

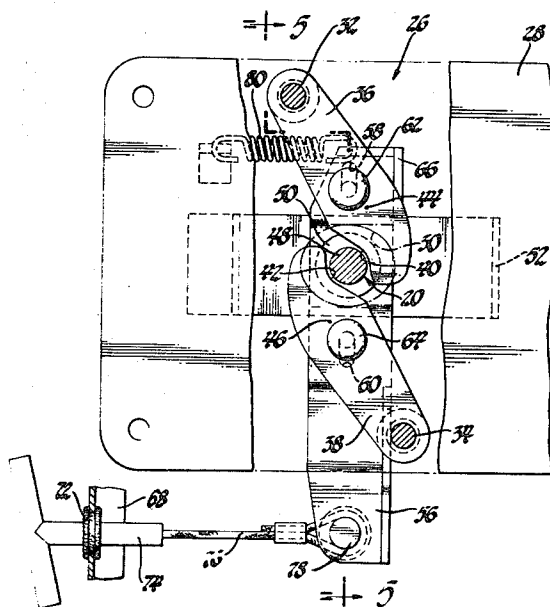
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[54] HOOD LATCHING ARRANGEMENT
4 Claims, 5 Drawing Figs.

[52] U.S. Cl..... 292/46,
70/240, 292/49, 292/50, 292/53, 292/DIG. 14,
292/DIG. 43, 292/DIG. 65
[51] Int. Cl..... E05c 3/34,
E05c 3/40
[50] Field of Search..... 292/25-30,
45-53, 221, 224, 227; 70/240, 241

ABSTRACT: A vehicle hood latching arrangement includes a striker mounted on the hood member and a pair of retaining levers pivotally mounted on a body member for movement between latched and unlatched positions. The retaining levers are situated in a generally parallel line relationship operative to maintain at least one of the retaining levers in the latched position thereof during rapid horizontal acceleration or deceleration of the vehicle in any direction. An operating lever is operatively connected to each retaining lever for moving the latter from latched to unlatched positions and the retaining levers are balanced on the operating lever to prevent inertially motivated unlatching of the hood member.



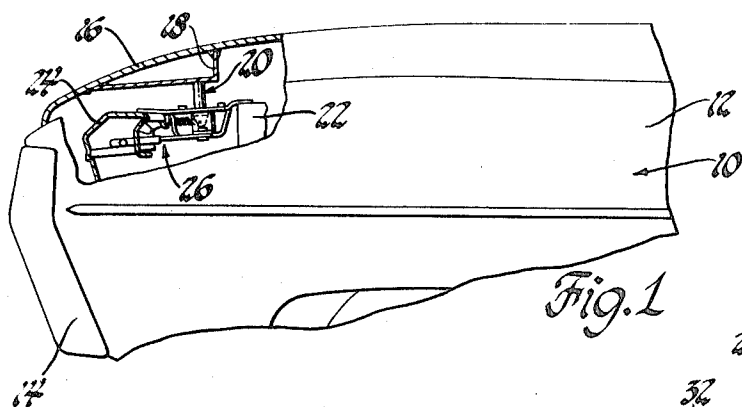


Fig. 1

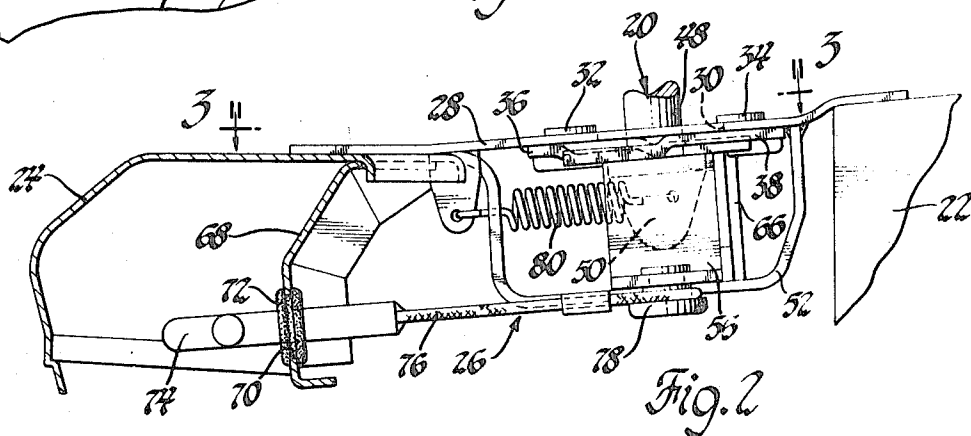


Fig. 2

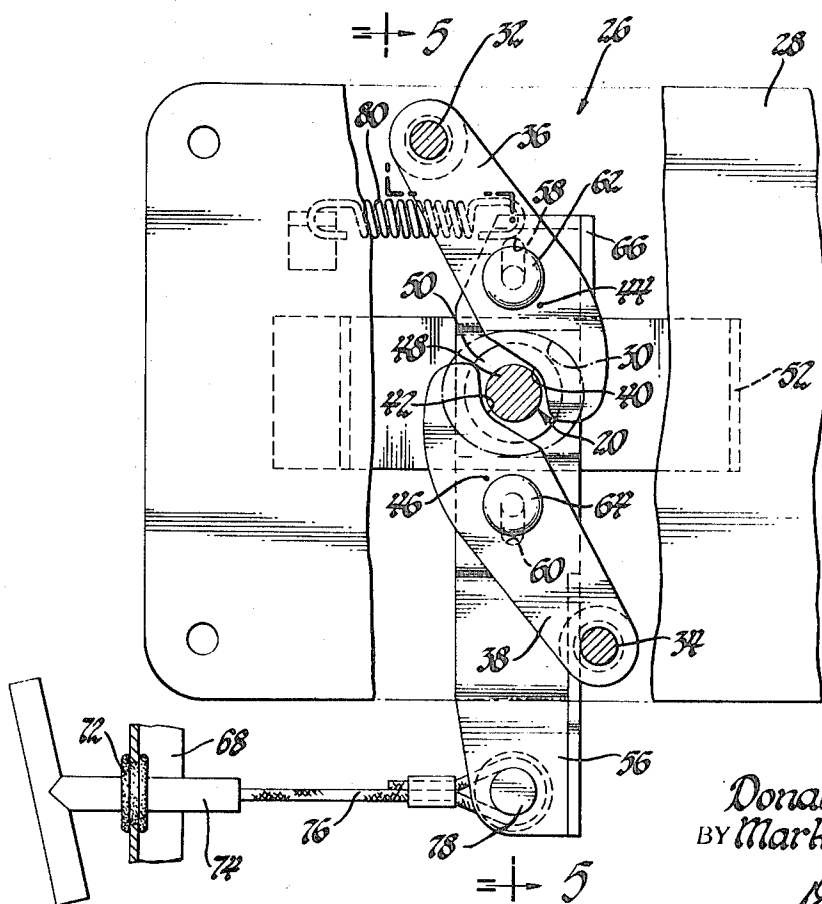


Fig. 3

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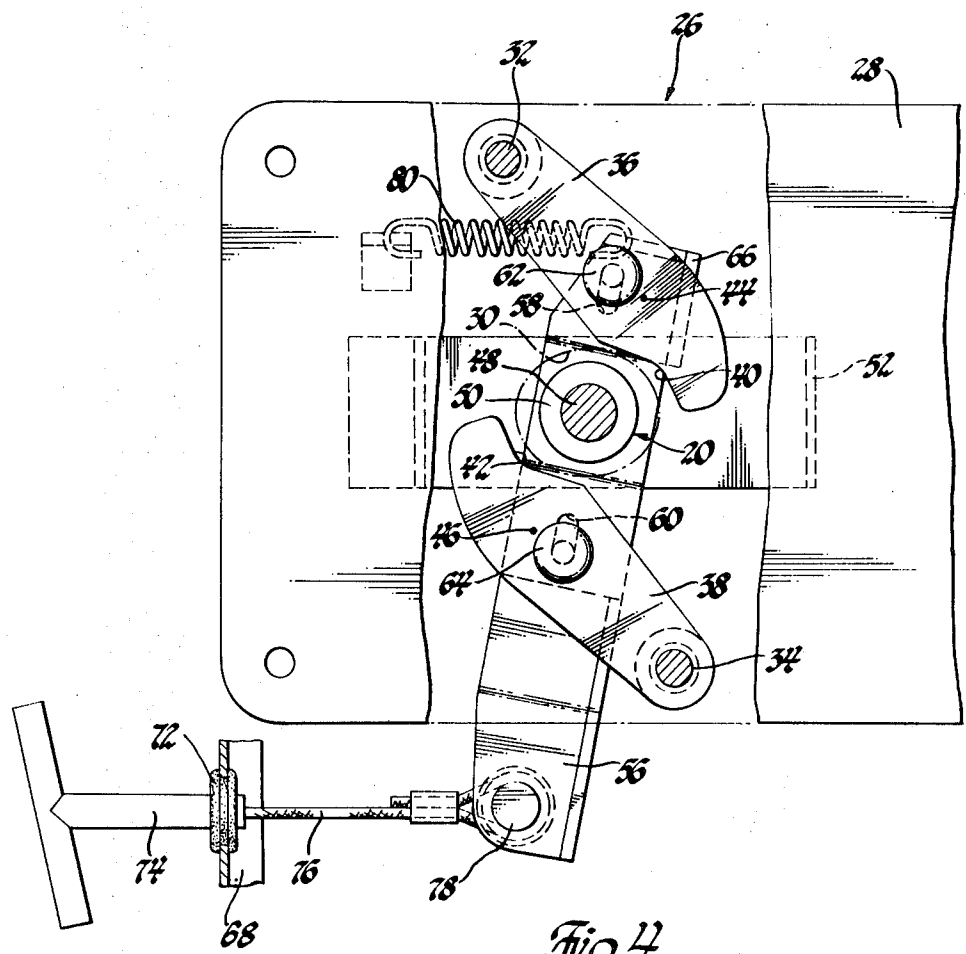


Fig. 4

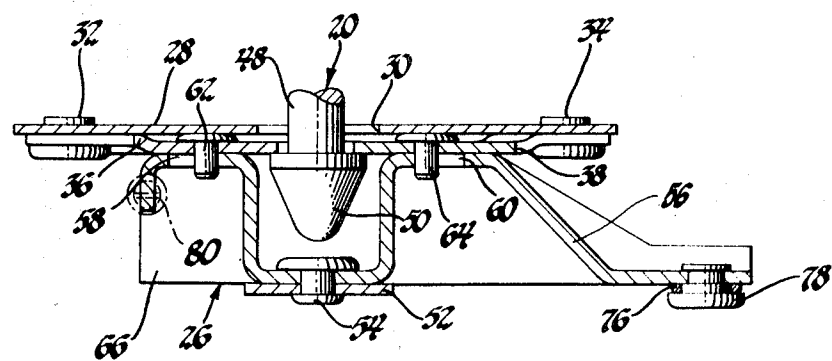


Fig. 5

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HOOD LATCHING ARRANGEMENT

This invention relates generally to vehicles having body members with hood members swingably mounted thereon and in particular to a latching arrangement for maintaining the hood member in the lowered position thereof.

The primary feature of this invention is that it provides a new and improved hood latching arrangement for vehicle hood members which remains operative during rapid horizontal acceleration or deceleration of the vehicle as occurs during a collision. Another feature of this invention is that it provides a hood latching arrangement wherein a striker mounted on one of the hood and body members is latchingly engaged by a pair of retaining levers each pivotally mounted on the other member which retaining levers embody a parallel line relationship to each other operative to maintain at least one of the retaining levers in latched position during rapid horizontal acceleration or deceleration of the vehicle. Yet another feature of this invention is that it provides a hood latching arrangement wherein a striker mounted on one of the hood and body members is latchingly engaged by a pair of retaining levers pivotally mounted on the other member and operatively connected to an operating lever pivotally mounted through its centroid on the other member so that the inertial force generated in the operating lever during vehicle acceleration or deceleration in any horizontal direction produces zero moment about the pivot axis thereof and so that the inertial force generated in each retaining lever and transferred to the operating lever produces an equal and opposite moment on the operating lever about the pivot axis thereof to prevent inertially motivated movement of the retaining levers to unlatched positions. These and other features of this invention will be readily apparent from the following specification and from the drawings wherein:

FIG. 1 is a partial broken away elevational view of an automobile type vehicle having a hood and body members and a hood latching arrangement according to this invention;

FIG. 2 is an enlarged view of a portion of FIG. 1 and showing the hood latching arrangement according to this invention,

FIG. 3 is a broken away view taken generally along the plane indicated by lines 3-3 in FIG. 2 and showing the hood latching arrangement in latched position thereof;

FIG. 4 is similar to FIG. 3 but showing the hood latching arrangement in unlatched position thereof; and

FIG. 5 is a sectional view taken generally along the plane indicated by lines 5-5 in FIG. 3.

Referring now to FIG. 1 of the drawings, an automobile type of vehicle having a body member generally designated 10 includes a pair of front fender panels, of which only fender panel 12 is shown, and a front bumper structure 14 extending across the front portion body member. A hood member 16 including a rigidly attached support bracket 18 with a striker 20 projecting therefrom is mounted on the body member by conventional hinge means, not shown, at the rear margin thereof for swinging movement about a horizontal axis of the body member between a raised position, not shown, wherein the conventional vehicle engine compartment located between the front fender panels is exposed and a lowered position, FIG. 1, wherein the hood member lies in generally coplanar relationship with the upper marginal edges of the front fender panels and conceals the engine compartment. A radiator support member 22 is secured to the body member generally within the engine compartment and a bracing member 24 is secured to the body member and longitudinally spaced forwardly of the radiator support member 22. Mounted between the radiator support member and the bracing member and generally underlying striker 20 in the lowered position of the hood member is a hood latching arrangement generally designated 26.

Referring more particularly to FIGS. 3, 4 and 5 in description of the latching arrangement, a main support plate 28 is fixedly secured at its rearward edge to the radiator support member 22, as by welding, and at its forward edge is fixedly

secured to bracing member 24, as by welding. Support plate 28 has a generally circular aperture 30 therein aligned generally with the striker 20 and of sufficient diameter to permit free movement of the striker through the aperture during swinging movement of the hood member. A pair of studs 32 and 34 are fixedly secured to the main support plate 28 at diametrically opposed locations on a circle concentric with aperture 30. A pair of retaining levers 36 and 38 each have one end pivotally mounted on studs 32 and 34 respectively for rotation thereabout in a generally horizontal plane between latched and unlatched positions and have indented portions 40 and 42 respectively generally at the distal ends thereof.

The studs 32 and 34 are mounted on the main support plate in locations predetermined to insure that with the respective retaining levers 36 and 38 mounted thereon and in the latched positions thereof a line on retaining lever 36 through the pivot axis and center of mass or centroid 44 thereof is generally parallel to a line on retaining lever 38 through the pivot axis and center of mass or centroid 46 thereof.

The striker 20 includes a shank portion 48 and a conical head portion 50 at the free end thereof. In the lowered position of the hood member 16, striker 20 protrudes thru aperture 30 and the conical head portion 50 thereof lies below the plane of retaining levers 36 and 38. The retaining levers are pivotable about their respective mounting studs between the latched positions, FIGS. 3 and 5, wherein indented portions 40 and 42 engage the striker shank portion 48 above the head portion 50 to prevent upward movement of the striker, and the unlatched positions, FIG. 4, wherein the indented portions 40 and 42 are disengaged from the striker shank portion and clear the head portion so that the hood member and attached striker are free to move to raised position.

In all vehicle hood latching arrangements it is particularly desirable that the latch remain operative during very rapid horizontal acceleration or deceleration of the vehicle, as upon impact thereof with another object. In the hood latching arrangement according to this invention, the parallel line relationship between the retaining levers 36 and 38 in the latched positions thereof is operative to maintain at least one of the retaining levers in latched position at all times. During horizontal acceleration or deceleration in a direction parallel to the aforementioned parallel lines, the inertia force generated in each retaining lever and acting through the respective centroid thereof is directed through the pivot axis of the respective lever with zero resulting moment thereabout so that neither lever is motivated to move to unlatched position. During horizontal acceleration or deceleration in any other direction, the inertia forces generated in the retaining levers motivate the levers to rotate in opposite directions about their respective pivot axes so that one retaining lever is always maintained in latched position in contact with shank portion 48 of striker 20 to prevent upward movement of the hood member.

An operating lever support member 52 is fixedly secured to the underside of support plate 28, as by welding, and has a pivot stud 54 pressed therein and defining a generally vertical axis coaxial with the striker 20 in the lowered position of the hood member 16. An operating lever 56 is pivotally mounted on stud 54 for movement between a retracted and an extended position in underlying relation to the retaining levers and has a pair of elongated apertures 58 and 60 therein and longitudinally spaced on opposite sides of the pivot stud. A pair of studs 62 and 64 pressed respectively into retaining levers 36 and 38 project generally vertically downward from the plane of the retaining levers and engage elongated apertures 58 and 60 respectively in the underlying operating lever 56 so that clockwise pivotal movement of the operating lever from the retracted position, FIG. 3, to extended position, FIG. 4, initiates counterclockwise pivotal movement of retaining levers 36 and 38 from latched to unlatched positions.

The operating lever 56 has a weight 66 secured thereto, as by welding, at a predetermined position therealong so as to align the centroid of the operating lever on the pivot axis

thereof. With the centroid thus aligned, the inertia force generated in the operating lever upon acceleration or deceleration of the vehicle in any horizontal direction and acting through the centroid of the operating lever is directed through the pivot axis thereof so that no moment about the pivot axis results.

During horizontal vehicle acceleration or deceleration in a direction parallel to the aforementioned parallel lines, the retaining levers, as described hereinbefore, are not inertially motivated to pivot from the latched positions thereof. Since the operating lever is not inertially motivated to pivot, acceleration or deceleration in the described direction has no effect on any of the three levers which therefore remain operative to maintain the hood member in the lowered position.

During vehicle acceleration or deceleration in any other horizontal direction, the one retaining lever inertially motivated to pivot toward unlatched position, as described hereinbefore, imparts through its connection to the operating lever a moment thereon about the pivot axis thereof motivating the operating lever to pivot toward the extended position. The other retaining lever, however, imparts through its connection to the operating lever an opposing moment thereon about the pivot axis thereof tending to maintain the operating lever in the retracted position. Balancing of these two opposing and inertially generated movements achieves zero resulting moment on the operating lever about the pivot axis thereof so that the latter remains in retracted position. With the operating lever in the retracted position neither of the retaining levers are movable from latched position and thus remain operative to maintain the hood member in lowered position.

In the preferred embodiment, FIGS. 3 and 4, balanced moments on the operating lever are achieved through the use of identical retaining levers mounted on the main support plate 28 as hereinbefore described and contacting the operating lever at locations equidistant from and on opposite sides of the pivot axes thereof. It will be readily apparent to those skilled in the art that numerous combinations of retaining lever size and positioning can be utilized to achieve balanced relationship with the operating lever and that when the two retaining levers operate in combination with an operating lever the retaining levers need not exhibit the parallel line relationship as described hereinbefore in order to have inertial stability.

To facilitate operation of the latching arrangement, a support 68, seen best in FIG. 2, depends from main support plate 28 and has an aperture 70 with a bushing 72 therein. A handle assembly 74 is slidably mounted in the bushing 72 and has attached to one end thereof a cable 76. The free end of cable 76 is looped around a stud 78 pressed into the distal end of operating lever 56 so that longitudinal movement of the handle assembly 74 and cable 76 pivots the operating lever 56 from retracted to extended position. A coil tension spring 80 is mounted between the main support plate 28 and the opposite end of operating lever 56 to bias the latter into retracted position. To preserve the inertial stability of the latching arrangement, handle assembly 74 and cable 76 are fabricated from a relatively lightweight material, such as aluminum, which presents only a negligible mass concentration at the distal end of operating lever 56.

A typical operational sequence of the latching arrangement begins with the hood member in the lowered or normal position, FIGS. 1, 2, 3 and 5, wherein the striker is retainingly engaged by retaining levers 36 and 38. To release the hood structure for raising movement thereof, an operator manually grasps handle assembly 74 and shifts the latter longitudinally forward, FIGS. 2 and 3. Upon such movement the cable 76 rotates operating lever 56 clockwise, FIGS. 3 and 4, from the retracted to the extended position, FIG. 4, during which rotation the elongated apertures 58 and 60 cooperate with studs 62 and 64 to rotate the retaining levers 36 and 38 from latched to unlatched positions thus freeing striker 20 to move upward with hood member 16. Following upward movement of the hood member, release of handle assembly 74 permits spring 80 to rotate the operating lever counterclockwise, FIG. 4,

until opposing faces of retaining levers 36 and 38 abut each other. In this position, not shown, indented portions 40 and 42 provide a generally oval shaped opening between the abutting retaining levers.

During return movement of the hood member 16 from the raised to the lowered position, striker 20 passes through aperture 30 until the conical head portion 50 enters the oval shaped opening whereupon continued lowering movement of the hood member causes the conical head portion to cam the retaining lever apart and rotate operating lever 56 clockwise against the action of spring 80. Camming motion continues until the conical head portion of the striker passes below the plane of retaining levers 36 and 38 whereupon spring 80 rotates operating lever 48 counterclockwise to bring the retaining lever into contact with the shank portion 48 of the striker above the head portion 50, FIG. 3, so that the striker and hood member are retained against upward movement.

Having thus described the invention, what we claim is:

1. In a vehicle including a body member and a hood member mounted thereon for swinging movement relative to said body member between raised and lowered positions about a generally horizontal axis, a striker fixedly secured to one of said hood and body members, a pair of retaining levers, means on the other of said members pivotally mounting each of said retaining levers for movement about an axis thereof between a latched position engaged with said striker and an unlatched position disengaged from said striker, said mounting means situated on said other member such that in the latched positions of said retaining levers a line on one of said retaining levers between the centroid and pivot axis thereof is parallel to a line on the other of said retaining levers between the centroid and pivot axes thereof, said parallel relationship being operative to maintain at least one of said retaining levers in the latched position thereof during changes in the horizontal velocity of said vehicle in any direction.

2. In a vehicle including a body member having a hood member mounted thereon for swinging movement between raised and lowered positions relative to said body member about a generally horizontal axis, a striker fixedly secured to one of said hood and body members and defining a first axis in the lowered position of said hood member, a pair of retaining levers, means pivotally mounting each of said retaining levers at one end thereof on the other of said members for movement about an axis of said member between a latched position engaging said striker at the other distal end of said retaining lever and an unlatched position disengaged from said striker, said mounting means situated on said other member at diametrically opposed locations on a circle centered on said striker axis in the lowered position of said hood member with a line between the centroid and pivot axis of one of said retaining levers in said latched position thereof being parallel to a line between the centroid and the pivot axis of the other of said retaining levers in said latched position thereof so that at least one of said retaining levers remains in latched position thereof during changes in horizontal velocity of said vehicle in any direction.

3. In a vehicle including a body member and a hood member mounted thereon for swinging movement relative to said body member between raised and lowered positions about a generally horizontal axis, a striker fixedly secured to one of said hood and body members, a pair of retaining levers, means pivotally mounting each of said retaining levers on the other of said members for movement about an axis of said member between a latched position engaging said striker and an unlatched position disengaged from said striker, an operating lever, means pivotally mounting said operating lever on the other of said members for movement about an axis thereof between extended and retracted positions, said axis intersecting the centroid of said operating lever so that an inertial force generated in said operating lever during changes in horizontal velocity of said vehicle in any direction produces zero resulting moment on said operating lever about said pivot axis thereof, and means on said operating lever connecting each of

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said retaining levers thereto at positions thereon longitudinally spaced and on opposite sides of said pivot axis thereof so that inertial forces generated in said retaining levers during changes in the horizontal velocity of said vehicle in any direction and transferred to said operating lever through said connecting means produce zero resulting moment on said operating lever about said pivot axis thereof, said connecting means being operative upon movement of said operating lever from said retracted to said extended position thereof to pivot said retaining levers from said latched to said unlatched positions thereof.

4. On a vehicle including a body member with a hood member mounted thereon for swinging movement relative to said body member between raised and lowered positions about a generally horizontal axis, a striker fixedly secured to said hood member, a pair of retaining levers each having a projection extending therefrom, means on said body member pivotally mounting each of said retaining levers thereon for movement about an axis thereof between a latched position engaging said striker and an unlatched position disengaged from said striker, said mounting means situated such that a line between the centroid and pivot axis of one of said retaining levers in said latched position thereof is parallel to a line between the centroid and pivot axis of the other of said retaining levers in said latched position thereof, an operating lever 25

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having a pair of elongated apertures therein longitudinally spaced and located on opposite sides of the centroid thereof, means on said body member pivotally mounting said operating lever thereon for movement about an axis thereof between retracted and extended positions, said axis generally intersecting the centroid of said operating lever so that an inertial force generated in said operating lever during changes in horizontal velocity of said vehicle in any direction produces zero resulting moment on said operating lever about said pivot axis thereof, each of said projections on said retaining levers engaging respective ones of said apertures in said operating lever so that movement of said operating lever from said retracted to said extended position thereof initiates pivotal movement of each of said retaining levers from said latched to said unlatched position thereof and so that inertial forces generated in each of said retaining levers during changes in horizontal velocity of said vehicle in any direction and transferred to said operating lever produce zero resulting moment on said operating lever about said pivot axis thereof, spring means biasing said operating lever toward said retracted position thereof, and actuating means selectively operable to pivot said operating lever from said retracted to said extended position thereof against the bias of said spring means.

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