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(54) Title: THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK

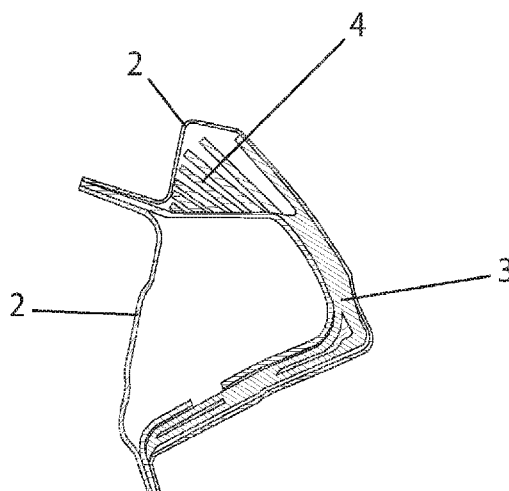


Fig. 5

(57) Abstract: Thermo-expandable device in motor vehicle bodywork, designed to close or to cut off sections, or to fill hollows that may form during the construction of the bodywork of vehicles between two or more of their component sheets (2), formed by a thermo-expandable base material (3) that includes one or more flexible and elastic fingers (4), which may include a thermo-stable support (5) of said base material (3), preferably of plastics or another reasonably rigid material, with fastening means and a suitable form in relation to its location in the bodywork; said support (5) having containment surfaces (6) configured to prevent the expansion of the base material (3), through the effect of heat, toward an undesired hollow zone of the bodywork or a zone exterior thereto and/or to concentrate or direct to a specific zone.

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- *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK

FIELD OF THE INVENTION

[0001] The present invention relates to a thermo-expandable device, the function of which is to create a wall or partition in a hollow space existing in the interior of the bodywork of a vehicle, preventing air, dust, water, sound, etc. from being able to propagate across said hollows, said device making it possible for it to be adapted to the process of assembling said bodywork when panels have to slide over others until they reach their final assembly position, at which point the device recovers its working position, ready for its thermo-expansion and the creation of the partition closing the hollow when the bodywork is placed in drying ovens.

BACKGROUND

[0002] In the automobile industry there is a known need for closing the cavities or hollows remaining in the interior of bodywork when various laminar surfaces that make up what will be the exterior shell of the vehicle have been joined. This is owing to the fact that, otherwise, air, dust, water and also noise or sound would propagate through the bodywork, resulting in vibrations, noise, water ingress, etc., which is bothersome and inadmissible when driving.

[0003] In the known prior art, this type of partition, the object of which is to cut the circulation of air, dust, water, noise, sound, etc. in a hollow space, is normally produced by injecting a fiber foam or rubber type material into said hollows, which fills and seals them. This takes place once the bodywork is completely assembled, access to the hollow being gained by means of an injection conduit and a preset amount of expandable foam being poured in.

[0004] This is a long, drawn-out process that may be improved, for example by means of the present invention, which has as principal objective the provision of a thermo-expandable device that can be installed in the initial stages of forming the bodywork such that, when the assembled bodywork as a whole is placed in the ovens, giving rise to the

thermo-expansion of the material, the partition for closing the hollows of the bodywork is constructed automatically.

[0005] A further objective envisaged by the present invention is that the thermo-expandable device adapts to the pressure potentially received in the step of assembling the parts of the panel, in which, by sliding some panels over others until they reach their final assembly position, the device is temporarily compressed and squashed, becoming deformed, but when assembly of the bodywork has been completed the device is able to elastically recover and to resume its initial configuration designed for closing the existing hollow.

[0006] A further objective envisaged by the present invention is that said devices incorporate stops or barriers, when necessary, to prevent the expansion of the material of the device to undesired zones.

[0007] A further objective of the invention is that it is used as an anti-collision device between panels or sheets of metal during the process of assembling the vehicle chassis.

[0008] This and other advantages of the present invention will become apparent in the course of the following description.

BRIEF DESCRIPTION OF THE INVENTION

[0009] The present invention describes a thermo-expandable device in motor vehicle bodywork, designed to close or to cut off sections, or to fill hollows that may form during the construction of the bodywork of vehicles, for example between two of their component sheets of the panel of the vehicle; said device is formed by a thermo-expandable base material that includes one or more flexible fingers, said finger(s) projecting toward the outside of said base material.

[0010] The device may incorporate a rigid support, preferably made from rigid and thermo-stable plastics, that is not deformed by heat, and is of a suitable form and arrangement in relation to its location in the bodywork where it is to be installed, which is the support of said base material.

[0011] This rigid support may incorporate containment stops, the aim of which is to block and to limit the expansion of the base material of the device, to the effect of heat, toward an undesired hollow zone not only of the bodywork but also to the exterior thereof.

[0012] The present invention also includes the method for using said thermo-expandable device, according to which said device is preinstalled in a panel or in an open structure of the bodywork, prior to complete assembly thereof by superposing the antagonistic panel either directly or by means of sliding one sheet over another until their final position is reached.

[0013] The method includes the fact that once the panel of the vehicle has been created and the hollows have been made therein, the fingers of said device recover their original position, facilitating the subsequent creation of a partition that closes said hollow when the bodywork is heated in the drying ovens.

[0014] The method described also makes provision for the existence of a support on said device for fastening thereof on the panel of the vehicle, for example made from rigid, thermo-stable plastics, which incorporates surfaces for containing or stopping the thermo-expansion of the base material toward undesired places in the vehicle.

BRIEF EXPLANATION OF THE DRAWINGS

[0015] To promote understanding of the invention, two sheets of drawings are attached to the present description, provided solely by way of non-limiting illustration of the invention.

[0016] FIG. 1 is a perspective representation of a preferred illustrative embodiment of the present invention, amongst other possible illustrative embodiments, showing a thermo-expandable device fitted in a support structure, said device having flexible fingers.

[0017] FIG. 2 is a perspective representation of the illustrative embodiment of the preceding figure, singling out the support made from rigid material.

[0018] FIG. 3 is a perspective representation of a further possible illustrative embodiment of the present invention, showing a device with a base thermo-expandable material

supported by a support structure that incorporates elements to contain the expansion of said base material.

[0019] FIG. 4 shows a schematic representation, in transverse section, of the process of assembling two parts of the bodywork of a vehicle, in which a broken line shows the part of the panel that is assembled by sliding over another panel part, this movement compressing the fingers of the device of the present invention.

[0020] FIG. 5 shows, in transverse section, the bodywork part of the preceding figure already assembled, in which the flexible and elastic fingers previously compressed in the assembly of the panel have recovered their original extended position.

DETAILED EXPLANATION OF THE INVENTION

[0021] The present invention comprises a thermo-expandable device (1) in motor vehicle bodywork, used for closing or cutting off sections or filling hollows existing in the interior of the bodywork of a vehicle, between the laminar surfaces (2) thereof.

[0022] For example, in Pillar A, the construction of the bodywork of the vehicle leaves a hollow space which has to be closed in order to prevent the transmission of air and noise through the bodywork of the vehicle. However, in this specific case, the order of welding of the component metal sheets of said bodywork part makes said task difficult because a sheet moves over the base structure until the section is closed.

[0023] The present invention makes it possible to close said section by incorporating the thermo-expandable device (1) into the bodywork in an initial step of the construction thereof, the section still being open and easily accessible for installation of the device (1) therein. The structural arrangement of the present invention is capable of even overcoming the mutual sliding of the two component panel parts of said bodywork, as shown in FIGS. 4 and 5 accompanying the present description.

[0024] The device (1) is formed by a flexible base material (3) that is thermo-expandable and includes one or a plurality of fingers (4), as shown in the various embodiments in FIGS. 1 to 3. Said fingers (4) are zones of the base material (3) that project toward the outside thereof.

[0025] This arrangement of the device (1) according to the present invention, incorporating fingers (4), confers sufficient elasticity to withstand the assembly, welding or machining in the construction of the bodywork. As shown by FIG. 4, when a panel (2) of the bodywork moves over another until it reaches its final position (FIG. 5) where it will ultimately be welded, the device (1) is held and the fingers (4) compressed against the base material (3), but once the sheets (2) have reached their final and definitive position, leaving the hollow space therebetween, the fingers (4) recover their extended position by virtue of their elasticity.

[0026] When, during the manufacture of the bodywork, the latter is heated in the manufacturing process ovens, the base material (3), and therewith the fingers (4), will expand, creating a partition between the panels (2) of the bodywork that will seal the section against the circulation of air, dust and noise.

[0027] Furthermore, it should be noted that fitting in the initial stages of the formation of the bodywork of the vehicle affords a further, additional advantage for the present invention, which is that the device (1) prevents collisions between panels (2) during assembly by virtue of the fact that it acts as a shock absorber against the impact of two panels, preventing not only noise but also damage to said metal sheets during the assembly process.

[0028] The device (1) may incorporate a support (5) of the rigid material, with the appropriate form in terms of its location in the bodywork, produced from any suitable material.

[0029] In the preferred embodiments shown in the attached figures, this support is made from rigid plastics. In other envisaged embodiments, on the other hand, it is produced from metal or another material, all within the scope of the present invention.

[0030] FIG. 1 shows a thermo-expandable device of this type. The plastics may, as appropriate, be more or less rigid, being thermo-stable, i.e. withstanding heating in the bodywork processing oven without deforming.

[0031] Said support (5) may incorporate means for fastening to the bodywork of the vehicle suited to the zone of the panel (2), for example, when it is to be installed. Said means fall within the known prior art, being mechanical, adhesive, etc. fastenings.

[0032] Lastly, in a further possible embodiment, as shown in FIG. 3, said support (5) has containment surfaces (6), for example in the form of lateral fins, the aim of which is to limit the expansion of the base material (3) through the effect of heat toward an undesired zone or to concentrate or direct it to a specific zone.

[0033] Moreover, the present invention includes the method for using the thermo-expandable device (1) in motor vehicle bodywork, according to which:

- said device (1) is fastened and installed in a section of the bodywork prior to closure thereof;
- the section is closed by superposing and fastening the antagonistic panel, including, as appropriate, the sliding of said panel over said section until it reaches its final position, during which process said fingers (4) are compressed and the original working position thereof recovered, through elasticity, when said panel reaches said final position;
- said base material (3), and with it said fingers (4), expand through the action of heat, creating a partition and closing said section against dust, water, air, sound and noise, etc.

[0034] The method includes the fastening of the device (1) to the bodywork by means of a support (5), where said support incorporates means for limiting the expansion of said base material (3) and/or of said fingers (4) toward undesired zones of the bodywork or with the aim of directing said expansion to a specific zone.

[0035] By implication, in the present case, all details of finishing or form that neither modify nor alter the essence of the invention or the alternative embodiments thereof may be varied, in accordance with the claims provided.

CLAIMS

1. A THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK, WHEREIN it is formed by a thermo-expandable base material (3) which incorporates one or more flexible and elastic fingers (4), said fingers (4) being zones of the base material (3) that project toward the outside thereof; said device (1) being configured in order to create a partition in a hollow section of the bodywork of a vehicle, between two or more of its component panels (2), closing the passage to air, dust, water, sound or noise, etc. upon the thermo-expansion of said base material (3) and of said fingers (4).
2. THE THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 1, WHEREIN it includes a support (5) of the base material (3), produced from any suitably rigid material and withstanding heating in the oven for processing the bodywork without deformation.
3. THE THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 2, WHEREIN said support (5) is made from thermo-stable rigid plastics.
4. THE THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 3, WHEREIN said support (5) includes means for fastening to the bodywork, such as mechanical, adhesive, etc. fastenings.
5. THE THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 4, WHEREIN said support (5) has containment surfaces (6) configured in order to prevent the expansion of the base material (3), through the effect of heat, toward an undesired hollow zone of the bodywork or a zone exterior thereto and/or to concentrate or direct its base material (3) to a specific zone.
6. THE THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 5, WHEREIN said containment surfaces (6) of said support (5) are lateral fins.

7. A METHOD FOR USING A THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK, of the type described in claim 1, CHARACTERIZED by the installation of said device (1) in a section of the bodywork, prior to closing same by superposing the antagonistic panel either directly or by means of sliding of a panel (2) over another until reaching its final position in which said fingers (4) of said device (1) are temporarily compressed; said device (1) expanding its fingers (4) into the hollow provided once said panels (2) of the bodywork have reached their final position, recovering their original configuration; said base material (3) and said fingers (4) expanding by means of heat, creating a partition in the hollow of said section, closing the passage of air, dust, water, noise, sound, etc.

8. THE METHOD FOR USING A THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in the claim 7, WHEREIN said base material (3) is fastened to the panel of the bodywork by a thermo-stable support (5) of suitable form and material.

9. THE METHOD FOR USING A THERMO-EXPANDABLE DEVICE IN MOTOR VEHICLE BODYWORK as claimed in claim 8, WHEREIN the expansion of said base material (3) through heat during thermo-expansion is limited by containment surfaces (6) present on said support (5).

10. A thermo-expandable device in motor vehicle bodywork, comprising a thermo-expandable base material that incorporates one or more flexible and elastic fingers, said fingers being zones of the base material that project toward an outside of the base material; said device being configured in order to create a partition in a hollow section of the bodywork of a vehicle, between two or more component panels, upon the thermo-expansion of said base material and including said fingers.

11. The thermo-expandable device in motor vehicle bodywork of claim 10, further comprising a support of the base material, produced from any suitably rigid material and withstanding oven heating for processing the bodywork without deformation.

12. The thermo-expandable device in motor vehicle bodywork of claim 11, wherein said support is made from thermo-stable rigid plastics.
13. The thermo-expandable device in motor vehicle bodywork of claim 12, wherein said support includes means for fastening to the bodywork.
14. The thermo-expandable device in motor vehicle bodywork of claim 13, wherein said support has containment surfaces configured to prevent the expansion of the base material, through effect of heat, toward an undesired hollow zone of the bodywork or a zone exterior thereto and/or to concentrate or direct base material to a specific zone.
15. The thermo-expandable device in motor vehicle bodywork of claim 14, wherein said containment surfaces of said support are lateral fins.

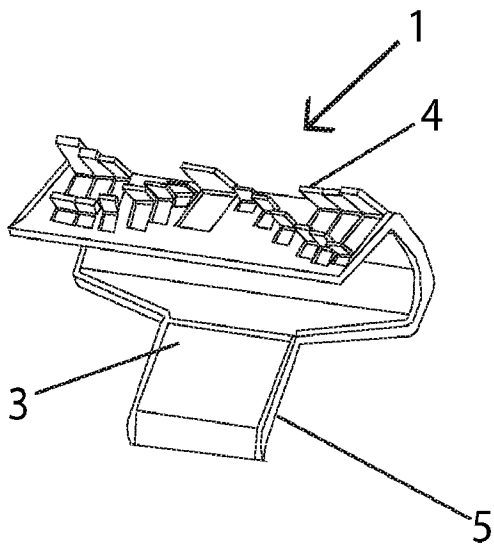


Fig. 1

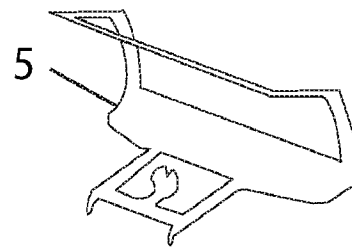


Fig. 2

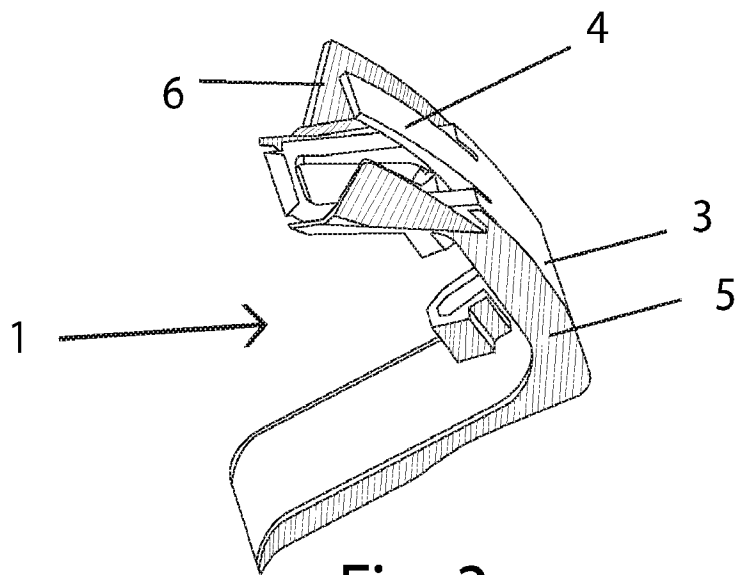


Fig. 3

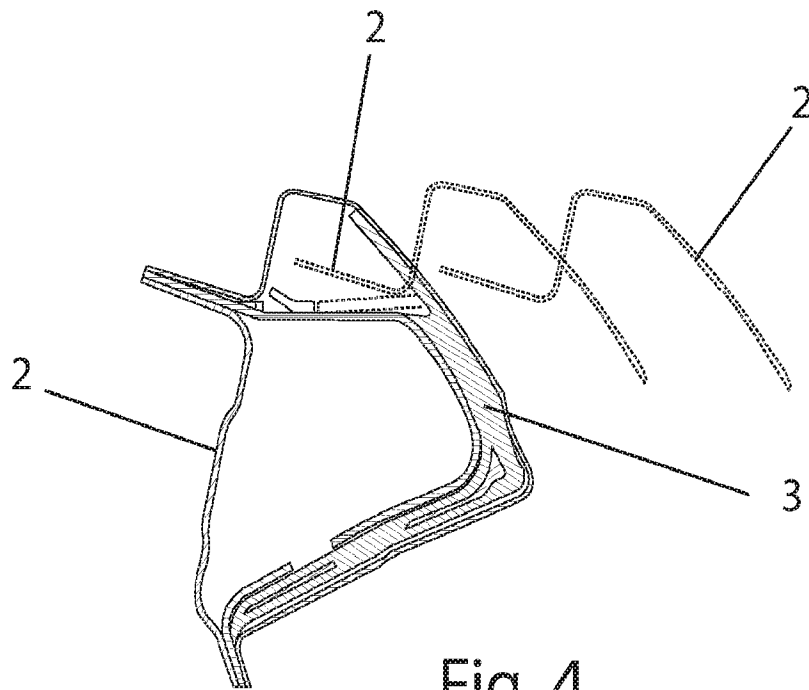


Fig. 4

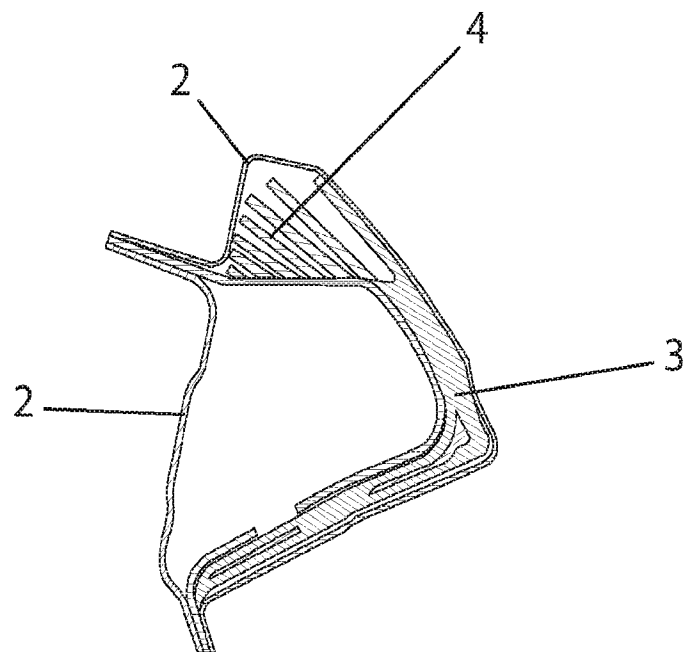


Fig. 5

INTERNATIONAL SEARCH REPORT

International application No
PCT/US2017/055049

A. CLASSIFICATION OF SUBJECT MATTER
INV. B62D25/00 B62D29/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B62D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP 2005 153715 A (IDA SANGYO KK) 16 June 2005 (2005-06-16) abstract figures	1-15
X	US 2009/223739 A1 (DUFFIN GARY R [US] ET AL) 10 September 2009 (2009-09-10) paragraphs [0003], [0005], [0006] paragraph [0016] paragraphs [0072] - [0091] figures 14-19	1-15
X	JP 2006 062595 A (IDA SANGYO KK) 9 March 2006 (2006-03-09) abstract figures 1-4,8,9	1,7,10
A		2-6,8,9, 11-15
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Further documents are listed in the continuation of Box C.



See patent family annex.

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Date of the actual completion of the international search

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INTERNATIONAL SEARCH REPORT

International application No

PCT/US2017/055049

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/US2017/055049

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