June 17, 1941. C. W. OSNER ET AL 2,245,812

WEATHERPROOFING STRUCTURE

Filed June 7, 1940 2 Sheets-Sheet 1

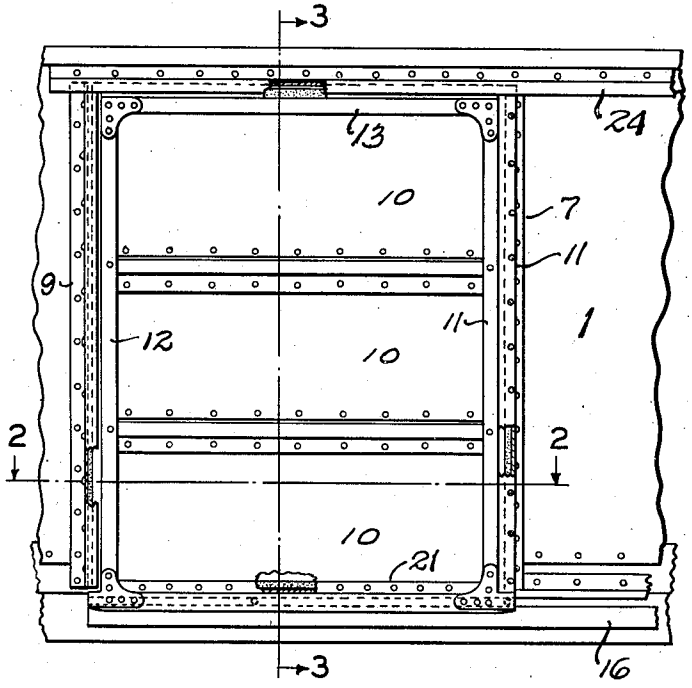


FIG. 1.

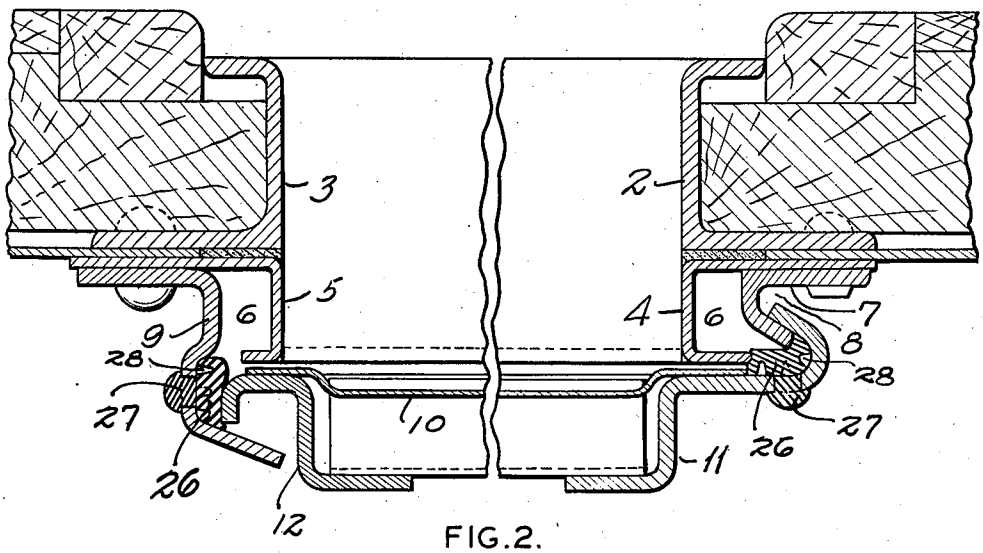


FIG. 2.

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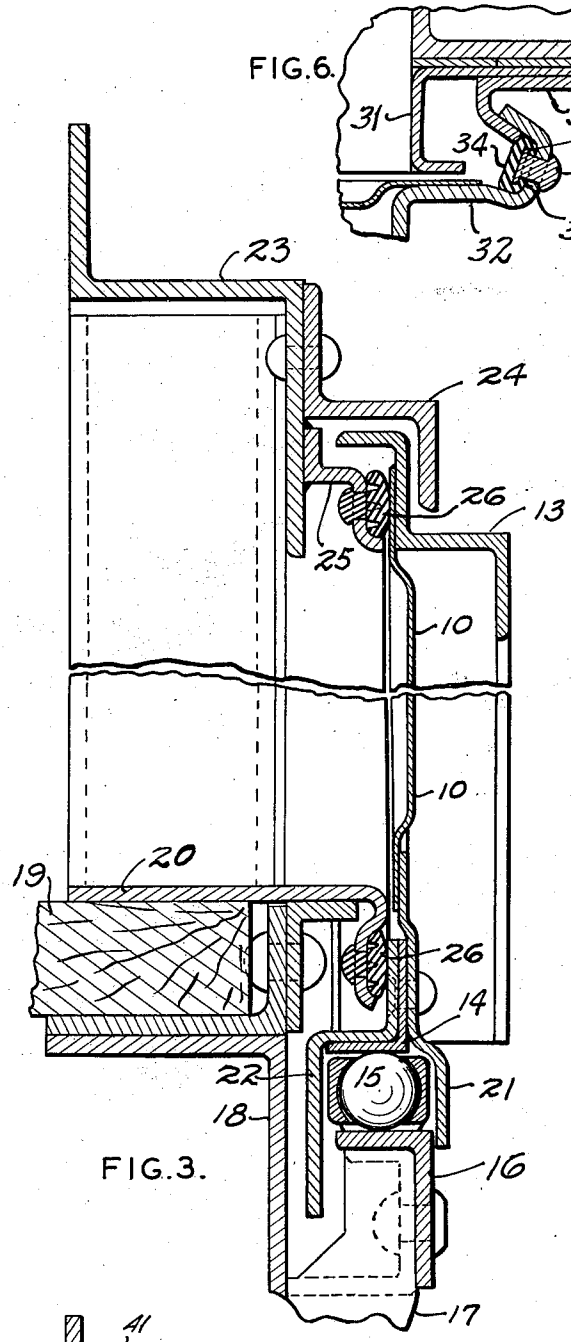


FIG.3.

FIG.6.

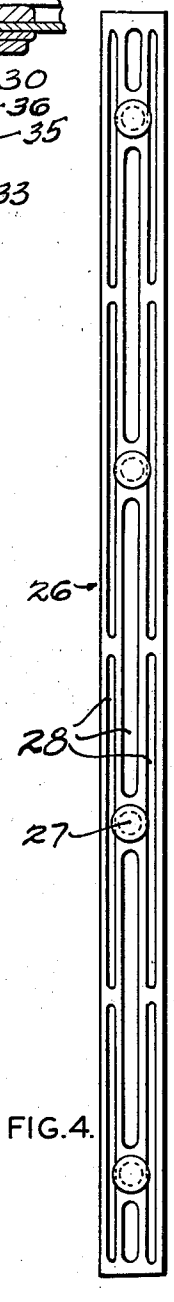


FIG.4.

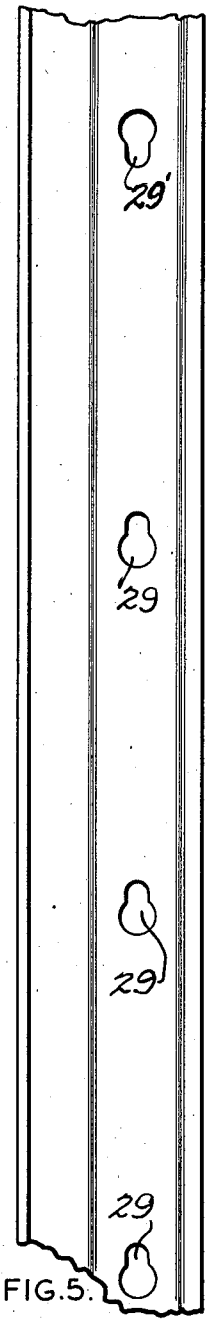


FIG.5.

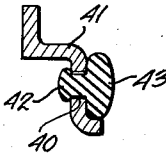


FIG.7.

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WEATHERPROOFING STRUCTURE

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Application June 7, 1940, Serial No. 339,278

8 Claims. (Cl. 20—26)

The invention relates to weather-stripping and is particularly adapted for use in weather-stripping railway house car doors which are subjected to hard usage because of rough handling and because of weaving of the car body and door relative to each other when the car is in transit.

Railroads and car builders have made extensive effort to provide tight joints between car bodies and doors due to the fact that flour, cotton and other perishable materials are subject to deterioration and loss due to rain, snow, cinders, etc. entering the crevices between the doors and the door posts, it being understood that the ordinary atmospheric conditions are accentuated by air currents and relative play of the door and body set up by the movement of the car.

The main object of the present invention is to form a weather-stripping which is readily applied to opposing elements about a door or other opening, and more particularly to provide weather-stripping adapted for use on railway car door and post structures.

Another object of the invention is to render the weather-stripping readily replaceable and, preferably, without the use of tools.

It is an additional object of the invention to provide weather-stripping in association with railway car doors and door posts so that if the weather-stripping should be removed accidentally, or otherwise, or become ineffective in itself, there would still be substantial resistance to the passage of air currents, and material carried thereby, through the joint.

These and other detail objects as will appear from the following description are attained by the structure illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a railway car door and the adjacent portion of the car body and embodying a selected application of the invention.

Figure 2 is a horizontal transverse section taken on the line 2—2 of Figure 1 and drawn to an enlarged scale.

Figure 3 is a vertical transverse section taken on the line 3—3 of Figure 1 and drawn to an enlarged scale.

Figure 4 is an elevational view of a section of weather-stripping applied to the car door and body framing.

Figure 5 is a corresponding view of the adjacent door stop or door edging member to which the weather-strip is applied.

Figure 6 is a section corresponding to the right hand portion of Figure 2 but illustrating a modified type of weather-strip and a different mounting upon the car door.

Figure 7 is a detail section through a weather-strip and mounting member illustrating another form of the invention.

The general arrangement of the car door and its mounting upon the car side corresponds to that shown in Wasberg Patent 2,114,756, issued April 19, 1938. The car body includes side wall 1 and door posts 2 and 3 to which are applied weather guards 4 and 5, each forming a channel-like pocket 6 facing longitudinally of the car and away from the door opening. A spark strip 7 attached to post 2 forms another pocket 8 facing away from the door opening and spaced from pocket 6. A door stop 9 attached to post 3 extends outwardly of the car beyond weather guard 5 to oppose the front edge of the door.

The door includes panels 10, rear and front edgings 11 and 12, and top and bottom edgings 13 and 14. The door is supported by ball bearings 15 riding upon a track 16 secured by bracket 17 to the body side sill 18 which also supports the floor 19 having a threshold plate 20 extending outwardly and downwardly to oppose the lower portion of the door. Door elements 21 and 22 straddle track 16 and limit movement of the lower portion of the door away from and towards the car body.

A body side plate 23 mounts a door retainer 24 overlying door top edging 13 and limiting the movement of the door away from the car body. A header 25 on side plate 23 limits movement of the upper portion of the door inwardly of the car body. All of the above described structure is known in the art and in itself does not constitute the present invention.

In this construction, the coacting parts 9 and 12, 7 and 11, 13 and 25, and 20 and 22 form a joint between the car body and the door and if these parts were made accurately and if their original contours and spacing could be maintained, then the joint would be weatherproof; but since the parts are made of rolled and pressed shapes assembled by punching and riveting operations and subjected to hammering in erection and by the slamming of the door and are subject to other forces affecting their opposing faces, the joints do not remain weatherproof, even if tight originally, and to avoid undesirable crevices between these coacting parts they are provided with elongated sections of weather-stripping each consisting preferably of a body or packing portion 26 of relatively soft elastic ma-

terial and attaching elements 27 of relatively hard unyielding material.

A suitable construction is shown embodying strips of rubber-like material of about 1" x ½" rectangular section and having deep grooves 28 with closed ends extending lengthwise, the attaching elements 27 consisting of shanks with button-like heads projecting from the grooved face of the body 26 and formed of relatively hard rubber and spaced apart substantially lengthwise of the section. For example, the sections may be approximately three feet in length and the attaching buttons eight or nine inches apart.

The steel members to which the weather-strips are applied are formed with keyhole slots 29, the circular portions of which are large enough to permit the passage therethrough of the button heads of elements 27 and the straight portions of which are of less width than the diameter of the heads but of sufficient width to receive the shanks of elements 27. Preferably, the spacing of slots 29 is greater than the normal spacing of elements 27 (see Figures 4 and 5) and in applying the weather-strip to the mounting member the strip is stretched to pass the heads of the attaching elements through the circular portions of the slots and the elasticity of the strips pulls the attaching elements towards each other so as to securely seat the same in the narrow portions of the slots.

Each line of weather-stripping is attached to one of the coacting metal parts and forms an abutment for the other part so that when the door is closed the weather-strips are distorted to compensate for any unevenness in the opposing faces of the metal parts and to compensate for any variation in the distances between the metal parts at opposite edges of the door. The vertically disposed weather-strips at the front and rear edges of the door opening are distorted by the sliding of the door to the left in Figure 2, and the horizontally disposed weather-strips at the top and bottom of the door opening are distorted by the movement of the door inwardly of the car by the inclined guiding faces formed on parts 7 and 9.

The grooving of the weather-strips permits the use of a very durable rubber compound while retaining desired flexibility to permit the cooperating elements to be imbedded into the rubber, thus giving longer life to the material than if it were made of softer rubber. The closed end grooves also act as suction cups so that when the strips are pulled tightly against the metal mounting parts by retaining elements 27, or are pressed against the mounting parts by the movement of the door to closed position, the suction cup action will help hold the strips in place. The mounting arrangement shown provides for ready original attachment and later replacement of the weather-stripping without the use of tools.

Usually the forward closing movement of the door is limited by the contact of the door front edging 12 with the door stop 9, and this may occur before the door rear edging 11 contacts spark strip 7, but the weather-strip is so arranged that it will contact the spark strip before the inturned edge of edging 11 is seated against the spark strip flange. Hence the structure provides the spaced sealing joints between the car body and the door which are so desirable but which have been difficult to attain.

All of the button-receiving slots 29 in the mounting member may have their narrower portions extending in the same directions, but it may be preferable to arrange these slots so that some of the slots have their narrower portions extending towards each other as indicated by the slot 29' and the uppermost slot 29 in Figure 5.

Figure 6 illustrates another arrangement of the sealing of the rear edge of the door opening in which the elements 30 and 31 are substantially the same as elements 7 and 11 previously described, but the door rear edging 32 is shaped to provide a flattened area 33 to oppose the flat rear face of weather-strip section 34 and to be apertured to receive the weather-strip retaining buttons 35. The latter are shown as formed of metal with enlarged bases 36 imbedded in the weather-strip body material.

While the button and keyhole slot arrangement is a preferred construction, it is to be understood that from some aspects the invention is not dependent upon this feature and Figure 7 illustrates a form of the invention in which the holes 40 in the mounting member 41 are circular and of less diameter and area than the heads 42 of the attaching buttons of the weather-strip 43. Preferably, the body of the weather-strip and the attaching shanks and buttons are molded integrally from rubber or rubber-like material which is soft enough to permit heads 42 to be distorted and thrust through the relatively small openings 40 and then to expand to hold the weather-strip and mounting member assembled. This arrangement would make the different spacing of the attaching elements and the mounting member holes less important than in the construction previously described as there would be no necessity to stretch the body of the weather-strip to maintain the buttons in shank embracing restricted portions of the openings. Nevertheless, the variation in the spacing of the buttons and openings might be retained to hold the weather-strip more closely to the mounting.

In some respects, the invention would be carried out by securing the weather-strip body to the mounting member by any of the processes used for bonding rubber to metal.

Other changes in the details of construction may be made without departing from the spirit of the invention and the exclusive use of such modifications as come within the scope of the claims is contemplated.

What is claimed is:

1. In a sliding door weather-sealing arrangement, a door post structure, a door edging structure, one of said structures having a flexible weather-strip of deformable material with sides disposed angularly relative to each other and the other of said structures having spaced edges arranged to contact different sides of said weather-strip from different directions to press said sides towards each other as the door is closed.

2. In combination, a wall member having a door opening, a door member movable along the wall member to close said opening, substantially rigid elements on the said members cooperating as the door closes to provide a plurality of pockets extending substantially throughout the length of a side of said opening and each pocket having a U-shaped cross section with the concave portion facing away from the door opening, the pockets being disposed one in front of the other to check successively air currents tending to pass inwardly through the door opening between the door and the wall, there being a weather-strip of deformable material on one of said members and movable towards said elements as said door

is closed and then engaged by spaced edges of said pocket forming elements to more effectively seal the joint between said members.

3. In combination, a wall having a door opening, a slidable door for closing said opening, substantially rigid elements secured to said wall adjacent to one side of said opening and forming successive three-sided pockets facing the same general direction away from said opening, one in front of the other, and each having its outer side disposed alongside of said door to trap matter tending to enter the car, there being a weather-strip of deformable material on said door arranged to be engaged by the edges of said element sides as the door is closed.

4. In a railway car, a side wall having a door opening, weather guards secured to said wall and extending outwardly therefrom adjacent to one side of said opening and then away from said opening longitudinally of said wall and terminating in edges spaced apart longitudinally of the car, a slidable door having an edging with portions extending longitudinally of the car wall and then inwardly towards said wall, and a weather-strip of deformable material mounted on said door edging and arranged to be compressed between said portions and both of said weather guard edges.

5. A weather strip for a joint between a wall member and a door member movable towards the same, said weather strip comprising an elongated narrow body of elastic material having a flat face on one side for application to one member of the joint and having a flat face on its opposite side for contacting the other member of the joint, there being deep longitudinal grooves in said body arranged at intervals to increase its capacity for yielding transversely of its length, and substantially continuous ribs between said grooves for resisting elongation of the body when it is compressed transversely.

6. A structure as described in claim 5 in which the body includes a plurality of grooves arranged abreast of each other and having their ends staggered longitudinally of the body.

7. In a sliding door weather sealing arrangement, a door post structure, a door framing structure, one of said structures having flanges extending from its general plane and terminating in parallel edges spaced transversely and longitudinally of the door and forming an air baffling pocket between them, an elongated weather strip secured to the other of said structures between the same and said edges and being contacted from different directions and at opposite sides of said pocket by said edges as the door is closed and being deformed thereby inwardly of said pocket.

8. In a sliding door weather sealing arrangement, a door post structure, a door framing structure, said post structure including channel-shaped members extending throughout the height of the door and arranged one in front of the other to form successive pockets facing away from the door opening, the outer flanges of said members terminating in edges spaced apart transversely and longitudinally of the door, the corresponding door framing structure forming a channel-shaped jaw disposed to receive said flange edges, a weather strip secured to the inner face of said jaw and having an edge portion disposed to contact one of said flange edges and having a side face portion disposed angularly relative to said edge portion and disposed to engage the other of said flange edges whereby the weather strip is contacted at spaced points and distorted in different directions as said door is closed.

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