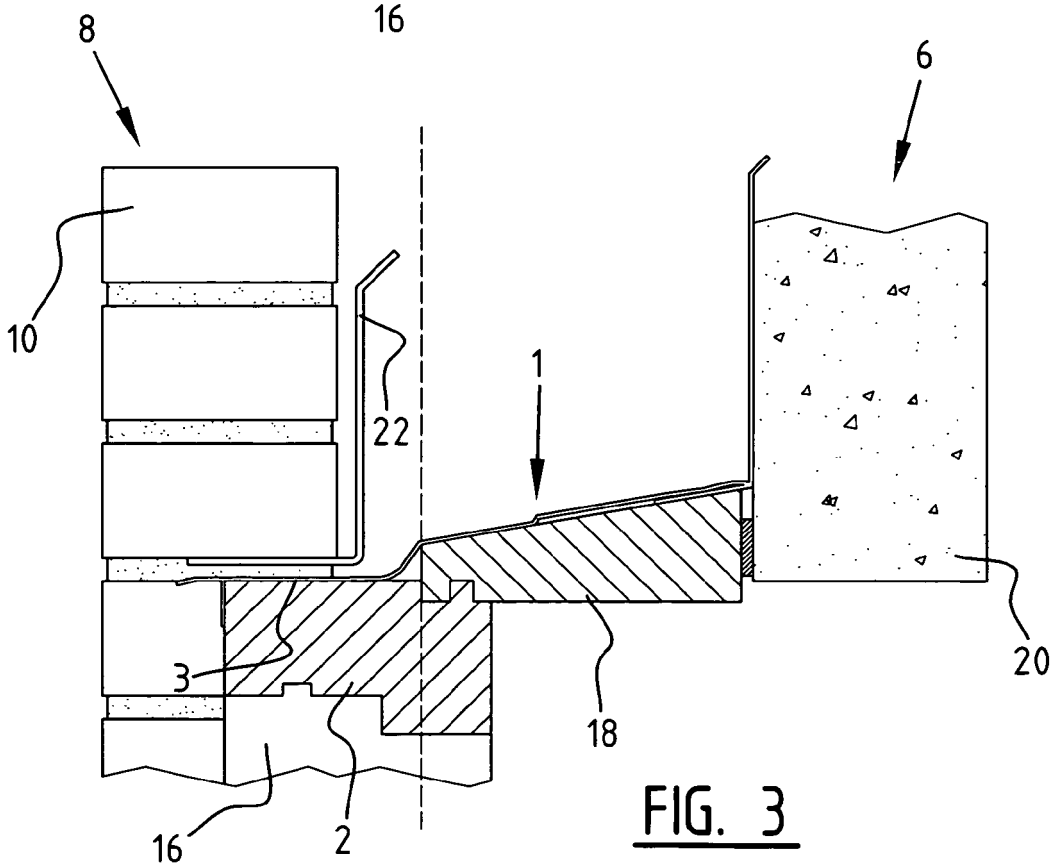


FIG. 3

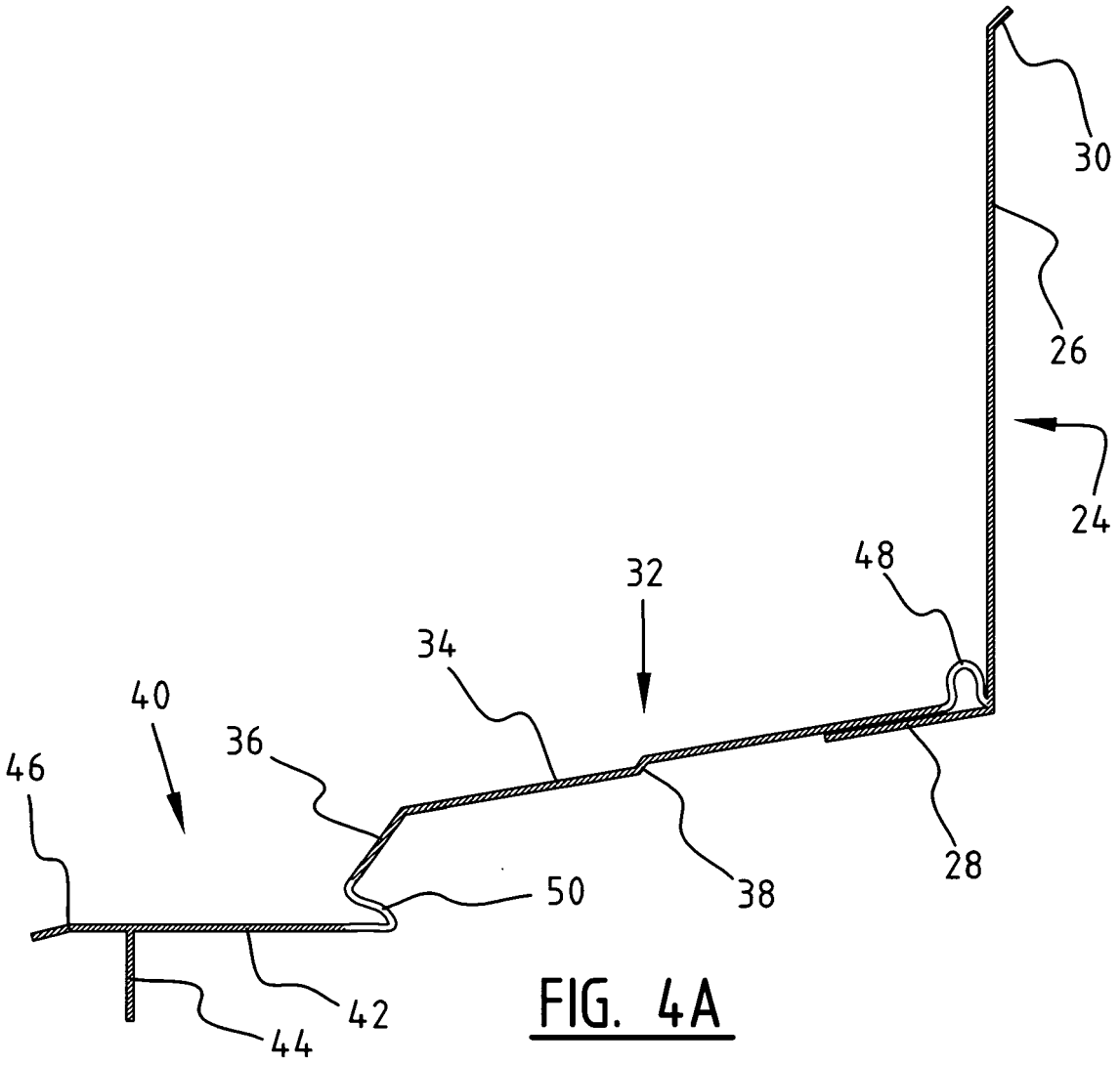


FIG. 4A

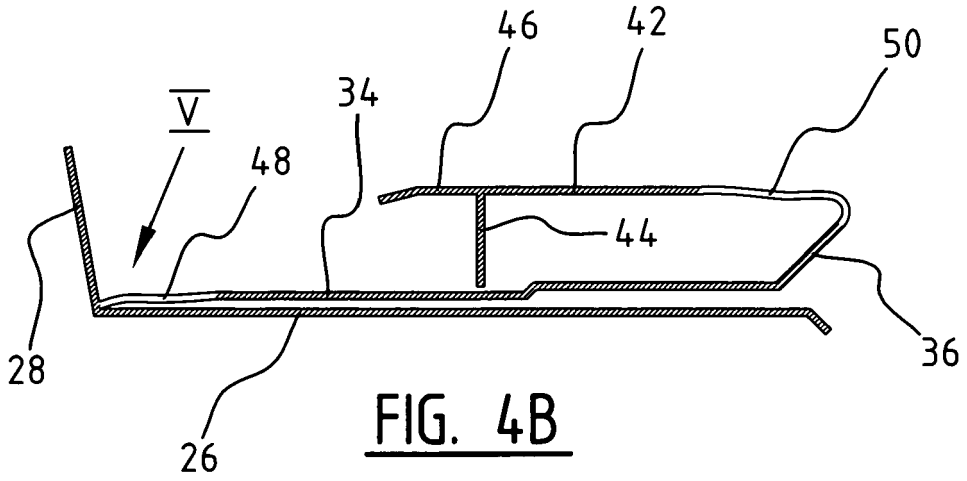


FIG. 4B

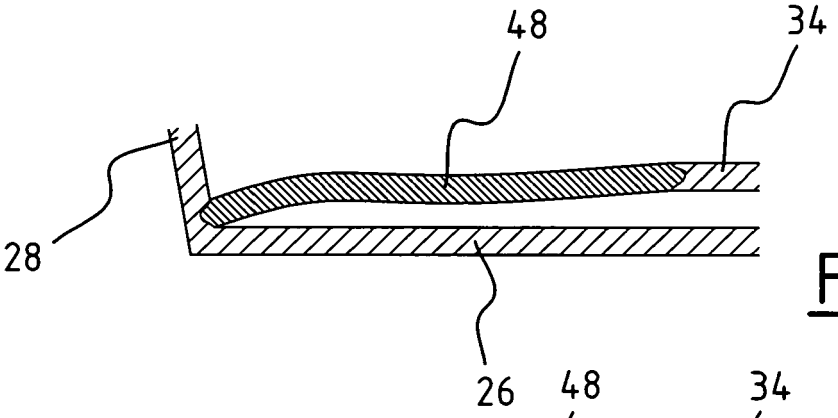


FIG. 5

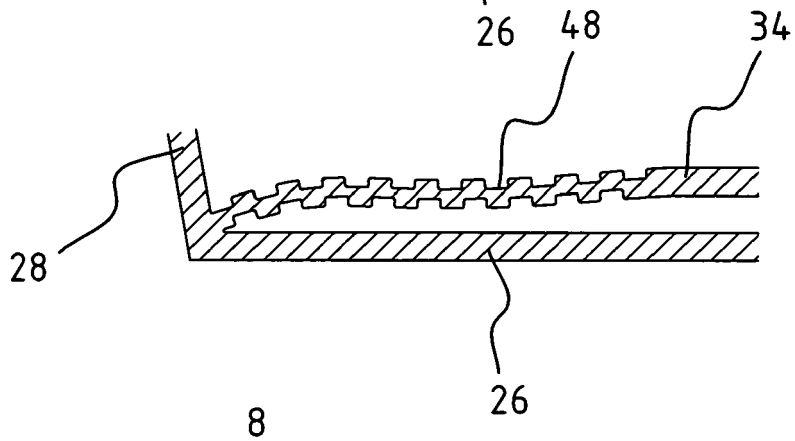


FIG. 6

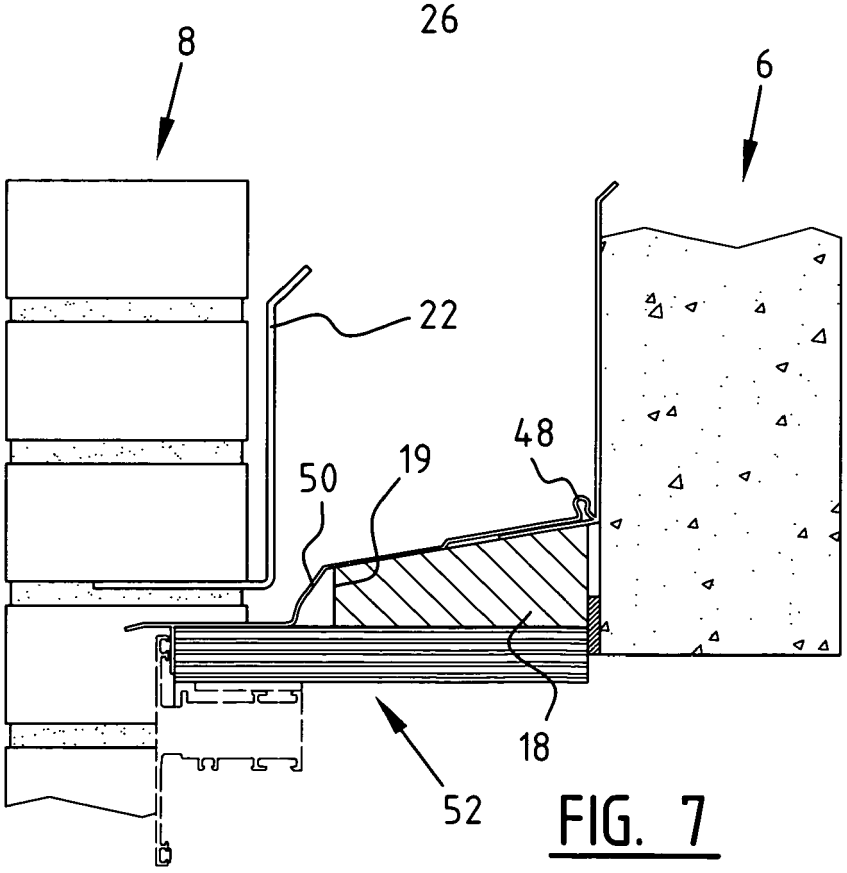


FIG. 7

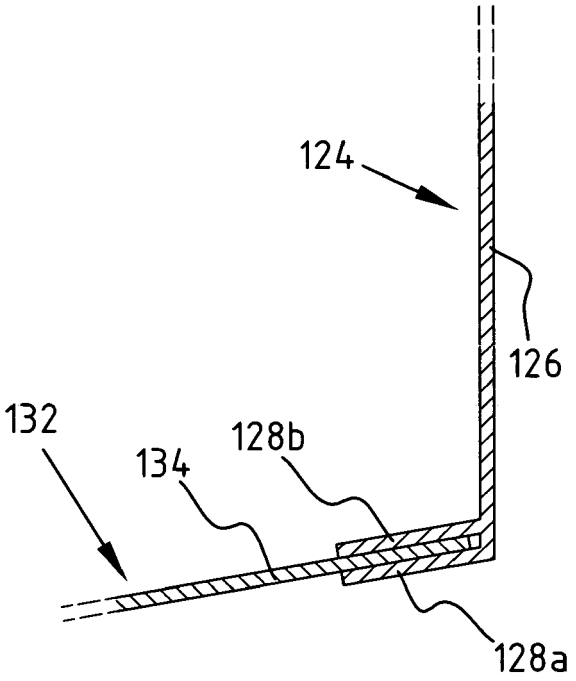


FIG. 8

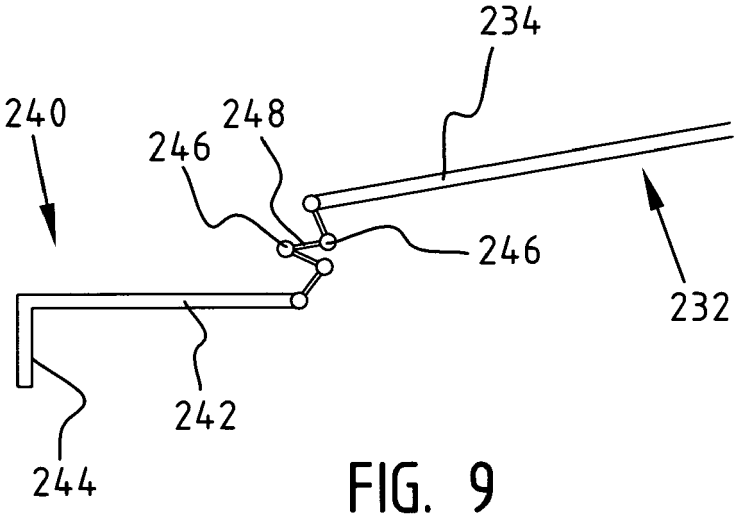
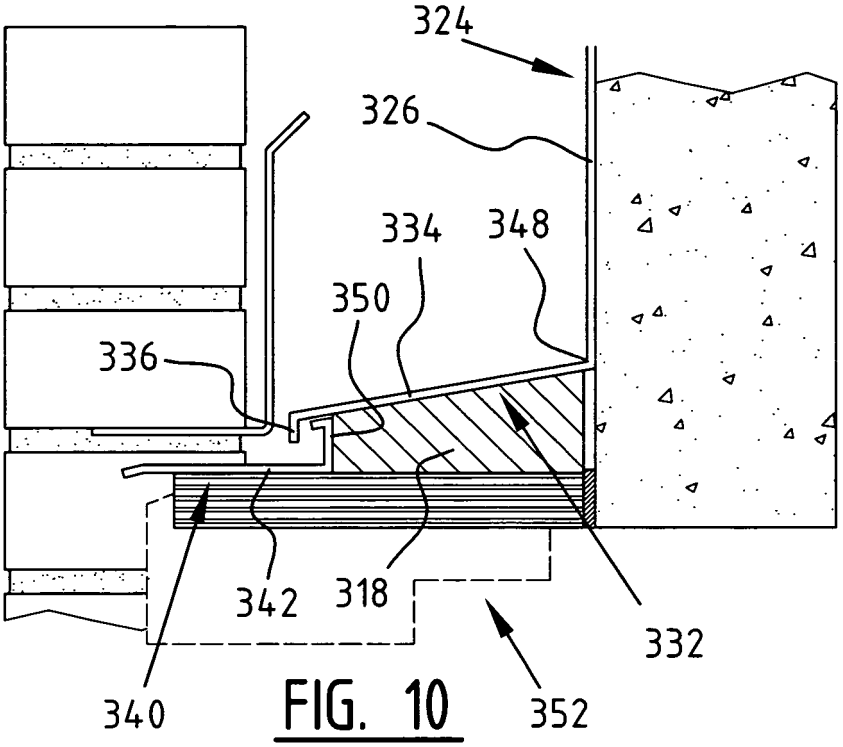


FIG. 9


324
326
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352

FIG. 10

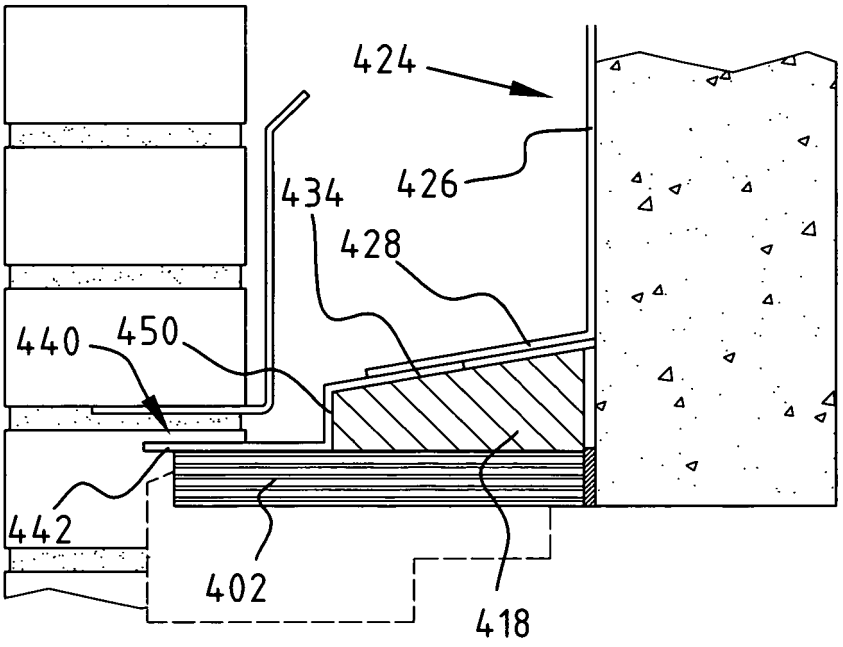
424
426
434
428
440
450
442
402
418

FIG. 11

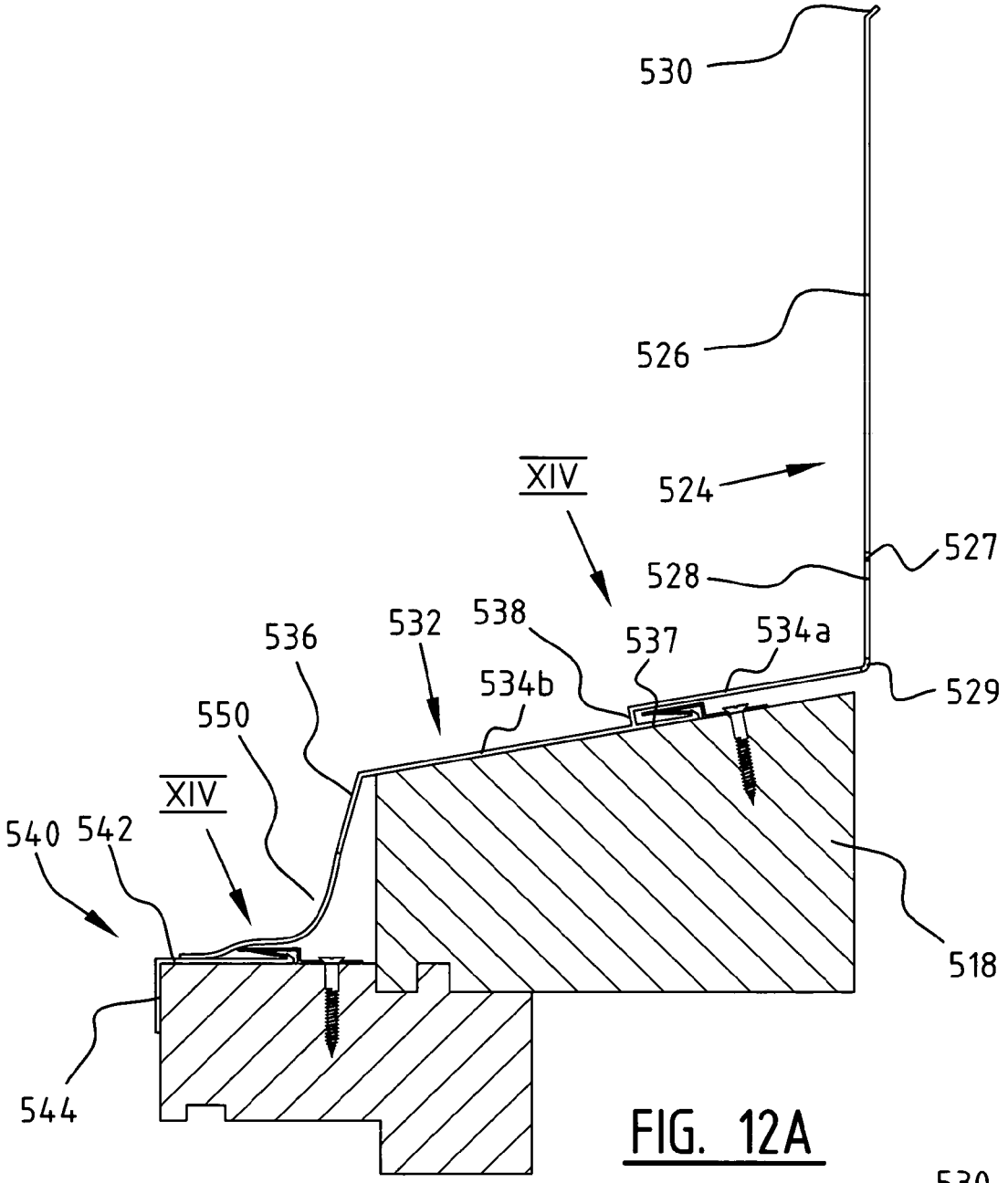

FIG. 12A

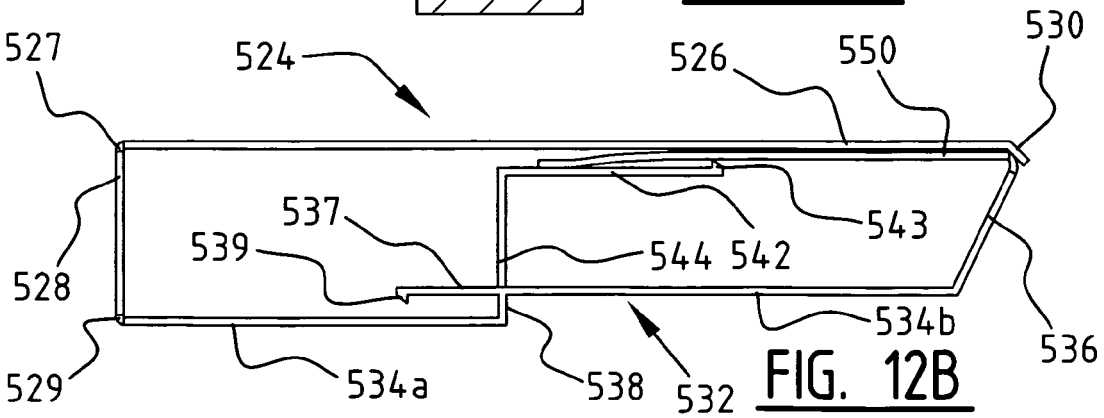

FIG. 12B

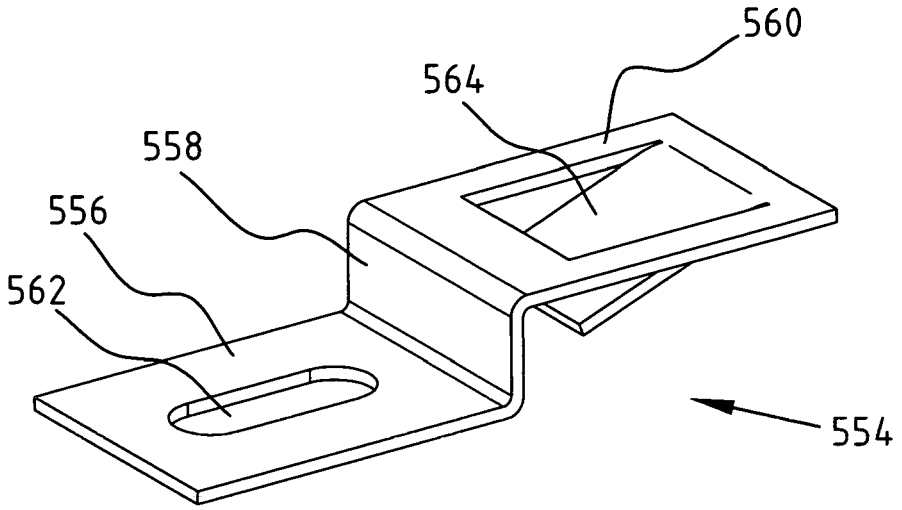

FIG. 13

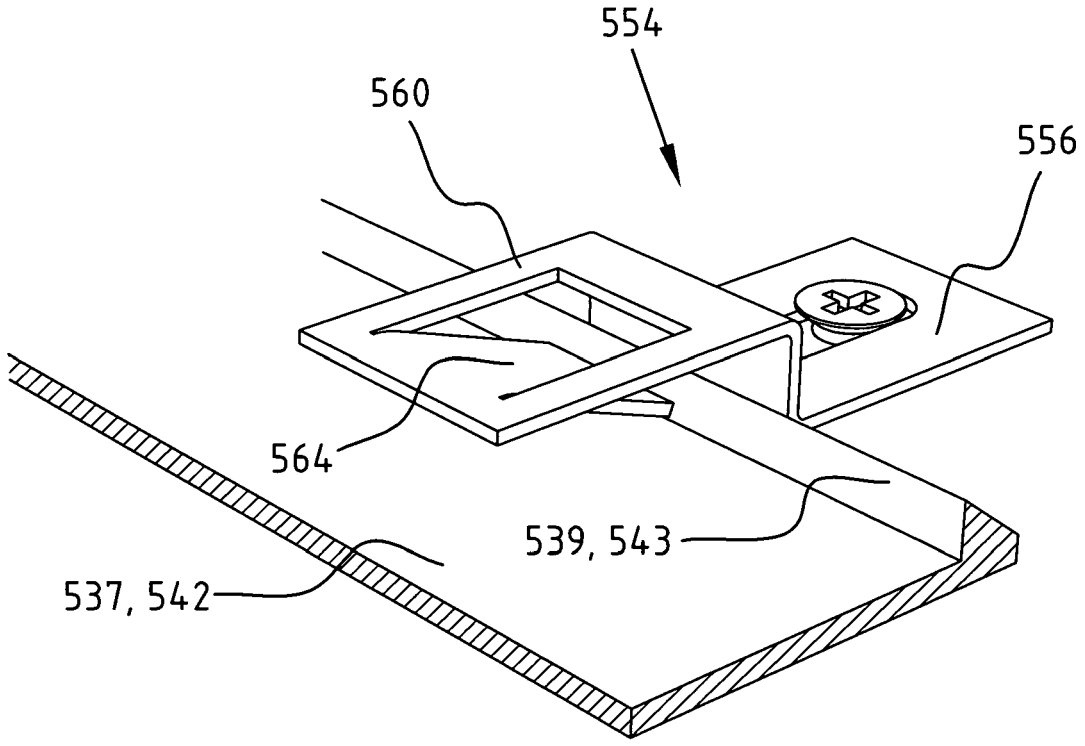

FIG. 14