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(54) SELF-SUPPORTING VEHICLE BODY WITH FRONT LONGITUDINAL BEARERS

(71) We, DAIMLER-BENZ AKTIENGESELLSCHAFT, of Stuttgart-Untertürkheim, Germany, a Company organised under the laws of the Federal Republic of Germany, do hereby declare the invention for which we pray that a patent may be granted to us and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to a vehicle structure comprising a self-supporting vehicle body and front longitudinal bearers abutted, on an end wall of the said body.

The front body portion of a motor vehicle, particularly a motor car, must be of such a nature that, on the one hand, it can take without permanent deformation the forces which originate during normal running, for example from the wheel suspension, and that, on the other hand, it will be permanently deformed in a planned manner, whilst absorbing energy, in the event of a frontal impact or collision. In this connection, the front longitudinal bearers and their abutment or support on the passenger compartment are of particular importance.

A common construction of longitudinal bearers in motor cars, in which the said bearers are bent for support on the end wall and in some cases are extended to the underfloor, has the disadvantage that vertical offset results from the bending. In the event of a frontal impact, a moment is produced which may cause bending of the bearer and penetration thereof into the floor space of the vehicle.

For experimental safety vehicles, it has been proposed to counteract this disadvantage by extending a support from the bent region of the longitudinal bearer to the front pillar of the passenger compartment. However, in order that this pillar may be capable in turn of taking the additional loading, it must be correspondingly designed, which means a considerable increase in weight.

The present invention seeks so to support front longitudinal bearers by simple means, without measures increasing the weight of supporting parts of the passenger compartment, that the forces produced under all conditions of loading will be transmitted safely and without deformation occurring where it is not intended.

According to the invention, in a vehicle structure comprising a self-supporting vehicle body and front longitudinal bearers abutted on an end wall of the body, the said wall in regions abutted by respective said bearers, is so bulged out locally in the direction towards the front of the vehicle as to present an inherently stiff formation, each said bearer being forked or having a forked bearer mounted thereon at its approach to the respective formation and the fork arms being so shaped so that they at least partially embrace that formation.

Increased stiffness is achieved if the stiff formation has substantially the shape of a truncated pyramid.

In preferred embodiment of the invention, the forking is achieved by mounting on each longitudinal bearer a forked bearer of which one arm is connected to the underfloor or to the inner wall of a transmission tunnel in the region of the central longitudinal axis of the vehicle and of which the other arm is abutted at its end on a front wall pillar, while the longitudinal bearer itself is connected to the underfloor and extended as far as the sill as an additional arm without interruption of the line of force transmission.

The forked bearer may be provided with an opening located in the neutral zone of its cross-section and intended for the passage of the vehicle steering column. No substantial reduction in the strength of the bearer results.

A prefabricated component serving a plurality of purposes may be produced by forming at least one mounting for a torsion bar in the upper region of the forked bearer.

The arm which is abutted on the pillar may be at an angle rising in relation to the horizontal and may be connected to the said pillar at a point located between superposed hinges of a front-hinged door. The distance from that point to the central longitudinal axis of the sill should be in a ratio of about 0·4 : 1 to the distance to the central longitudinal axis of the outer longitudinal roof member. All three arms adjoin regions extend-

ing substantially in the direction of a frontal impact.

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

Fig. 1 is a side view of part of a motor car, including a front longitudinal bearer, and

Fig. 2 a plan view thereof.

The two front longitudinal bearers 1 (Figure 2) of a self-supporting motor car body (not shown in detail) are abutted and supported on the front end wall 2 of the body. For each bearer 1, the wall 2 is locally bulged out forwardly in the form of a truncated pyramid 3, that is a formation which is stiff, i.e. retention of shape, and has high strength. Before each bearer 1 reaches the stiff formation it is forked by virtue of a forked bearer 4 mounted on it. A total of three arms 5, 6 and 7 are thus formed which are bent or offset in retention to the bearer 1, in such a manner as to embrace the stiff formation 3, at least partially, and transmit proportions of the forces arising.

The arm 5 ends in the region of the central longitudinal axis 8 of the vehicle on the respective, inner, wall 9 of the transmission tunnel, while the arm 6 is abutted and supported on a front wall pillar 10. The arm 7, formed by an extension of the longitudinal bearer 1, is connected to the underfloor 11 and extends to the lateral sill 12 without interruption of the line of force transmission.

One or each forked bearer 4, which may be mounted as a prefaabricated component, is provided in the neutral zone of its cross section with an opening 13 through which a steering column 14 can pass. The bearers 4 may also be provided with mountings 15 for a torsion bar 16 (Figure 1). The mountings 15 may, for example, be integral with the bearers 4.

As may be seen from Figure 1, the arm 6, for better force distribution, extends at an angle rising in relation to the horizontal, say at about 20°. This arm is connected to the pillar 10 at a point whose distance from the central longitudinal axis 17 of the sill 12 is in a ratio of 0·4 : 1 in relation to its distance from the central longitudinal axis 18 of the outer longitudinal member 19 on the same side of the roof. Care should also be taken that the point of connection to the pillar 10 is located between the superposed hinges (not shown) of front-hinged doors, which are currently common, so that, in the event of a particularly violent collision, the force required to open the door will, as far as possible, not be increased.

WHAT WE CLAIM IS:—

1. A vehicle structure comprising a self-supporting vehicle body and front longitudinal bearers abutted on an end wall of the body which wall, in regions abutted by respective said bearers, is so bulged out locally in the direction towards the front of the vehicle as to present an inherently stiff formation, each said bearer being forked or having a forked bearer mounted hereon at is approach to the respective stiff formation and the fork arms being shaped so that they at least partially embrace that formation.

2. A structure according to Claim 1, wherein the stiff formation has substantially the shape of a truncated pyramid.

3. A structure according to Claim 1 or 2, wherein one said arm of a forked bearer mounted on each longitudinal bearer is connected to the underfloor or to the inner wall of the transmission tunnel in the region of the central longitudinal axis of the vehicle and another arm is abutted at its end on a front wall pillar, the said longitudinal bearer being connected to the underfloor and extended, as a further arm, to the sill.

4. A structure according to Claim 3, wherein the forked bearer has an opening located in the neutral zone of its cross section and intended for the passage of the steering column.

5. A structure according to Claim 3 or 4, wherein at least one mounting for a torsion bar is formed in the upper part of each forked bearer.

6. A structure according to any one of the preceding claims, wherein the arm abutted on the pillar is at an angle rising in relation to the horizontal and is connected to the said pillar at a point which is located between superposed hinges of a front-hinged door, the distance from which point to the central longitudinal axis of the sill—being substantially in a ratio of 0·4 : 1 in relation to the distance to the central longitudinal axis of the outer longitudinal member of the roof.

7. A vehicle structure with front longitudinal bearers substantially as hereinbefore described with reference to the accompanying drawings.

JENSEN & SON,
Agents for the Applicants,
8 Fulwood Place,
High Holborn,
London WC1V 6HG.
Chartered Patent Agents.

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Sheet 1

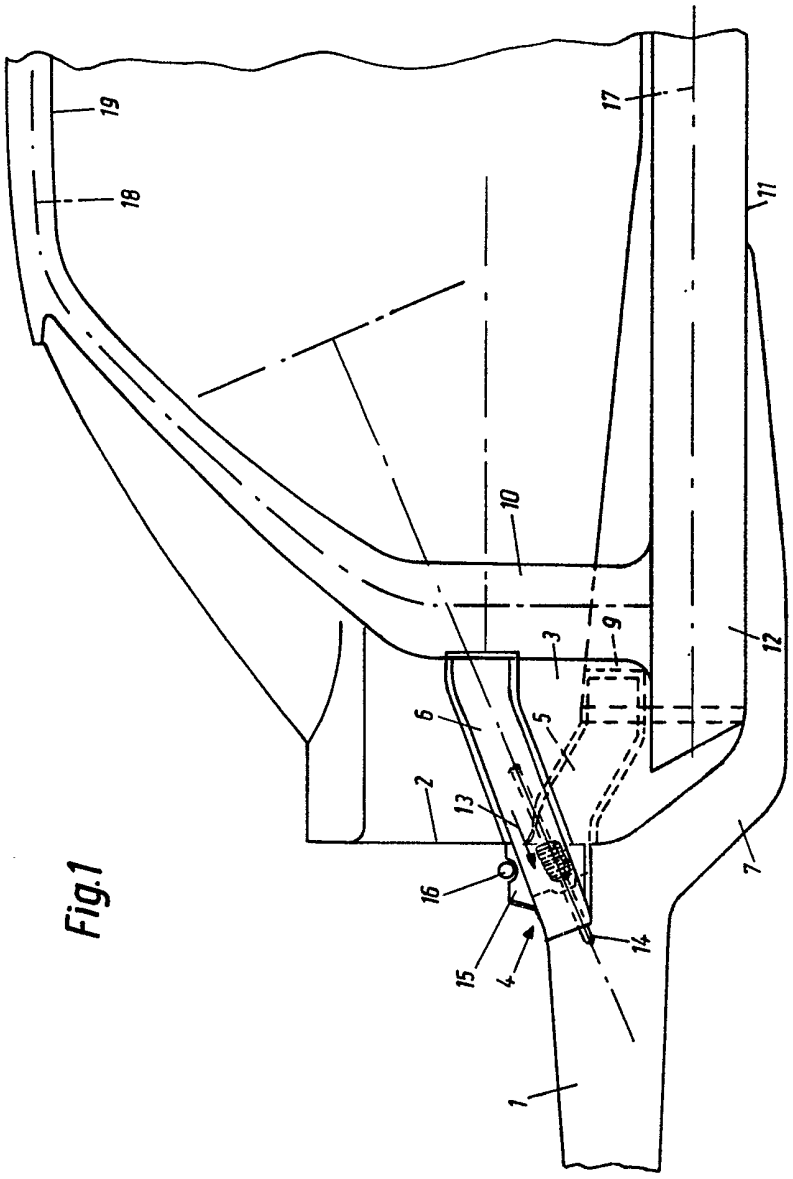

Fig.1

1600714 COMPLETE SPECIFICATION
2 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 2

Fig.2