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(54) Retractable sealing for a slit under a door or a window

(57) A device for sealing a slit between a bottom sill and a closed door or window, comprising a sealing strip and an operating structure (10-13; 37, 38; 110-113; 220; 320) for moving the sealing strip from a first, retracted position for displacement over the bottom sill to a second, downwardly projecting position for sealingly abutting the sealing strip against the bottom sill and, in reaction to the opening of the door or the window, for moving the sealing strip back from the second position to the first position. In the second position, the sealing strip projects horizontally and in a transverse direction to the sealing strip relative to the connecting area of the operating structure for causing the sealing strip to project at an outer side of the bottom sill beyond an upper side of the bottom sill. The operating structure (10-13; 37, 38; 110-113; 220; 320) has a connecting area for connection to a lower part of a door or window and is coupled to the sealing strip.

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Description

[0001] The invention relates to a device according to the preamble of claim 1.

[0002] Such a device is known from the international patent application WO 94/17276. With this weather strip, the operating structure for moving the sealing strip, in reaction to the opening and closing of the door, between the first, retracted position and the second, more downwardly projecting position is formed by a flange, projecting at an angle from the sealing strip and cooperating with a narrow, upstanding edge of the lower sill. Upon closure of the door, the flange strikes the upstanding edge, thus causing the sealing strip to swivel from the first, retracted position to the second position, which, compared to the first position, projects downwards more. Upon opening of the door, the sealing strip ascends against the upstanding edge of the lower sill and is thus forced back into the first, retracted position.

[0003] A drawback of this weather strip is that the lower sill has to be provided with an upstanding edge. One can easily bump one's foot against such an edge which in itself can be unpleasant and can lead to tripping. Further, passing the sill with rolling objects is rendered more difficult and the lower sill can easily become damaged by hard objects striking against it. Upon opening of the door, the sealing strip, while abutting against the upstanding edge of the lower sill with normal closing force, slides along the upstanding edge during movement from the first to the second position. In particular when the upstanding edge is damaged, this can easily lead to wear of the sealing edge of the sealing strip. A further drawback is that pushing the sealing strip against the sealing force from the first to the second position renders the opening of the door more difficult.

[0004] From the U.S. patent publication 2 802 247, a sealing strip is known which can swivel about a swivel axis adjacent the inner surface of the door, from a first, retracted position to a second position which, relative to the retracted position, projects further downwards, and which, in this second position, engages over an outward facing edge of a lower sill. With this sealing strip, the downward swivelling of the sealing strip is effected in that its free edge, during closure of the door, moves against a guideway on the hinged side of the post. The sealing strip is thereby moved against a spring force, which spring force, upon opening of the door, also causes the sealing strip to swivel upwards again when this movement is gradually released by the guideway. A drawback of this sealing is that the sealing edge of the sealing strip, particularly at the side where the lock of the door is located, upon opening, has to move with a movement component in the opening direction of the door. Thus, the sealing edge slides over the sill, which, in combination with any sand and the like, leads to wear of the lower sill and the sealing edge.

[0005] An object of the invention is to provide a sealing with which a water damming sealing along an underside of a door or a window can be obtained, while no upstanding edge for operating the movement of the sealing strip is necessary and wherein, to limit wear of the sealing edge of the sealing strip, this sealing edge can be rapidly moved away from the lower sill upon opening of the door.

[0006] To this end, the invention provides a sealing according to claim 1. As the operating structure coupled to the sealing strip has a connecting area for connection to a lower part of a door or window, swivelling the sealing strip can be operated from the door or the window. The necessity for using a narrow upstanding edge or movement patterns wherein the sealing edge slides strongly over the lower sill is thereby removed. With sealings at the underside of a door where the sealing does not engage over a lower sill but is pushed vertically downwards below the door, it is known per se to use an operating structure with a connecting area for connection to a lower part of a door or window. However, such sealings are particularly destined for use in situations where no lower sill is present and there, the problem of the sealing strip engaging over an outwards facing surface of the lower sill when the door is closed does not occur. The invention can also be embodied in a swivelling panel according to claim 10.

[0007] The invention is further elucidated on the basis of a number of embodiments of the invention which are represented in the drawing.

[0008] In the drawing:

Fig. 1 shows a side view in cross section of a lower edge of a door with a sealing device according to the invention in opened condition;
Fig. 2 shows a side view in cross section of a lower edge of a door and bottom sill with a sealing device according to the invention in closed condition;
Fig. 3 shows a side view in cross section of a lower edge of a door with a different sealing device according to the invention in opened condition;
Fig. 4 shows a side view in cross section of Fig. 3 in closed condition;
Fig. 5 shows a front view of a door provided with a sealing device according to the invention;
Fig. 6 shows a side view in cross section of a lower edge of a door with a sealing device according to the invention;
Fig. 7 shows a side view in cross section of a lower edge of a door with a sealing device according to the invention;
Fig. 8 shows a side view in cross section of a lower edge of a door with a sealing device according to the invention, and
Fig. 9 shows a side view in cross section of a lower edge of a door with a sealing device according to the invention.

[0009] In Fig. 5, a door 2 is shown which is accommodated in a door casing 50 with a bottom sill 3. It is noted

that the element 2 can also be a window and that the bottom sill 3 can also be formed by a casing portion under that window. In the following description, for brevity's sake, each time, the starting point is a sealing of an underside of a door.

[0010] As shown in Fig. 1, at the underside of the door 2, a sealing device 1 is provided. The door 2 has a front side 6 and a rear side 7. At the underside of the door 2, against the bottom surface 5, an elongated profile 10 of an operating structure is provided, which extends over the entire width of the door 2. The profile 10 has a hollow and, in cross section, rectangular part 13 from which a projecting part 11 extends. The extremity of the projecting part 11 remote from the rectangular part 13 is provided with claws 12 bounding a groove. In the groove 12 defined by the claws, a circular segmental profile part forming a hinge pin 32 is confined. To the hinge pin 32, a sealing part 31 is connected. The claws 12 and the hinge pin 32 form a hinge having the axis of the hinge pin as central axis, such that the sealing part 31 can hinge about the central axis relative to the profile 10, in the direction indicated with the arrow B in Fig. 1.

[0011] The sealing part 31 is designed as an elongated profile. On an edge 34 remote from the door 2, at the side proximal to the hinge, the sealing part 31 is provided with a holder profile 35 in which a sealing rubber 36 is provided. The sealing rubber 36 is continuous along the entire edge 34 of the sealing part 31. On the edge 33 proximal the door 2, the sealing part 31 is provided over the entire length of the edge 33 with a rubber strip 33.

[0012] On the inside 7, the door 2 is fitted with a weather profile 20, provided on the profile 10. An upper extremity of the weather profile 20 is provided with a rubber strip 21 extending along the entire edge of the weather profile 20. In mounted condition, the rubber strip 21 seals off the space between the profile 10 and the underside 5 of the door 2 in a draught-proof manner. Further, at a lower edge, the weather profile 20 is provided with a rubber strip 22 which, in the initial condition shown, reaches below the door 2.

[0013] In Fig. 1, the sealing device 1 is shown in the initial position wherein the sealing part 31 is tilted such that the extremity 34 of the sealing part 31, in this example, is higher than the lower edge 11 of the profile 10. The invention is, for that matter, not limited to such a height; according to the invention, it suffices that the sealing part is at a sufficient height relative to an underlying sill for the sealing part to be movable over the sill upon closure of the door, while possibly, contact between the sealing part and the sill can occur,

[0014] The operating structure of the sealing device 1 is further provided with a spring member 37, schematically represented in the drawing, which forces the sealing device to the opened position, as shown in Fig. 1, and with a transmission 38, also schematically represented.

[0015] Upon closure of the door, whereby the door is moved in the direction indicated with an arrow A in Figs. 1 and 2, the sealing device 1 is moved over and beyond a sill 3 belonging to the door opening. The post of the door 2 is engaged by a pin which, via a transmission 38, engages the sealing part 31. Thus, the sealing part 31 is swivelled against the spring pressure in the direction indicated with the arrow B.

[0016] During the closing of the door 2, the sealing part 31 swivels further to such an extent that, in fully closed condition of the door 2 as shown in Fig. 2, the rubber 36 abuts to an outermost edge 8 of an upstanding portion of the bottom sill 3. In this closed condition of the sealing part 31, the rubber strip 33 of the sealing part 31 abuts against the underside 5 of the door 2.

[0017] In closed condition, a good sealing of the underside of the door is obtained in that the sealing part 31, by means of the rubber 36, seals off the space below the door and above the sill from the outer side of the door, so that draught and moisture cannot penetrate. Preferably, the rubber 36 is designed such that in closed condition the rubber 36 deforms to such an extent in contact with the edge 8 that a damming sealing is obtained. As the rubber 33 too abuts against the bottom side of the door, a further sealing against draught and moisture of the space below the door is obtained. What is thereby achieved is that no dirt can penetrate into the sealing part construction.

[0018] By swivelling the sealing part, a relatively large vertical distance between the bottom sill and the door can be bridged by the sealing device in closed condition, while in opened condition the space required for the sealing device in vertical direction is small.

[0019] In closed condition, the rubber strip 22 abuts against the rear side of the sill 2, so that a further sealing of the space below the door is obtained.

[0020] In Figs. 3 and 4 a second exemplary embodiment of a sealing device according to the invention is shown. A door 2', corresponding to the door 2 of the previous example, has a front side 6' and a rear side 7'. At the underside of the door 2, against the bottom surface 5', an operating structure with an elongated profile 110 is provided, extending over the entire width of the door 2. The profile 110 corresponds to the profile 10 of the previous exemplary embodiment, and is correspondingly provided with a hollow and, in cross section, rectangular part 113 from which a projecting part 111 extends. The extremity of the projecting part 111 remote from the rectangular part 113 is provided with claws 112 bounding a groove. In the groove bounded by the claws 12, a circular segmental profile portion, functioning as a hinge pin 132 is confined. To the hinge pin 132 a sealing part 131 is connected. The claws 112 and the hinge pin 132 form a hinge such that the sealing part 131 can hinge about the hinge pin 132 relative to the profile 110, in the direction indicated with the arrow B' in Fig. 3.

[0021] The sealing part 131 is designed as an elongated profile. From the sealing part 131, in the side remote from the door 2', a sealing rubber 136 extends. In

this example, the sealing rubber 136 is relatively thin and supple. The sealing rubber 136 is continuous along the entire sealing part 131.

[0022] On the inside 7' the door 2' is fitted with a weather profile 120 provided on the profile 110. An upper extremity of the weather profile 120 is provided with a rubber strip 121 extending along the entire edge of the weather profile 120. In mounted condition, the rubber strip 121 seals off the space between the profile 110 and the underside 5' of the door 2' in a draught-proof manner. Further, on a lower edge, the weather profile 120 is provided with a rubber strip 122 which, in the initial condition shown, reaches below the door 2'.

[0023] On the upper surface, the bottom sill 3' is provided with a wearing plate 108. On the upper edge of the bottom sill 3' proximal to the outer side, a profile 109 is provided extending over the entire length of the bottom sill 3'. In cross section, the profile 109 is substantially U-shaped with a downwardly directed edge 109". The edge 109" is fitted on an upstanding edge of the bottom sill 3', such that a middle part 109' of the U-shape of the profile is located adjacent an edge of the bottom sill 3'.

[0024] At the underside of the door 2', on the outside 6' a water bar 106 is provided. This water bar 106 extends over the width of the door. Such water bars are known per se and serve for preventing the entrance of water under the door.

[0025] In Fig. 3 the sealing device 101 is shown in the initial position wherein the sealing part 131 is tilted such that, in this example, the extremity 136 of the sealing part 131 is higher than the lower edge 111 of the profile 110. The invention is, for that matter, not limited to such a height; according to the invention it suffices that the sealing part is at a sufficient height relative to an underlying sill for moving the sealing part over the sill when closing the door, while, possibly, contact between the sealing part and the wearing plate on the sill can be possible. In the framework of this invention, sill or sill assembly is also understood to mean the sill including any wearing plates or other metal work provided on the sill, such as the profile 109.

[0026] The operating structure of the sealing device 101, like the previously described embodiment, is provided with a spring member (not shown) urging the sealing part 131 towards the opened position, as shown in Fig. 3, and with a transmission (not shown).

[0027] When closing the door, whereby the door is moved in the direction indicated with an arrow A' in Figs. 3 and 4, the sealing device 101 is moved over and beyond a sill 3' belonging to the door opening. The post of the door 2' is provided with a pin engaging a part of the sealing part 131 proximal to the post. Thus, the sealing part 131 is swivelled against the spring pressure in the direction indicated with B' in Fig. 3.

[0028] During closing of the door 2', the sealing part 131 swivels further to such an extent that in the fully closed condition of the door 2' as shown in Fig. 4, the rubber strip 136 abuts the U-shaped part 109' of the profile 109 on the bottom sill 3. Here, the rubber strip 136 can bulge up to some extent and fold the extremity of the rubber strip against the profile 109 such that in a manner known per se a damming sealing is obtained.

[0029] In closed condition, a good sealing of the bottom side of the door is obtained in that the sealing part 131, by means of the rubber 136, seals off the space below the door and above the sill from the outside of the door, so that draught and moisture cannot penetrate. Preferably, the rubber 136 is designed such that in closed condition the rubber 136 deforms in contact with the U-shaped part 109', such that a damming sealing is obtained. With the water bar 106, when the door 2' is closed, water running along the outside of the door 2' is prevented from running directly onto the sealing device 101.

[0030] In closed condition, the rubber strip 122 abuts against the rear side of the sill 2', so that a further sealing of the space below the door is obtained.

[0031] In Fig. 6, a further variant of the embodiment according to the invention is shown. The sealing device 200 comprises a sealing strip 250 which is connected by means of a coupling piece 210 to an operating structure 220. The operating structure 220 has a connecting area 230 for connection to a bottom part 245 of a door 240 and coupled to the sealing strip 250. The operating structure 220 is known from the state of the art and is arranged, when opening the door, to move upward in a translating manner in the direction indicated with D and to move downward when closing the door. In Fig. 6, the device is shown in the closed condition, wherein the sealing strip 250 sealingly abuts a bottom sill 260 belonging to the door. When opening the door in the direction indicated with C, in reaction to the closing of the door, the operating structure 220 moves the sealing strip from the closed position to an at least partly retracted position wherein the sealing strip is kept clear from the bottom sill. At least in the closed position the sealing strip projects horizontally and in a direction transverse to the sealing strip relative to the connection area of the operating structure so that the sealing strip projects at an outside of the bottom sill beyond an upper side of the bottom sill. Thus, with a closed door, an efficient damming sealing between bottom sill and door is obtained.

[0032] In Fig. 7, yet a further variant of the embodiment according to the invention is shown. The sealing device 300 comprises a sealing strip 350 which, by means of a coupling piece 310, is connected to an operating structure 320. In this example, the sealing strip 350 is designed as a lip resilient in horizontal direction, viewed in operative condition. The lip is placed at an angle of 30° - 60° and preferably 40° - 50° to the vertical. The operating structure 320 has a connecting area 330 for connection to a bottom part 345 of a door 340 and coupled to the sealing strip 350. The operating structure 320 is known from the state of the art and is arranged, when opening the door, to move upwards in a translating

manner in the direction indicated with D, and to move downwards when closing the door. In Fig. 7, the device is shown in the closed position, wherein the sealing strip 350 is in sealing contact with the bottom sill 360 belonging to the door. When opening the door in the direction indicated with C, in reaction to the closing of the door, the sealing strips moves from the closed position to an at least partly retracted position wherein the sealing strip is kept clear from the bottom sill. At least in the closed position, the sealing strip projects horizontally and in a transverse direction to the sealing strip, relative to the connecting area of the operating structure so that the sealing strip projects at an outside of the bottom sill beyond an upper side of the bottom sill. The surface in the area where the bottom sill and the sealing strip abut each other, makes, in operative condition, an angle of 30° - 60° and preferably of 40° - 50° with the vertical. Due to this angle, with a relatively limited vertical movement a rapid release of the sill is obtained, while, still, a good sealing is guaranteed.

[0033] In Fig. 8, a further variant embodiment according to the invention is shown. At the bottom side of a door 420 a sealing device 401 according to the invention is provided. In contrast to the preceding examples, the door 402 opens to the outside relative to the sill 3 in the direction indicated with the arrow X. The door 402 has a front side 6 and a rear side 7. At the front side 6 a water bar 406 is provided. At the bottom side of the door 2, against the bottom surface of the door, an operating structure with an elongated profile 110 is provided, extending over the entire width of the door 402. The profile 110 corresponds to the variant shown in Figs. 1- 4, and has a hollow and, in cross section, rectangular part 13 from which a projecting part 11 extends. In a manner corresponding to the example of Fig. 1, a sealing part 431 is provided on the projecting part 11, wherein the sealing part 431 can swivel relative to the part 11. At the rear side, the profile 110 is provided with an extra weather profile 420 whose function corresponds to the sealing 20 of the preceding examples.

[0034] The sealing part 431 is provided with a sealing rubber 436, corresponding to the previously described sealing rubber 36, which, in closed condition as shown in Fig. 8, abuts against the sill 3. When opening the door, whereby it moves in the direction X, the operating structure, identically to the first exemplary embodiment, provides that the sealing part swivels upwards. The edge 433 of the sealing part 431 proximal to the door can, if desired, be provided over the entire length of the edge 433 with a rubber strip, which, in closed condition, provides for an extra sealing, corresponding to the edge 33 of the first exemplary embodiment.

[0035] A further embodiment of the sealing device 501 according to the invention with a door opening to the outside is shown in Fig. 9. Here, the door 402 and sill 3 are identical to corresponding parts of the exemplary embodiment of Fig. 8. Here, the door 402 and sill 3 are identical to corresponding parts of the exemplary embodiment of Fig. 8. This also holds for the profile 110 and the weather profile 420. Instead of a water bar, a cover profile 506 is provided for preventing water penetration.

[0036] The profile 110 of the operating structure has a hollow and, in cross section, rectangular part from which a projecting part extends. In a manner corresponding to the example of Fig. 1, a sealing part 531 is provided on the projecting part, while the sealing part 531 can swivel relative to the part. In this example, the swivel axis is located adjacent an edge of the sealing part; therefore an edge 33, 433, as shown in preceding examples, is absent. Providing the swivel axis adjacent the edge of the sealing part has as an advantage that the build-in height can remain limited. To improve the swivelling movement of the sealing part a spring element, such as, for instance, a spiral or torsion spring can be provided around the rotation axis of the sealing part 531. On the rear side, the profile 110 is provided with an extra weather profile 420 whose function corresponds to the function of sealing 20 according to the preceding examples.

[0037] The sealing part 531 is provided with a sealing rubber 436, corresponding to the sealing rubber 36, described hereinabove, which, in closed condition, abuts the sill 3, as shown in Fig. 9. When opening the door, whereby it moves in the direction X, an operating device, identical to the one of the first exemplary embodiment, causes the sealing part to swivel upwards.

[0038] Although in the examples shown the sealing device is shown for a door in cooperation with a frame, the device according to the invention can also be used with other outer wall openings with a frame and movable sealing part such as, for instance, windows and shutters.

Claims

1. A device for sealing a slit between a bottom sill (3; 3'; 260; 360) and a closed door (2; 2'; 240; 340) or window, comprising a sealing strip (31; 131; 431; 531; 210; 310) and an operating structure (10-13; 37, 38; 110-113; 220; 320) coupled to the sealing strip (31; 131; 431; 531; 210; 310) for moving, in reaction to the closing of the door or the window, the sealing strip (31; 131; 431; 531; 210; 310) from a first, at least partly retracted position, for displacement over the bottom sill (3; 3'; 260; 360) to a second position, more downwardly projecting with respect to the first position, for a sealing abutment of the sealing strip (31; 131; 431; 531; 210; 310) against the bottom sill (3; 3'; 260; 360) and for moving, in reaction to the opening of the door or the window, the sealing strip (31; 131; 431; 531; 210; 310) back from said second position to said first position, **characterized in that** the operating structure (10-13; 37, 38; 110-113; 220; 320) has a connecting

area for connection to a lower part of a door (2; 2'; 240; 340) or window, and that the sealing strip (31; 131; 431; 531; 210; 310) at least in said second position, viewed in operative condition, projects horizontally and in a transverse direction to said sealing strip (31; 131; 431; 531; 210; 310) relative to said connecting area of said operating structure (10-13; 37, 38; 110-113; 220; 320) for causing the sealing strip (31; 131; 431; 531; 210; 310) to project on an outer side of the bottom sill (3; 3'; 260; 360) beyond an upper side of the bottom sill (3, 3', 260, 360).

2. A device according to claim 1, wherein the sealing strip and the operating structure (10-13; 37, 38; 110-113) are designed such that, upon movement from said second position to said first position, a free edge of the sealing strip (31, 131; 431; 531) moves with a directional component horizontally away from said connecting area.

3. A device according to claim 2, wherein, with regard to the operating structure (10-13, 37, 38; 110-113) the sealing strip can swivel between said first position and said second position about an axis parallel to the sealing strip (31, 131; 431; 531).

4. A device according to claim 3, wherein the sealing strip and the operating structure (10-13, 37, 38; 110-113) are designed such, that during swivelling of the sealing strip (31, 131; 431) from said first position to said - second position an edge (33; 433) of the sealing strip (31, 131; 431), viewed in operative condition, moves upwards to abut in a sealing manner against a downwards facing surface (5, 5') of the door (2; 2') or the window.

5. A device according to any one of the preceding claims, further comprising a spring (37) urging the sealing strip (31, 131; 210; 310; 431; 531) to said first position.

6. A device according to any one of the preceding claims, wherein the sealing strip (31, 131; 431; 531) can swivel about a swivel axis at a distance below the door or the window.

7. A device according to claim 6, wherein the sealing strip (31, 131; 431; 531) comprises a longitudinal profile part and wherein a longitudinal edge (32; 132) of the profile part forms a hinge axis directed in the longitudinal direction of the profile part for swivelling movement about said swivel axis.

8. A device according to any one of claims 1 - 5, wherein the sealing strip (210; 310) relative to the operating structure (220, 320) is movable back and forth in a translating manner between said first position and said second position.

9. A device according to claim 8, further comprising a sealing profile (210; 310) with a lip (250; 350) resilient in horizontal direction, viewed in operative condition.

10. A swivelling panel such as a door or a window, provided with a device according to any one of claims 1 - 9.

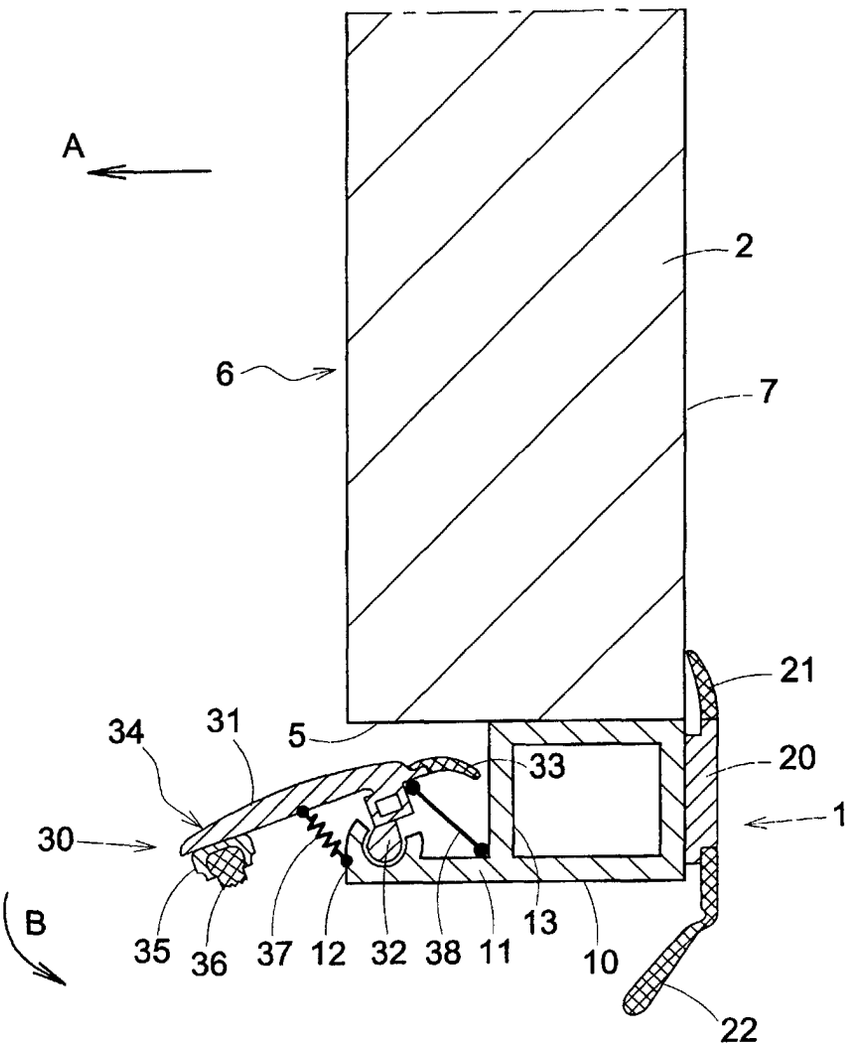


Fig. 1

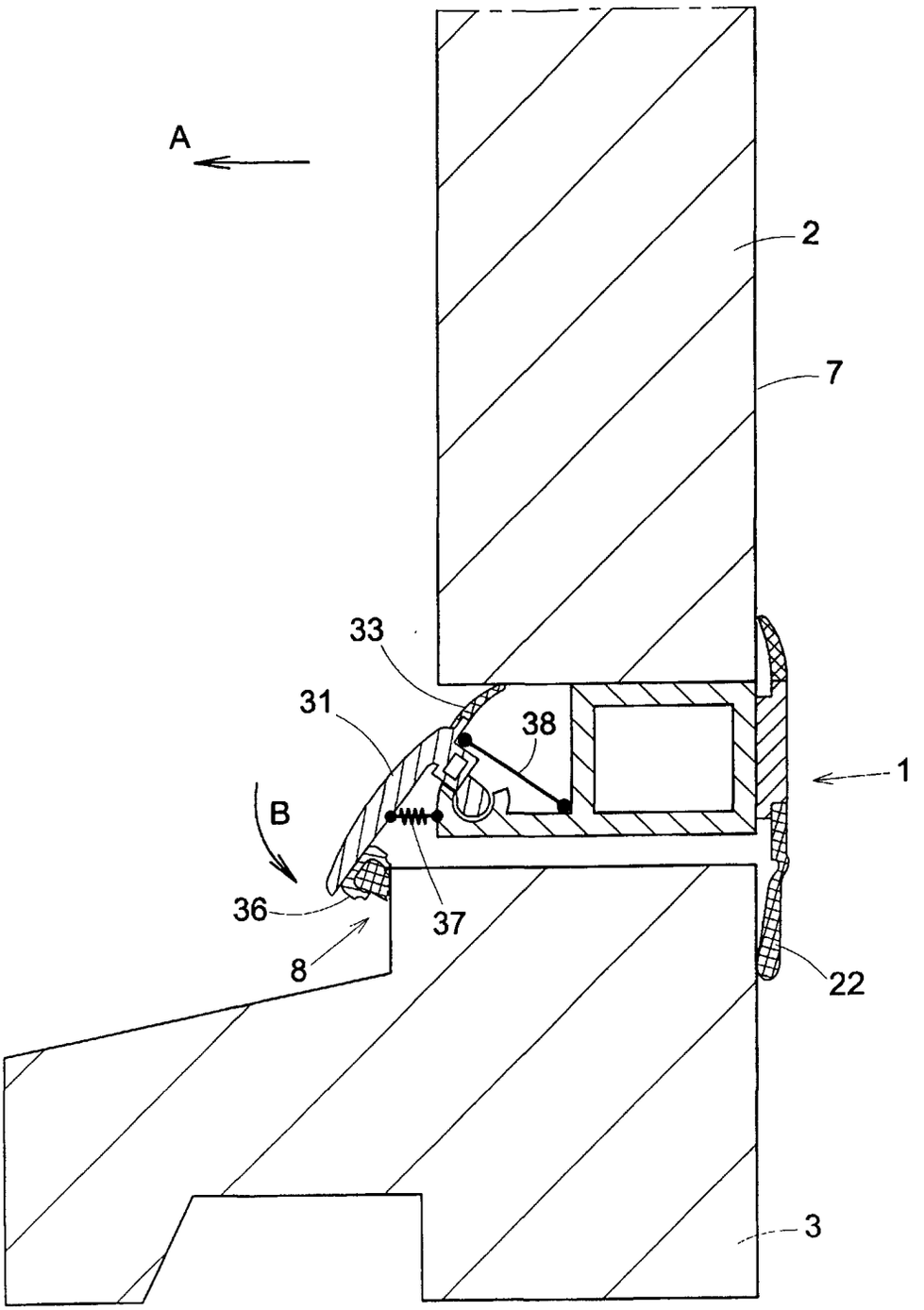
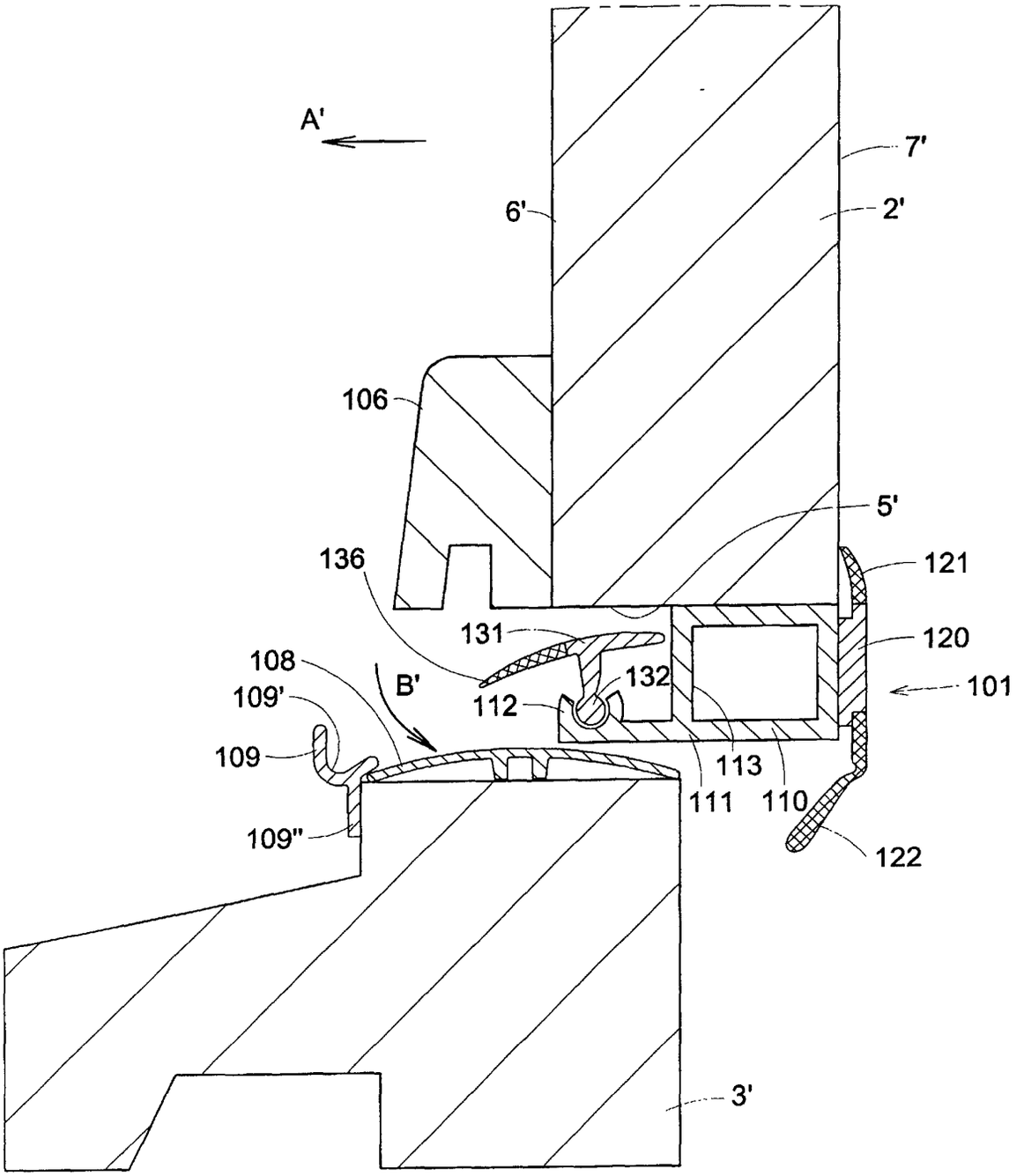


Fig. 2


A'
7'
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106
5'
136
121
131
120
108
B'
132
101
109'
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109
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110
109"
122
3'

Fig. 3

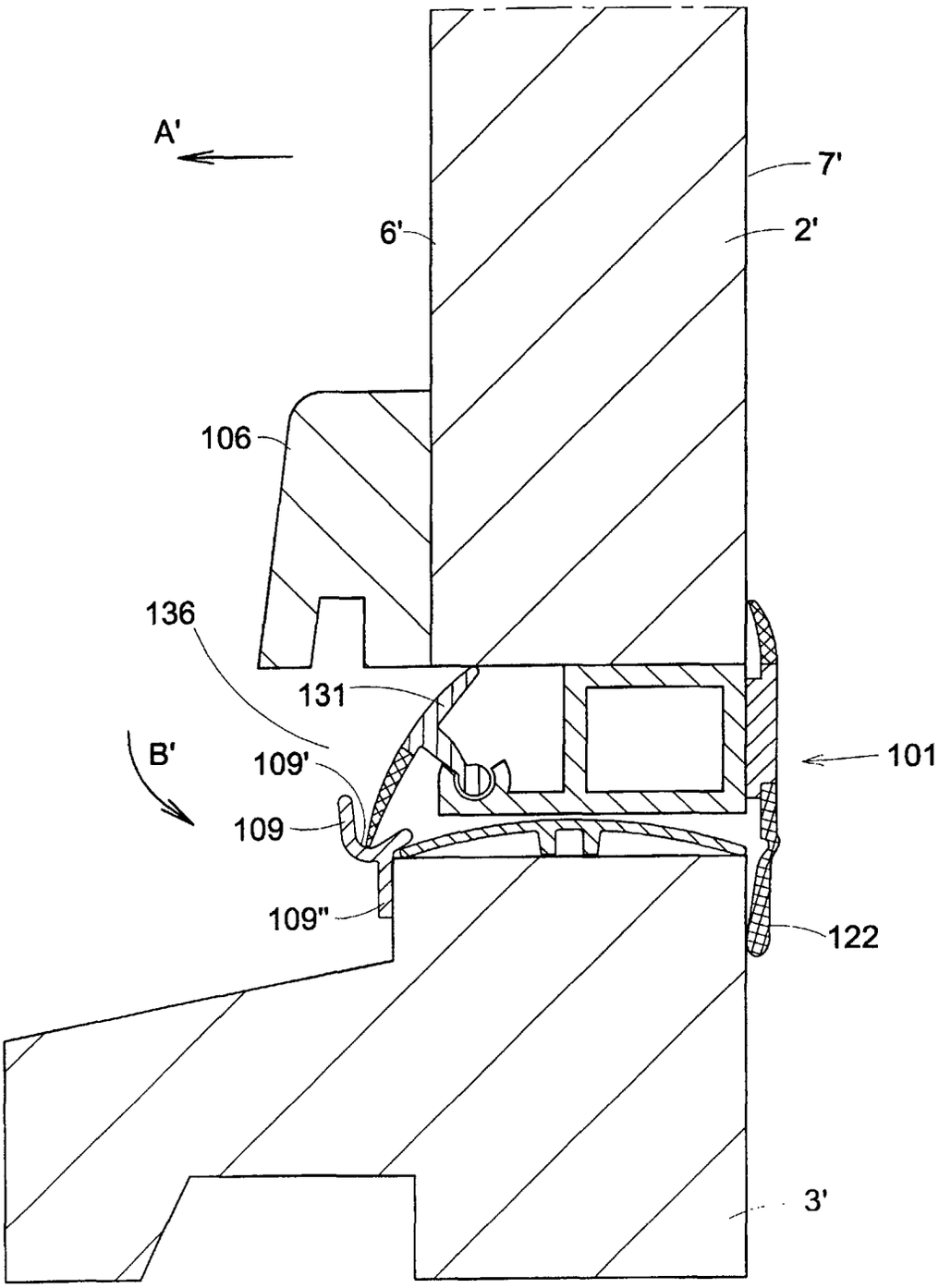

Fig. 4

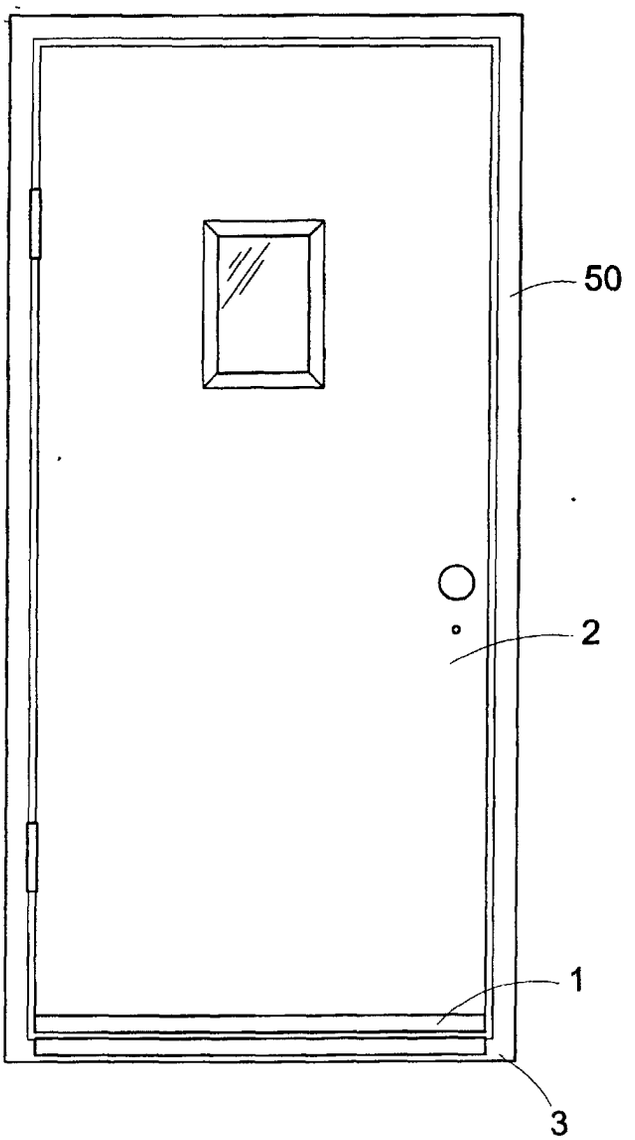

Fig. 5

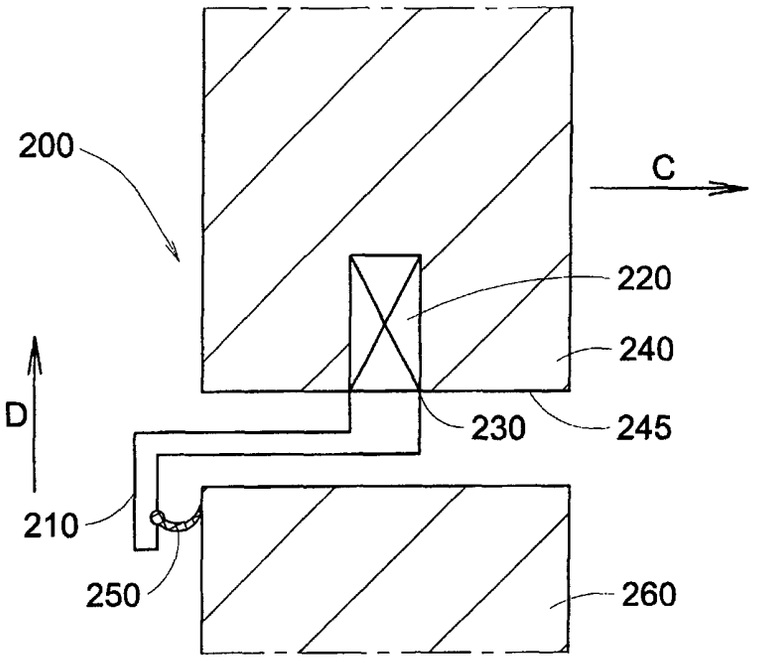
200
C
220
240
D
230
245
210
250
260

Fig. 6

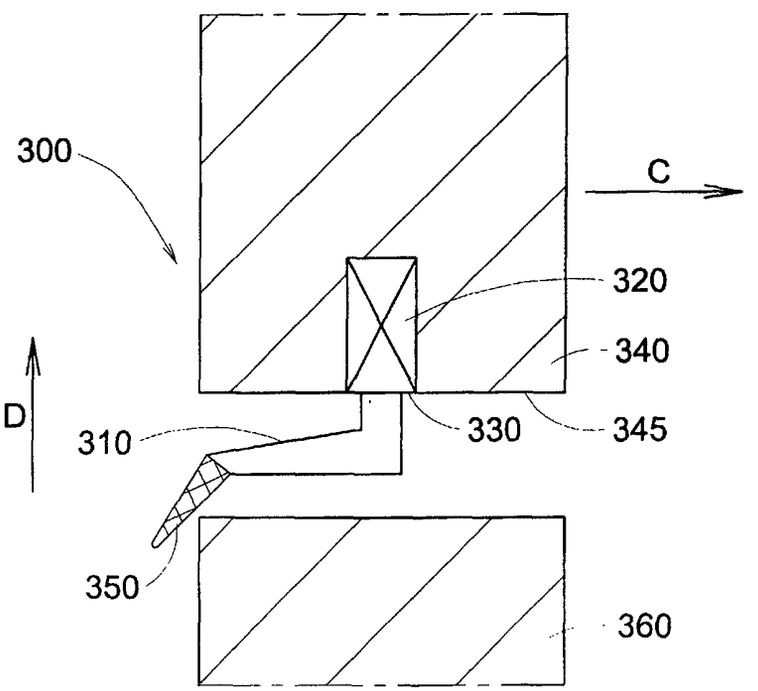
300
C
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Fig. 7

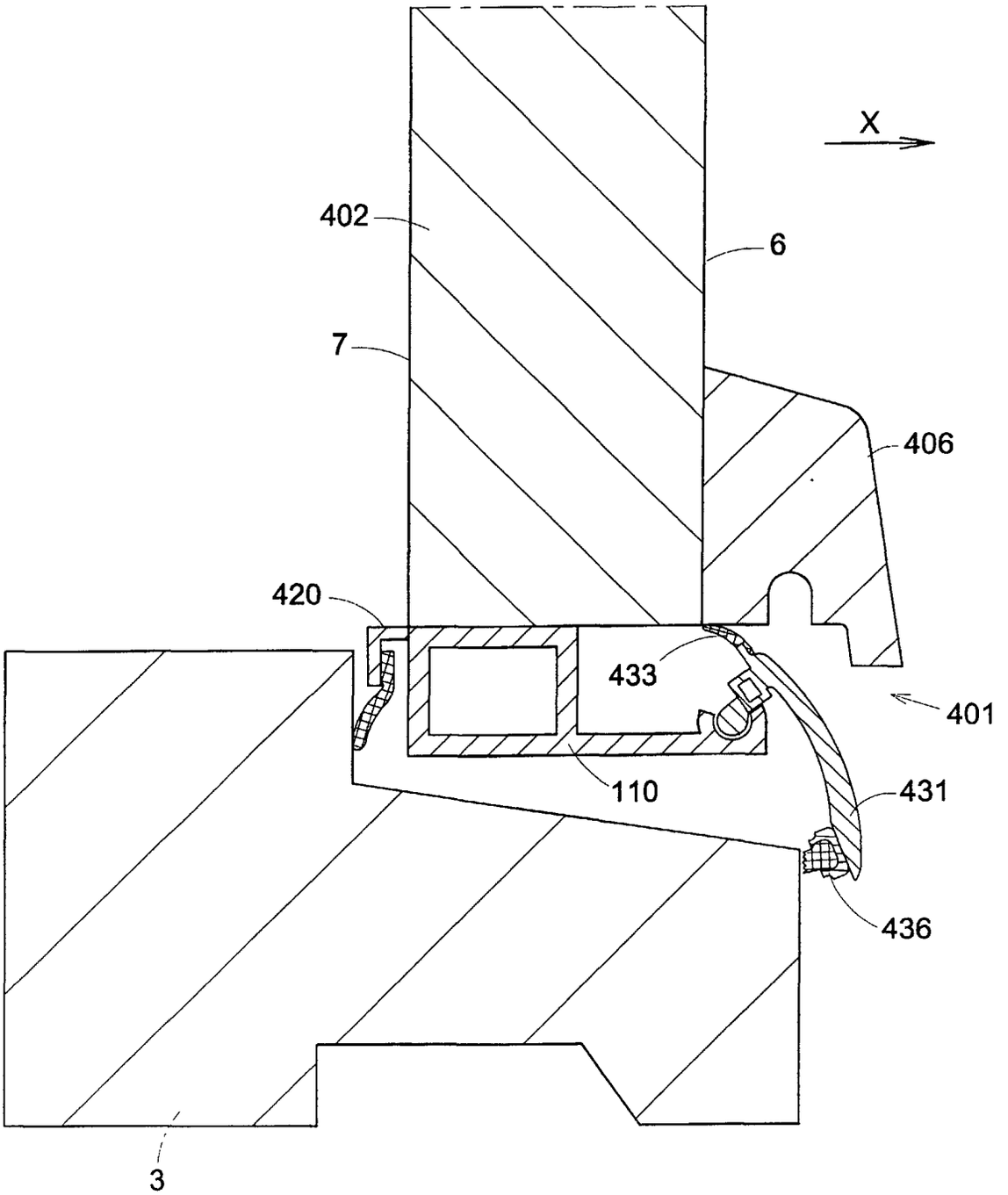

Fig. 8

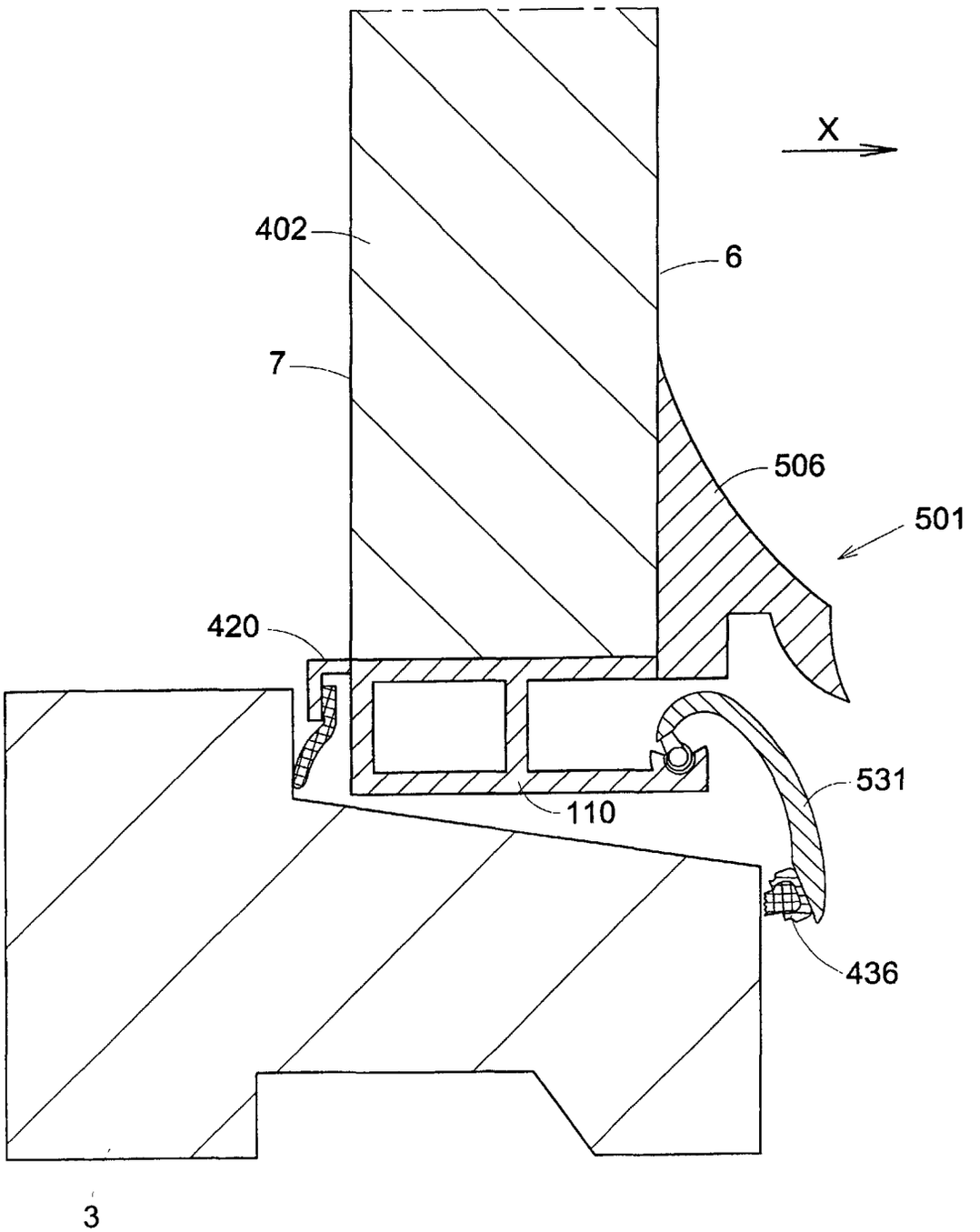

Fig. 9

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 02 07 5005

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	WO 94 17276 A (ATHMER FA F ;FAFLEK JENOE (DE)) 4 August 1994 (1994-08-04) * page 6, line 30 - line 37 * * figures 3,4 *	1-6,10	E06B7/23 E06B7/215
X	US 2 802 247 A (T.W. ANDERSON) 13 August 1957 (1957-08-13) * column 2, line 29 - line 49 * * figures 1,2 *	1-6,10	
X	US 115 625 A (S. MC FALL) 6 June 1871 (1871-06-06) * column 2, line 1 - line 3 * * figures 1,2 *	1-6,10	
A	DE 296 10 748 U (TEGTMEIER METALLBAU) 29 August 1996 (1996-08-29) * page 12, line 4 * * figure 1 *	8,9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.7) E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	11 April 2002	Geivaerts, 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
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T : theory or principle underlying the invention
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