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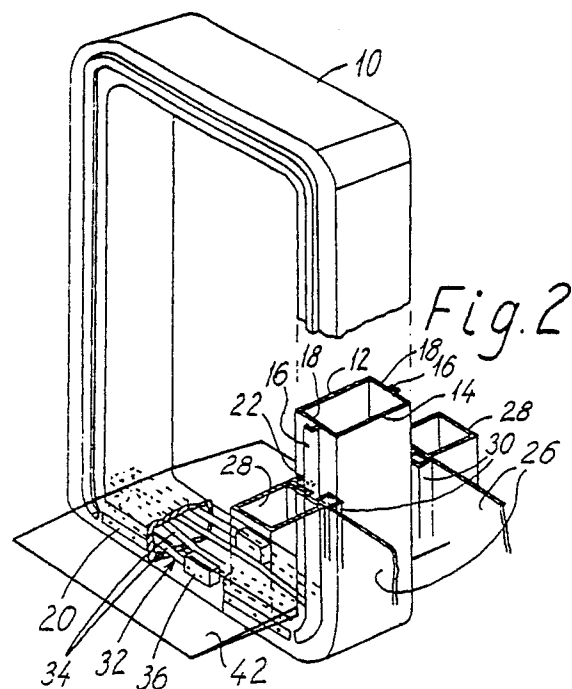
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54 **A passage connection between steadily intercoupled railway cars.**

57 Only relatively small mutual movements will occur between steadily intercoupled railway cars (2) supported by a common bogie (4), so it is possible to make use of short and simple passage connections between such cars. By fast driving through tunnels strong pressure wave impacts may occur, and the invention provides for a passage connection, which, in being completely tightly connected with the car ends, can isolate the interior of the cars from these impacts. Use is made of a hose ring element (10) which holds pressurized air and extends all the way around the passage opening in active holding engagement with each of the opposed car gables.



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### A passage connection between steadily intercoupled railway cars.

The present invention relates to a passage connection between railway cars in a train, in which the interfacing ends of the cars are supported by a common bogie. When supported in this manner the adjacent car ends will carry out only relatively small mutual movements, viz. mutual turnings by the passage of the train through curves, while there will be no substantial lateral displacements, this conditioning a relatively simple design of the passage connection between the cars. Moreover the car ends will be permanently coupled together, such that in normal use they shall be separable, and while more conventional passage connections will consist of intercoupable halves on each single car end the same connection may here be established by means of a unitary structure which shall not have to be midway dividable. The distance between the car ends may be relatively short, and for several reasons the passage connection may thus be designed essentially simpler than the connections between conventional separable cars.

In principle it will be sufficient to provide an "accordeon wall" around the passage opening, or it is possible to make use of a compressed hose member, which, by driving through curves, may be further compressed at one side and expand resiliently at the other side for maintaining a reasonable tightness around the passageway between the cars.

So far it has been considered sufficient to provide for just a 'reasonable' tightness, i.e. a protection against the weather and the wind in the passage connection, but as driving speeds are generally increased new problems occur, which have already been found difficult to solve. Thus, in connection with fast driving through conventionally dimensioned tunnels the said 'reasonable' tightness of the passage connections has been found insufficient, as an almost absolute tightness is required for avoiding the occurrence of unpleasant air pressure variations inside the cars. This may be counteracted by increasing the cross sectional area of the tunnels, but of course that will be a very expensive solution. It would be cheaper to arrange for a much effective sealing of the passage connections, but in practice it has been found very difficult to realize this in an efficient and reasonably cheap manner.

It is the purpose of the invention to provide a passage connection showing a high degree of tightness in a simple and nonexpensive manner, and according to the invention this is achieved by the connection being designed as specified in the characterizing clause of claim 1.

The desired tight connection can be estab-

lished by means of the said hose body when this is actively tightly connected with the car gables all the way round, as the hose body may then act as a buffer towards outer pressure variations and prevent direct transmissions of pressure and/or vacuum waves between the surroundings and the interior of the cars. Both the elastomeric material and the air contained in the hose body are important as wave shock absorbing means, the air acting as an absorber air spring.

It implies certain complications to arrange the floor carrying structure inside the roundgoing hose body, but still this solution is considerably cheaper than a widening of the relevant tunnels. According to claim 2 the desired tightness is achievable in a reasonably cheap manner, even though the connection unit itself will hereby be somewhat more complicated than conventionally.

In the following the invention is described in more detail with reference to the drawing, in which:

Fig. 1 is a lateral view of a connection area between two railway cars,

Fig. 2 is a perspective view of the connection area,

Fig. 3 is a vertical sectional view thereof, and

Fig. 4 is a more detailed sectional view of the joint between a car end and the connection element.

In Fig. 1 is shown two railway cars 2, the adjacent ends of which are supported by a common bogie 4 with driving wheels 6 and are interconnected through a passage connection 8. The car ends are connected with the bogie 4 in a pivotal manner, which is not further illustrated. When driving through horizontal curves the car ends may thus pivot slightly both mutually and relative the bogie 4, such that the passage connection 8 will be compressed at one side and expanded at the other side, while the top side of the connector element 8 by driving through vertical curves will be compressed or expanded, depending of the curve being concave or convex, respectively.

The passage connection 8 is illustrated in more detail in Figs. 2-4. It is constituted mainly by a roundgoing, closed hose body 10, which preferably consists of an annular hose made in one piece from vulcanized rubber shaped by plate rubber laid up against the walls of a surrounding mould. The hose body is shaped with a generally rectangular cross section with generally parallel inner and outer side portions 12 and 14, though in Figs. 3 and 4 it is shown that these sides may be welled, and with outwardly projecting beads 16 on the respective end faces 18. The beads 16 are provided on the

top and side portions of the hose body, whilst on the bottom portion thereof, in lieu of the beads, there are arranged flat iron beams 20 on the opposed inner sides of the hose walls and in holding connection with the rubber walls and provided with threaded holes for receiving tightening bolts.

The overall passage connection includes holding means on the car gables for sealingly holding the element 10, and along the sides and the top portion of the element 10 such holding means consist of a rim shaped flange portion 22 on the respective car gables. The beads 16 are shaped with car gables. The beads 16 are shaped with an inwardly thickened head portion 24, while the flange portions 22 have a correspondingly outwardly thickened edge portion, which can thus be brought into a very firm and tight holding engagement with the bead 16, 24. In Fig. 2 the car gables are represented by plate portions 26 and by profiled tubes 28 mounted close to the hose element 10. On the gables there are also mounted outer rectangular profiles 30 engaging the respective outer end surface areas of the hose element 10, and preferably a corresponding engagement occurs between the inner end surface areas and a non-illustrated frame portion adjacent the passage openings in the respective car gables.

Inside the bottom portion of the hose element 10 is mounted a support structure, which in the embodiment shown consists of horizontal, upper and lower pipe frame portions 34 which at the middle are secured to opposed elastomeric blocks 36, the outer sides of which are secured to a steel plate having threaded holes for receiving tightening bolts projecting through the associated wall portions of the hose element 10. As shown in Fig. 3 the bottom portion of the hose element is fastened to downwardly projecting flange portions 38 of respective plate members 40 associated with the floor structures of the respective cars, whereby a generally good sealing between the iron beam 20 and the flange 38 and a safe securing of the central block members 36 of the lower, encapsulated support structure 32 will be achieved. The pipe frame portions 34 are outwardly converging, such that they permit the car gables to carry out such mutual pivot movements as will occur by driving through horizontal curves, while they will also keep the bottom portion of the hose element distended and act carrying for the passage traffic between the cars. The elastomeric blocks 36 will permit the said pivot movements even though at their outer sides they are rigidly fastened to the respective car gables.

Along the bottom portion of the hose element the rigid holding flanges 38 at the car ends are of a height sufficient to make them abutting the hose element both above and beneath the actual fasten-

ing zones along the flanges 38.

Thus, according to the invention, a high degree of tightness between the hose element 10 and the adjacent car gables will be obtained, and it will be appreciated that the hose element 10 may still be deformed by compressions and expansions as coming up by driving through curves.

The floor in the passageway between the cars is constituted by the top side of the lower portion of the hose element 10 and the interior support structure therein, and by the outwardly converging shape of the latter there may be left partial areas of insufficient support capacity, if the wall thickness of the hose element is kept reasonably small also in these areas. As shown in Fig. 2, therefore, it can be desirable than a mat plate member 42 of an elastomeric material be placed over the floor area to both sides of the connecting area, whereby the walking pressure in that area will be distributed between the floor ends of the cars and the support structure inside the bottom portion of the hose element 10, while the mat plate member may also participate in the mutual pivot movements between the cars as occurring by driving through horizontal curves.

For the invention it is important that the hose element 10 may be inflatable by introduction of compressed air therein anywhere along the circumference thereof, though preferably through a non-illustrated inlet stub in the bottom portion of the hose element, where one of the applied tightening bolts may be tubular for enabling a connection with a source of compressed air. By such an inflation the hose element 10 will engage the associated car gable portions extra tightly, whereby a high degree of security against transmission of outer pressure waves to the interior of the cars will be obtained.

As shown in Fig. 4 a wire 25 may be provided inside and along the beads 16 for enabling the beads to be tightened strongly about and against the respective rim flanges 22. However, there will also be other tightening possibilities, e.g. the use of a stop wedge adjacent the outer side of the bead.

In Fig. 2 the hose element 10 is shown with a regular rectangular cross section, whilst in Figs. 3 and 4 a preferred shape of the outer and inner sides of the top and side portions of the hose element is shown. These sides are corrugated, and internal cross connector straps 44 are provided for holding the opposite innermost sub areas together, such that the hose or hose ring element will not expand in the cross direction when subjected to compressed air. Also, the corrugated shape is advantageous both by the operative working of the hose element, by driving through curves, and with respect to the desired damping effect on pressure shocks from outside.

## Claims

1. A passage connection between railway cars in a train, in which the interfacing ends of the cars are supported by a common bogie, characterized in that the connection is established by a round-going, elastomeric hose body, which, on its opposed car end facing sides, is provided with engagement means for being tightly fixed to associated holding means on the respective car ends, the lowermost portion of the hose body having its top side located substantially flush with the floor level of the cars, this portion being provided with an internal carrier structure, the opposed foremost and rearmost middle areas of which are connected with the car ends through or across the respective opposite wall portions of the hose body, and the hose body preferably being inflated or inflatable for imparting an increased sealing pressure against the car gables.

2. A passage connection according to claim 1, in which the said engagement means at least along the top and side portions of the hose body are constituted by an integral bead projecting from the hose body, this bead being pressed into firm engagement with a complementarily profiled holding rim portion on the respective car ends.

3. A passage connection according to claim 2, in which the hose body is shaped with a generally rectangular cross section and with engagement beads projecting from a middle line area along the wall portions facing the respective car ends, the hose body adjacent these wall portions being in abutting engagement with rigid surface portions of the car ends both outside and inside the bead.

4. A passage connection according to claim 1, in which the carrier structure inside the bottom portion of the hose body consists of a block or frame structure, which is oblong in the transverse direction of the train and adjacent each of its central areas facing the respective car ends is secured to the inner side of an elastomeric block member, the outer side of which is secured to the respective car end through or across the respective wall portion of the hose body, the said block or frame structure being shaped so as to be outwardly converging to both sides of the middle thereof.

5. A passage connection according to claim 1 or 4, in which the bottom portion of the hose body adjacent each of the sides facing the car ends is in a firm holding connection with a clamping bar bolted to flange portions on the car ends.

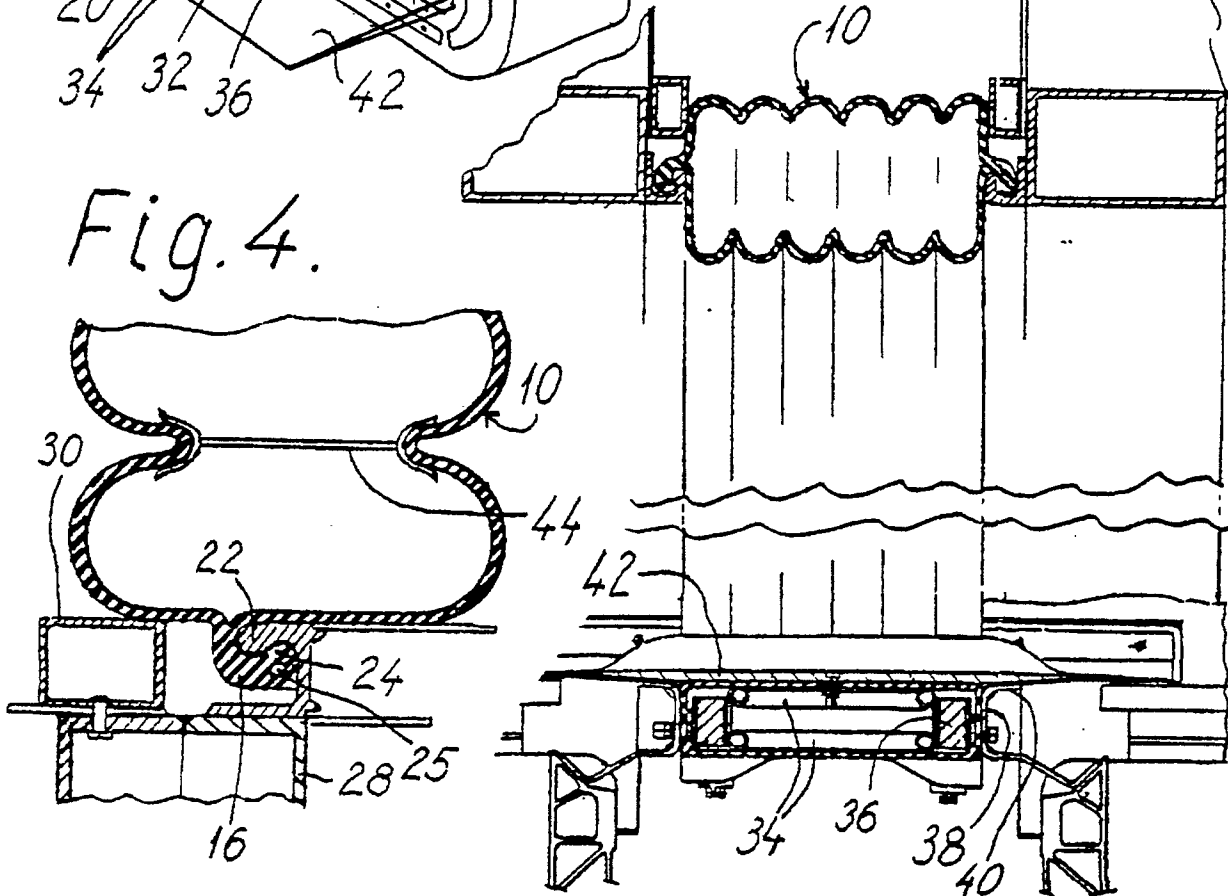
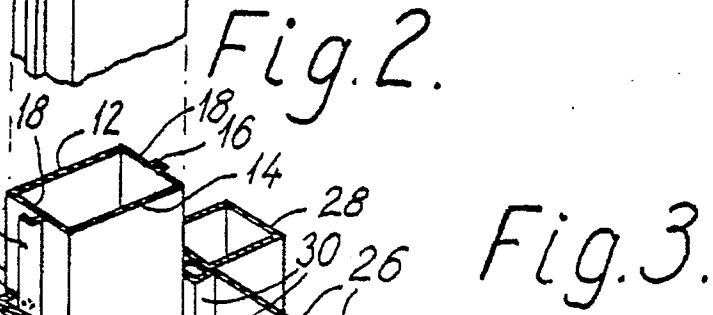
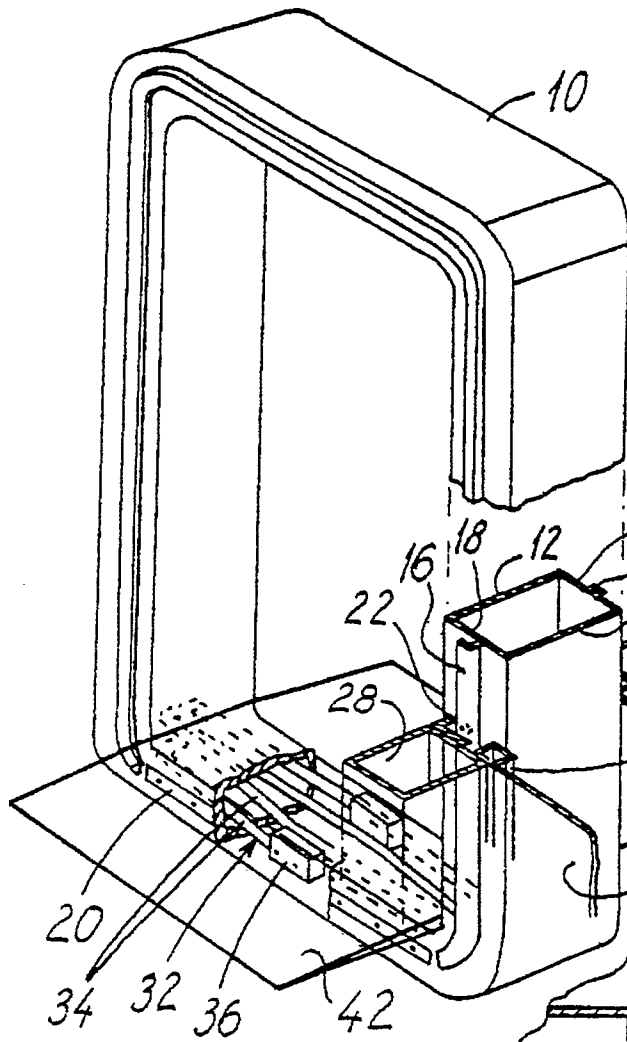
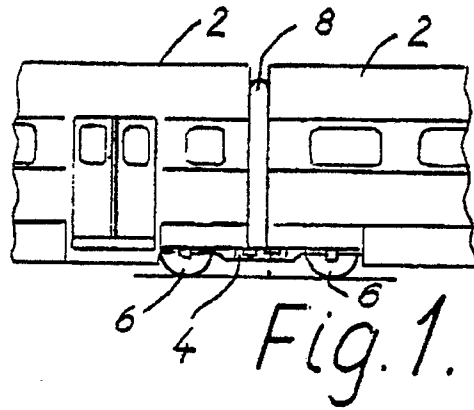
6. A passage connection according to claim 1, in which the top side of the bottom portion of the hose body is located in the floor level of the cars and is covered by an elastomeric cover plate projecting beyond the said bottom portion over the nearby floor ends of the cars.

7. A passage connection according to claim 1 or 3, in which the lateral outer and inner wall portions of the hose body are corrugated.

8. A passage connection according to claim 7, in which the corrugated shape of the lateral wall portions is stabilized by internal connector members interconnecting opposed depressions of the respective inner and outer corrugated wall portions of the hose body.

9. A passage connection according to claim 1, in which the lateral walls of the hose body are corrugated in the side portions and preferably also the top portion of the hose body.

10. A passage connection according to claim 9, in which connector straps or other holding means are arranged inside the corrugated hose portions for preventing crosswise expansion of the hose portions.





DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.4)
A	DE-A-2 826 779 (LINKE-HOFMANN-BUSCH WAGGON-FAHRZEUG-MASCHINEN GmbH) * Figures 1-3; page 4, line 27 - page 5, paragraph 2 * ---	1	B 61 D 17/22 B 61 D 17/20 B 61 G 5/02
A	EP-A-0 187 413 (DANSKE STATSBANER) * Figures 1-4; page 5, line 29 - page 8, line 25 * ---	1,3	
A	GB-A-1 228 200 (AIRTECH LTD) * Figures 1-3; page 1, line 68 - page 2, line 59 * ---	2	
A	EP-A-0 067 944 (MESSERSCHMITT-BÖLKOW-BLOHM GmbH) * Figures 1-2a; page 3, lines 5-29 * -----	1	
			TECHNICAL FIELDS SEARCHED (Int. Cl.4)
			B 61 D B 61 G B 60 D B 62 D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 01-09-1988	Examiner CHLOSTA P.
<b>CATEGORY OF CITED DOCUMENTS</b>			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document			
T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons ----- & : member of the same patent family, corresponding document			