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(54) An assembly for sealing doors.

(57) A door assembly comprises a frame (9) defining an aperture, a door (1) for closing the aperture, and a sealing assembly (20) disposed along at least one and preferably all the edges of the door (1) for sealing the door in the aperture. The sealing assembly (20) comprises a generally hollow deformable sealing number (5) which is mounted in a channel member (4) and extends therefrom in a direction parallel to the plane of the door (1). The sealing member (5) is of pear-shaped cross-section and is capable of a shearing movement as the door (1) is closed.

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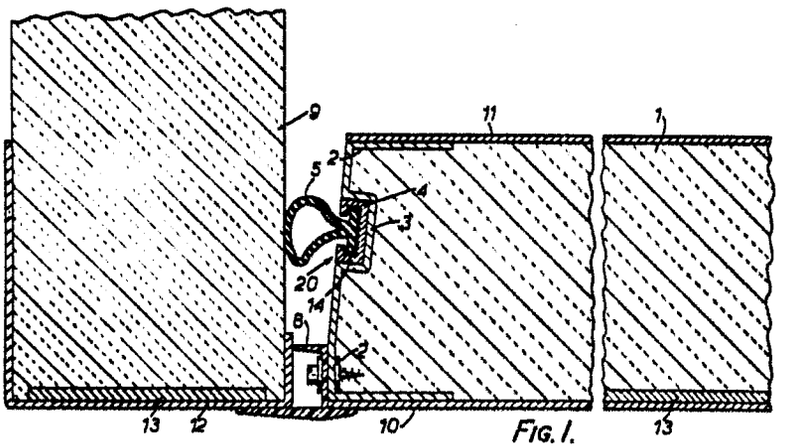

FIG. 1.

AN ASSEMBLY FOR SEALING DOORS

This invention relates to an assembly for sealing doors more particularly, but not exclusively to sealing refrigerated van doors.

In the type of door seals known as finger seals a flexible seal of substantially 'U' shaped cross section is provided, the arms of the 'U' extend in a direction parallel to the plane of the door and co-operate with a door frame or pillar surrounding the door to be sealed. The lengths of the arms are crucial because too short a length would not ensure a sufficient seal and too long a length would increase the resistance necessary to pull open the sealed door due to the tips of the arms becoming bent and catching the door frame or pillar. Such seals are susceptible to wear and tear and therefore need replacing, this involves complete dismantling of the sealing arrangement. In addition to being unnecessarily expensive to replace it is also time consuming during which time the van is rendered inoperative and meanwhile losing business.

Hollow seals have previously been proposed having a circular cross-section but these have previously only been used as a compression seal and therefor extend in a direction transverse to the plane to the door.

It is an object of the present invention to provide a sealing assembly for sealing doors which

assembly includes a sealing member capable of providing a "rolling action" during operation of the assembly. As a result of this "rolling action" it is possible to provide a substantially airtight and thermotight seal which an opening does not catch and opens with relatively low resistance.

It is another object of the present invention to provide a sealing member for use in an assembly which is removably located in a holder for allowing replacement of the seal to be done relatively quickly and cheaply.

An example of a preferred construction according to the present invention will now be described by way of example only, with reference to the accompanying drawings in which:-

Figure 1 shows a section through a part of a door frame and a part of a door including an assembly according to the present invention;

Figure 2 shows a section through a further part of a door frame and the part of the door as shown in Figure 1;

Figure 3 shows a section through yet a further part of a door frame and the part of the door as shown in Figure 1; and

Figure 4 shows a section through a sealing member included in an assembly as shown in Figures 1 to 3.

As shown in Figure 1 there is provided a part of a section of a door frame of a refrigerated container which frame 9 delimits an aperture in the container for receiving a door 1 and a sealing assembly 20. The sealing assembly 20 is attached to the edges of the door for providing a seal between said door and said frame. When in use one advantage of the present invention is that the sealing assembly may be attached to a door for use in sealing the door with a variety of differently constructed

door frames for example the frames shown in Figures 2 and 3.

The door 1 has parallel front and back panels 10 and 11 respectively. In the preferred embodiment the front panel 10 extends slightly beyond the back panel 11.

The sealing assembly is attached on each edge of the door between the front and back panels 10 and 11 and comprises a substantially rigid member 2 for attachment to the inside of the panels 10 and 11 in the region of the periphery thereof for closing the gap therebetween. The rigid member 2 is preferably arranged to lie substantially flush with the periphery of the panels 10 and 11 and because the front panel 10 extends slightly beyond the back panel 11 the rigid member 2 tapers along a substantial length between one panel and the other.

The rigid member 2 has a recess 3 between the front and back panels for receiving a holder 4 which has a C-shaped cross section and may have serrated sides for additional grip with the recess 3 when the rigid member 2 is moulded around the holder 4. A first sealing member 5 made from suitably flexible material such as P.V.C. capable of being compressed and advantageously capable of withstanding temperatures in the region of -40°c without degradation of its properties and having retaining means 14 extending from the base thereof for being removably located in said holder. The sealing member 5 protrudes outwardly from the holder 4 in a direction parallel to the plane of the door and in use communicates in a compressed condition with a door frame or pillar 9 surrounding the door 1. Between the frame 9 and the door 1 there is provided a gap no less than the height of the seal when fully compressed so as to enable the seal to be inserted.

In addition to the first sealing member 5 there is

provided a secondary, conventional, sealing member 8 advantageously fixed to the rigid member 2 in the region of the rigid member 2 adjacent the front panel 10 of the door 1, which sealing member 8 co-operates with the face of the front panel 10 and when in use co-operates with the outer face of the door frame 9 providing a seal between the frame 9 and front panel 10.

One type of door frame to be sealed with the door including a sealing assembly as described above is shown in Figure 1 in which the door frame 9 may be provided with a tapping plate 13 preferably welded on the inside of the outer wall of the door frame similarly a tapping plate 13 may be provided on the inside of the front panel 10 of the door 1, for providing means to hinge the door 1 on either side of the frame 9. The door frame 9 may be surrounded by a shield 12 as shown in Figures 1 and 2 but advantageously the part of the door frame 9 which co-operates with the seal 5 when in use should be heat insulative. However if the shield 12 is made from conductive material then the shield 12 may be isolated from the interior of the container by providing a suitable heat break with which the sealing member 5 co-operates when the door is in position in the door frame 9 as shown in Figure 2.

In use, the fact that the edge of the door is tapered means that as the door is closed, the sealing member 5 is subjected to both a compressive force and a shearing force which increase as the door shuts. The member 5, which is air-filled, thus effectively seals the gap between the door and door frame.

An alternative construction of the door frame is shown in Figure 2 and is used primarily for the bottom or floor section of the container. The door frame 9 adjacent the door edge is angled to be parallel

to the tapering portion of the door edge until the level of the floor is reached. At this point the heat break 6, previously mentioned, is provided and the sealing member is arranged to co-operate therewith to isolate the interior, and the metal floor of the container from ambient atmosphere. The sealing member 5 is again under both compressive and shearing forces in this arrangement.

It will be appreciated that the shield 12 and the plate or wall 7 may be made of the same material and may be of one material moulded or bent around the heat break 6.

Another variation of the door frame construction is shown in Figure 3 in which the door frame 9 has an edge which is of registering shape to the edge of the door 1 i.e. the door frame has a first portion extending substantially at right angles from the outer wall 12 for co-operation with the sealing member 8 and an angled portion which is arranged to be parallel to the tapered portion of the door when the door is in its closed position. This arrangement again caused compression and shearing forces to be exerted on the sealing member 5.

Figure 4 shows a preferred form of the sealing member 5 suitable for use in the above mentioned sealing assembly. The sealing member has a pear shaped cross section and retaining means extending from the narrow part of the sealing member capable of being removably located in the holder 4. The "pear" part of the upper part of the sealing member 5 projects from the holder and by virtue of its material and wall thickness is capable of being compressed by say 1/7th of its original height and when in a compressed condition is capable of shearing for providing a "rolling action". When operating said assembly for operation of said assembly the door having been hinged to a door frame 9 as shown for example in Figures

1 to 3 is closed, the sealing member 5 comes into contact with the frame 9, because the gap between the door frame and door is smaller than the height of the sealing member 5 the sealing member compresses and by shearing rolls into position.

The air trapped inside the upper part of the seal provides an insulator between the air on either side of the seals and in addition to the air trapped between the secondary seal and the part of the door frame 9 opposite the secondary seal which acts as an insulator between the atmosphere and the air between the secondary seal member and the first sealing member provides a substantially airtight, thermotight seal.

On opening the door 1 the first sealing member 5 "rolls" back with minimal resistance.

In the preferred embodiment of the present invention the sealing member 5 is longitudinal and the retaining means 14 preferably 'T' shaped whereby the bar of the T can be slid along the holder 4 on each side of the door 1. At the corners of the door 1 the sealing member 5 on one side is bonded with the sealing member 5 on the adjacent side to form a mitre edge.

It will be appreciated by those in the art that variations to the embodiments may be made without going outside the scope of the present invention as described above.

CLAIMS:

1. A door assembly comprising a frame (9) defining an aperture, a door (1) for closing the aperture, and a sealing assembly (20) disposed along at least one edge of the door (1) and projecting in a plane parallel to the plane of the door (1) and the corresponding edge of the aperture when the door (1) is closed characterised in that the sealing assembly (20) comprises a deformable generally hollow member (5) which is capable of being compressed between the said edge of the door and the edge of the aperture and is capable of a shearing movement as the door (1) is closed.

2. A door assembly according to claim 1, wherein the sealing member (5) is mounted in the said one edge of the door and projects therefrom in a plane parallel to the plane of the door (1).

3. A door assembly according to claim 1 or 2, and comprising a channel member (4) of C-shaped cross-section, the sealing member (5) being provided with a base portion (14) which is received in the channel member (4) and the generally hollow member protects therefrom.

4. A door assembly according to claim 3, wherein the channel member (4) is received in a recess (3) in the edge of the door (1).

5. A door assembly according to any one of the preceding claims, wherein the edge of the aperture is provided with a thermally insulating member (6) and the sealing member (5) is arranged on the edge of the door (1) to contact the thermally insulating member when the door (1) is closed.

6. A door assembly according to any one of the preceding claims, and comprising a further sealing member (8) located on the edge of the door (1), the first-mentioned sealing member (5) being located inwardly of the further sealing member (8).

7. A door assembly according to any one of the preceding claims, wherein the sealing member (5) is made of polyvinylchloride and is pear-shaped in cross-section with the smaller cross-sectional dimension adjacent the edge to which it is mounted.

8. A sealing member for providing a heat seal and comprising a hollow resilient portion (5) of generally pear shaped cross-section which is arranged to be mounted at its smaller cross-sectional dimension.

9. A sealing member according to claim 8 wherein the sealing member (5) is made of polyvinylchloride.

10. A sealing member according to claim 8 or 9 and comprising a base portion (14) for enabling the member to be mounted.

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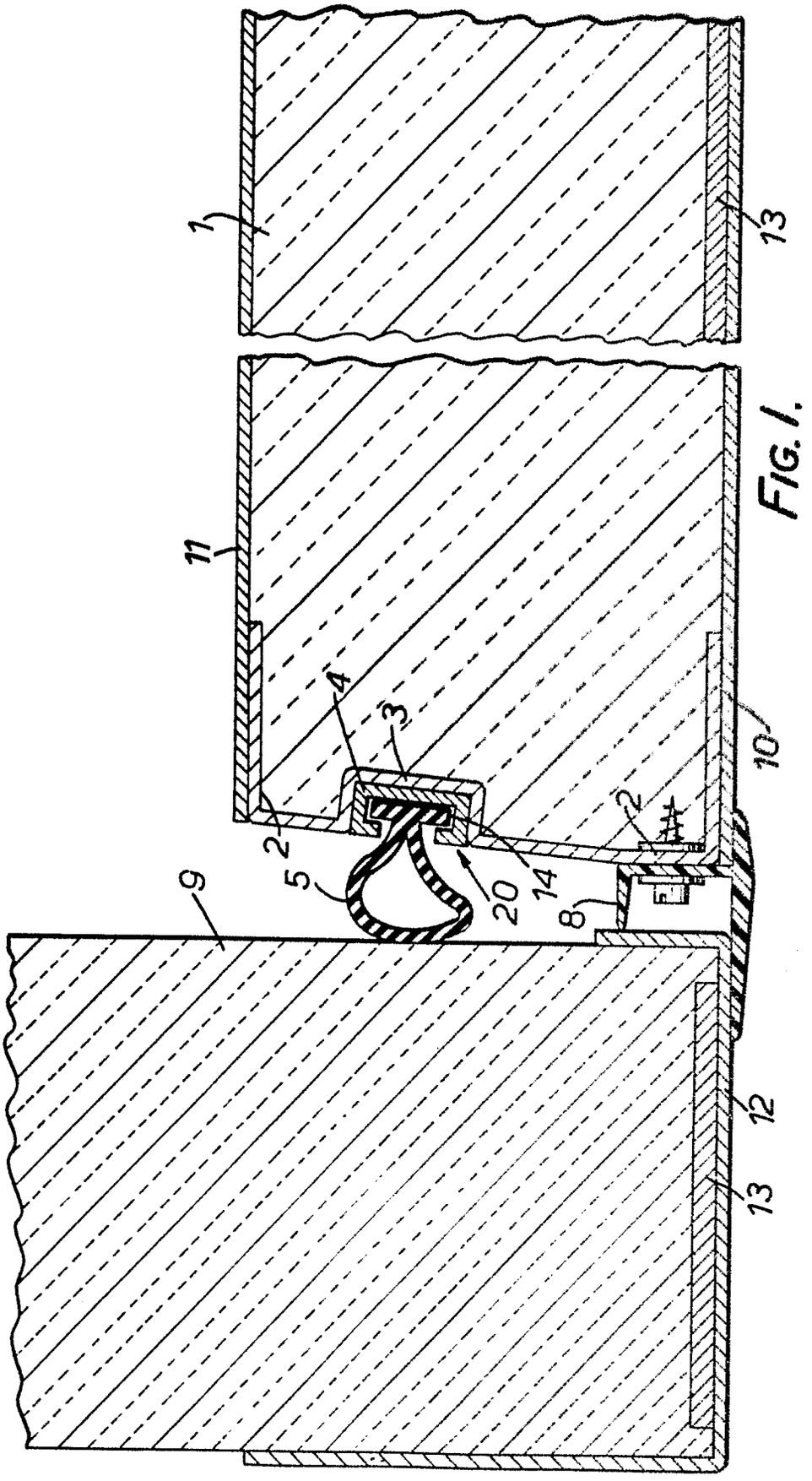

FIG. 1.

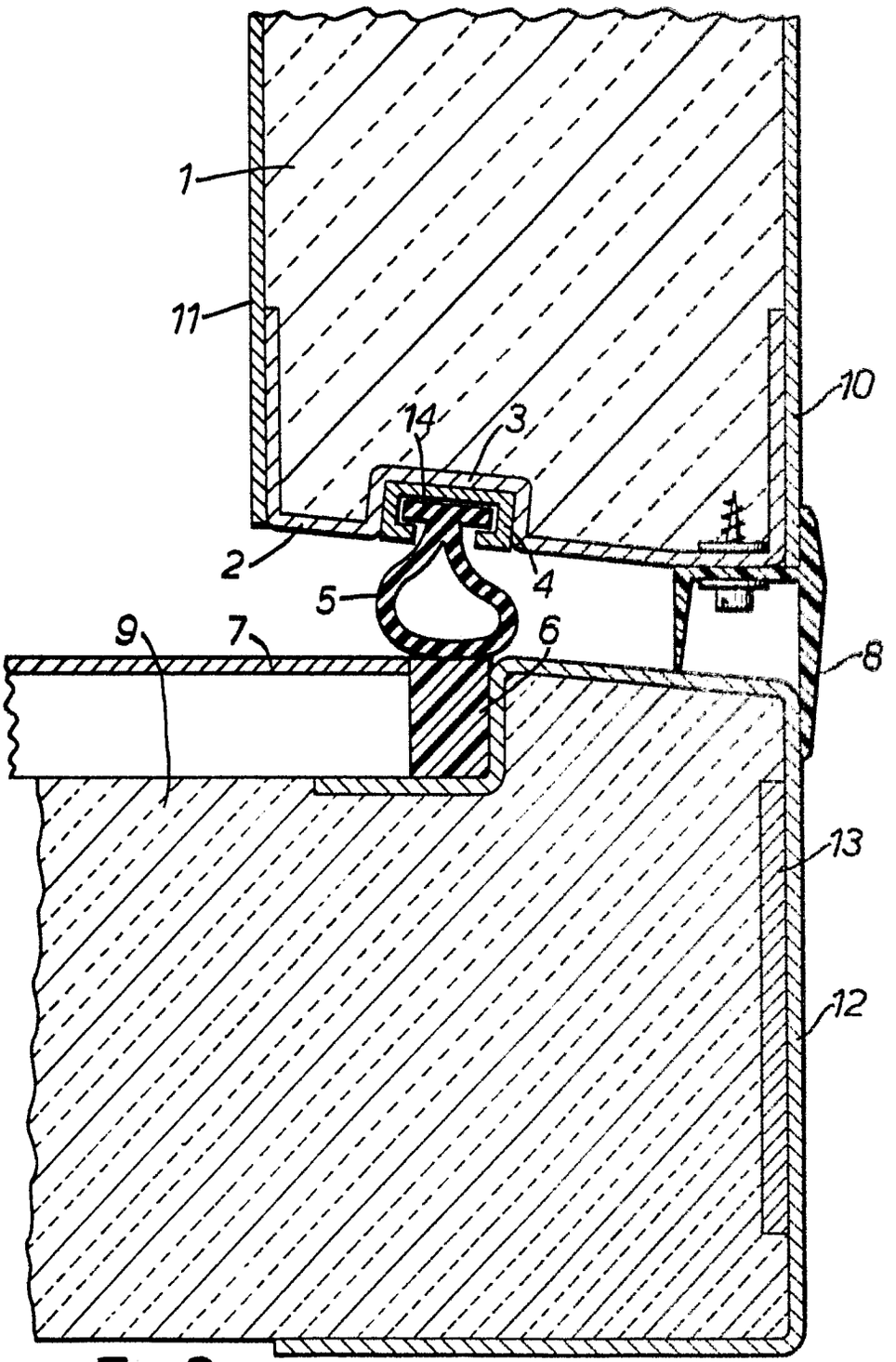

FIG. 2.

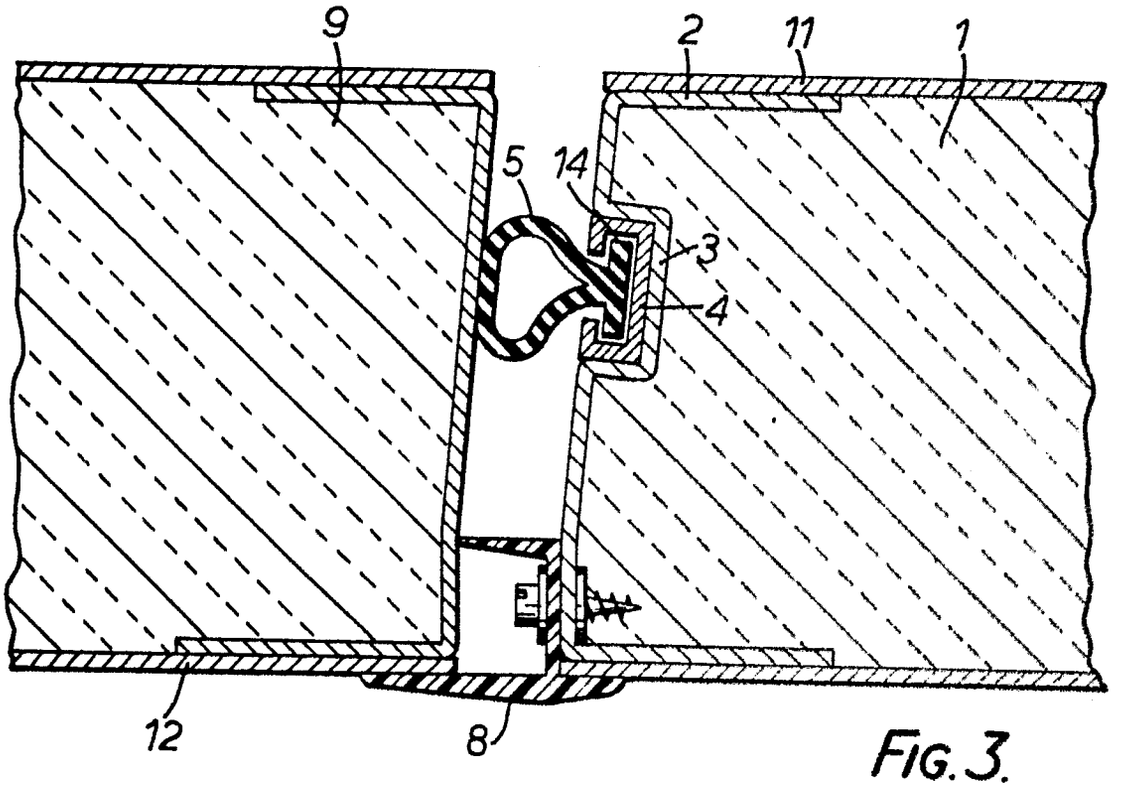

FIG. 3.

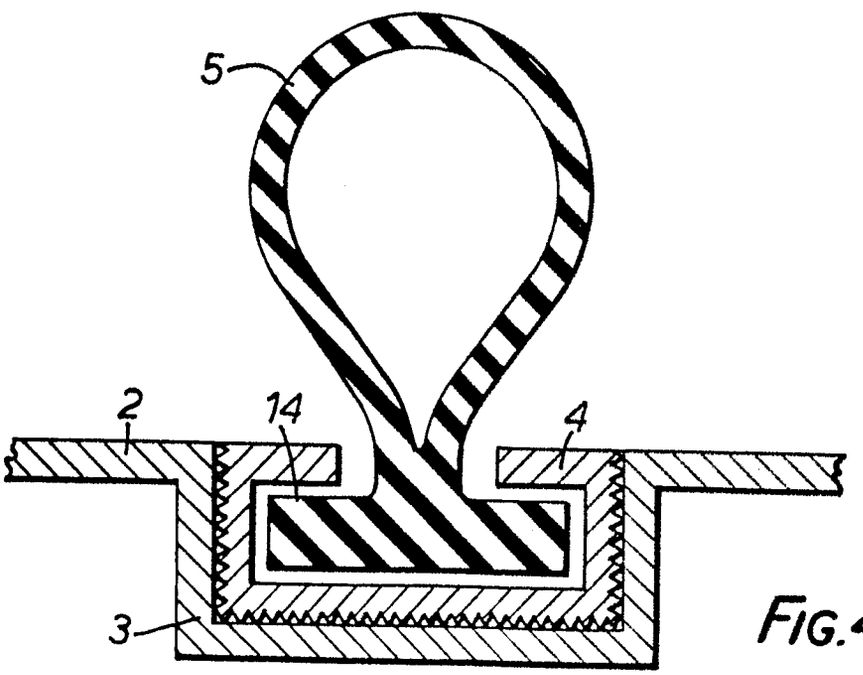

FIG. 4.