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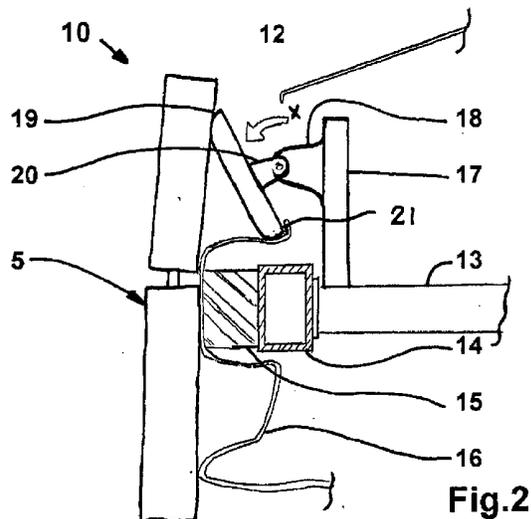
(52) UK CL (Edition W):
B7B BSBNC BSES

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**EP 1138557 A2 EP 1024063 A2
DE 019918202 A1 JP 2000168473 A**

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INT CL⁷ **B60R, B62D**
Other: **Online: EPODOC, WPI, JAPIO**

(54) Abstract Title: **Extendible safety device above a vehicle bumper**

(57) A safety device comprises a member 19 which is suitable for location between a motor vehicle bonnet 12 and a transversely extending bumper 14 concealed by a fascia 16, wherein at least an upper part of the member 19 is capable of deploying forwards of the bonnet 12 front when the fascia 16 is deformed in a collision. Preferably, the member 19 is a grille for admitting air to an engine compartment and which pivots forwards when the fascia 16 is deformed by means of a mechanical coupling 21. Alternatively, movement of the member 19 may be electronically controlled and pyrotechnically actuated. The member 19 is preferably made from a resilient plastic and may be mounted on a deformable energy absorbing bracket 20. Energy absorbing foam 15 may be located behind the fascia 16. Injury to a pedestrian's leg 5 is minimised by providing a contact with the grille 19 in addition to a fascia contact zone.



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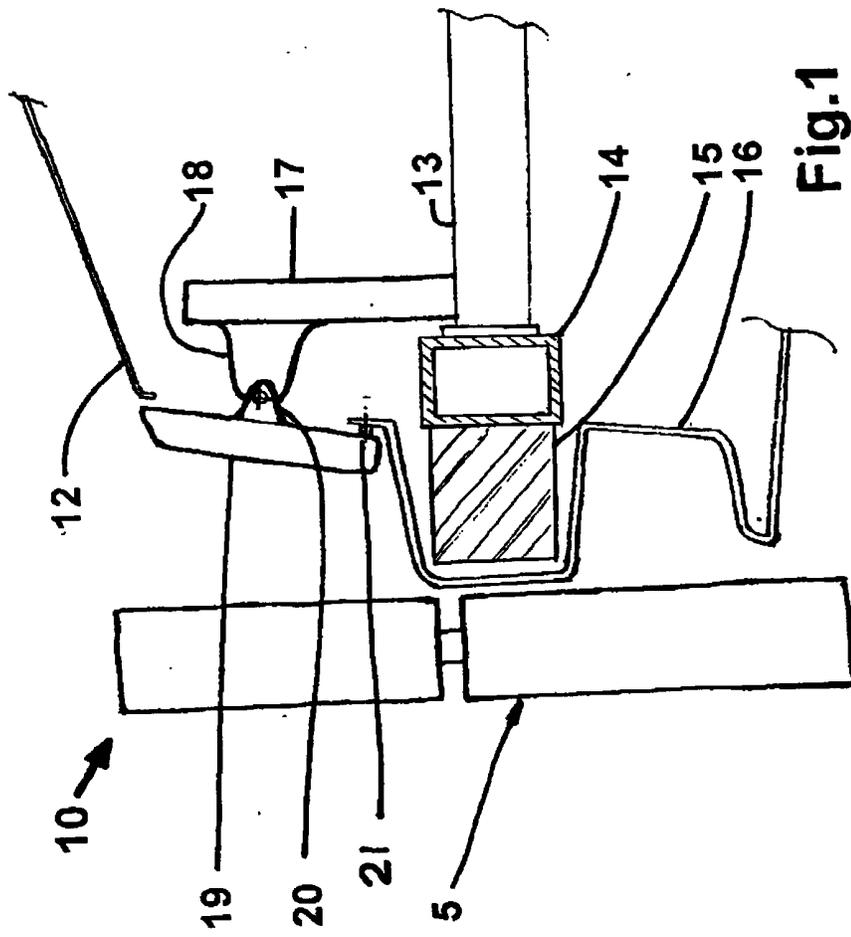


Fig.1

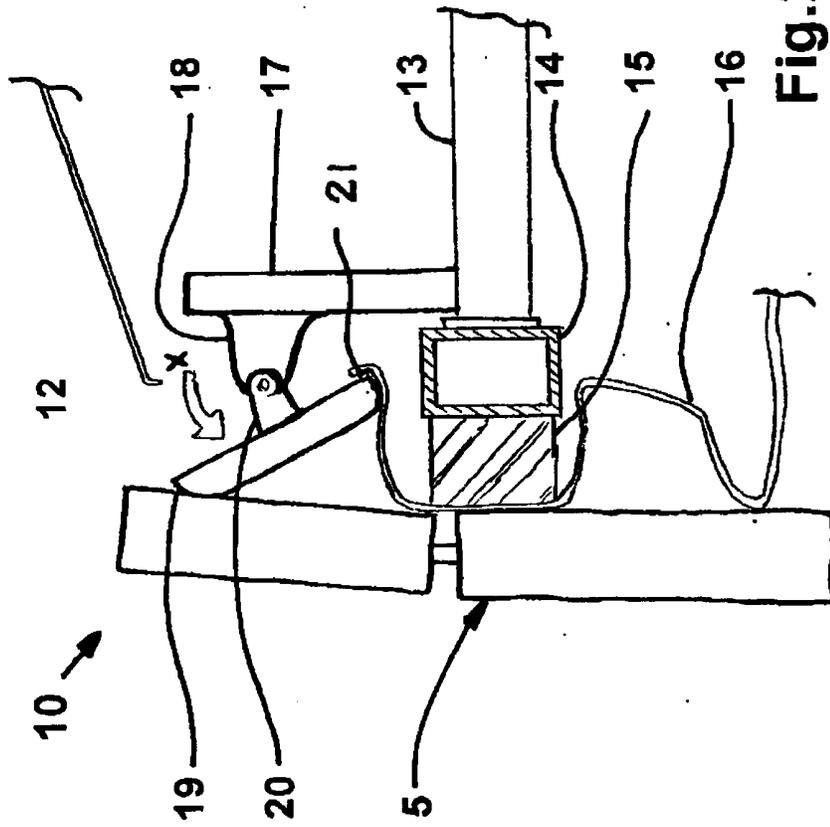


Fig. 2

A Safety Device for the front end of a Motor Vehicle

This invention relates to motor vehicles and in particular to improving the safety of pedestrians when impacted against by the front end of a motor vehicle.

It is well known from, for example, EP-A-1065108 to provide a motor vehicle with a front end that is less likely to produce severe injuries to a pedestrian when the motor
5 vehicle is involved in an impact with a pedestrian.

It is an object of this invention to provide an improved safety device for the front end of a motor vehicle that reduces the likelihood of injury to a pedestrian impacted against by the motor vehicle.

According to a first aspect of the invention there is provided a safety device for the
10 front end of a motor vehicle having a bonnet for covering an engine compartment of the motor vehicle, a transversely extending bumper and a bumper fascia for concealing the bumper from view wherein the safety device comprises a moveable member located adjacent a front edge of the bonnet for movement to a deployed position in which at least an upper end thereof projects forwards with respect to the front edge of the bonnet when
15 the bumper fascia is deformed due to contact with another object.

The moveable member may be pivotally connected to part of a body structure of the motor vehicle and when the bumper fascia is deformed due to contact with another object the moveable member is pivoted forward about the position of pivotal connection so that the upper end of the moveable member projects forwards with respect to the front edge of
20 the bonnet.

The moveable member may be pivotally connected to part of the body structure by a deformable bracket, the deformable bracket being arranged to absorb energy when the moveable member is impacted against by another object.

The moveable member may be pivotally connected to the part of the body structure of the motor vehicle towards a lower end of the moveable member.

The moveable member may be coupled to the bumper fascia so as to transfer movement of the bumper fascia to the moveable member.

5 The moveable member may be made from a resilient plastic material.

Preferably, the moveable member may be a grille for admitting air into the engine compartment, in which case the grille may be moveable from a normal position in which it permits the flow of air into the engine compartment to a deployed position in which it projects forwards of the front edge of the bonnet.

10 According to a second aspect of the invention there is provided a motor vehicle having a safety device in accordance with said first aspect of the invention.

The invention will now be described by way of example with reference to the accompanying drawings, of which:-

Fig.1 is a cutaway side view of the front of a motor vehicle having a safety device

15 according to the invention showing the safety device in a normal position; and

Fig.2 is a view similar to that of Fig.1 but showing the safety device in a deployed position.

With reference to the figures there is shown a motor vehicle 10 having a bonnet 12 for covering an engine compartment of the motor vehicle 10, one of a pair of side rails 13 forming part of the body structure of the motor vehicle 10, a transversely extending bumper 14, an energy absorber 15 attached to the bumper 14 and a bumper fascia 16 overlying the bumper so as to conceal it from view.

20

The bumper 14 is made from a fairly rigid material and as shown is in the form of an aluminium box section which is connected near to each end to a respective one of the two side rails 13 of which only the left hand side rail is shown.

5 The energy absorber 15 is constructed so as to provide considerable absorption of energy when it is compressed due to an impact of the motor vehicle 10 with another object. The energy absorber 15 is less rigid than the bumper 14 and as shown is made from a foam material of relatively low stiffness so as to provide a relatively soft structure when impacted against by a pedestrian.

10 The bumper fascia 16 is made from a resilient flexible plastic material so as to be able to absorb minor impacts without suffering permanent distortion and is sufficiently flexible to deform when involved in a collision with a pedestrian.

A safety device in the form of a moveable member is located adjacent a front edge of the bonnet 12. The moveable member is positioned just below the top surface of the bonnet 12 and as described herein is in the form of a grille 19. The grille 19 is moveably
15 connected to the body structure of the motor vehicle 10 by means of a deformable bracket 20. The deformable bracket 20 is pivotally connected to a support bracket 18 fastened to a front bulkhead 17 forming part of the body structure of the motor vehicle 10.

At a lower end the grille 19 is connected by a coupling 21 to the bumper fascia 16. The location of the pivotal connection between the grille 19 and the body structure is
20 preferably towards the lower end of the grille 19. As shown the position of the pivotal connection is located approximately half way up the grille 19 and this is towards the upper limit of preferred locations. This is because the upper end of the grille 19 has to move forwards to perform its safety function and the nearer the position of pivotal connection is to the lower end the greater will be the extension of the upper end of the grille 19.

The grille 19 is made from a deformable material so that when impacted against by another object it can deform and absorb energy. As shown the grille 19 is made from a resilient plastic material.

During normal operation of the motor vehicle 10 the grille 19 is positioned as shown in a normal position as shown in Fig. 1 in which it slopes backwards and allows air to enter the engine compartment of the motor vehicle 10.

If the motor vehicle 10 is involved in a collision with a pedestrian, contact may occur between a leg 5 of the pedestrian and the bumper fascia 16. Such an impact, if of sufficient severity, may cause the bumper fascia 16 to be deformed by the impact causing it to move rearwards. The rearward movement of the bumper fascia 16 is transferred to the grille 19 via the coupling 21 causing the grille 19 to rotate about the pivotal connection to the body structure. This pivotal movement causes the upper end of the grille 19 to move forwards so that the upper end of the grille 19 extends further forward in this deployed position than it does when in its normal position and the upper end of the grille 19 projects forwards with respect to the front edge of the bonnet 12.

The extended position of the grille 19 allows it to contact an upper portion of the leg 5 thereby preventing excessive mid-point bending of the leg 5. In addition, the deformable bracket 20 used to pivotally connect the grille 19 to the body structure is arranged to deform and absorb energy. This deformation reduces the forces input to the leg 5 and permits a softer transition as the pedestrian is transferred from a position in front of the motor vehicle 10 to a position in which the pedestrian is lying upon the bonnet 12. In particular the extended grille 19 provides a softer impact surface than the relatively rigid front edge of the bonnet 12.

It will be appreciated that the invention is not limited to the specific embodiment described herein and that various modifications and alternatives can be constructed without

departing from the scope of the invention. For example, although the grille as described is moved directly by the bumper fascia it will be appreciated that other mechanisms could be used to transfer displacement of the bumper fascia to movement of the grille. That is to say the grille could be moved by an actuator such as a pyrotechnic actuator controlled by
5 an electronic control unit. The electronic control unit could be arranged to receive a signal for an sensor arranged to sense when the motor vehicle has impacted against another object such as a pedestrian. When an impact is sensed then the electronic control unit is operable to energise the actuator and move the grille forward. It will also be appreciated that, instead of rotating forwards, the grille could be arranged to be displaced in its entirety
10 in a forward direction.

CLAIMS

1. A safety device for the front end of a motor vehicle having a bonnet for covering an engine compartment of the motor vehicle, a transversely extending bumper and a bumper fascia for concealing the bumper from view wherein the safety device comprises a moveable member located adjacent a front edge of the bonnet for movement to a deployed position in which at least an upper end thereof projects forwards with respect to the front edge of the bonnet when the bumper fascia is deformed due to contact with another object.
2. A safety device as claimed in claim 1 in which the moveable member is pivotally connected to part of a body structure of the motor vehicle and when the bumper fascia is deformed due to contact with another object the moveable member is pivoted forward about the position of pivotal connection so that the upper end of the moveable member projects forwards with respect to the front edge of the bonnet.
3. A safety device as claimed in claim 2 in which the moveable member is pivotally connected to part of the body structure by a deformable bracket, the deformable bracket being arranged to absorb energy when the moveable member is impacted against by another object.
4. A safety device as claimed in any of claims 2 or 3 in which the moveable member is pivotally connected to the part of the body structure of the motor vehicle towards a lower end of the moveable member.
5. A safety device as claimed in any of claims 1 to 4 in which the moveable member is coupled to the bumper fascia so as to transfer movement of the bumper fascia to the moveable member.
6. A safety device as claimed in any of claims 1 to 5 in which the moveable member is made from a resilient plastic material.

7. .A safety device as claimed in any of claims 1 to 6 in which the moveable member is a grille for admitting air into the engine compartment.
8. A safety device as claimed in claim 7 in which the grille is moveable from a normal position in which it permits the flow of air into the engine compartment to a deployed position in which it projects forwards of the front edge of the bonnet.
9. A motor vehicle having a safety device as claimed in any of claims 1 to 8.
10. A safety device for the front end of a motor vehicle substantially as described herein with reference to the accompanying drawings.
11. A motor vehicle substantially as described herein with reference to the accompanying drawings.



Application No: GB 0225945.5
Claims searched: 1 to 9

Examiner: Mark Thwaites
Date of search: 24 January 2003

Patents Act 1977 : Search Report under Section 17

Documents considered to be relevant:

Category	Relevant to claims	Identity of document and passage or figure of particular relevance
X	1, 6, 9	DE 19918202 A1 (BAYER) whole document relevant
X	1, 6, 9	JP 2000168473 A (NISSAN) especially figures 4-8
X	1, 6, 9	EP 1024063 A2 (NISSAN) especially figures 1-3
A		EP 1138557 A2 (FUJI) para 49 & figures 4-6

Categories:

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.

Field of Search:

Search of GB, EP, WO & US patent documents classified in the following areas of the UKC^v:

B7B

Worldwide search of patent documents classified in the following areas of the IPC⁷:

B60R, B62D

The following online and other databases have been used in the preparation of this search report:

Online: EPODOC, WPI, JAPIO