June 7, 1966 J. F. DENNIS 3,254,453

SEALING DEVICE

Filed June 11, 1964

Fig. 3

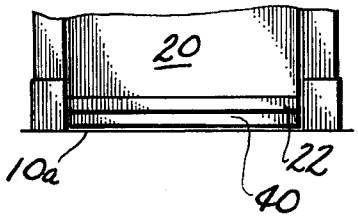


Fig. 4

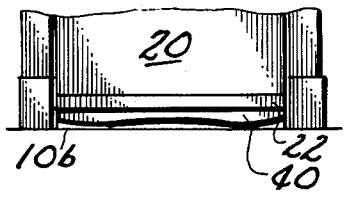


Fig. 1

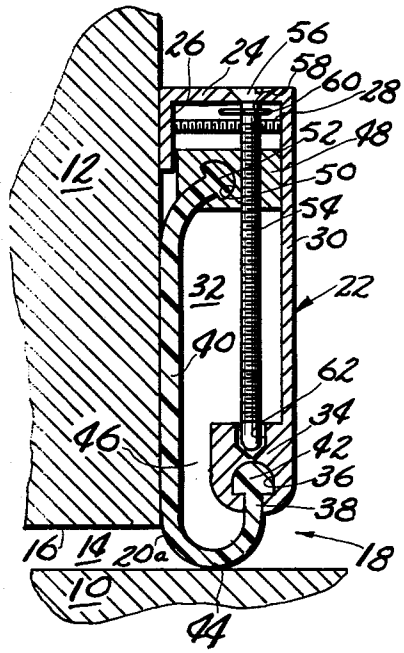
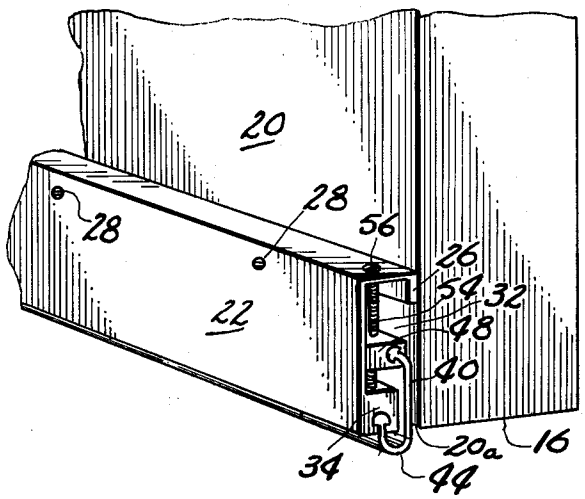


Fig. 2



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SEALING DEVICE

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This invention relates to an improved sealing device and more particularly to a device to form a seal at the junction between a frame member defining an opening and a generally rectilinear planar member closing the opening. While the invention will be described as it specifically relates to a device for forming a seal between the bottom edge of a door and the associated threshold, it will be obvious from the description that the invention is not limited to such a door bottom seal but is useful in many environments.

The problem which the instant invention solves is an old one. It is impossible to closely fit closures in their associated openings and still maintain reasonable costs in building construction. More particularly, it is common to have substantial openings and leakage between the bottom of a door and the associated threshold in both industrial and residential construction. This is true because of the inherent lack of precision in building construction work, wear, warpage, and shifting during normal building life. The results of the failure to precisely close building openings are drafts, loss of heat, and the introduction of dirt, dust, and perhaps insects within the building.

There have been many proposals heretofore to solve these problems. The simplest and most common has been the use of weather-stripping or similar straight flexible strips mounted on the door or window and engageable with the associated frame, or conversely, mounted on the frame for engagement with the closure. Such devices are satisfactory in many cases where the spacial relationship of the parts is predictable and constant and where the closure is not frequently opened or removed. To cope with the additional problems inherent in the formation of the seal between a door and a threshold, various pivoted and resilient devices have been proposed. These have included resilient members disposed in the threshold to engage the door, a pivoted or hinged device on the door to engage the threshold, or mechanisms which are actuated upon the closure of the door to move into the space between the door and threshold and form a seal. All of the foregoing have suffered from one or more deficiencies including excessive costs, difficulty of installation, short life, or the requirement that the basic building structure be altered by removing the threshold, reducing the size of the door, and the like. Also, many of these structures have not been well adapted for use with uneven openings and have not been adapted to cope with changes in the relationship between the door and the the threshold during normal use.

Thus, it is one important object of this invention to provide an improved sealing device to form a weatherproof seal between a frame member defining an opening and a generally planar member adapted to substantially close that opening.

It is another object of this invention to provide an improved door bottom which is adapted for use with new construction or doors and thresholds which are worn, warped, uneven, or ill-fitted.

It is still another object of this invention to provide an improved door bottom adapted to form a seal with an associated threshold wherein the door bottom is adjustable to accommodate uneven thresholds and changes in the relationship of the door and threshold during normal use.

It is another object of this invention to provide an improved door bottom which is adjustable in situ when first installed and during normal life.

Another object of this invention is the provision of an improved door bottom which does not require the alteration of the door or threshold, the removal of any portion of the door, or removal of the door during installation.

Further and additional objects of this invention will become manifest from a consideration of this description, the accompanying drawing, and the appended claims.

In one particular form of the invention, a sealing device is provided which is especially adapted for use along the bottom edge of a door where the device comprises a body portion secured to the door along a line spaced from the bottom edge, a flexible web secured to the lower portion of the body and extending downwardly toward the threshold whereupon it is folded upon itself extends upwardly between the body and the door into a chamber defined thereby, and a retainer within the chamber supporting the other end of the flexible member and adjustable within the chamber to determine the extension of the flexible member beneath the door bottom. The bight portion of the flexible member extends beneath the plane of the bottom surface of the door and effects a seal with the threshold outwardly of the plane of the door.

For a more complete understanding of this invention, reference will now be made to the accompanying drawing, wherein:

FIG. 1 is a cross section of a preferred embodiment of this invention;

FIG. 2 is a partial perspective view of the embodiment of FIG. 1;

FIG. 3 ilustrates the invention as installed on a new, relatively perfect door; and

FIG. 4 illustrates the invention as applied to an old or worn door.

Referring now to the drawing and more particularly to FIG. 1, a portion of a threshold **10** is diagrammatically shown in association with a fragment of a door **12**. The door **12** is spaced from the threshold **10** as is common in building construction to leave a gap **14** for clearance between the lower or bottom surface **16** of the door and the threshold. The door bottom or sealing device **18** of this invention is externally mounted to one of the planar surfaces **20** of the door along a line substantially parallel to and spaced from the bottom edge **20***a*. It is generally preferred that the surface **20** on which the door bottom **18** is mounted be the outer surface of the door as external doors generally open outwardly and this produces an improved seal and improved operation. However, if desired, the door bottom **18** may be mounted on the interior surface of the door.

The door bottom comprises a body **22** having a transverse support **24** which abuts against the door surface **20** and extends outwardly therefrom. The support **24** is secured to the surface **20** a fixed distance from the bottom surface **16** of the door and is supported against planar surface **20** by an elongate mounting plate **26**. The plate **26** is mounted in rigid abutting relationship against the surface **20** by a plurality of screws **28**. Extending downwardly from support **24** is a cover web **30** which is spaced from the door surface and in combination therewith defines a chamber **32**. A mounting flange **34** is integrally formed at the lower or free edge of the cover web **30** and extends inwardly toward the door surface **20**. It is preferred that the mounting plate **26**, the support **24**, the cover web **22**, and the mounting flange **34** be integrally formed preferably by extrusion as a single member of aluminum or similar material.

A channel **36** is formed within the mounting flanges **34** to receive one elongate edge **38** of a flexible web **40**. The edge **38** is formed with an enlarged rib **42** which en-

gages the correspondingly shaped cavity within the channel **36**. Thus, the web is secured in the mounting flange **34** and extends downwardly therefrom toward the threshold **10**. The web is folded upon itself to define a bight **44** and the web extends upwardly through a slot **46** between the mounting flange **34** and the door surface **20** into the chamber **32**.

A retainer **48** extends over the entire length of the channel-like body **22** and is formed with a channel **50** to receive the other free edge of web **40**. A rib **52** is formed in this free edge and is retained within the channel **50** in retainer **48** in the same manner as already described with respect to rib **42**. As the retainer moves toward and away from the bottom edge **20***a* of the door **12**, it will be apparent that the flexible web **40** extends to a greater or lesser extent through the slot **46** into space **14** between the door **12** and the threshold **10**. This results in a high degree of adaptability in the sealing device to accommodate threshold varying in shape and configuration as well as unevenness resulting from warpage, wear, and the like.

The retainer **48** has a plurality of threaded holes formed therein generally uniformly spaced over its entire length. Each of these holes receives a bolt **54** or similar threaded device, and it is this set of bolts **54** which maintains the retainer **48** in the desired position. Each bolt has a shaped head **56** which prevents passage of the bolt into the cavity **32**. The bolt is also provided with a small annular recess **58** with a spring clip **60** secured thereto to prevent withdrawal of the bolt **54** from the cavity either in response to the resilient action of the web **40** or any other force which might be applied thereto. The mounting flange **34** is provided with a plurality of spaced apertures **62** which receive the free ends of the associated bolts **54**. The bolts are freely rotatable in the recesses **62** and thus rotation of bolt **54** produces linear motion of retainer **48** in the area of the selected bolt. The apertures **62** are somewhat enlarged to permit limited longitudinal or transverse movement of the bolts **54** therein to accommodate manufacturing tolerances and selective adjustment of the bolts **54**.

Retainer **48** is formed of extruded aluminum and has dimensions such that it has substantial flexibility. Thus, one or more of the bolts **54** may be adjusted to produce external extension of the web **40** while the other bolts may be adjusted to retract the web to accommodate high points of the threshold.

The manner in which the body **22** is mounted on the door surface **20** by a plurality of wood screws **28** or similar means is clearly illustrated in the perspective view of FIG. 2. Also, FIG. 2 clearly illustrates the manner in which the head **56** of the adjusting screw **54** is externally accessible for screwdriver adjustment of the flexible web **40** without removing the door from its hinges or any other major structural operations. The manner in which each adjusting screw **54** is seated in an aperture in mounting flange **34** is also clear from FIG. 2 as in the manner in which the flexible web **40** occupies the cavity **32** and forms a seal having the shape of a U with an adjustable bight portion **44**.

The manner in which the sealing device of this invention is mounted on new construction is illustrated in FIG. 3 where the flexible web **40** extends uniformly into the opening to engage a straight and uniform threshold **10***a*.

Conversly, the structure illustrated in FIG. 4 exemplifies the use of the instant invention on old constructions where the body **22** is mounted on the door surface **20** in the same manner as heretofore but the adjusting bolts are so altered that the flexible web **40** extends to various degrees from the chamber defined by the body **22** to engage a worn threshold **10***b*.

While the instant invention has been specifically described as it relates to use as a door bottom in association with a spaced threshold wherein the door is of the conventional hinged type, it will be apparent that the invention can be adapted to windows, sliding panels, or the like without departing from the basic concept described herein.

Furthermore, the invention may be adapted for use with doors or windows which are either hinged along one edge, centrally hinged, or slidable relative to their associated frames. In the preferred construction, the flexible web **40** is molded of a polyvinyl material and the body **22** and retainer **48** are formed of aluminum, preferably anodized. However, it will be apparent that other materials may be used provided only that the retainer **48** must have limited flexibility to accommodate the various adjustments required and the flexible web **40** must have sufficient stiffness to conform to the chamber while still being sufficiently flexible to form a bight without fracture or serious deterioration. The sealing device may be made in any desired length dependent only on the material available. The sealing device has, as several of its salient features, an external mounting requiring no alteration in the original parts, elimination of any need for the removal of the door or window to which the seal is being adapted, permanence once adjusted, and complete adjustability to accommodate imprecise initial construction, wear or warpage.

Without further elaboration, the foregoing will so fully explain the character of this invention that others may, by applying current knowledge, readily adapt the same for use under varying conditions of service, while retaining certain features which may properly be said to constitute the essential items of novelty involved, which items are intended to be defined and secured by the following claims.

What is claimed is:

1. A device to seal a junction between a frame member defining an opening, and a generally rectilinear planar member substantially closing said opening, said device comprising: a generally channel-shaped body secured to one of said members and having an elongate support leg abutting a portion of said one member spaced from said junction, an elongate cover web extending transversely from said leg as a cantilever the free end of which is adjacent said junction, and a mounting flange extending transversely from said free end and defining an elongate slot between said mounting flange and said one member, said support leg, cover web, and mounting flange cooperating with said one member to define an elongate chamber; a flexible web having two generally parallel elongate edges, one of said edges being secured in said mounting flange and said web passing through said slot and into said chamber; elongate movable retainer means within said chamber, the other of said edges being secured thereto; and means for adjusting the position of said retainer within said chamber whereby said flexible web engages the other of said members.

2. A device to seal a junction between a frame member defining an opening, and a generally rectilinear planar member substantially closing said opening, said device comprising: a generally channel-shaped body secured to one of said members and having an elongate support leg abutting a portion of said one member spaced from said junction, an elongate cover web extending transversely from said leg as a cantilever the free end of which is adjacent said junction, and a mounting flange extending transversely from said free end and defining an elongate slot between said mounting flange and said one member, said support leg, cover web, and mounting flange cooperating with said one member to define an elongate chamber; a flexible web having two generally parallel elongate edges, one of said edges being secured in said mounting flange and said web passing through said slot and into said chamber; elongate movable retainer means within said chamber, the other of said edges being secured thereto; adjusting means engaging said retainer and extending through said body, external manipulation of said adjusting means positioning said retainer within said chamber

whereby said flexible web engages the other of said members.

3. The device of claim 2, wherein said adjusting means comprises a plurality of threaded members extending through said support leg, rotatably engaging said mounting flange and threadedly engaging said retainer means.

4. The device of claim 3, including means securing said threaded members in said supporting leg to prevent axial movement while permitting rotation thereof.

5. A device to seal the junction between the edge of a generally planar door and an adjacent threshold, said device comprising: a generally channel-shaped body having an elongate support leg abutting a portion of said door spaced from said edge, an elongate cover web extending transversely from said leg as a cantilever the free end of which is adjacent said edge, and a mounting flange extending transversely from said free end and defining an elongate slot between said mounting flange and said door, said support leg, cover web, and mounting flange cooperating with said door to define an elongate chamber; a flexible web having two generally parallel elongate edges, one of said edges being secured in said mounting flange and said web passing through said slot and into said chamber; elongate movable retainer means within said chamber, the other of said edges being secured thereto; and means for adjusting the position of said retainer within said chamber whereby said flexible web engages said threshold.

6. A device to seal the junction between the edge of a generally planar door and an adjacent threshold, said device comprising: a generally channel-shaped body having an elongate support leg abutting a portion of said door spaced from said edge, an elongate cover web extending transversely from said leg as a cantilever the free end of which is adjacent said edge, and a mounting flange extending transversely from said free end and defining an elongate slot between said mounting flange and said door, said support leg, cover web, and mounting flange cooperating with said door to define an elongate chamber; a flexible web having two generally parallel elongate edges, one of said edges being secured in said mounting flange, said web extending outwardly therefrom toward said threshold, said web being turned upon itself to form a bight and passing through said slot and into said chamber; elongate movable retainer means within said chamber, the other of said edges being secured thereto; and means for adjusting the position of said retainer within said chamber whereby said bight engages said threshold.

7. A device to seal the junction between the edges of a generally planar door and an adjacent threshold, said device comprising: an elongate body portion secured to the planar surface of said door along a line spaced from said threshold, said body portion extending toward said threshold in spaced relationship to said planar surface and cooperating therewith to define an elongate chamber, elongate movable retainer means within said chamber, and a flexible elongate web secured to said body and extending therefrom, said flexible web being formed upon itself to form a bight and extending between said body and said planar surface and terminating in said retainer means, said web having sufficient stiffness to maintain a U configuration with the bight portion thereof engaging said threshold.

8. A device to seal the junction between the edge of a generally planar door and an adjacent threshold, said device comprising: an elongate body portion secured to the planar surface of said door along a line spaced from said threshold, said body portion extending toward said threshold in spaced relationship to said planar surface and cooperating therewith to define an elongate chamber, elongate movable retainer means within said chamber, a plurality of threaded devices rotatably mounted in said body and externally manipulatable, said devices threadedly engaging said retainer means for adjustment thereof relative to said body, and a flexible elongate web secured to said body and extending therefrom, said flexible web being formed upon itself to form a bight and extending between said body and said planar surface and terminating in said retainer means, said web having sufficient stiffness to maintain a U configuration with the bight portion thereof engaging said threshold.

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