

(12) UK Patent Application (19) GB (11) 2 110 282 A

(21) Application No 8225359
(22) Date of filing 6 Sep 1982
(30) Priority data
(31) 3143685
(32) 4 Nov 1981
(33) Fed. Rep. of Germany (DE)
(43) Application published
15 Jun 1983
(51) INT CL³
E06B 1/04
(52) Domestic classification
E1J GB
U1S 1831 E1J
(56) Documents cited
None
(58) Field of search
E1J
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(54) A method of installing a
pivoting door in a rail vehicle

(57) A pivoting door assembly
comprises a main frame 1 and a panel
2 hinged to it and is installed in a door
opening bounded by body members 3.
The assembly is aligned in the opening
with regard to height and width, being
retained in position by means of
spacing elements 5; the frame 1 and
body members 3 are then secured to
each other by means of a permanently
elastic adhesive 7. A filler strip 8 (Fig.
2) may be used to reduce the adhesive
required and tacking bolts 6 may be
used temporarily during installation.

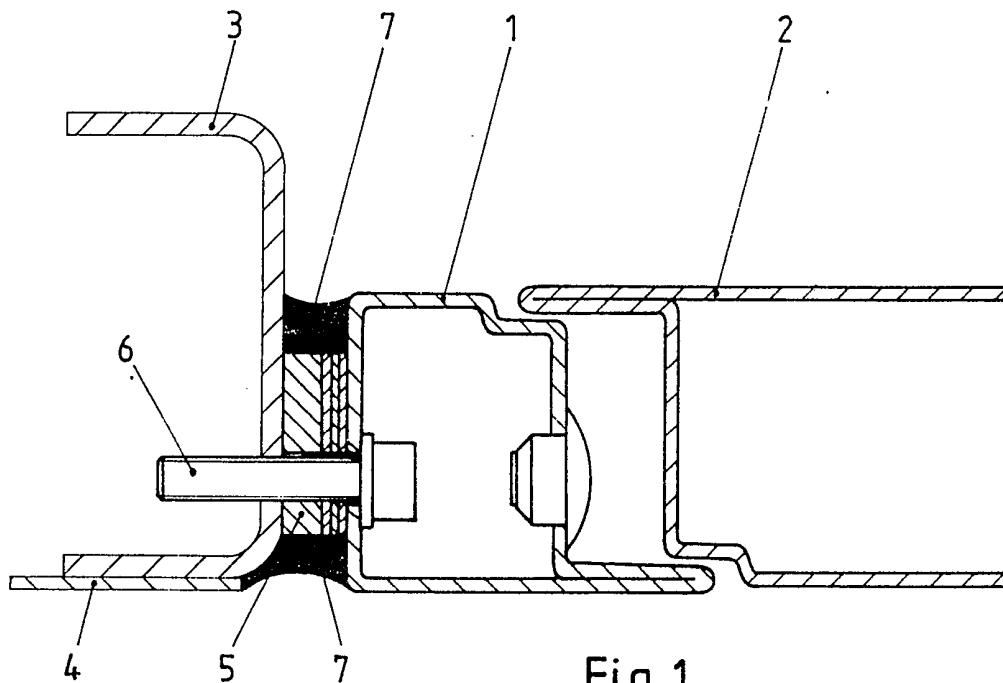


Fig. 1

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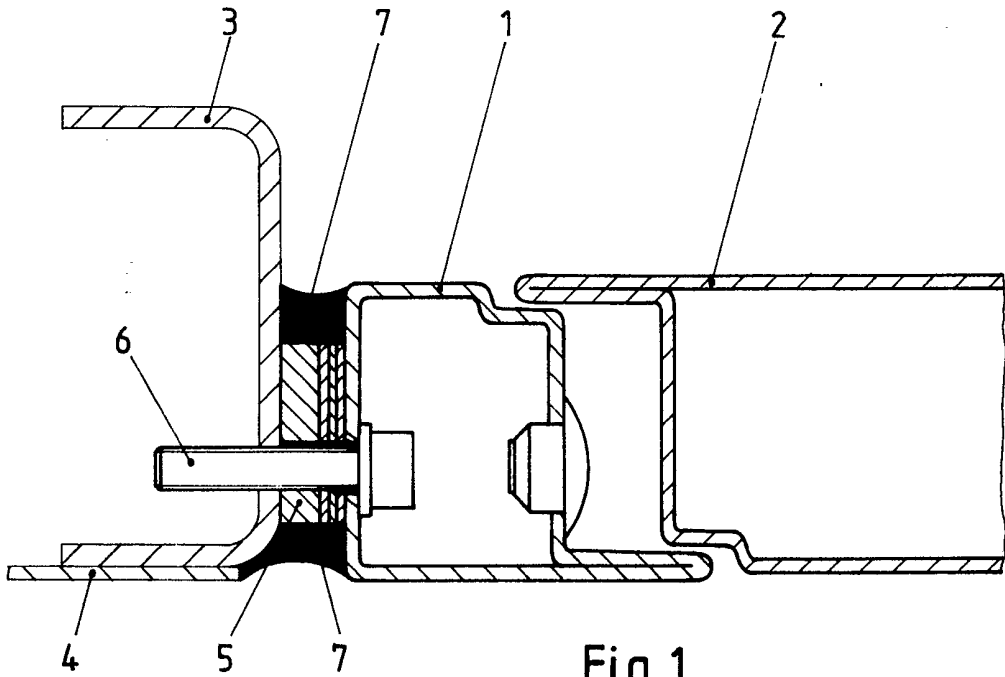


Fig. 1

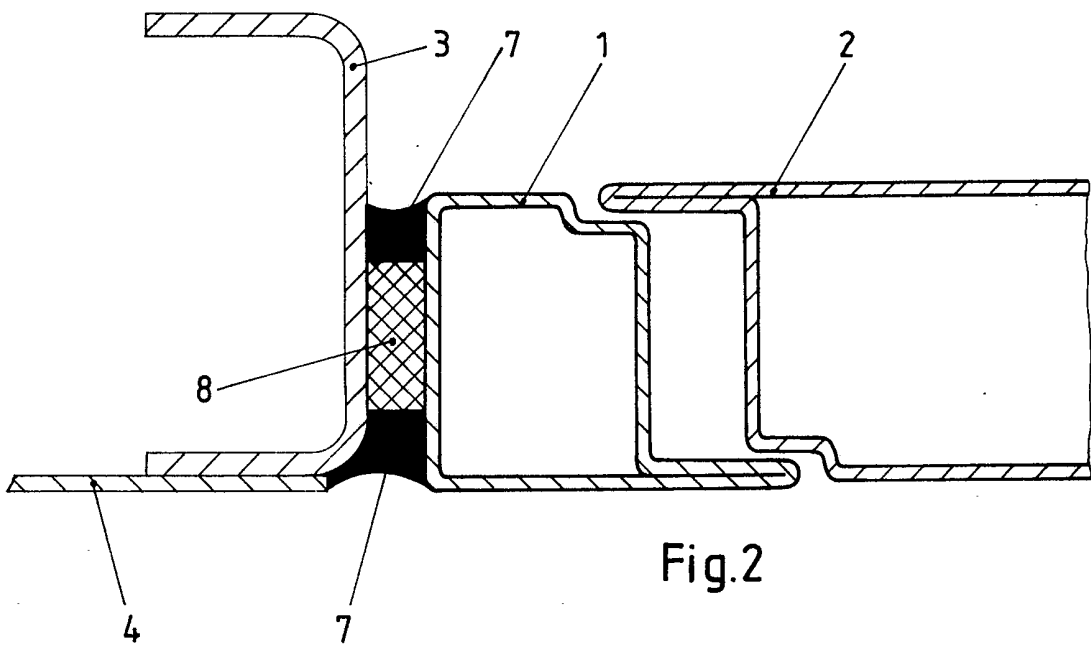


Fig. 2

SPECIFICATION

A method of installing a swing door in a vehicle

This invention relates to a method of installing a swing door in a vehicle, in particular in a rail vehicle, where the swing door comprises a door frame and a door panel hinged to the door frame and the vehicle has a door opening bounded by door struts.

In rail vehicles it is known to weld the door frame of a swing door to the struts bounding the door opening. It is in the first instance a precondition for this that the door frame is set into the door opening with no play and free of pressure. However this involves a considerable outlay since due to the welding of the door struts to the vehicle body framework and/or to the metal plating a welding warp occurs which must be compensated for by mechanical operations on the door struts. When the inner dimensions of the door opening match the outer dimensions of the swing door the latter is inserted and the door frame is then welded to the door struts. This results in a further welding warp so that it is necessary to deal mechanically with the door frame in order to be able to instal the door panel. When the swing door must be exchanged, for example following damage to the door area due to an accident, additional difficulties arise with regard to the removal of the damaged swing door and the alignment of the door struts. When a swing door is rivetted or screwed into position it is necessary that the door frame and the door struts should differ in design in order to achieve an accessible connection which is partially ruled out, in particular in the lower region of the door, on account of the external longitudinal supports of the sub-frame. In addition it has proved that an attachment method of this type prevents good sealing against moisture penetration from the exterior. As a result of the rigid connection of the swing door to the carriage body both in the case of a welded connection and in the case of a rivet or screw connection, torsion resulting for example from the crossing of track points is substantially all transferred to the swing door which has an undesirable effect not only upon the connection between the struts and the frame but also upon the sealing between the door frame and the door panel.

According to this invention there is provided a method of installing a swing door in a vehicle, where the swing door comprises a door frame and a door panel hinged to the frame and the vehicle has a door opening bounded by door struts, said method including the steps of aligning the swing door in the opening in respect of height and width, retaining the swing door in position in the door opening by means of spacing elements and securing the door frame to the struts bounding the door opening by applying a permanently elastic adhesive.

Conveniently it may be that in the region of the spacing elements the alignment of the swing door is maintained during installation by means of

tacking bolts which are removed prior to completion of the application of the adhesive.

Preferably a filler strip is inserted centrally between the door struts and the door frame and is covered on both sides by the adhesive.

An embodiment of the invention will now be described by way of example, with reference to the accompanying drawing in which:—

Fig. 1 is a horizontal sectional view of part of a swing door aligned in a door opening during installation by a method embodying this invention;

Fig. 2 is a view, corresponding to Fig. 1, of the completely installed door shown in Fig. 1.

A swing door comprises a door frame 1 and a door panel 2 which are connected to one another by means of hinges. To accommodate the swing door the vehicle has a door opening which is defined by horizontal and vertical door struts 3 which are welded to the vehicle body frame work and/or to associated metal plating 4. Since the dimensions of the door opening are selected to be approximately 20 mm larger than those of the swing door, slight deviations of the door strut out of the horizontal or vertical or deviation due to a welding warp—provided the swing door can still be satisfactory installed—can be disregarded.

Having been inserted into the door opening the swing door is firstly aligned with the aid of spacing elements 5 in such manner that the door frame 1 assumes a predetermined position such that the door panel 2 is aligned with the metal plating 4. In order to relieve the lower spacing elements of the weight of the swing door tacking bolts 6 can be inserted above and beside the spacing elements 5 in order to secure the door frame 1 to the door struts 3 in such manner as to eliminate movement between the two (Fig. 1).

When the swing door has been fixed in the door opening the space between the door struts 3 and the door frame 1, in the region between the spacing elements 5, is filled with a permanently elastic adhesive 7. Following the setting of the adhesive the spacing elements 5 and tacking bolts 6 are removed and the openings which thereby arise are likewise filled with the permanently elastic adhesive 7. In order to reduce the time required for the setting of the adhesive 7, as likewise illustrated in Fig. 2, a filler strip 8, e.g. foam strip, is inserted centrally between the door struts 3 and the door frame 1 and on both sides of said filler strip the space between the door struts 3 and the door frame 1 is then filled with the adhesive 7. Since the spacing elements 5 are not permanently secured to the door struts 3 or the door frame 1, it is also possible simply to remove the tacking bolts 6 and thus allow the spacing elements 5 to form additions to the filler strip 8 following the application and setting of the adhesive 7.

As the adhesive 7 adheres only to metal components but otherwise maintains a certain degree of elasticity and the filler strip 8 is unconnected with the metal components, an elastic connection exists between the door frame

1 and the door struts 3 which allows the swing door to remain substantially unaffected by torsion of the carriage body. In the event of an accident to the region of the door the strips of permanently elastic adhesive 7 is cut away and the swing door is removed. Following the re-alignment of the carriage body and the door struts 3 a replacement swing door can then be installed in the manner described above.

The arrangement described above provides for installation of a swing door in a vehicle wherein tolerances with regard to the production of the swing door and the door opening remain negligible, the door frame can be installed tension-free, and the swing door remains substantially unaffected by torsion exerted on the carriage body.

Claims

1. A method of installing a swing door in a vehicle, where the swing door comprises a door frame and a door panel hinged to the frame and the vehicle has a door opening bounded by door struts, said method including the steps of aligning the swing door in the opening in respect of height and width, retaining the swing door in position in the door opening by means of spacing elements and securing the door frame to the struts bounding the door opening by applying a permanently elastic adhesive.

2. A method as claimed in claim 1, wherein in the region of the spacing elements the alignment of the swing door is maintained during installation by means of tacking bolts which are removed prior to completion of the application of the adhesives.

3. A method as claimed in claim 2 wherein the spacing elements are also removed prior to completion of the application of the adhesive.

4. A method as claimed in claim 1 or claim 2, wherein a filler strip is inserted centrally by between the door struts and the door frame and is covered on both sides by the adhesive.

5. A method as claimed in claim 4, wherein the spacing elements are retained with the filler strip between strips of the adhesive.

6. A method as claimed in claim 4 or claim 5 wherein the filler strip is made of a resiliently deformable foamed plastics material.

7. A method of installing a swing door in a vehicle, where the swing door comprises a door frame and a door panel hinged to the frame and the vehicle has a door opening bounded by door struts, said method being substantially as described herein with reference to the accompanying drawing.

8. A vehicle having a swing door installed by a method as claimed in any one of the preceding claims.