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# (54) DOOR THRESHOLD

(57) The present invention relates to a door threshold (1) for arrangement at a doorway between a first floor or ground surface (2) and a second floor or ground surface (3). The door threshold (1) comprises a bottom member (10) configured to be arranged on a bottom surface (4) of the doorway, and extend towards the second floor or ground surface (3); a ramp member (20) configured to, at a first end (21) of the ramp member be in contact with the first floor or ground surface (2); a sealing member (30) configured to, at a first engagement portion (31) of the sealing member, be attached to the ramp member (20), and at a second engagement portion (32) of the sealing member, be attached to the bottom member (10). The sealing member (30) is adapted in shape and material to provide an inherent biasing force towards a resting state. If a force is applied on the sealing member (30), the sealing member is configured to move towards a down-pressed state.

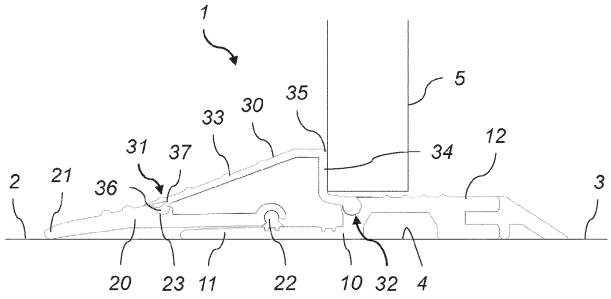


*Fig. 1a*

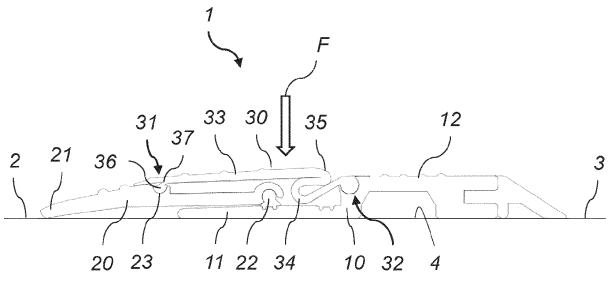


*Fig. 1b*

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## Description

### Technical Field

**[0001]** The present disclosure relates to a door threshold, and especially to a door threshold being moveable between two states.

### Background

**[0002]** A standard threshold for a door has an appearance adapted to function based on the requirements that apply regarding, among other things, sealing and fire requirements. The edge that exists to meet these requirements is unfortunately an obstacle for wheelchair users.

**[0003]** To simplify passage through a doorway, there is currently no universal solution and the measures that can be taken are often bulky and costly.

**[0004]** The society should be accessible to all. Regardless of functional ability, it must be possible to be involved in society. There may be regulations on easily remedied obstacles in the built environment that states that entrances, balconies, terraces and patios must be accessible, which means that they should be designed without level differences, unless there is a need for a threshold for humidity or climate reasons. However, this should be as low as possible and be phased. Moisture safety has historically largely been handled at openings in a building with the help of level differences between the wet and the dry side. The issue of accessibility means in these situations that the possibility of level differences is limited, i.e. opportunities for threshold and plinth, which gives a built-in conflict in the design of the building. Since the requirements regarding accessibility have gradually been tightened and the awareness of the issue has increased, problems with leakage at the entrance, balcony and patio doors have increased. In almost all construction projects, there are also time-consuming discussions at the design and production stage about how details should be solved to meet all criteria regarding availability and moisture safety. A contributing reason is that there is an uncertainty in the interpretation of the regulations. Furthermore, the interpretation varies in, for example, how large a height difference a threshold may constitute and whether it is acceptable with retrofitted ramp and wedge solutions.

**[0005]** Consequently, there is a need for a solution for a door threshold that is adapted for requirements and regulations, and at the same time is flexible in its use in different door arrangements.

### Summary

**[0006]** It is an object of the present invention to provide an improved solution that alleviates the mentioned drawbacks with present devices. Furthermore, it is an object to provide a solution that gives wheelchair users the right conditions for free mobility, while at the same time the solution looks integrated and adapted to the environment. Instead of using a solution that causes great damage to the home, it is an object to provide a solution where only the door threshold is replaced. The solution needs to be adapted for requirements and directives; adapted for passage with a wheelchair; and adjustable to be able to mount the threshold regardless of conditions. The provided solution may meet the requirements to function as a standard threshold in its basic position and then be converted into a solution adapted for wheelchairs when a wheelchair is to pass.

**[0007]** The invention is defined by the appended independent claims, with embodiments being set forth in the appended dependent claims, in the following description and in the drawings.

**[0008]** According to aspects of the present invention, a door threshold for arrangement below a door at a doorway is provided, wherein the doorway is located between a first floor or ground surface and a second floor or ground surface. The door threshold comprises a bottom member configured to, when in use, be arranged on a bottom surface of the doorway, and extend towards the second floor or ground surface; a ramp member configured to, at a first end of the ramp member, when in use, be in contact with the first floor or ground surface; and a sealing member configured to, at a first engagement portion of the sealing member, be attached to the ramp member, and at a second engagement portion of the sealing member, be attached to the bottom member. The sealing member is adapted in shape and material to provide an inherent biasing force towards a resting state. If a force is applied on the sealing member, the sealing member is configured to move towards a down-pressed state.

**[0009]** The door threshold may be extended in a longitudinal direction corresponding to the width direction of the doorway. The door threshold may further extend along the first floor or ground surface and the second floor or ground surface in a throughgoing direction corresponding to the direction along which the doorway is passed.

**[0010]** When the door threshold is in use, the bottom member may be configured to be arranged on a bottom surface of the doorway. The bottom surface may be a floor or ground surface between the first and second floor or ground surfaces. The bottom surface may be a portion of one of the first and second floor or ground surfaces, preferably the second floor or ground surface, located in the doorway. The bottom member may be configured to extend towards the second floor or ground surface such that a smooth passage between the door threshold and the second floor or ground surface is provided. The bottom member may extend in a downward sloping ramp towards the second floor or ground surface. The bottom member may extend towards the second floor or ground surface all the way to be in contact with the second floor or ground surface.

**[0011]** When the door threshold is in use, the ramp member may be configured to, at a first end of the ramp

member, be in contact with the first floor or ground surface. The first end of the ramp member may abut on the first floor or ground surface, or be fixed or moveable relative to the first floor or ground surface.

**[0012]** The ramp member may be configured to be attached directly or indirectly to the doorframe. As the door threshold may extend in the longitudinal direction, the ends of the ramp member in the longitudinal direction may be attached to the doorframe. The ramp member may be configured to, at a second end of the ramp member, be attached to the doorframe. Thereby, the ramp member may be attached to the doorframe at the second end of the ramp member in each end of the ramp member in the longitudinal direction. The ramp member may be attachable to and detachable from the doorframe. The ramp member may be attached to the door frame by fastening means, such as screws, or by a form fitting, such as a snap fastening. The attachment of the ramp member may provide the ramp member to be pivotal relative to the door frame.

**[0013]** The ramp member may be configured to, at a second end of the ramp member, be attached directly or indirectly to the bottom member. The ramp member may, at the second end of the ramp member, be fastened to the bottom member. The ramp member may be attachable to and detachable from the bottom member. The first floor or ground surface and the second floor or ground surface may have different heights. The height difference between the first and second floor or ground surfaces may be provided in the doorway such that the first floor or ground surface may be arranged higher than the second floor or ground surface. The first floor or ground surface may be at an inside of a house or room, and the second floor or ground surface may at an outside of a house or room. The ramp member may be attached to the doorframe such that the arrangement of the ramp member is adapted to the height of the first floor or ground surface. The second end of the ramp member may be attached to the bottom member such that the arrangement of the ramp member is adapted to the height of the first floor or ground surface. The ramp member may have different inclinations relative to the bottom member depending on the height of the first floor or ground surface. The ramp member may be attached to the doorframe such that the inclination of the ramp member relative to the bottom member is fixed. The second end of the ramp member may be attached to the bottom such that the inclination of the ramp member relative to the bottom member is fixed.

**[0014]** The sealing member may extend from the ramp member towards the bottom member. The sealing member may be attached to the ramp member at a first engagement portion of the sealing member such that the sealing member is fastened to the ramp member. The first engagement portion of the sealing member may be located at or near the end of the sealing member that extends towards the ramp member. The sealing member may be, at the first engagement portion, directly or indirectly attached to the ramp member. The first engagement portion of the sealing member may comprise a part that connects the sealing member to the ramp member. The sealing member may be attached to the bottom member at a second engagement portion of the sealing member such that the sealing member is fastened to the bottom member. The second engagement portion of the sealing member may be located at or near the end of the sealing member that extends towards the bottom member. The sealing member may be, at the second engagement portion, directly or indirectly attached to the bottom member. The second engagement portion of the sealing member may comprise a part that connects the sealing member to the bottom member. The sealing member may be flexible. The sealing member may be able to change shape or form under influence of an external force or have the capability to adapt to changing requirements. The sealing member may be sufficiently rigid or stiff to maintain a certain shape or structure when not being influenced by an external force, i.e. in the resting state. The sealing member may be adapted in shape and material to provide an inherent biasing force towards the resting state. The inherent resilience of the sealing member may provide a certain beneficial structure and functionality of the door threshold, both in the resting state and in the down-pressed state. In the resting state this may ensure that sealing requirements of the door threshold relative to a door in the doorway are fulfilled, and in the down-pressed state this may provide a smooth passage through the doorway. The sealing member may provide stability to the door threshold when being in the resting state and when being in the down-pressed state. Furthermore, the sealing member may provide a safety function, such that nothing may be clamped between or interact with the members of the door threshold when moving towards the down-pressed state. The sealing member may further prevent dirt or objects to reach down, into the door threshold, interfering with the function of the door threshold.

**[0015]** When the door threshold is in use, the sealing member may, in the resting state, extend from the ramp member towards a door in the doorway, if the door is closed. At least a part of the sealing member may be in contact with or adjacent to a surface of the door, if the door is closed. At least a part of the sealing member may extend along a surface of the door, if the door is closed, such that the lower part of the door is in contact with or is adjacent to the sealing member. At least a part of the sealing member may extend under a door, if the door is closed. When in use, at least a part of the sealing member may, in the resting state, provide a seal towards a door, if the door is closed, such that the door threshold fulfills the sealing requirements.

**[0016]** In the resting state, if nothing or no one passes through the doorway, the door threshold may provide the function of a standard door threshold in terms of fulfilling the requirements of e.g. sealing at a doorway. If someone passes through the doorway, either by foot, wheelchair or

other equipment, at least a part of the sealing member may be configured to move towards a down-pressed state. In the down-pressed state, at least a part of the sealing member is closer to the bottom member than in the resting state. That is, the height from the bottom surface of at least a part of the sealing member in the down-pressed state is less than the height of at least that part of the sealing member in the resting state. The door threshold may thereby provide a smooth movement of any wheel based equipment passing the door threshold.

**[0017]** The door threshold may provide an effective way of enabling a smooth passing through the doorway at the same time as e.g. sealing requirements are fulfilled. In the resting state, at least a part of the sealing member may provide a seal against a door if the door is closed, i.e. provide the function of a standard door threshold. If a force is applied to the sealing member, such as if someone passes the doorway, at least a part of the sealing member may be configured to move towards a down-pressed state to provide a smooth passage for a wheelchair or any other equipment. Further, the door threshold may provide a solution of a flexible threshold that remains arrangeable in a doorway without any need for damage or modification of the door or door lining. The door threshold may be mounted in both new installations (new building/room) and as replacement of a previous door threshold in an existing doorway. The door threshold may be mounted in an integrated manner with the door lining.

**[0018]** The force applied on the sealing member may be directed, at least partly, downward in a vertical direction. If a force is applied on the sealing member, at least a part of the sealing member may then be configured to move downward in the vertical direction towards a down-pressed state. If a force is applied on the sealing member, at least a part of the sealing member may be configured to move towards the bottom member and/or the ramp member.

**[0019]** The terms "longitudinal", "through-going" and "height" as used herein refer to directions of the different parts of the invention when the invention is in use.

**[0020]** The term "longitudinal direction" as used herein means the direction corresponding to the width direction of the doorway.

**[0021]** The term "through-going direction" as used herein means the direction corresponding to the direction along which the doorway is passed.

**[0022]** The term "height direction" as used herein means the direction perpendicular to the bottom surface. If the bottom surface is horizontal, then the height direction may coincide with a vertical direction.

**[0023]** According to some embodiments, the sealing member may comprise a covering part and a sealing part, wherein the covering part is configured to, at a first end, be attached to the sealing part, and wherein the sealing part is configured to, in the resting state, provide a difference in height from the bottom member between the first end of the covering part and the bottom member. In the resting state, the covering part of the sealing member may extend from the ramp member towards a door in the doorway, if the door is closed. In the resting state, the first end of the covering part may be close to, adjacent to, or in contact with a surface of the door, if the door is closed. The covering part may, at the first end, be attached to the sealing member such that the covering part and the sealing part are fastened in each other. The sealing part of the sealing member may, in the resting state, provide a difference in height between the first end of the covering part and the bottom member. The difference in height may, in the resting state, provide a seal against the door, if the door is closed. In the resting state, at least a part of the sealing part may extend along a surface of a door, if the door is closed. In the resting state, at least a part of the sealing part may be in contact with or adjacent to a surface of a door, if the door is closed. At least a part of the sealing part may be configured to, in the resting state, extend along a direction perpendicular to the bottom surface of the doorway, that is the height direction. In the resting state, at least a part of the sealing part may extend along the height direction and, if a door is closed, be in contact with the door thereby providing a seal towards the door. The covering part and the sealing part may be integrated such that the covering part and the sealing part constitutes a single unit. If the covering part and the sealing part are integrated to constitute a single unit, the first end may be a part or a point where the covering part and the sealing part meet.

**[0024]** According to some embodiments, the bottom member may comprise a first part and a second part. The height from the bottom surface of the first part may be less than the height from the bottom surface of the second part. The second engagement portion of the sealing member may be attached to the second part of the bottom member. The sealing part may be configured to, in the resting state, provide a difference in height from the bottom surface between the first end of the covering part and the second part of the bottom member. The difference in height may, in the resting state, provide a seal against a door, if the door is closed. The ramp member may be configured to, at the second end of the ramp member, be attached to the first part of the bottom member. The height of the first part of the bottom member may be less than the height of the second part of the bottom member such that there may be sufficient space for the ramp member. The first and second part of the bottom member may thereby provide a smoother passage for any wheel based equipment passing the doorway. The height of the first part of the bottom member may be less than the height of the second part of the bottom member such that, if a force is applied on the sealing member, at least a part of the sealing member may move towards the first part of the bottom member. Thereby an even smoother movement of any wheel based equipment passing the doorway is provided.

**[0025]** According to some embodiments, if a force is applied on the sealing member, the sealing member may be configured to move towards the down-pressed state,

wherein at least a part of the sealing part of the sealing member may be configured to move towards the first part of the bottom member. The height of the first part of the bottom member from the bottom surface may be less than the height of the second part of the bottom member such that, if a force is applied on the sealing member, the sealing part may move towards the first part of the bottom member and thereby provide an even smoother movement of any wheel based equipment passing the doorway. If a force is applied on the sealing member, the sealing part may be bended or folded towards the first part of the bottom member, thereby providing an even smoother movement of any wheel based equipment passing the doorway.

**[0026]** According to some embodiments, if the sealing member is in the down-pressed state, the first end of the covering part of the sealing member and the second part of the bottom member may be at substantially the same height from the bottom surface. This provides an even smoother movement of any wheel based equipment passing the doorway. In the down-pressed state, the transition between the first end of the covering part and the second part of the bottom member may be as smooth as possible, preventing a significant step in height when moving between the covering part of the sealing member and the second part of the bottom member. If the sealing member is in the down-pressed state, the difference in height from the bottom surface between the first end of the covering part and the bottom member may be less than the difference in height from the bottom surface between the first end of the covering part and the bottom member in the resting state.

**[0027]** According to some embodiments, the door threshold may further comprise a filler member. The filler member may be configured to be arranged between the sealing member and the ramp member and/or the bottom member. The filler member may provide a biasing force to the sealing member towards the resting sate. If a force is applied on the sealing member, the sealing member may be configured to move towards the down-pressed state, thereby compressing the filler member. The filler member may be configured to be arranged between the sealing member and at least one of the ramp member and the bottom member. At least a part of the filler member may be in direct or indirect contact with at least one of the sealing member, the ramp member and the bottom member. The filler member may be configured to be fixed or moveable between the sealing member and the ramp member and/or the bottom member. The filler member may be configured to be attached directly or indirectly to at least one of the sealing member, the ramp member and the bottom member. The filler member may be flexible. The filler member may be able to change shape or form under influence of external forces or have the capability to adapt to changing requirements. The filler member may be compressible or be capable of being pressed together under influence of an external force. The filler member may be able to be decompressed or expanded when pressure from an external force is released. The filler member may be elastic or springy such that the filler member can change its shape when an external force is applied, and can return to its original shape when the external force is removed.

**[0028]** Since the filler member may be arranged between the sealing member and at least one of the ramp member and the bottom member, the filler member may be enclosed by these members of the door threshold. The filler member may then not be in direct contact with any parts in the doorway surrounding the door threshold, such as a door or the bottom surface. As the sealing member may be attached to the ramp member and to the bottom member, the sealing member may cover the filler member. Thereby, the sealing member may provide a safety function, such that nothing may interact with the filler member. The sealing member may further prevent dirt or objects to reach down, into the door threshold, interfering with the function of the filler member.

**[0029]** The filler member may provide a biasing force to the sealing member towards the resting state which may improve the stability of the sealing member. The biasing force provided to the sealing member by the filler member together with the inherent biasing force of the sealing member may improve the stability of the door threshold in the resting state. The sealing member and the filler member co-operate to maintain a certain shape or structure such that the door threshold fulfills the sealing requirements in the resting state. If a force is applied to the sealing member, the filler member may be arranged to be compressed by the movement of the sealing member towards a down-pressed state. The filler member may thereby follow the movement of the sealing member. The sealing member may be arranged to compress the filler member when in the down-pressed state. The sealing member may be configured to, if a force is applied on the sealing member, compress the filler member between the sealing member and at least one of the ramp member and the bottom member. If someone passes through the doorway, either by foot, wheelchair or other equipment, the filler member may provide improved support in the movement towards the down-pressed state of the sealing member. Thereby a smoother passage through the doorway may be obtained.

**[0030]** According to some embodiments, the filler member may be further configured to be arranged at a distance from the second part of the bottom member. The filler member may be configured to be arranged between the sealing member and at least one of the ramp member and the first part of the bottom member. The filler member may not be in direct contact with the second part of the bottom member. Thereby, a space or gap may be provided between the filler member and the second part of the bottom member in the through-going direction. Thereby, if a force is applied on the sealing member, the movement of the sealing member towards the down-pressed state may be facilitated. The space provided between the filler member and the second part of the

bottom member may also ensure that the sealing part of the sealing member may move towards the first part of the bottom member or that the sealing part may be bended or folded in a beneficial manner if a force is applied to the sealing member. Thereby an even smoother movement of any wheel based equipment passing the doorway may be provided.

**[0031]** According to some embodiments, the ramp member may be further configured to be integrated with the bottom member. The ramp member may be configured to be static such that the ramp member may be fixed at a certain location of the bottom member and in a certain inclination relative to the bottom surface. The static ramp member may then be integrated with the bottom member. Thereby, the door threshold may be suited for a certain height of the first floor or ground surface. The door threshold may also be suited for the case when the first floor or ground surface and the bottom surface have the same height.

**[0032]** According to some embodiments, the ramp member may, at a second end of the ramp member, be rotatably attached to the bottom member. The ramp member may then be capable of rotating relative to the bottom member. The ramp member may, at the second end of the ramp member, be rotatably attached to the first part of the bottom member. The ramp member may be connected to the bottom member in a hinge like manner. As the ramp member is rotatably attached to the bottom member, the ramp member may then be adaptable to different heights of the first floor or ground surface. The ramp member may be rotatably attached to the doorframe. As the ramp member may be rotatably attached to the bottom member and/or to the doorframe, the door threshold may be used for different heights of the first floor or ground surface, the second floor or ground surface or the bottom surface. The same door threshold may then be used in different doorways or in a doorway where the height conditions of the floors or ground surfaces may change. For example, if the first floor or ground surface is raised or lowered or if the bottom surface is raised or lowered in a doorway, the door threshold may still fit in that doorway.

**[0033]** According to some embodiments, the first engagement portion of the sealing member may comprise a protruding head and the ramp member may comprise a groove. The protruding head may be configured to be arranged into the groove of the ramp member, such that the sealing member may be attached to the ramp member. The protruding head may be a protrusion or a part that protrudes from the sealing member. The protruding head may be attached directly or indirectly to the sealing member. The protruding head may have any shape such that the protruding head may fit into the groove. The groove of the ramp member may be a smaller depression, cavity or recess in the ramp member in which the protruding head may be inserted. The protruding head may then be fastened or fixed into the groove of the ramp member. The protruding head being arranged into the groove provides an improved stability of the sealing member. The protruding head being arranged into the groove may also provide improved positioning of the sealing member in the resting state, such that e.g. sealing requirements of the door threshold are fulfilled. The groove and the protruding head may both extend along the longitudinal extension of the door threshold, in one embodiment along the entire, or at least substantially the entire, longitudinal length of the door threshold.

**[0034]** According to some embodiments, an attachment of the protruding head to the sealing member may be adjustable. If the ramp member rotates, the attachment may be configured to move relative to the sealing member depending on the rotation of the ramp member. The attachment of the protruding head to the sealing member may be adjustable or flexible to be able to suit different inclinations of the ramp member relative to the bottom member. If the ramp member rotates, the attachment may move relative to the sealing member and change position depending on how the ramp member rotates, e.g. if the inclination of the ramp member relative to the bottom member is increased or decreased. The movement and adjustability of the attachment of the protruding head when the ramp member rotates ensures that, in the resting state, at least a part of the sealing part of the sealing member may be in contact with or adjacent to a door, if the door is closed. Then the positioning of the sealing member in the resting state can be maintained if the ramp member rotates, thereby ensuring that the sealing requirements of the door threshold are fulfilled. Thereby, the sealing requirements of the door threshold are fulfilled when the height condition between the first floor or ground surface and the bottom surface in a doorway is changed or when the door threshold is moved to another doorway.

**[0035]** According to some embodiments, at least a part of the sealing member may be configured to be fixed in the resting state. For example, the sealing member of the portions of the door threshold being closest to the doorframe may be fixed in the resting state. Thereby, the sealing to the doorframe may be improved since there are no moving parts in connection with the doorframe. The sealing member may be attached to the doorframe to provide a sealing thereto.

**[0036]** According to some embodiments, the sealing member and the filler member may constitute a single unit.

**[0037]** According to some embodiments, the filler member may comprise a foam material, for instance polyurethane. The filler member may comprise a flexible material. The filler member may comprise any material suitable for the purpose of the filler member or any material fulfilling the characteristics or properties of the filler member.

**[0038]** According to some embodiments, the sealing member may comprise a rubber material or a plastic material. The sealing member may comprise a flexible material. The sealing member may comprise any materi-

al suitable for the purpose of the sealing member or any material fulfilling the characteristics or properties of the sealing member.

Brief Description of the Drawings

**[0039]** The invention will in the following be described in more detail with reference to the enclosed drawings, wherein:

Fig. 1a shows a cross-sectional view of a door threshold in resting state with no height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 1b shows a cross-sectional view of a door threshold in down-pressed state with no height difference between the first and second floor or ground surface according to some embodiment of the invention.
Fig. 2a shows a perspective view of a door threshold in resting state with no height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 2b shows a perspective view of a door threshold in down-pressed state with no height difference between the first and second floor or ground surface according to some embodiment of the invention.
Fig. 2c shows a cross-sectional view of a door threshold in resting state with no height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 2d shows a cross-sectional view of a door threshold in down-pressed state with no height difference between the first and second floor or ground surface according to some embodiment of the invention.
Fig. 3a shows a perspective view of a door threshold in resting state with a height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 3b shows a perspective view of a door threshold in down-pressed state with a height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 3c shows a cross-sectional view of a door threshold in resting state with a height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 3d shows a cross-sectional view of a door threshold in down-pressed state with height difference between the first and second floor or ground surface according to some embodiments of the invention.
Fig. 4 shows a perspective view of a door threshold according to some embodiments.

**[0040]** As illustrated in the figures, the sizes of the elements and regions may be exaggerated for illustrative purposes and, thus, are provided to illustrate the general structures of the embodiments. Like reference numerals refer to like elements throughout.

Description of Embodiments

**[0041]** The present invention will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. In the drawings, like numbers refer to like elements.

**[0042]** With reference to Figs. 1a-1b, a door threshold 1 according to some embodiments of the invention is illustrated where there is no height difference between a first floor or ground surface 2 and a second floor or ground surface 3. Figs. 1a-1b illustrates the door threshold 1 in cross-sectional view. Fig. 1a illustrates the door threshold 1 in resting state and Fig. 1b illustrates the door threshold 1 in down-pressed state.

**[0043]** The door threshold 1 is arranged at a doorway between a first floor surface 2 and a second floor surface 3. The first floor surface 2 and the second floor surface 3 have the same height. The door threshold 1 has an extension in a longitudinal direction corresponding to the width direction of the doorway. The door threshold 1 further extends along the floor surfaces 2, 3 in a throughgoing direction corresponding to the direction along which the doorway is passed. The door threshold 1 comprises a bottom member 10. The bottom member 10 is configured to be arranged on a bottom surface 4 of the doorway. The bottom surface 4 is a surface between the first and second floor surfaces 2, 3, and at least partly below the door 5 if the door is closed. The bottom surface 4 may be a part of the second floor surface 3, and/or parallel to the floor surfaces 2, 3. A height direction may be defined as a direction perpendicular to the bottom surface 4. If the bottom member is a part of the second floor surface 3, a height direction may be defined as a direction perpendicular to the second floor surface 3. In Figs. 1a-1b the bottom surface 4 has the same height as the first and second floor surfaces 2, 3. The bottom member 10 extends in the through-going direction towards the second floor surface 3 in a downward sloping ramp. The bottom member 10 may extend all the way to be in contact with the second floor surface 3. The bottom member 10 comprises a first part 11 and a second part 12. The height of the second part 12 is greater than the height of the first part 11.

**[0044]** The door threshold 1 comprises a ramp member 20 extending from the first floor surface 2, at a first end 21, to the bottom member 10, at a second end 22. The ramp member 20 extends from the first end 21 to the second end 22 in the through-going direction. The first

end 21 abuts on or lies against the first floor surface 2. The second end 22 is attached to the first part 11 of the bottom member. The ramp member 20 may, at the second end 22, be fixedly attached to the bottom member 10. The ramp member 20 may then have a certain inclination relative to the bottom member 10. The ramp member 20 may, at the second end 22, be rotatably attached to the bottom member 10, as illustrated in the figures. The ramp member 20 may then have the capability of changing inclination relative to the bottom member 10.

**[0045]** The door threshold 1 comprises a sealing member 30 extending from the ramp member 20 to the bottom member 10 in the through-going direction. In the resting state, as illustrated in Fig. 1a, the sealing member 30 extends from the ramp member 20 towards a door 5, if the door is closed. The sealing member further extends downwards along a surface of the door 5 and at least partly below the door 5 towards the bottom member 10. The sealing member 30 is attached to the ramp member 20 at a first engagement portion 31.

**[0046]** The first engagement portion 31 comprises a protruding head 36. The ramp member 20 comprises a groove 23 in which the protruding head 36 is arranged. The attachment 37 of the protruding head 36 to the sealing member 30 is adjusted to fit the inclination of the ramp member 20 relative to the first part 11 of the bottom member. The sealing member 30 is attached to the second part 12 of the bottom member at a second engagement portion 32. The sealing member 30 comprises a covering part 33. In the resting state, the covering part extends from the ramp member 20 towards the closed door 5, when in use, in the through-going direction. The covering part 33 comprises a first end 35.

**[0047]** The sealing member 30 further comprises a sealing part 34. In the resting state, at least a part of the sealing part 34 extends in the height direction. At the first end 35, the covering part 33 is attached to the sealing part 34. The sealing part 34 provide a difference in height between the first end 35 of the covering part and the second part 12 of the bottom member. In the resting state when in use, the sealing part 34 is in contact with the door 5 and extends in parallel with the door 5, if the door 5 is closed. As seen in the illustrated embodiments, the covering part 33 is integrally formed with the sealing part 34. The sealing member 30 is made of a flexible material, such as rubber or soft plastics material.

**[0048]** As illustrated in Fig. 1a, the sealing member 30 is adapted in shape and material to provide an inherent biasing force towards the resting state. The sealing member 30 may be adapted such that, for example, the material, the shape and/or the thickness of the sealing member is suited for maintaining the arrangement of the sealing member 30 in the resting state. Thereby, the sealing member maintain a certain shape or structure such that the door threshold fulfills the sealing requirements in the resting state. The thickness of the sealing member 30 may vary at different parts of the sealing member 30. For example, the covering part may be thicker, and thereby more stiff, than the sealing part such that the sealing part is more easily bent. In the Fig. 1a, where the first floor surface 2 and the bottom surface 4 have the same height, the sealing member 30, and more specifically the covering part 33, extends in an upward slope from the ramp member 20 towards the closed door 5, when in use. In such a resting state, the sealing part 34 extends along the height direction to provide a height difference between the first end 35 of the covering part 33 and the second part 12 of the bottom member. This height difference in the resting state provides a sealing towards the closed door 5, such that the sealing fulfills the requirements in terms of climate and safety. Fig. 1a illustrates the door threshold 1 in resting state when the door 5 is closed where the sealing part 34 is in contact with the door 5, thereby providing the sealing.

**[0049]** As illustrated in Fig. 1b, a force F is applied on the sealing member 30 such that the sealing member 30 is in the down-pressed state. The force F applied on the sealing member 30 may be provided by someone passing through the doorway, either by foot, wheelchair or other equipment. When the door threshold 1 is stepped on or pushed down by a wheelchair, at least a part of the sealing member 30 moves towards the down-pressed state. As illustrated in Fig. 1b, the sealing part 34 of the sealing member 30 moves towards the first part 11 of the bottom member. The sealing part 34 may be folded or bended in the down-pressed state, as seen in Fig. 1b. In the down-pressed state, the first end 35 of the covering part 33 is substantially at the same height as the second part 12 of the bottom member.

**[0050]** If the force F applied on the sealing member 30 is released, that is when the person, wheelchair etc. has passed the doorway, the inherent biasing force of the sealing member 30 forces the sealing member 30 back to the resting state as seen in Fig. 1a.

**[0051]** With reference to Figs. 2a-2d, a door threshold 1 according to some embodiments of the invention is illustrated where there is no height difference between a first floor or ground surface 2 and a second floor or ground surface 3. Figs. 2a-2b illustrates the door threshold 1 in perspective view and Figs. 2c-2d illustrates the door threshold 1 in cross-sectional view. Figs. 2a and 2c illustrates the door threshold 1 in resting state and Figs. 2b and 2d illustrates the door threshold in down-pressed state. It should be noted that the door threshold 1 shown in Figs. 2a-2d has several features in common with the door threshold 1 shown in Figs. 1a-1b, and it is hereby referred to Figs. 1a-1b and the associated text for an increased understanding of these features of the door threshold 1.

**[0052]** As illustrated in Figs. 2a-2d, the door threshold 1 further comprises a filler member 40. The filler member 40 is arranged between the sealing member 30 and the ramp member 20 and the first part 11 of the bottom member, or at least portions thereof. The filler member 40 is in direct contact with the sealing member 30, the ramp member 20 and the first part 11 of the bottom

member. In other embodiments the filler member 40 may be arranged between the sealing member and one of the ramp member 20 and the first part 11 of the bottom member 10. As shown in Figs. 2c-2d, the filler member 40 is arranged at a distance d from the second part 12 of the bottom member so that a gap is provided in between. The filler member 40 is made of a flexible foam material, such as polyurethane.

**[0053]** As illustrated in Figs. 2a and 2c, the filler member 40 provides a biasing force to the sealing member 30 towards the resting state. The sealing member 30 and the filler member 40 co-operate to maintain a certain shape or structure such that the door threshold fulfills the sealing requirements in the resting state. In the Figs. 2a and 2c, where the first floor surface 2 and the bottom surface 4 have the same height, the sealing member 30, and more specifically the covering part 33, extends in an upward slope from the ramp member 20 towards the closed door 5, when in use. In such a resting state, the sealing part 34 extends along the height direction to provide a height difference between the first end 35 of the covering part 33 and the second part 12 of the bottom member. This height difference in the resting state provides a sealing towards the closed door 5, such that the sealing fulfills the requirements in terms of climate and safety. Fig. 2c illustrates the door threshold 1 in resting state when the door 5 is closed where the sealing part 34 is in contact with the door 5, thereby providing the sealing.

**[0054]** As illustrated in Figs. 2b and 2d, a force F is applied on the sealing member 30 such that the sealing member 30 is in the down-pressed state. The filler member 40 is compressed by the sealing member 30. The force F applied on the sealing member 30 may be provided by someone passing through the doorway, either by foot, wheelchair or other equipment. When the door threshold 1 is stepped on or pushed down by a wheelchair, at least a part of the sealing member 30 moves towards the down-pressed state. The filler member 40 follows the movement of the sealing member 30 and may provide improved support in the movement towards the down-pressed state. As illustrated in Figs. 2b and 2d the sealing part 34 of the sealing member 30 moves towards the first part 11 of the bottom member. The sealing part 34 is folded towards the filler member 40. The distance d between the filler member 40 and the second part 12 of the bottom member provide room for the sealing part 34 in the down-pressed state. In the down-pressed state, the first end 35 of the covering part 33 is substantially at the same height as the second part 12 of the bottom member.

**[0055]** If the force F applied on the sealing member 30 is released, that is when the person, wheelchair etc. has passed the doorway, the filler member 40 together with the inherent biasing force of the sealing member 30 forces the sealing member 30 back to the resting state as seen in Figs. 2a and 2c.

**[0056]** With reference to Figs. 3a-3d, a door threshold 1 according to some embodiments of the invention is illustrated where there is a height difference between the first floor or ground surface 2 and the second floor or ground surface 3. Figs. 3a-3b illustrates the door threshold 1 in perspective view and Figs. 3c-3d illustrates the door threshold 1 in cross-sectional view. Figs. 3a and 3c illustrates the door threshold 1 in resting state and Figs. 3b and 3d illustrates the door threshold in down-pressed state. It should be noted that the door threshold 1 shown in Figs. 3a-3d has several features in common with the door threshold 1 shown in Figs. 1a-1b and Figs. 2a-2d, and it is hereby referred to Figs. 1a-1b and Figs. 2a-2d and the associated text for an increased understanding of these features of the door threshold 1.

**[0057]** In Figs 3a-3d, the doorway may be between inside and outside of a building, wherein the first floor surface 2 may be at the inside of the building and the second floor surface 3 may be at the outside of the building. According to building requirements, the first floor surface 2 is at a higher level in the height direction than the second floor surface 3. The first and/or second floor surfaces 2, 3 may alternatively be ground surfaces. In Figs. 3a-3d, the bottom surface 4 has the same height as the second floor surface 3.

**[0058]** In Figs 3a-3d, since the first floor surface 2 is higher than the bottom surface 4, the ramp member 20 extends from the first floor 2 in a downward slope towards the bottom member. The ramp member 20 may, at the second end 22, be rotatably attached to the first part 11 of the bottom member. The ramp member 20 then have the capability of changing inclination relative to the first part 11 of the bottom member to fit the height of the first floor surface 2. In the resting state, as seen in the Figs. 3a and 3c, the sealing member 30, and more specifically the covering part 33, extends almost in parallel with the bottom surface 4 from the ramp member 20 towards the door 5. In such a resting state, the sealing part 34 extends along the height direction to provide a height difference between the first end 35 of the covering part 33 and the second part 12 of the bottom member (as also seen in for example Figs. 2a and 2c). The attachment 37 of the protruding head 36 to the sealing member 30 is adjusted to fit the inclination of the ramp member 20 relative to the first part 11 of the bottom member. Comparing for example Figs 1a and 3c or Figs. 2c and 3c, the attachment 37 of the protruding head 36 is adjusted to correspond to the different inclinations of the ramp member 20 relative to the bottom member 10. As the ramp member 20 rotates, the attachment 37 of the protruding head 36 to the sealing member 30 moves relative to the sealing member 30 depending on the rotation of the ramp member 20. This movement and adjustability of the attachment 37 of the protruding head 36 maintains the sealing part in its position when the inclination relative to the bottom member 10 of the ramp member 20 is changed. Thereby the door threshold 1 fulfils the sealing requirements when the height of the first and/or second floor surface is changed.

**[0059]** With reference to Fig. 4 a door threshold 1 according to some embodiments of the invention is illu-

strated. The door threshold 1 is arranged in a doorway. As illustrated in Fig. 4, a part of the sealing member 30 is fixed in the resting state. As seen, the part of the sealing member 30 located closest to the doorframe in the door way is fixed in the resting state.

**[0060]** In the drawings and specification, there have been disclosed preferred embodiments and examples of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for the purpose of limitation, the scope of the invention being set forth in the following claims.

## Claims

1. A door threshold (1) for arrangement below a door (5) at a doorway, the doorway being located between a first floor or ground surface (2) and a second floor or ground surface (3), the door threshold (1) comprising:

   a bottom member (10) configured to, when in use, be arranged on a bottom surface (4) of the doorway, and extend towards the second floor or ground surface (3);
   a ramp member (20) configured to, at a first end (21) of the ramp member, when in use, be in contact with the first floor or ground surface (2);
   a sealing member (30) configured to, at a first engagement portion (31) of the sealing member, be attached to the ramp member (20), and at a second engagement portion (32) of the sealing member, be attached to the bottom member (10);
   wherein, the sealing member (30) is adapted in shape and material to provide an inherent biasing force towards a resting state; and
   wherein, if a force is applied on the sealing member (30), the sealing member is configured to move towards a down-pressed state.

2. The door threshold (1) according to claim 1, wherein the sealing member (30) comprises a covering part (33) and a sealing part (34), wherein the covering part (33) is configured to, at a first end (35), be attached to the sealing part (34), and wherein the sealing part (34) is configured to, in the resting state, provide a difference in height from the bottom surface between the first end (35) of the covering part and the bottom member (10).

3. The door threshold (1) according to claim 2, wherein the bottom member comprises a first part (11) and a second part (12), wherein the height from the bottom surface of the first part (11) is less than the height from the bottom surface of the second part (12), wherein the second engagement portion (32) of the sealing member is attached to the second part (12) of the bottom member, and wherein the sealing part (34) is configured to, in the resting state, provide a difference in height from the bottom surface between the first end (35) of the covering part and the second part (12) of the bottom member.

4. The door threshold (1) according to claim 3, wherein, if a force is applied on the sealing member (30), the sealing member is configured to move towards the down-pressed state, wherein the sealing part (34) of the sealing member is configured to move towards the first part (11) of the bottom member.

5. The door threshold (1) according to claim 3 or 4, wherein, if the sealing member (30) is in the down-pressed state, the first end (35) of the covering part of the sealing member and the second part (12) of the bottom member are at substantially the same height from the bottom surface (4).

6. The door threshold (1) according to any preceding claims, wherein the door threshold (1) further comprises a filler member (40) configured to be arranged between the sealing member (30) and the ramp member (20) and/or the bottom member (10), wherein the filler member (40) provides a biasing force to the sealing member (30) towards the resting state, and wherein, if a force is applied on the sealing member (30), the sealing member is configured to move towards the down-pressed state thereby compressing the filler member (40).

7. The door threshold (1) according to claim 6 when depending on any of claims 3-5, wherein the filler member (40) is further configured to be arranged at a distance (d) from the second part (12) of the bottom member.

8. The door threshold (1) according to any of the preceding claims, wherein the ramp member (20) is further configured to be integrated with the bottom member (10).

9. The door threshold (1) according to any of claims 1-7, wherein the ramp member (20) is further configured to, at a second end (22) of the ramp member, be rotatably attached to the bottom member (10).

10. The door threshold (1) according to claim 9, wherein the first engagement portion (31) of the sealing member comprises a protruding head (36), and wherein the ramp member (20) comprises a groove (23), and wherein the protruding head (36) is configured to be arranged into the groove (23) of the ramp member, such that the sealing member (30) is attached to the ramp member (20).

11. The door threshold (1) according to claim 10, where-

in an attachment (37) of the protruding head (36) to the sealing member is adjustable such that, if the ramp member (20) rotates, the attachment (37) is configured to move relative to the sealing member depending on the rotation of the ramp member (20).

**12.** The door threshold (1) according to any preceding claims, wherein at least a part of the sealing member (30) is configured to be fixed in the resting state.

**13.** The door threshold (1) according to claim 6 or any of claims 7-12 when depending on claim 6, wherein the sealing member (30) and the filler member (40) constitutes a single unit.

**14.** The door threshold (1) according to claim 6 or any of claims 7-13 when depending on claim 6, wherein the filler member (40) comprises a foam material, preferably polyurethane.

**15.** The door threshold (1) according to any preceding claims, wherein the sealing member (30) comprises a rubber material or a plastic material.

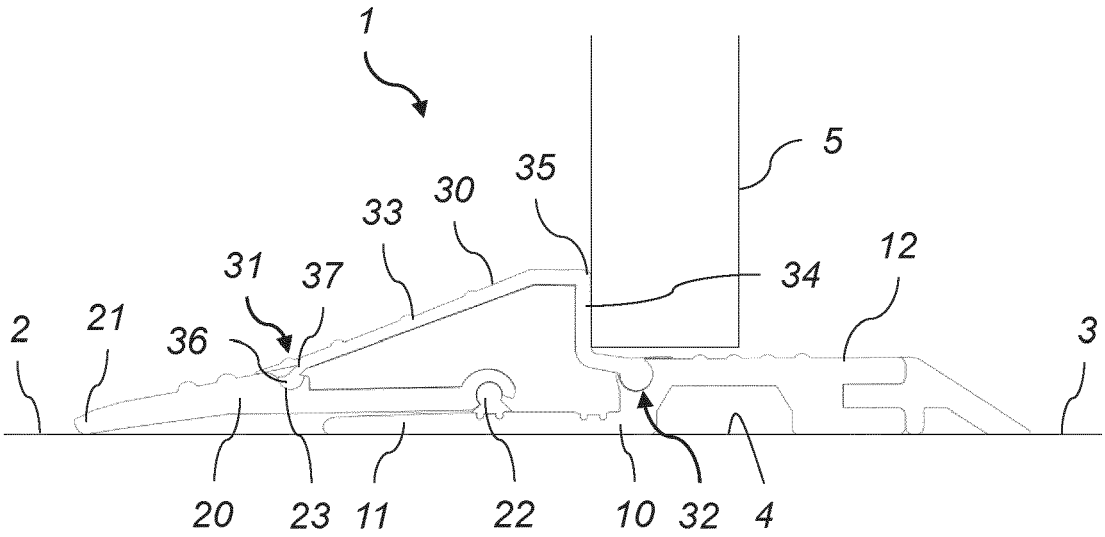
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Fig. 1a

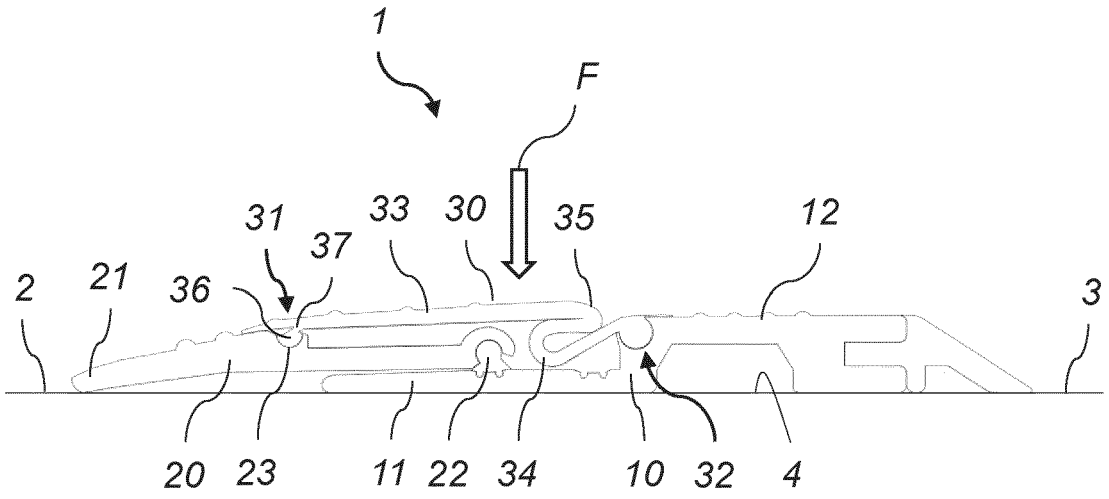
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Fig. 1b

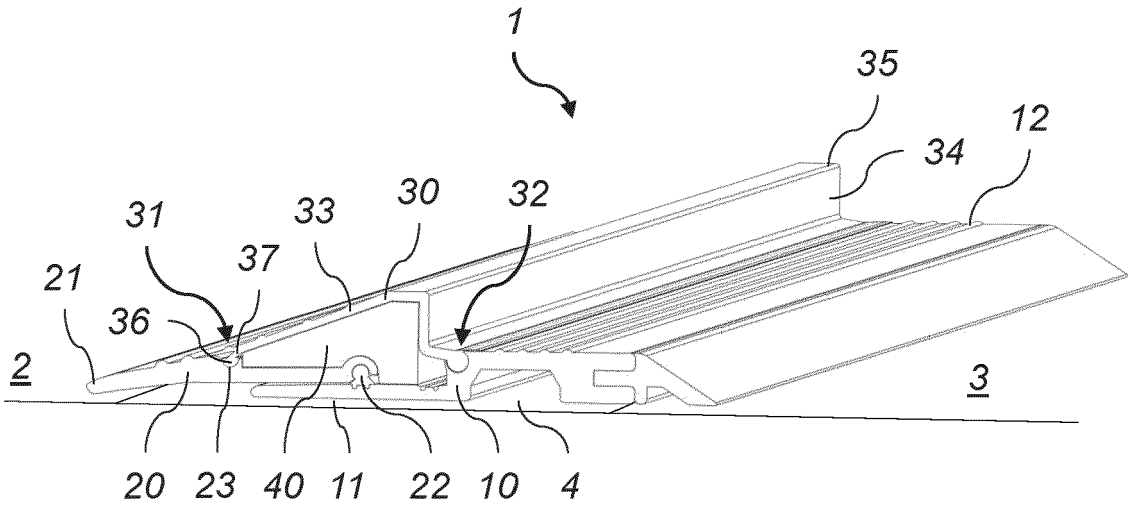
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Fig. 2a

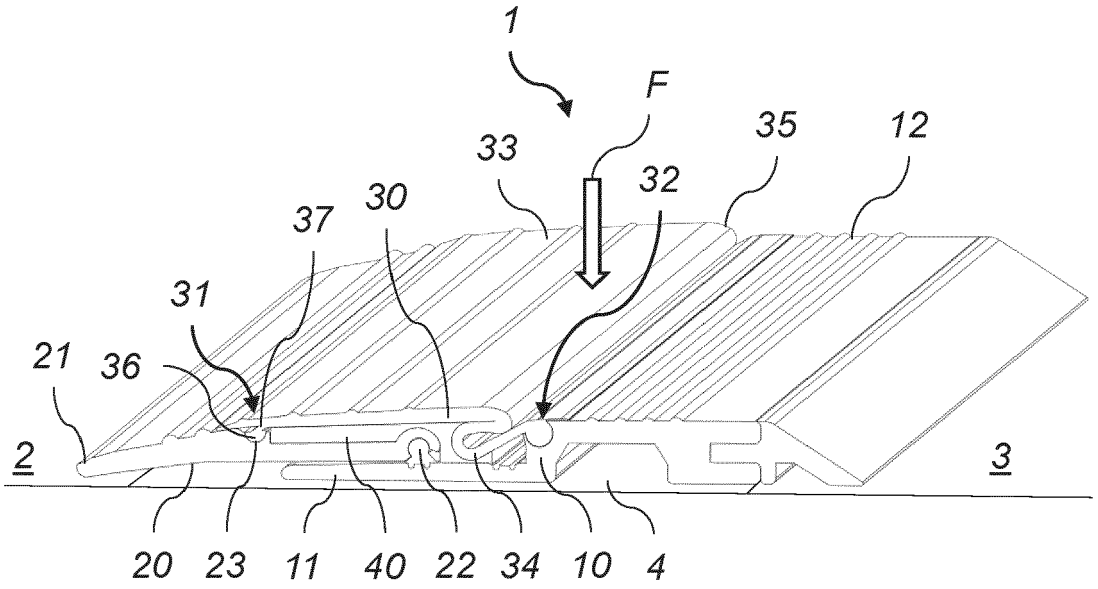
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Fig. 2b

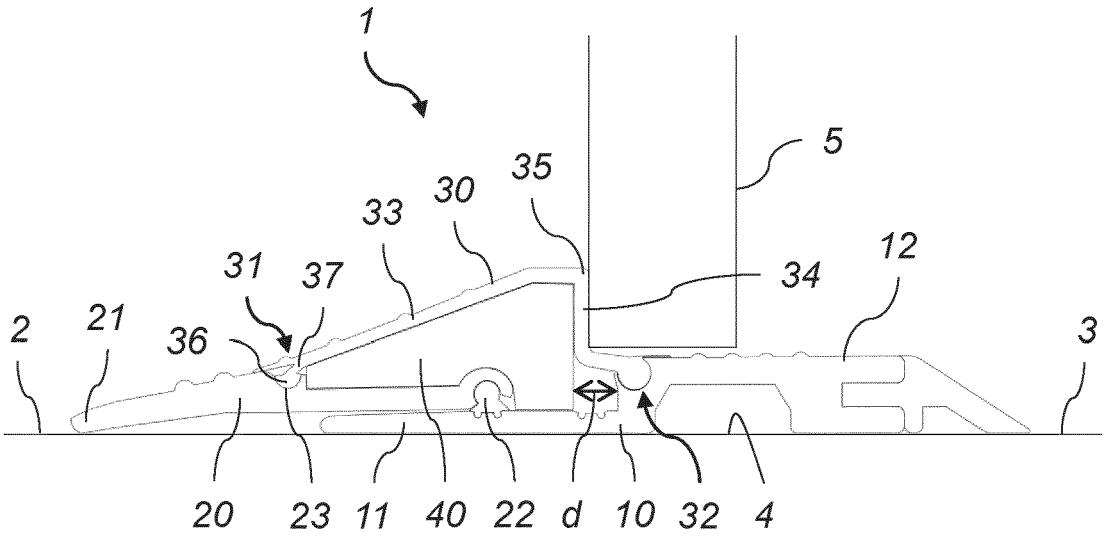
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Fig. 2c

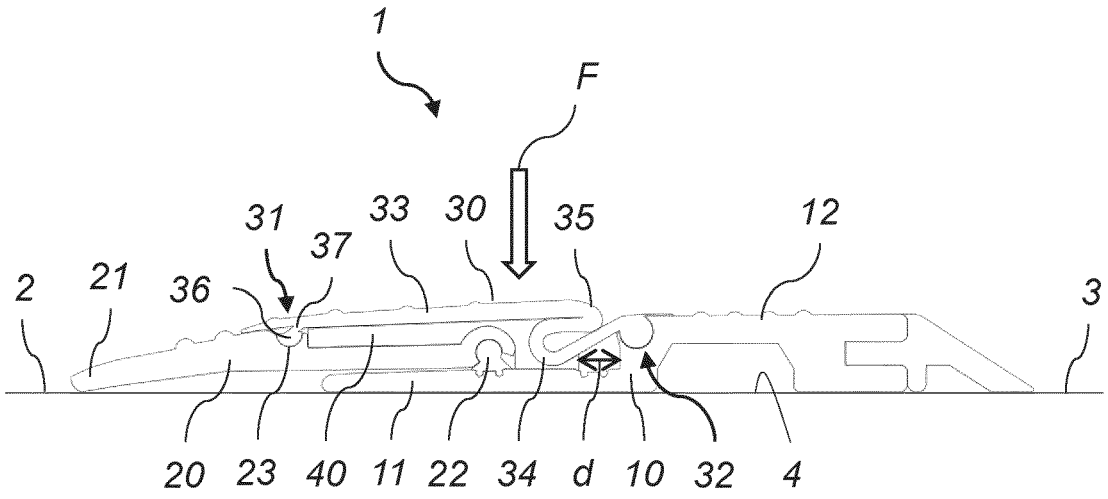
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Fig. 2d

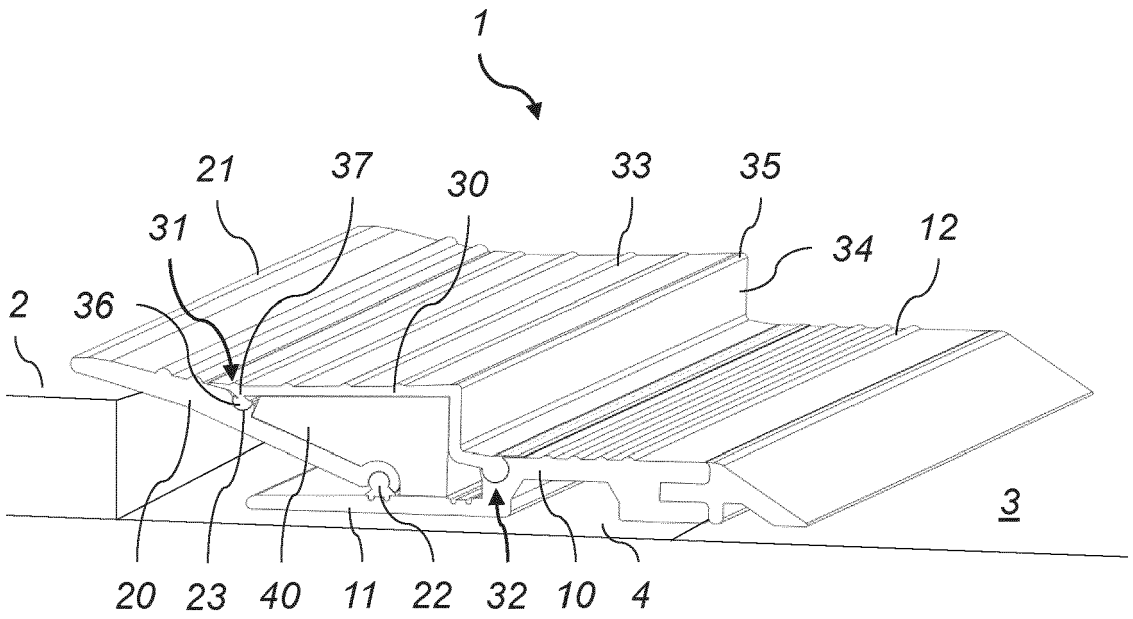
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Fig. 3a

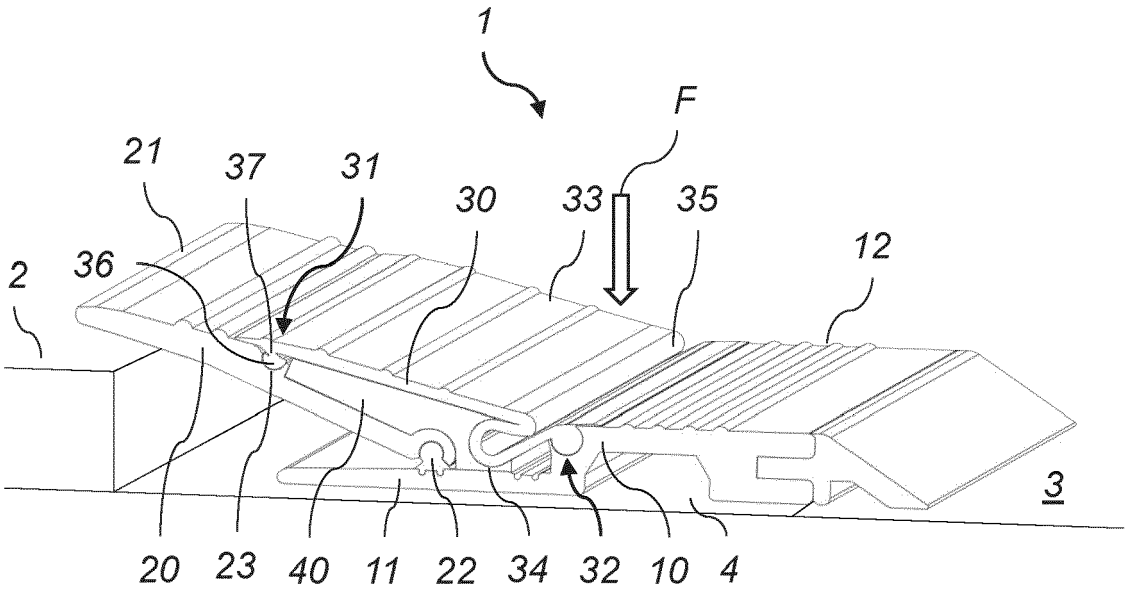
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Fig. 3b

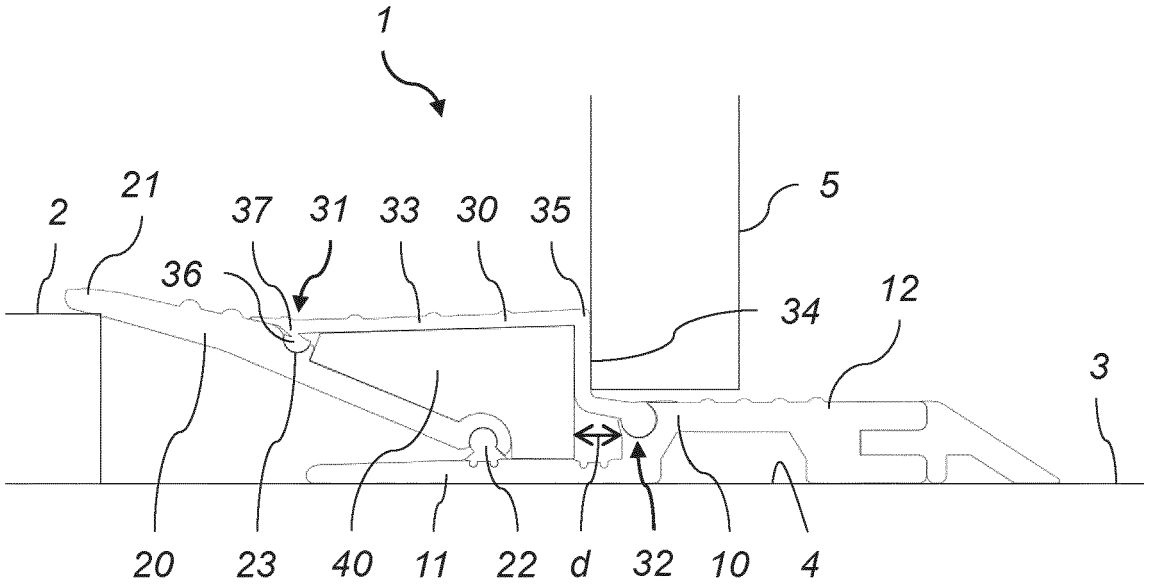
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Fig. 3c

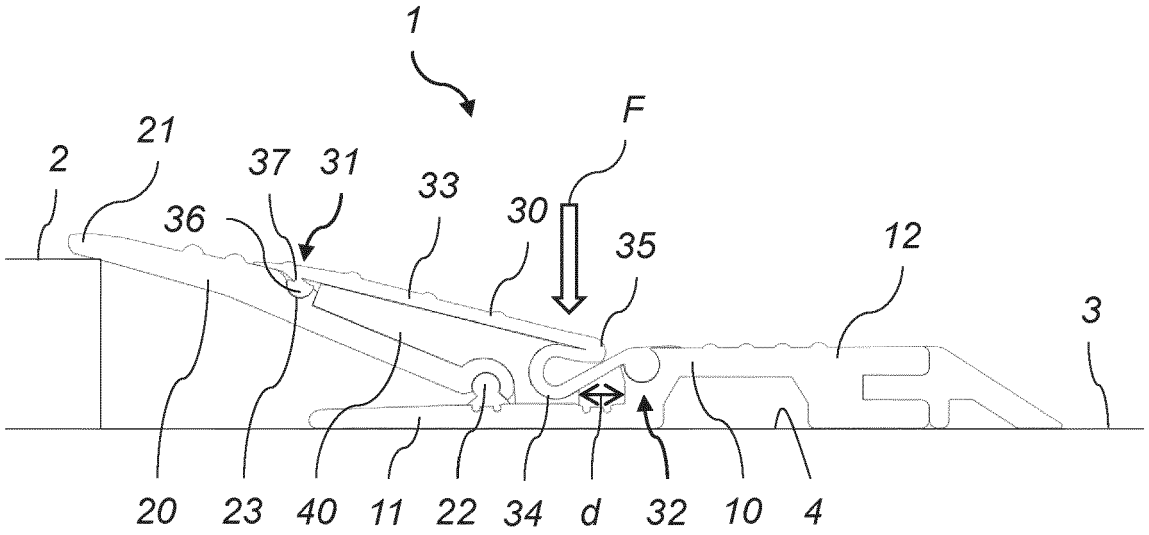
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Fig. 3d

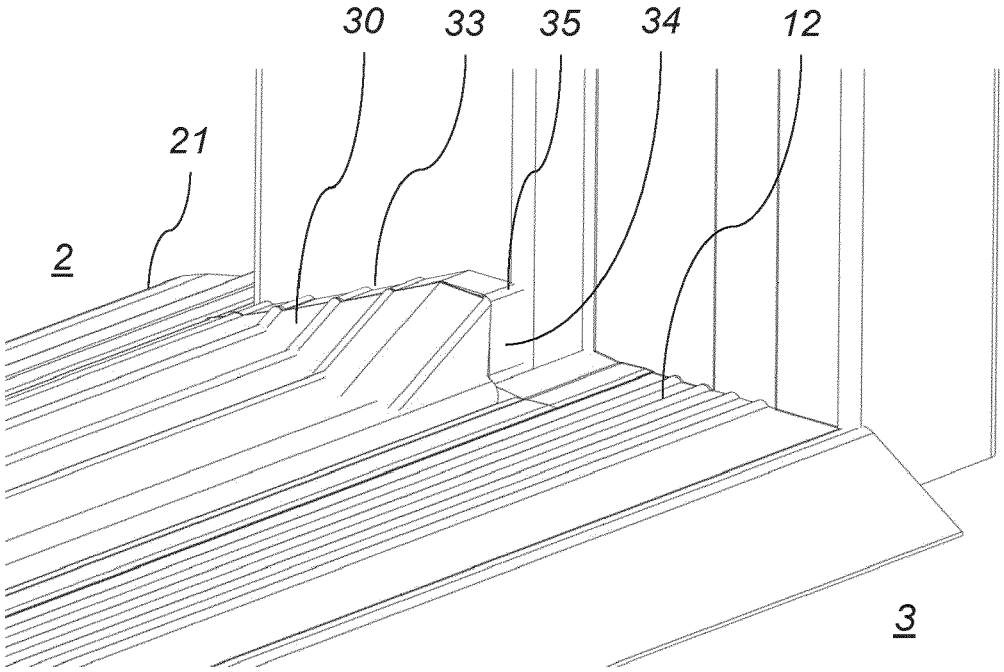


Fig. 4

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# EUROPEAN SEARCH REPORT

Application Number
EP 23 17 5904

## DOCUMENTS CONSIDERED TO BE RELEVANT

| Category | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim | CLASSIFICATION OF THE APPLICATION (IPC) |
|---|---|---|---|
| X | US 2010/031578 A1 (HARTWELL CHRIS [US])<br>11 February 2010 (2010-02-11)<br>* figures * | 1,12,15 | INV.<br>E06B1/70<br>E06B7/23 |
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TECHNICAL FIELDS SEARCHED (IPC)

E06B

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| The Hague | 19 November 2023 | Verdonck, Benoit |

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# ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 17 5904

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19-11-2023

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|---|---|---|---|
| US 2010031578 A1 | 11-02-2010 | CA 2672368 A1 | 06-02-2010 |
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| EP 4148223 A1 | 15-03-2023 | NONE | |



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