Feb. 27, 1934. W. H. ROSS 1,948,942

DOOR STRIP AND METHOD OF MAKING

Filed July 31, 1931

Fig. 1.

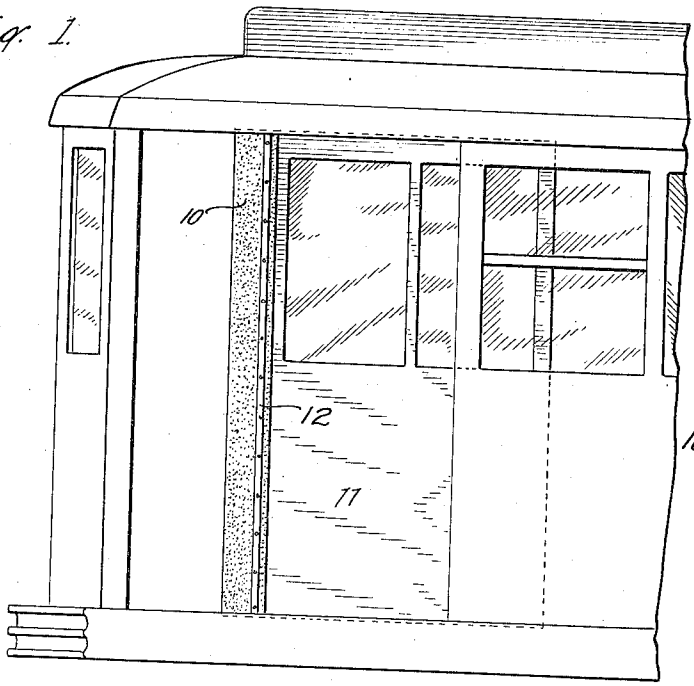


Fig. 3.

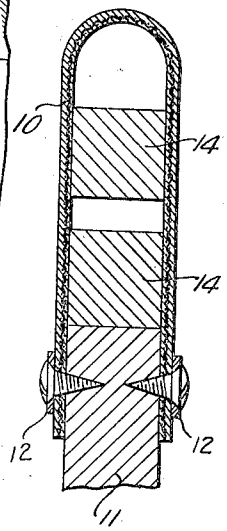
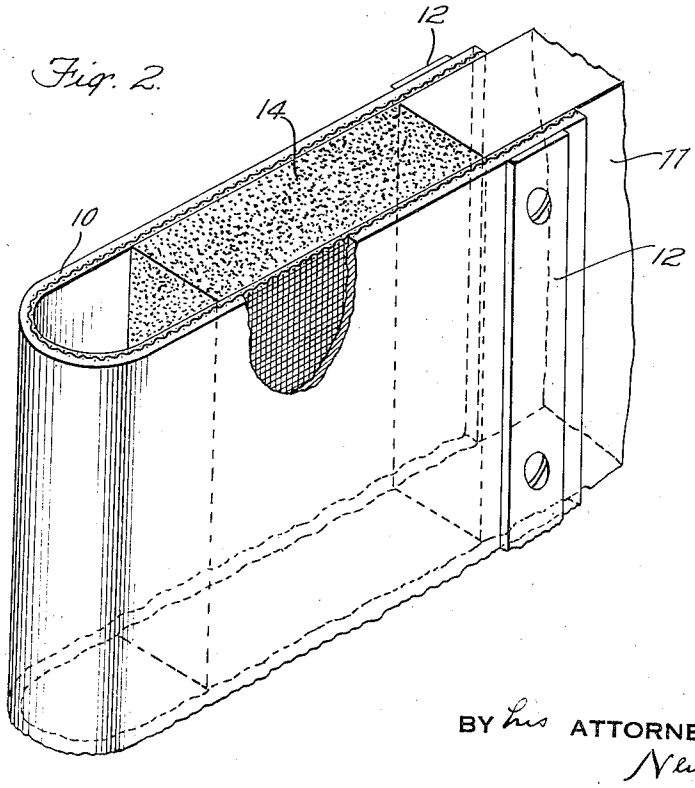


Fig. 2.



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UNITED STATES PATENT OFFICE

1,948,942

DOOR STRIP AND METHOD OF MAKING

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2 Claims. (Cl. 20—69)

This invention relates to a novel guard strip adapted particularly to be used in connection with doors used by the general public, e. g., in railway passenger coaches, busses, elevators, etc., and especially adapted for sliding doors. More particularly, the invention relates to a guard strip formed of a looped or tubular flexible sheet in which the inner surfaces of the sheet are anchored together over an important part of their area by a material which does not objectionably interfere with the elastic deformation of the strip, and preferably one which is sufficiently elastic to assist in returning the flexible strip to its normal form.

In the doors of railway passenger coaches, as one example, it is desirable that the door, when closed, should be substantially wind-tight, and yet in closing should present an edge sufficiently soft so that if the door is accidentally closed when a passenger is entering a coach it will not cause him any injury or serious discomfort. Furthermore, and particularly where the doors of a number of coaches are controlled automatically or by a single operator, the edge of the door should be made so that if it is accidentally closed against a passenger, he will not be pinned between the door and the frame, but can easily extricate himself, and thus avoid any injury which might result if he were carried along between the door and its frame.

To meet these requirements, the doors of the railway carriages have heretofore been equipped with bumpers made by looping a heavy sheet of vulcanized rubber over the edge of the door and securing its ends to the door. Such a loop forms a soft cushion which prevents the door from injuring anyone whom it strikes, and also leaves a substantial width, when the door is closed, which is sufficiently flexible to permit a passenger to extricate himself, or any part of his body such as his arm or leg, from between the door and its frame, even though the door has been closed upon him. Such bumpers have proved, for the most part, highly satisfactory. They have, however, proved to be short lived, both because they are subject to rapid deterioration on account of their exposure to weather and because of accidental and wanton destruction by passengers, by cutting or tearing the rubber sheet. Furthermore, such strips do not give entirely satisfactory protection against the weather, because of the fact that according to the stiffness in the various parts of the rubber along the length of the strip, it may form a narrower or wider loop, and thus may not fit uniformly against the door jamb.

It is an object of the present invention to provide a door strip which will withstand long weathering without substantial impairment of its function, and which may be cut and torn without seriously impairing its function, and which will form an efficient weather strip, fitting uniformly and tightly against the door jamb when the door is closed.

In the accompanying drawing, I have illustrated a number of preferred examples of door strips made according to my invention.

Fig. 1 is a side elevation showing such a strip in place upon the door of a railway carriage.

Fig. 2 is a fragmentary perspective view showing such strip in place upon a door, and

Fig. 3 is a cross sectional view illustrating another form in which the invention may be embodied.

Referring first to Fig. 1, the strip 10 of rubber sheet is looped over the edge of the door 11, and is fastened to the door near its edge by means of the metal strips 12. In the preferred form of the invention, the strip 10 is of vulcanized rubber sheet reinforced by a single layer of canvas duck. The exact composition of the sheet, however, is not important, and it will be understood that there may be several layers of duck, or the duck may be entirely omitted. According to the present invention, the sheet 10 is looped into the shape shown in Fig. 1 before it is given its final hot vulcanization. By so doing, the rubber of the strip is permitted to readjust itself to the looped form while softened by the heat before being given its final set. I have found that the strip thus formed, so as to be in relaxed condition in the looped form, will withstand weathering for very much longer periods and under more severe conditions of service than will strips which have been used heretofore, which have been made by bending a flat sheet into looped form after its final vulcanization; and furthermore will tend always to resume its shape accurately fitted to the door jamb, since there will be no tendency to bulge more or less along its length.

As shown in Fig. 2, it is desirable also to reinforce the loop by means of a cushion 14 of a material which is readily compressible, and which readily returns to its original shape after being compressed, but which is capable of adhering securely to the inner surfaces of the looped rubber sheet, and which will itself have sufficient tensile strength to hold the rubber sheet on the two sides of the loop spaced as desired, independently of the tendency of the rubber sheet itself to hold such spacing, and even though the rubber sheet

should be cut, torn, or otherwise mutilated, so as no longer to be capable of holding its form without support. This cushion 14 is most advantageously made of sponge rubber of a relatively soft open structure. It may, however, be of other materials such, for example, as ground rubber cemented together by a film of rubber deposited from latex or a solution in organic solvents and vulcanized so as to form a reticulated structure of elastic rubber which, like sponge rubber, will be largely voids, but the voids of which will be open to the atmosphere, instead of enclosed, as in the case of sponge rubber; or the cushion may be of felted fibrous material cemented together by a film of rubber, e. g., deposited from a dispersion or solution and vulcanized so as to hold the fibres in their loosely felted arrangement, and to lend to them some additional elasticity.

In the example illustrated in Fig. 2, the cushion 14 fills the greater part of the space between the inner surfaces of the looped sheet 10. An open space, however, is left adjacent the end of the loop, which allows the softer tip to take the impact in case the door should strike an entering passenger. In other cases, even less of the cushion may be used. For example, as shown in Fig. 3, there may be separated strips of the cushion with air spaces between, or blocks of the cushion may be used, as shown in Fig. 2, but spaced vertically so that less than the entire space between the sides of the loop will be filled with the cushion.

In some cases, a wire or other device within the loop is made to control the operation of the door so that if a passenger or other obstacle is in the way of the door, it will automatically draw back and be opened again to permit the passenger to enter the car before closing. Where such devices are used, it may be necessary to leave a suitable space near the end of the loop, e. g., as shown in Figs. 2 and 3, within which such devices may be mounted and may operate. Or the door control device may be more or less embedded in the cushion 14 so that upon compression of the cushion at any point, or other deformation of the strip, the control device will be operated. With such springs it may also be desirable to place the cushion strips in which the contact springs are embedded closer to the end of the loop than is shown in Fig. 3.

In the manufacture of these strips, the cushion 14, preferably of sponge rubber, is advantageously formed first and vulcanized. The looped strip 10 may also be formed advantageously by giving it its final set cure in the looped condition, as already described, and the two may then be cemented together, or the cushion 14 may be preformed as described, and the sheet 10 may be formed and partially cured, and may then be looped to the final form over the cushion 14 and cemented thereto, after which the sheet may be given its final cure and the cement by which it is made to adhere to the cushion 14 may be vulcanized at the same time. For this purpose, a highly accelerated rubber cement is desirable, in order that its cure may be completed during the final cure of the sheet 10.

Although I have described above and shown in the accompanying drawing a preferred embodiment of my invention and a number of alternatives and modifications, nevertheless, it is to be understood that many other changes may be made within the scope of this invention.

What I claim is:

1. A flexible safety strip for doors, which comprises an open loop of rubber sheet and a filling of soft sponge rubber adhering throughout its length to the inside of said sheet at opposite sides of said loop near its open end and spaced from the sheet in the bight of the loop, whereby to leave a free space within said bight of the loop.

2. A flexible safety strip as defined in claim 1, in which the rubber sheet comprises rubber of substantial thickness relaxed when in said loop form.

WALTER H. ROSS.