Oct. 21, 1958 F. HOBBS 2,856,651

SEALING DEVICE FOR A DOOR OPENING

Filed June 29, 1956

FIG. 1

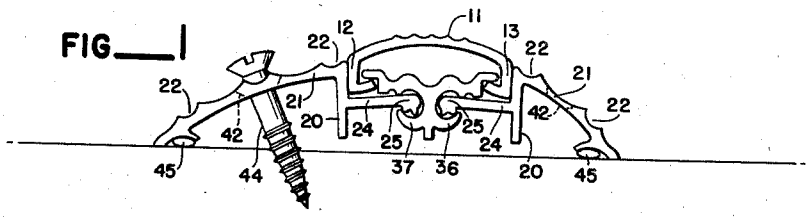


FIG. 2

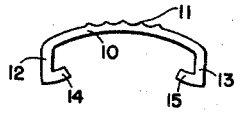


FIG. 3

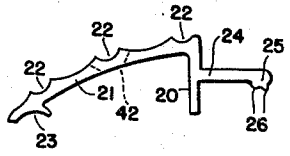


FIG. 4

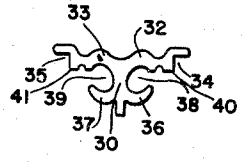


FIG. 5

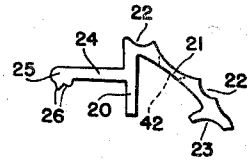
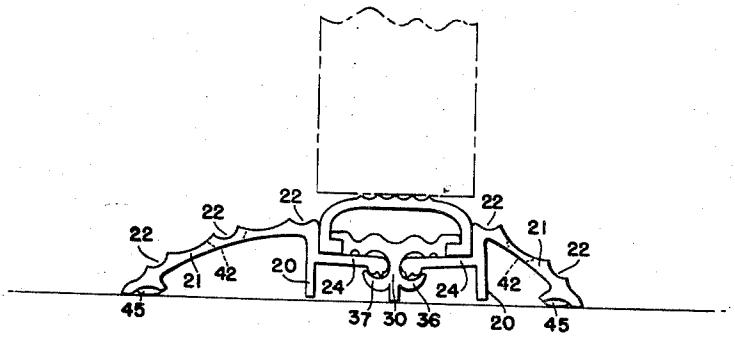


FIG. 6



FRANK HOBBS
INVENTOR.

BY Smith & Tuck

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SEALING DEVICE FOR A DOOR OPENING

Frank Hobbs, Seattle, Wash., assignor to Colotrym Company, Seattle, Wash., a corporation of Washington

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3 Claims. (Cl. 20—64)

The present invention relates to a sealing device for a door opening and, more particularly, to a threshold incorporating a flexible and deformable seal for the purpose of cooperating with a door edge to prevent the movement of air past such edge and to preclude the entrance of moisture from outside such a door.

Devices of the type comprising the basis of this invention are useful to seal doors of air-conditioned buildings, or of buildings having swinging doors such as hospitals, restaurants, and the like, where air and moisture seals are desirable between the doors and the edge of the adjacent opening when the door is normally at rest. Without any intention of being unduly limited as to the scope of this invention, the description of a typical application of this device will be confined to its use at the threshold of a swinging door of the type commonly found in hospital or other corridors where the traffic includes not only persons walking but also wheeled vehicles, carts and the like.

It is a primary object of the present invention to provide a universally usable door seal assembly including a flexible and deformable arch sealing strip that is adapted to snugly engage an edge of the door conforming to the normal irregularities present to form, when the door is closed, an air and moisture seal of substantial effectiveness.

Another important object of the present invention relates to the provision of a door sealing structure in which the flexible deformable resilient sealing strip is mechanically clamped in place under compression at its edges in a manner to resist dislodgment through repeated brushing actions of the door edge, or the action of heavy vehicles or other objects that may pass over it.

One other object is the provision of a metallic threshold or door sealing device having low thermal conductivity when used between zones of varying temperatures.

Still another object of the present invention is to provide a three-piece metallic assembly for receiving a resiliently deformable arched sealing strip which assembly is composed of metallic parts each individually formed by conventional methods, simple to make, and which are articulated together in a hinge-fashion without requiring fasteners or tools during the assembly of the three pieces.

A further object of the present invention is to provide an anchor member for a door opening seal in which is included a pair of slot-like clamps to receive and to compressibly grip in an adjustable manner the edges of the flexible resilient strip.

Another and further object of this invention is the provision of inexpensive extruded metal strips each having integral therewith a hinge element and which strips when appropriately assembled being capable of arching and collapsing for the ready reception and retention of a concavo-convex sealing strip to permit assembly and replacement of the latter in a simple and effective manner, and without necessarily removing the anchor member from a predetermined location relative a door in an opening.

Other objects and advantages of this invention will appear during the course of the following specification

in which I have set forth and described a preferred form of my invention. It will, of course, be apparent to those skilled in the art that changes and modifications and alterations of parts and their proportions may be made without departing from the spirit and scope of the invention as defined by the subjoined claims. The following specification is to be read in conjunction with the accompanying drawings, wherein:

Figure 1 shows an end view of a sealing device for a door opening as initially applied in a threshold position;

Figure 2 is an end view of the resilient deformable arched sealing strip;

Figure 3 is an end view of a ramp strip forming part of my anchor member for the sealing device;

Figure 4 is an end view of an intermediate coupler employed in the anchor member assembly;

Figure 5 is an end view of a second ramp member employed in my anchor member, similar to that shown in Figure 3; and

Figure 6 is an end view of a sealing device for a door opening according to this invention as it appears when finally applied to the threshold of a door.

Throughout the drawings like reference characters refer to like parts in the several figures.

Referring to Figures 2–5, wherein is shown the individual parts of my sealing device, the sealing strip of Figure 2 comprises the concavo-convex portion **10**, corrugated at **11**, and having side walls **12** and **13** and their associated in-turned flanges **14** and **15** respectively. The sealing strip is formed of rubber, rubber-like material, or vinyl or like plastic material, and is preferably very tough but at the same time quite resilient and flexible and easily deformable when in use. The corrugations **11** facilitate the frictional joinder of the arched or concavo-convex portion **10** with a door edge. Because of the resilience or relatively high deformability of the strip, irregularities of such a door edge are easily accommodated.

The ramp strip of Figure 3 includes an upright wall **20** from the top edge of which extends the curved sloping ramp wall **21** which is roughened on its exposed face at grooves **22** for anti-skid purposes. On the underside of the outer edge of wall **21** is an inverted groove **23** to receive a strip or rope of sealing compound, mastic or the like to provide a moisture barrier when the ramp strip is in place in a door opening. Wall **20**, intermediate its edges and opposite the sloping wall **21**, has ledge or rib **24** which is provided with an enlarged bead-like head **25** that forms part of a hinge (later to be described). The surface of the bead **25** is provided with slightly protruding, longitudinally extending, ribs **26**. The rib-strip **24** of Figure 5 is in all respects similar to strip **24** of Figure 3 with the exception that the outward and downward curving ramp wall **21** is relatively narrower.

The intermediate or coupler strip of Figure 4 is roughly T-shaped in cross section or end view and comprises the leg portion **30** having, laterally outstanding at its upper end, opposite arms or ribs **32, 33** and the obliquely downwardly open rabbet groove **34** and **35** respectively. Adjacent the point of joinder of leg **30** with the arms **32, 33**, and by means of the outstanding curved ribs **36, 37**, I form narrow-mouth, wide-throated cylindrical grooves **38, 39**. Grooves **38, 39** are open oppositely and receive the bead ends **25** of ledges **24** of ramp strips as shown in Figures 3 and 5. Shoulders **40** and **41**, respectively adjacent the rabbet grooves **34** and **35**, comprise stop members, useful in a manner to be described.

The ramp strips of Figure 3 and Figure 5 and the intermediate coupler strip of Figure 4 are preferably formed as metallic extrusions in the conventional manner. Normally they are formed of aluminum, highly polished and surface treated to insure the retention of a glossy appearance desirable in such elements.

Either or both of the ramp strips may be provided periodically along the length with fastener openings 42 to receive screws or other similar fastening devices.

In Figure 1, I have shown the elements, that have been described and illustrated in detail in Figures 2–5, as they appear in their initial assembled form, preliminary to finally securing the sealing device in the threshold of a door opening. In such assembled form, the bead hinge members **25, 25** are located in the grooves **38** and **39**, and the flanges **14** and **15** of the flexible sealing strip are disposed in slot-like grooves including the rabbet grooves **35** and **34** respectively. The proportions of the flanges **14** and **15** to their rabbet grooves, and their tendency to curl upwardly imparts a tensing and arching action on the metallic assembly. In other words, the device is tensed into the arched position shown. It will be noted that the screw fastener **44** is not fully driven home. Bead sealant materials **45, 45** in the downwardly open groove **23** of each of the ramp strips serve to seal the edges of the assembly to the floor. In this position the flexible and deformable resilient sealing strip is only temporarily secured. It may be slid endwise and with some dexterity the flanges **12** and **13** and their respective flanges 14 and 15 may be dislodged by the installer if such is necessary.

As further downward securing or downward acting pressure is applied to assembly of Figure 1, by means of a series of screws such as **44**, the tendency is to collapse the metal parts of the assembly to the position shown in Figure 6. The collapse of these parts is facilitated by the hinge action permitted through the swinging movement of the arms **24** in the mouths of slots **38** or **39** under which circumstances the beads **25** revolve in said slots. Such collapse is continued until the shoulders **40** and **41** come to rest upon the then adjacent upper surfaces of the arms **24** of the ramp strip. At such time substantial gripping pressure is obtained on the flanges **14** and **15** of the flexible sealing strip between the overhanging lips of the intermediate coupler member which form part of the rabbets **34** and **35**. In other words, the bead-like flanges **14** and **15** are tightly compressed or gripped in slot-like clamps against the ledges **24, 24** and also between the outer ends of the rabbet flanges and the adjacent upright face of the walls **20, 20**.

It will be understood that by employing the different widths of ramp strip shown in Figures 3 and 5, varying widths of threshold or door sealing strips can be provided. For example, a threshold may be assembled in which there are two strips such as are shown in Figure 3 and the coupler strip of Figure 4. In that case a relatively wide threshold would be produced. Alternatively, a narrow threshold comprising two strips such as shown in Figure 5 and the coupler strip of Figure 4 would produce a quiet narrow threshold. Such assemblages permit, because of the three piece construction shown herein, the accommodation of many and varying conditions that might be encountered. At the same time, this avoids the necessity of the supplier maintaining an excessive stock, by weight as well as by bulk, of thresholds if they were manufactured in the one-piece constructions which have come to this applicant's attention.

When the threshold unit is mounted in operative position in connection with a door the concavo-convex or arched sealing strip **10** is normally disposed about one-eighth of an inch higher than the plane in which the bottom of the door swings. When the door is in the normal closed position, the arched strip is then deformed or downwardly pressed. Because of its resiliency it tends to push against the door and to provide the desirable and effective seal. Ribs **11** on the top of the seal function to insure that the deformation of the sealing strip occurs in the mid-area and immediately beneath the door located over it. The greater stiffness of the heavier marginal areas of the concavo-convex portion **10** supports the readily deformable mid-portion tightly against the door

edge. Such strips may be made of any suitable flexible and resilient-type synthetic materials, or rubber or the like. The main consideration is that they are suited to the abrasive action as well as the deforming action encountered in the case of a threshold.

The instant invention is to be considered in all its aspects in the foregoing description merely as illustrative and not restrictive of the invention. The scope and the spirit of the invention is set forth in the appended claims. All changes which come within the meaning and range of equivalency of the claims are intended to be embraced thereby.

This device has a materially reduced thermal conductivity by comparison with one-piece constructions. The line contacts between the parts, largely produced through the limited metal-to-metal contact between ribs **26** and the surfaces of grooves **38, 39** reduce heat conduction. Likewise the line contact between shoulders **40, 41** and flanges or strips **24** reduces conduction. This is important where, for example, thresholds are used in extremely cold country and frosting on the inner parts of metal objects extending between the warmer inside and the colder outside is a serious problem.

Having thus described my invention, I claim:

1. A door seal structure, comprising: a substantially T-shaped coupler strip to span a door opening, a ramp strip coextensive on each side of the coupler strip, each ramp strip having a flange disposed beneath its highest point and extending toward said coupler strip beneath a lateral arm thereof, means forming a hinge coupling between each said flange and the leg of said T-shaped coupler strip, each lateral arm extending close to the ramp strip and forming therewith a slot-like clamp outward of the hinge coupling, and a concavo-convex resilient sealing strip having each edge engaged in a slot-like clamp and extending therebetween over the coupler strip throughout its length, said sealing strip engagement in said clamps tending to cause said structure to form an arch between the outer edges of said ramp strips, at least one of said ramp strips being adapted to receive fastener means operable to draw the ramp strip toward an underlying supporting surface to thereby reduce said arch and close said clamps.

2. A door seal structure, comprising: a substantially T-shaped coupler strip to span a door opening, a ramp strip coextensive on each side of the coupler strip, each ramp strip having a flange disposed beneath its highest point and extending toward said coupler strip beneath a lateral arm thereof, said T-shaped coupler strip having a narrow restricted mouth groove along each side of its legs, and each flange having a bead edge hingedly engaged in a groove, each lateral arm extending close to the ramp strip and forming therewith a slot-like clamp outward of the hinge coupling, and a concavo-convex resilient sealing strip having each edge engaged in a slot-like clamp and extending therebetween over the coupler strip throughout its length, said sealing strip engagement in said clamps tending to cause said structure to form an arch between the outer edges of said ramp strips, at least one of said ramp strips being adapted to receive fastener means operable to draw the ramp strip toward a supporting surface to thereby reduce said arch and close said clamps.

3. The structure according to claim 2 in which the resilient sealing strip has an inturned flange at each edge, and said inturned flange is disposed under a lateral arm of the substantially T-shaped coupler strip to be pressed to the underlying ramp strip flange.

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