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(54) FRAME FOR COLD ROOM DOORS

(57) A frame (12) for cold room doors comprising a box-like body (14) adapted to be fixed to a wall (16) of a cold room to obtain an at least partial framework. The body (14) is provided with a seat (18) adapted to contain heating means (20), and any power supply means (22) for said heating means (20). The frame (12) comprises a heat sink (24) adapted to be coupled to the body (14) to close the seat (18), and to receive heat from the heating means (20). The heat sink (24) comprises an outer abutment surface (26) for a door of the cold room, and an inner surface (28) facing the heating means (20) in use. The heat sink (24) comprises coupling arms (30, 32) arranged to be cantilevered with respect to the inner surface (28), adapted to be contained at least partially between opposite side surfaces (34, 36) of the seat (18). The coupling arms (30, 32) are elastically deformable towards and away from each other. Moreover, the coupling arms (30, 32) on the surface thereof facing said opposite side surfaces (34, 36) of the seat (18) in use are provided with at least one coupling tooth (38, 40). The opposite side surfaces (34, 36) of the seat (18) are provided with a plurality of mutually parallel recesses (42, 44, 46, 48, 50) adapted to house the at least one coupling tooth (38, 40). The coupling defined by the at least one coupling tooth (38, 40) arranged on each coupling arm (30, 32) with at least one of the recesses (42, 44, 46, 48, 50) on the respective opposite side surfaces (34, 36) defines a plurality of possible coupling positions between the heat sink element (24) and the seat (18).

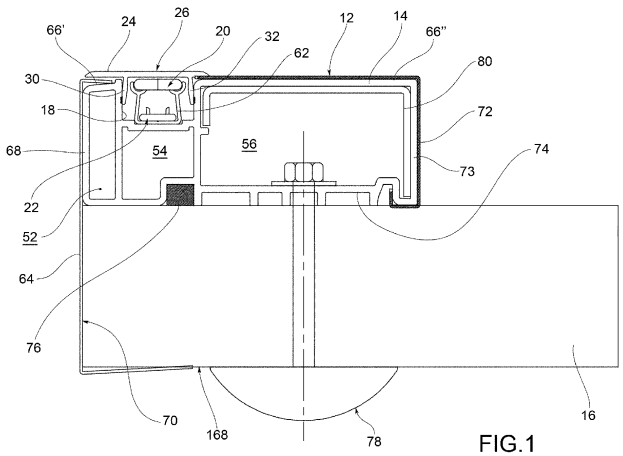

FIG.1

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Description

FIELD OF APPLICATION

[0001] The present invention relates to a frame for cold room doors. In particular, the present invention relates to a frame for cold room doors provided with a heat sink.

BACKGROUND ART

[0002] As is known, frames for cold room doors can comprise a peripheral box-like body adapted to be fixed to a wall of a cold room.

[0003] The box-like body is provided, in a portion thereof close to the area of coupling to the respective door, with a heating element such as an electrical resistor, for example, adapted to distribute a certain amount of heat at the position of the frame where the gasket arranged on the door of the cold room is closed. This aims to prevent any condensate, due to the thermal gradient between the inside and outside of the cold room, from freezing and avoiding a correct coupling between frame and door.

[0004] For this purpose, the box-like body includes a seat adapted to accommodate the electrical resistor and the related power supply cables, which is closed with a heat sink adapted to distribute heat.

[0005] The coupling between heat sink and electrical resistor must necessarily be very precise, so that the heat sink is in contact with the electrical resistor. In fact, any lack of contact between electrical resistor and heat sink would result in a thermal gradient and thus a poor distribution of the heat energy with the possible formation of ice.

[0006] Some technical solutions are known from the prior art, aimed to ensure contact between heat sink and electrical resistor.

[0007] In fact, it is known to couple the heat sink to the frame body with screws, so that, due to the possibility to adjust the tightening, a precise coupling can be obtained, and the resistor sustained by its support can be placed in contact with the heat sink.

[0008] However, this solution is clearly impractical and laborious, since each screw is to be tightened by the right amount so as to achieve the desired coupling between resistor and heat sink, but at the same time the tightening must not be such as to deform the heat sink along the longitudinal extension thereof.

[0009] In order to avoid such drawbacks, it has been suggested to couple the body of the profile to the heat sink by snap-fit connection means. In this case, the heat sink is substantially a U-shaped element where, close to the end of each arm, there is arranged a protuberance towards the outside. Due to the elastic deformation possibility of the U-shaped arms, these can be inserted into the seat of the frame body, so that the protuberances can be coupled to respective side recesses of the seat obtained in the frame body.

[0010] Although such a solution allows obtaining a simpler coupling as compared to the screw coupling, and allows the heating element to expand in length when switched on, it does not however allow an adjustable coupling between the frame body and the heat sink, adapted to maintain the contact between the electrical resistor and the heat sink itself under different conditions of use, such as different types of resistors, or different size variations of the frame body due to the use of linings for the body itself, for example.

[0011] Therefore, although the prior art is widely used and appreciated, it is not free from drawbacks.

PRESENTATION OF THE INVENTION

[0012] The need is thus felt to solve the drawbacks and limitations mentioned with reference to the prior art.

[0013] Therefore, the need is felt to provide a frame for cold room doors which allows easily adjusting the position of the heat sink with respect to the resistor.

[0014] Moreover, the need is felt to provide a frame for cold room doors, in which the position of the heat sink can be adjusted according to the actual thickness of the resistor used.

[0015] Again, the need is felt for a frame for cold room doors of the modular type, which can also be used with additional components while allowing a secure coupling between the heat sink element and the resistor to be obtained.

[0016] Moreover, the need is felt to provide a frame for cold room doors, in which the position of the heat sink can follow the thermal expansions to which it is subjected when activated, without altering the consistency of the thermal contact between heating element and heat sink.

These needs are met by a frame for cold room doors according to claim 1, and a kit for cold rooms comprising a frame and a door according to claim 24.

DESCRIPTION OF THE DRAWINGS

[0017] Further features and advantages of the present invention will become more comprehensible from the following description of preferred embodiments thereof, given by way of non-limiting examples, in which:

- figure 1 diagrammatically shows a section view of a frame for a cold room door according to a possible embodiment of the present invention, mounted to a wall of a cold room;
- figures 2 and 3 diagrammatically show two perspective views according to different points of view of a frame portion for a cold room door according to a possible embodiment of the present invention;
- figure 4 diagrammatically shows a front view of the frame portion shown in figures 2 and 3;
- figure 5 diagrammatically shows a section view of a component of a frame for a cold room door according to a possible embodiment of the present invention;

- figure 6 diagrammatically shows a section view of two components of a frame for a cold room door according to a possible embodiment of the present invention, in disassembled conditions;
- figure 7 shows an enlarged detail of the respective coupling areas of the two components in figure 6;
- figure 8 diagrammatically shows a section view of the two components in figure 6 in an assembled condition; and
- figure 9 shows an enlarged detail of the coupling between the two components in figure 8.

[0018] The elements or parts of elements common to the embodiments described below will be indicated by the same reference numerals.

DETAILED DESCRIPTION

[0019] The present invention relates to a frame for cold room doors, which is indicated by reference numeral 12 in the accompanying figures.

[0020] As can be seen in figure 1, the frame 12 comprises a box-like body 14 adapted to be fixed to a wall 16 of a cold room to obtain an at least partial framework.

[0021] In this disclosure, reference will often be made to details of the frame which can be appreciated from a cross-section. However, as is very clear from figures 2, 3, 4, the frame 12 has a main extension in longitudinal direction. Therefore, elements to be defined based on an outline thereof according to a cross-section plane are obviously provided with a longitudinal extension as will be obvious per se to those skilled in the art.

[0022] The body 14 is provided with a seat 18 adapted to contain heating means 20, and any power supply means 22 for the heating means 20, such as electric cables connected to a power supply, for example.

[0023] Moreover, the frame 12 comprises a heat sink 24 adapted to be coupled to the body 14 to close the seat 18, and to receive heat from the heating means 20. In this regard, as can be seen for example in figure 8, the heat sink 24 comprises an outer abutment surface 26 for a door of a cold room, and an inner surface 28 facing the heating means 20 in use.

[0024] The heat sink 24 comprises coupling arms 30, 32 arranged to be cantilevered with respect to the inner surface 28, adapted to be contained at least partially between opposite side surfaces 34, 36 of the seat 18. The coupling arms 30, 32 are elastically deformable towards and away from each other. Moreover, on the surface of the coupling arms 30, 32 facing the opposite side surfaces 34, 36 of the seat 18 in use, they are provided with at least one coupling tooth 38, 40.

[0025] In this regard, the opposite side surfaces 34, 36 of the seat 18 are provided with a plurality of mutually parallel recesses 42, 44, 46, 48, 50 adapted to house the at least one coupling tooth 38, 40.

[0026] The coupling defined by the at least one coupling tooth 38, 40 arranged on each coupling arm 30, 32 with at least one of the recesses 42, 44, 46, 48, 50 on the respective opposite side surfaces 34, 36 thus defines a plurality of possible coupling positions between the heat sink element 24 and the seat 18.

[0027] According to a possible embodiment, the coupling arms 30, 32 are each provided with two coupling teeth 38, 40.

[0028] In turn, the opposite side surfaces 34, 36 can each be provided with at least three recesses 42, 44, 46, 48, 50, and preferably with at least five recesses 42, 44, 46, 48, 50.

[0029] According to a possible embodiment, the recesses 42, 44, 46, 48, 50 can have a longitudinal extension substantially corresponding to the longitudinal extension of the seat 18.

[0030] Advantageously, the at least one coupling tooth 38, 40 arranged on each coupling arm 30, 32 can also have a longitudinal extension substantially corresponding to the length of the heat sink 24.

[0031] In other words, the seat 18 can have recesses 42, 44, 46, 48, 50 adapted to accommodate corresponding coupling teeth 38, 40 which can have, in turn, a longitudinal extension corresponding to the length of the heat sink 24, or have a smaller extension.

[0032] According to a possible alternative embodiment (not shown in the accompanying figures), the coupling teeth 38, 40 can have a limited longitudinal extension, e.g., of a few centimeters, and can be repeated at regular intervals, for example.

[0033] The coupling teeth 38, 40 protrude from the respective coupling arm 30, 32 by an amount between 0.2 and 0.4 mm, preferably by about 0.3 mm. Moreover, the coupling teeth 38, 40 can have a substantially triangular shape according to a transverse plane. In particular, the distance between the coupling teeth 38, 40 can be between 0.4 and 0.6 mm, preferably of about 0.5 mm.

[0034] According to a possible embodiment, the recesses 42, 44, 46, 48, 50 can have a depth between 0.3 and 0.6 mm, preferably of about 0.4 mm. Moreover, the recesses 42, 44, 46, 48, 50 can be mutually spaced apart by 0.4-0.6 mm, preferably by about 0.5 mm.

[0035] The operation of the coupling between body 14 and heat sink 24 will now be described, with particular reference to figures 6 and 7, which show a disassembled condition of the two elements, and figures 8 and 9, which instead show an assembled condition.

[0036] According to a possible embodiment of the present invention, once the heating means 20 and any power supply means 22 have been positioned inside the seat 18, the heat sink 24 is positioned above the seat 18 itself, so that the coupling arms 30, 32 face the seat 18. The heat sink 24 is then pushed so that the coupling arms 30, 32 enter into the seat 18 due to the fact that they are moved towards each other since they are elastically deformable. Now, according to the actual thickness of the heating means 20 and any power supply means, according to a possible bending in the length direction caused by an imperfect assembly, or in light of the overall toler-

ances of the frame especially in the case of very large doors, the at least one coupling tooth 38, 40 arranged on both coupling arms 30, 32 will engage at least one of the recesses 42, 44, 46, 48, 50 arranged on each of the opposite side surfaces 34, 36 of the seat 18, respectively. Since the recesses 42, 44, 46, 48, 50 arranged on the opposite side surfaces 34, 36 of the seat 18 are at different heights with respect to the bottom of the seat 18, the heat sink through the coupling arms thereof will be positioned more or less deeply inside the seat 18 according to the actual contents, and according to the actual position, bending and twisting when mounting the seat 18 itself.

[0037] In this regard, the embodiment including two coupling teeth 38, 40 for each coupling arm 30, 32 and five recesses 42, 44, 46, 48, 50 parallel to one another on the opposite side surfaces 34, 36 of said seat 18, respectively, was found to be particularly advantageous. Such a structure allows four different relative positions between seat 18 and heat sink 24. Moreover, it allows achieving a perfect compromise between structure simplicity, modulability and solidity of the connection between body and heat sink.

[0038] In any case, according to alternative embodiments, it is possible to provide a plurality of coupling teeth 38, 40, for example three, and/or a larger or smaller number of recesses 42, 44, 46, 48, 50, so that in any case the possible couplings between coupling teeth 38, 40 and recesses 42, 44, 46, 48, 50 are at least two in number.

[0039] Moreover, with the coupling thus created between heat sink 24 and heating means 20, they are free to slide in the longitudinal direction following the thermal expansions without introducing any strain and without altering the thermal contact between heat sink 24 and heating means 20.

[0040] According to a possible embodiment, the body 14, considering a cross-section thereof, can comprise three compartments 52, 54, 56 placed side-by-side, where the two side compartments 52, 56 have a greater height than the central compartment 54. The term "height" here means the dimension substantially perpendicular to the rear surface 74 of the body which, in use, is intended to rest on the wall of the cold room. Such a difference in height with respect to the two side compartments 52, 56 is adapted to obtain the seat 18 at the central compartment 54.

[0041] Advantageously, the three compartments 52, 54, 56 can be substantially mutually aligned at the surface intended to be coupled to the wall of the cold room in use.

[0042] According to a possible embodiment, at the surface intended to be coupled to the wall of the cold room in use, a seat can be arranged for a gasket 76 adapted to prevent the body from sliding on the wall of the cold room, and to seal the air passages.

[0043] The frame can also be provided with a fixing system 78 to the wall of the cold room. Since these means are known per se and not strictly inherent to the principles of the present invention, they will not be explored further.

[0044] As can be seen in figure 5, for example, the compartments 52, 54, 56 are essentially empty rectangles in cross-section, which share the walls placed side-by-side.

[0045] According to a possible embodiment, the body 14 can be made of a polymer material, such as PVC.

[0046] The heat sink 24 can be made of metal, preferably aluminum or an alloy thereof. Advantageously, the heat sink 24 can be made by extrusion.

[0047] According to a possible embodiment, the heat sink 24 can comprise side wings 58, 60 which protrude laterally above the body 14 in use.

[0048] As can be seen in figures 1, 2 and 3, the frame can comprise a resistor and cable-return-channel holder profile 62, adapted to be arranged inside the seat 18. The profile 62 can be a U-shaped element, for example, in which a seat is arranged at the bottom for a cable return channel, and in the upper part, a seat is arranged for the heating means 20, intended in use to face the heat sink 24.

[0049] According to a possible embodiment, the frame can comprise a substantially C-shaped connection lining 64 of the rigid type, adapted to overlap a first front surface portion 66' which, in use, is close to the opening of the wall 16 on which the frame lies, a first side surface 68 adjacent to the front surface 66 of the body 14, and the edge 70 of the wall 16, by closing on a portion of the inner surface 168 of the panel 16, opposite to the first front surface portion 66'. The connection lining 64 can thus create a continuous lining surface for the body 14 and the wall 16. The transverse extension of the connection lining 64 and thus the thickness of the panel 16, which can be small in size, can be sized according to specific needs. For example, the connection lining 64 can be adapted to contain a panel 16 with a thickness ranging between 60 mm and 240 mm.

[0050] As can be seen in figure 1, at least one portion of the connection lining 64 overlaps the first front surface portion 66', and can be covered in turn by a side wing 58 of the heat sink 24.

[0051] For example, the connection lining 64 can be a bent sheet made of metal, for example a painted sheet, or made of stainless steel.

[0052] According to a possible embodiment, the frame 12 can comprise a side lining 72 adapted to partially overlap a second front surface portion 66", a second side surface 73 adjacent to the front surface 66 and opposite to the opening of the door, and a rear surface 74 of the body 14.

[0053] As can be seen in figure 1, at least one portion of the connection lining 72 overlapping the second front surface portion 66'' can be covered by a side wing 60 of the heat sink 24.

[0054] According to a possible embodiment, the side lining 72 can be a bent sheet made of metal, preferably made of stainless steel.

[0055] Therefore, the modulability of the coupling be-

tween seat 18 and heat sink 24 can also be used when the side lining 72 and the connection lining 64 are provided. In fact, when provided, the heat sink can be coupled to the seat so that the side wings 58, 60 can be moved towards the respective side lining 72 and connection lining 64, so that they can be contained between the side wings and the frame body.

[0056] In other words, the modulability of the coupling between seat 18 and heat sink 24 allows one of the two side and connection linings, or both, to be optionally inserted without modifying the heat sink itself, while however ensuring all the advantages already mentioned above with reference to the type of coupling achieved.

[0057] According to a possible embodiment, the body 14 can be provided with an inner structural reinforcement 80, e.g., C-shaped, adapted to be coupled to respective inner walls of one of the compartments 52, 54, 56. Advantageously, the structural reinforcement can be placed at the compartment 56 which will be used to fix the frame to the wall of the cold room in use. The inner structural reinforcement can be made of metal, e.g., steel.

[0058] Moreover, the frame according to the present invention can be part of a kit comprising a door for cold rooms.

[0059] Now, the advantages which can be achieved by a frame according to the present invention are thus apparent.

[0060] First, a frame is provided, in which the particular coupling between heat sink and body allows easily obtaining a constant contact with the heating means.

[0061] Moreover, a frame is provided, which allows obtaining a modulable and simple coupling which can also be easily used by inexperienced people.

[0062] Again, as previously mentioned, the frame allows for the choice of whether to use a lining for the body or not, without any modifications to the frame components, due to the modulability of the coupling between the heat sink 24 and the seat 18.

[0063] Moreover, the body preferably made of PVC can be provided with an inner structural reinforcement 80. Advantageously, the inner structural reinforcement 80 can allow constructional elements such as hinges, screws, etc., for example, required for the construction of the door to be fastened.

[0064] Moreover, the coupling thus created between heat sink and heating means leaves the heat sink free to slide in the longitudinal direction following the thermal expansions without introducing any strain and without altering the thermal contact between heating element and heat sink.

[0065] Again, the frame according to the present invention allows particularly high health standards to be complied with, since no screws or equivalent elements are used to fix the heat sink to the body. Moreover, the coupling is free from sharp edges or areas where possible dirt can stagnate, and therefore it is a globally easily sanitizable structure.

[0066] In order to meet specific needs, those skilled in the art will be able to make changes to the embodiments described above or replace the elements described with equivalent elements, without departing from the scope of the appended claims.

Claims

1. Frame (12) for cold room doors comprising a box-like body (14) adapted to be fixed to a wall (16) of a cold room to obtain an at least partial framework;

   said body (14) being provided with a seat (18) adapted to contain heating means (20), and any power supply means (22) for said heating means (20);
   said frame (12) comprising a heat sink (24) adapted to be coupled to said body (14) to close said seat (18), and to receive heat from said heating means (20); said heat sink (24) comprising an outer abutment surface (26) for a door of said cold room, and an inner surface (28) facing said heating means (20) in use;
   characterized in that
   said heat sink (24) comprises coupling arms (30, 32) arranged to be cantilevered with respect to said inner surface (28), adapted to be contained at least partially between opposite side surfaces (34, 36) of said seat (18), said coupling arms (30, 32) being elastically deformable towards and away from each other;
   said coupling arms (30, 32), on the surface thereof facing said opposite side surfaces (34, 36) of said seat (18) in use, being provided with at least one coupling tooth (38, 40),
   said opposite side surfaces (34, 36) of said seat (18) being provided with a plurality of mutually parallel recesses (42, 44, 46, 48, 50) adapted to house said at least one coupling tooth (38, 40);
   wherein the coupling defined by said at least one coupling tooth (38, 40) arranged on each coupling arm (30, 32) with at least one of said recesses (42, 44, 46, 48, 50) on said respective opposite side surfaces (34, 36) defines a plurality of possible coupling positions between said heat sink element (24) and said seat (18).

2. Frame (12) according to claim 1, **characterized in that** said coupling arms (30, 32) are each provided with two coupling teeth (38, 40).

3. Frame (12) according to any one of the preceding claims, **characterized in that** said opposite side surfaces (34, 36) are each provided with at least three recesses (42, 44, 46, 48, 50), preferably with five recesses (42, 44, 46, 48, 50).

4. Frame (12) according to any one of the preceding

claims, **characterized in that** said recesses (42, 44, 46, 48, 50) have a longitudinal extension substantially corresponding to the longitudinal extension of the seat (18) and/or said at least one coupling tooth (38, 40) arranged on each coupling arm (30, 32) has a longitudinal extension substantially corresponding to the length of said heat sink (24).

5. Frame (12) according to any one of the preceding claims, **characterized in that** said at least one coupling tooth (38, 40) protrudes from said coupling arm (30, 32) by an amount between 0.2 and 0.4 mm, preferably by 0.3 mm; said coupling teeth being mutually spaced apart by 0.4 and 0.6 mm, preferably by about 0.5 mm.

6. Frame (12) according to the preceding claim, **characterized in that** said at least one coupling tooth (38, 40) has a substantially triangular shape in a transverse plane.

7. Frame (12) according to any one of the preceding claims, **characterized in that** said recesses (42, 44, 46, 48, 50) have a depth between 0.3 and 0.6 mm, preferably of about 0.4 mm; said recesses (42, 44, 46, 48, 50) being mutually spaced apart by 0.4-0.6 mm, preferably by about 0.5 mm.

8. Frame (12) according to any one of the preceding claims, **characterized in that** said body (14) in cross section comprises three compartments (52, 54, 56) placed side-by-side, wherein the two side compartments (52, 56) have a greater height than the central compartment (54), so as to obtain said seat (18) at the central compartment (54), by virtue of the difference in height with respect to the two side compartments (52, 56), said frame preferably comprising an inner structural reinforcement (80), preferably C-shaped, adapted to be coupled to respective inner walls of one of the compartments (52, 54, 56).

9. Frame (12) according to any one of the preceding claims, **characterized in that** said heat sink (24) comprises side wings (58, 60), which protrude laterally above said body (14) in use.

10. Frame (12) according to any one of the preceding claims, **characterized in that** it comprises a resistor and cable-return-channel holder profile (62) adapted to be arranged inside said seat (18).

11. Frame (12) according to any one of the preceding claims, **characterized in that** said body (14) is made of a polymer material, preferably PVC, and/or said heat sink is made of metal, preferably aluminum or an alloy thereof.

12. Frame (12) according to any one of the preceding claims, **characterized in that** it comprises a substantially C-shaped connection lining (64) of the rigid type, adapted to overlap a first front surface portion (66') which, in use, is close to the opening of the wall (16) on which the frame lies, a first side surface (68) adjacent to the front surface (66) of the body (14), and the edge (70) of the wall (16), by closing on a portion of the inner surface (168) of the panel (16), opposite to the first front surface portion (66'); preferably at least one portion of said connection lining (64) overlapping said first front surface portion (66') is covered by a side wing (58) of said heat sink (24).

13. Frame (12) according to any one of the preceding claims, **characterized in that** it comprises a side lining (72) adapted to partially overlap a second front surface portion (66"), a second side surface (73) adjacent to said front surface (66) and opposite to the opening of said door, and a rear surface (74) of said body (14); preferably, at least one portion of said side lining (72) overlapping said second front surface portion (66") is covered by a side wing (60) of said heat sink (24).

14. Frame (12) according to the preceding claim, **characterized in that** said connection lining (64) is a bent sheet made of metal, preferably stainless steel, and said side lining (72) is a bent sheet made of metal, preferably stainless steel.

15. Kit comprising a cold room door and a frame for cold rooms according to any one of the preceding claims.

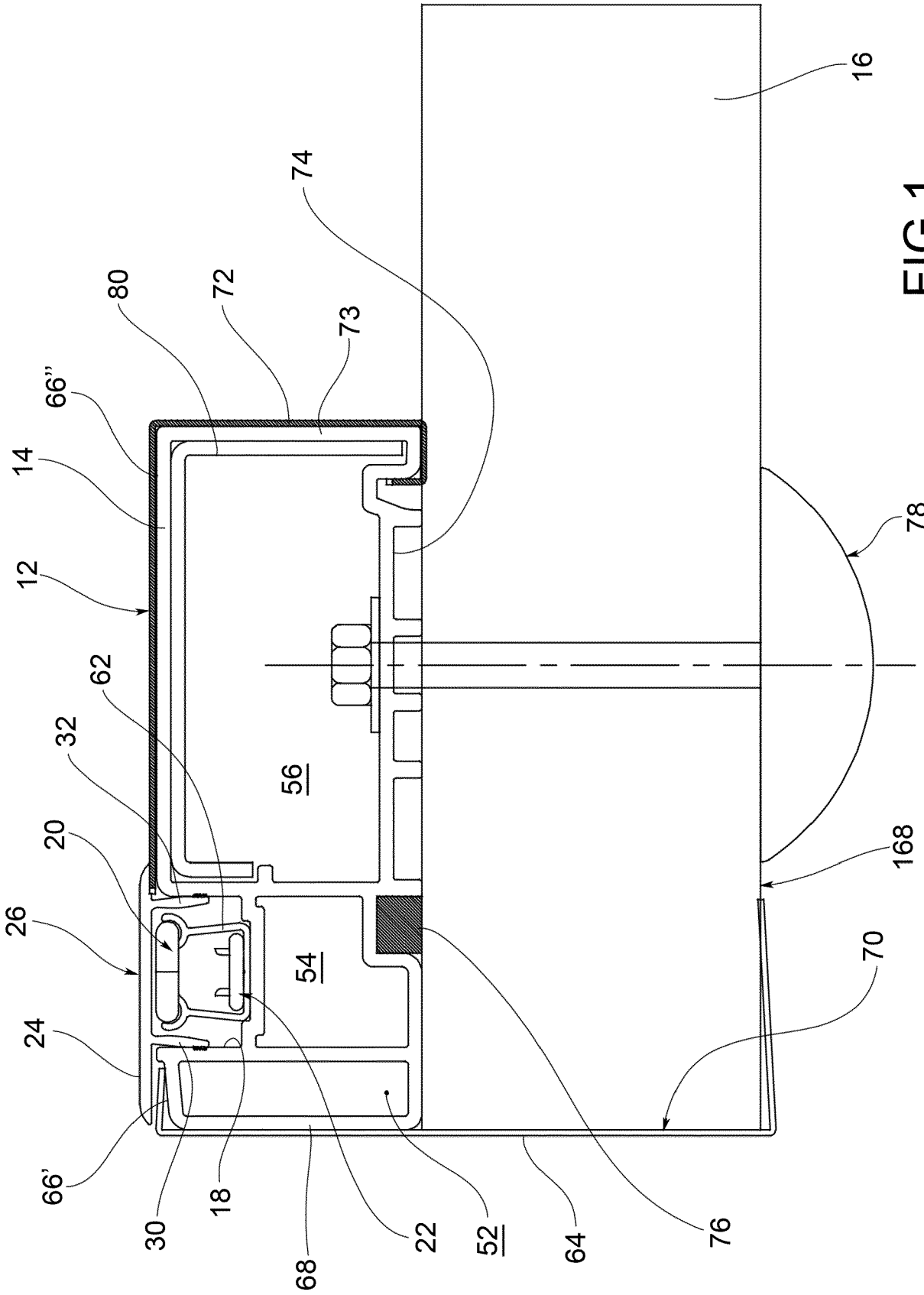
16
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FIG.1

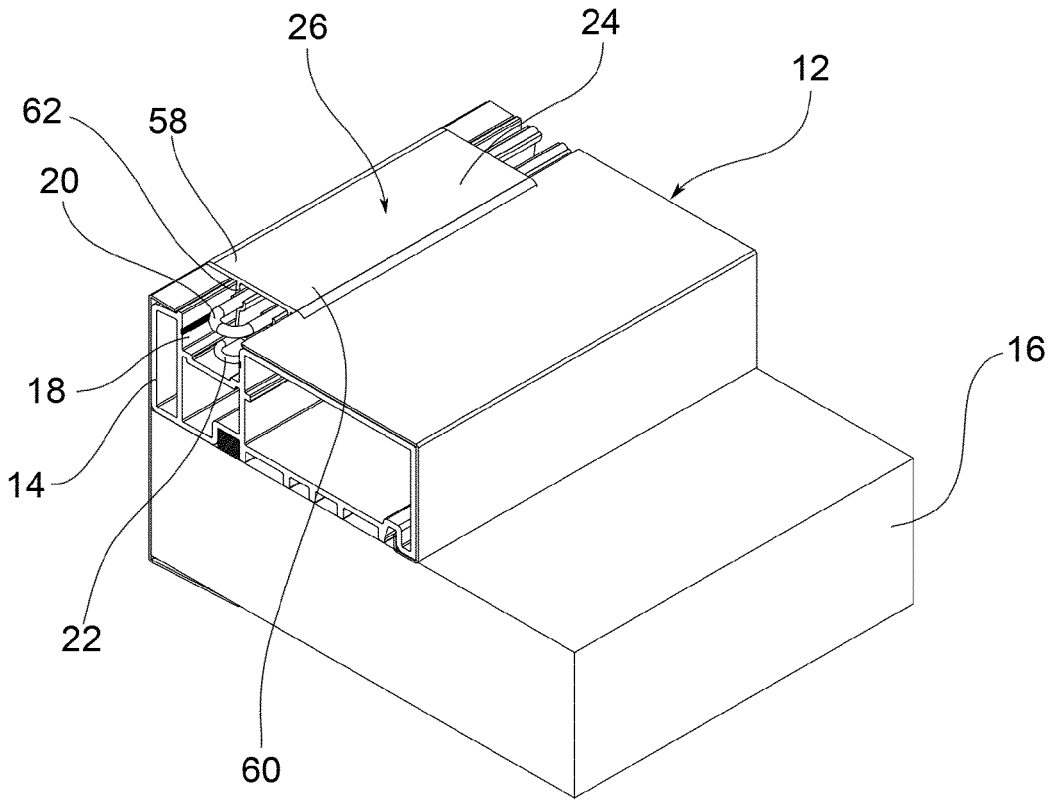

FIG.2

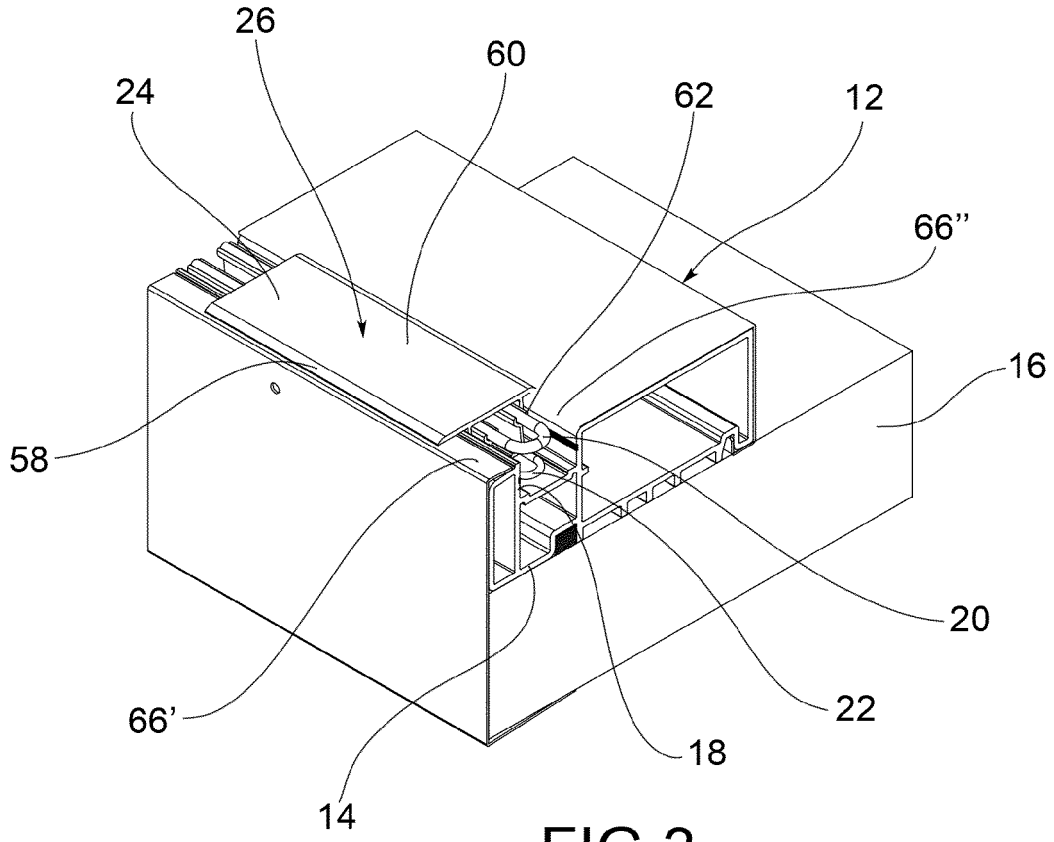

FIG.3

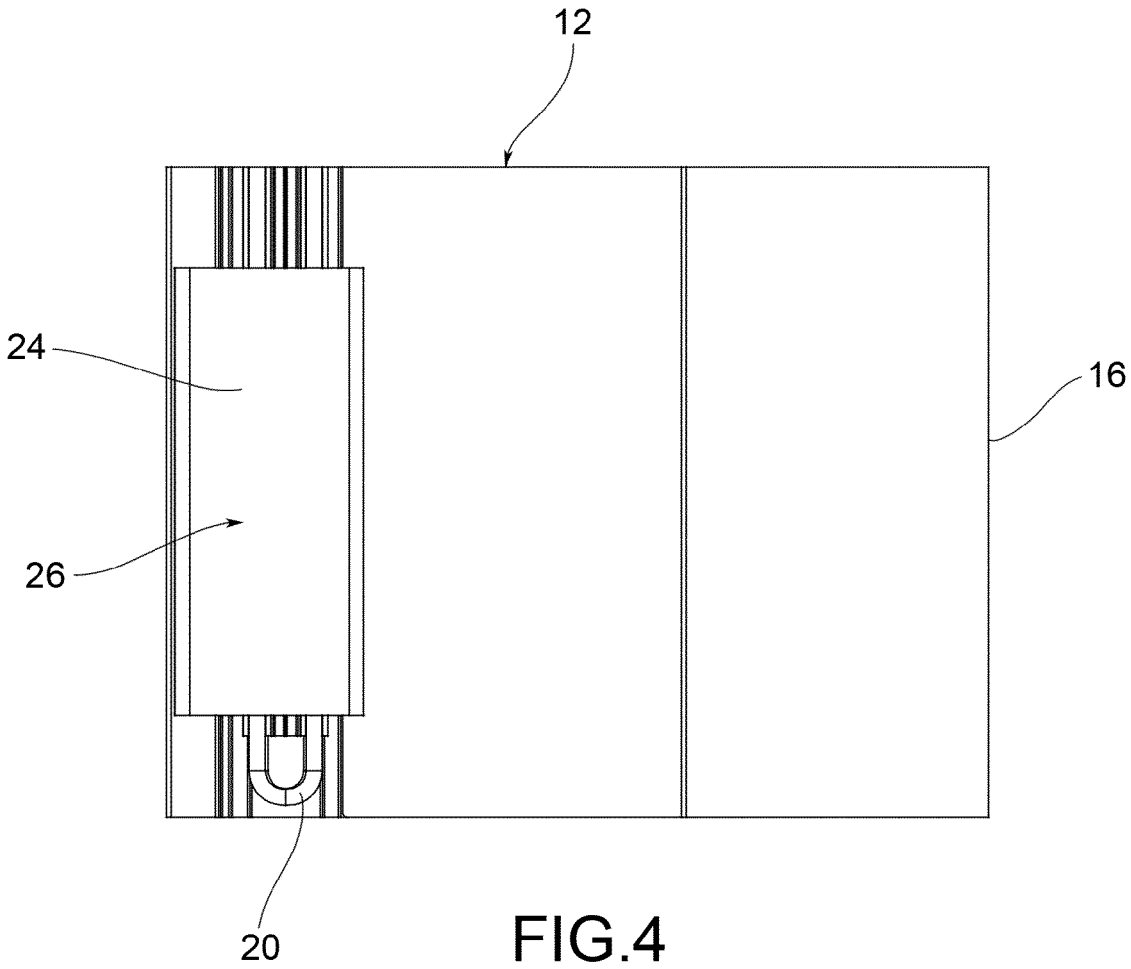

FIG.4

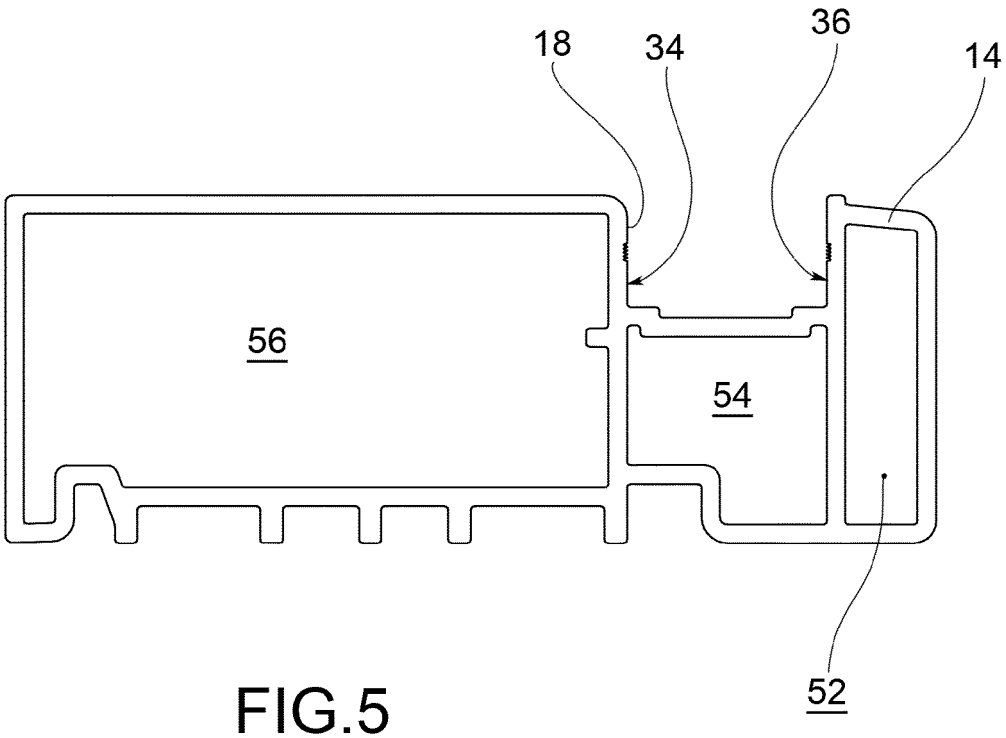

FIG.5

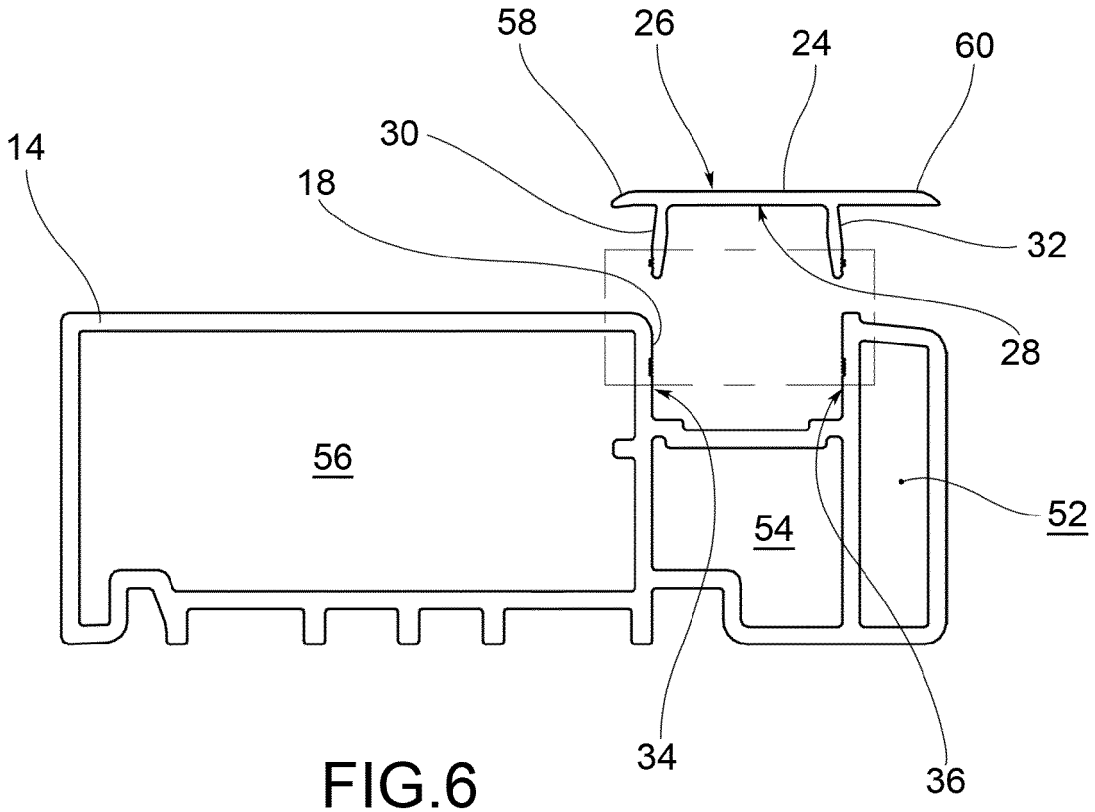
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FIG.6

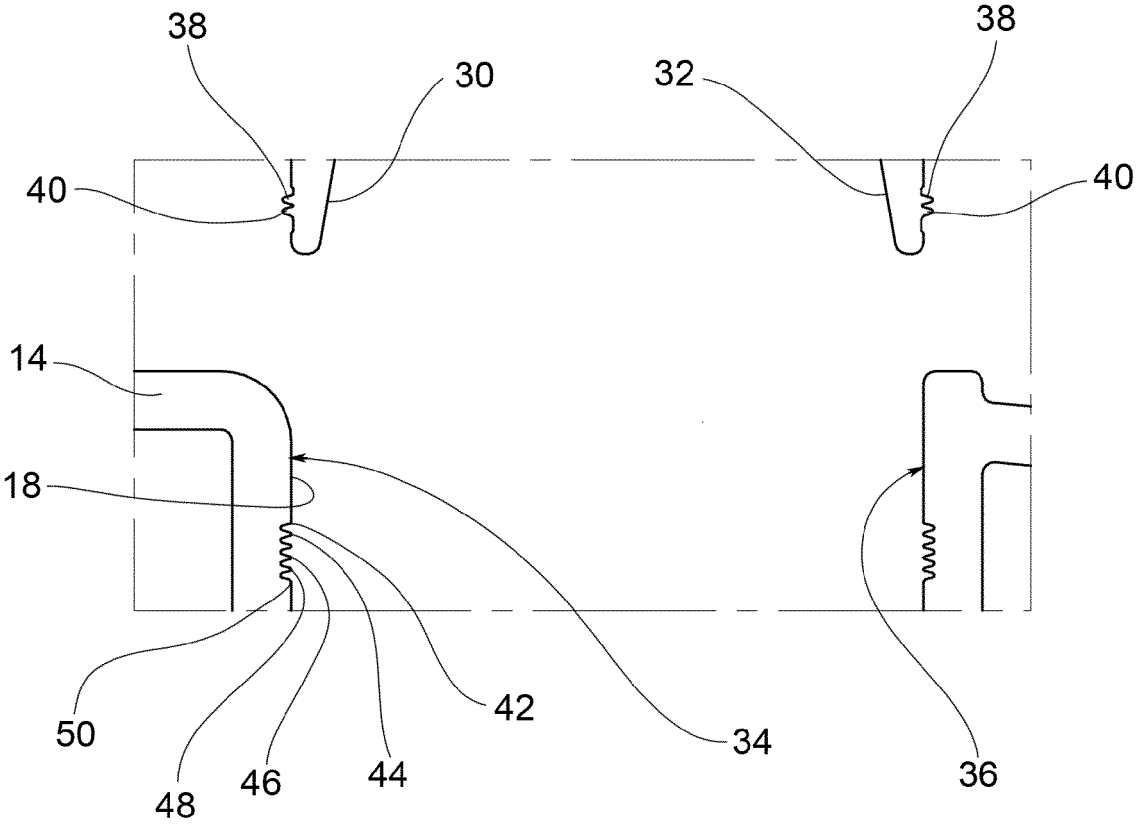
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FIG.7

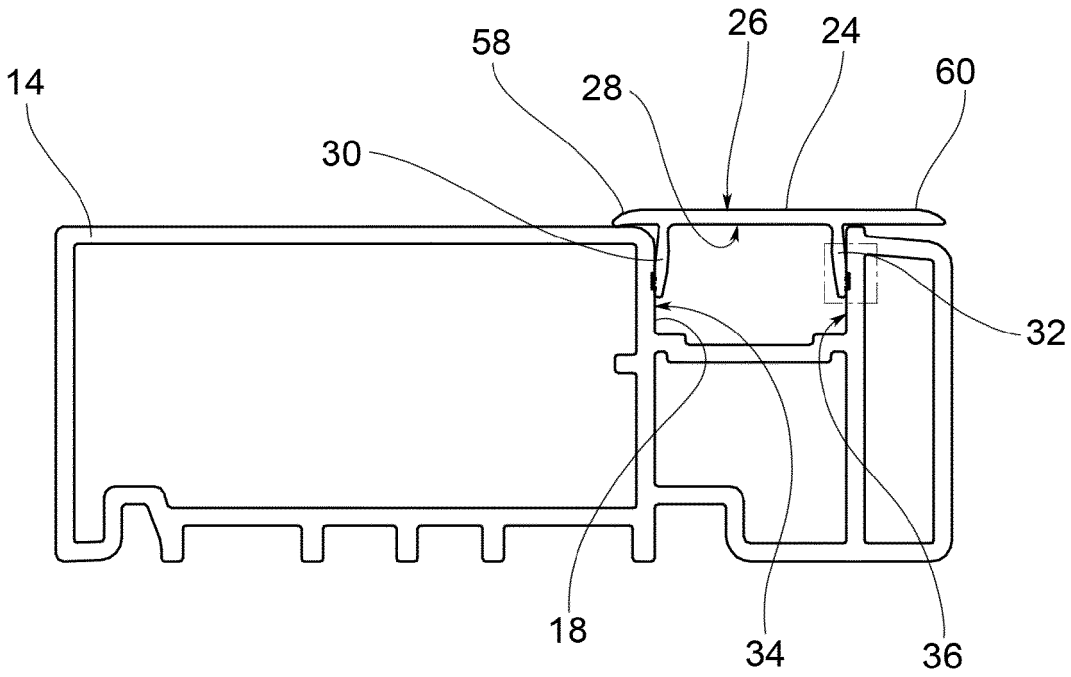

FIG.8

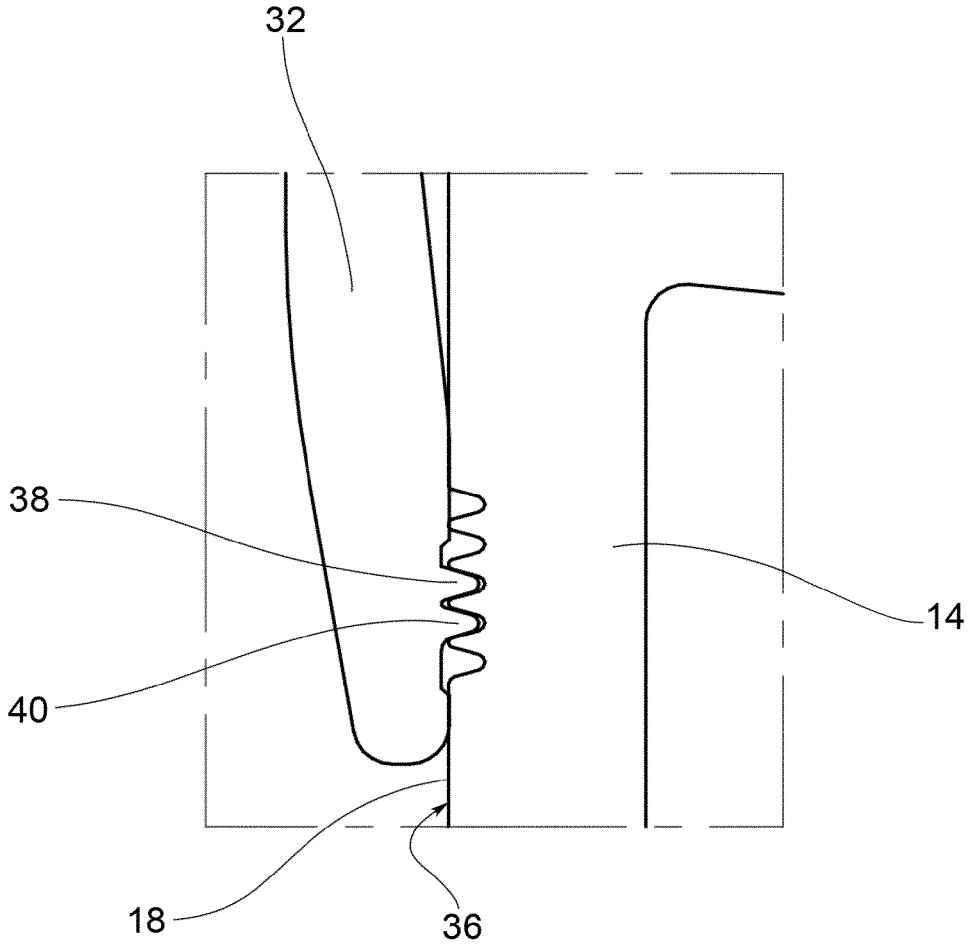

FIG.9

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EUROPEAN SEARCH REPORT

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Place of search	Date of completion of the search	Examiner
The Hague	6 July 2023	Kuljis, Bruno

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