Feb. 14, 1939. E. L. ACKERMAN 2,147,133

HINGE AND PILLAR CONSTRUCTION FOR VEHICLE DOORS

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Fig. 1.

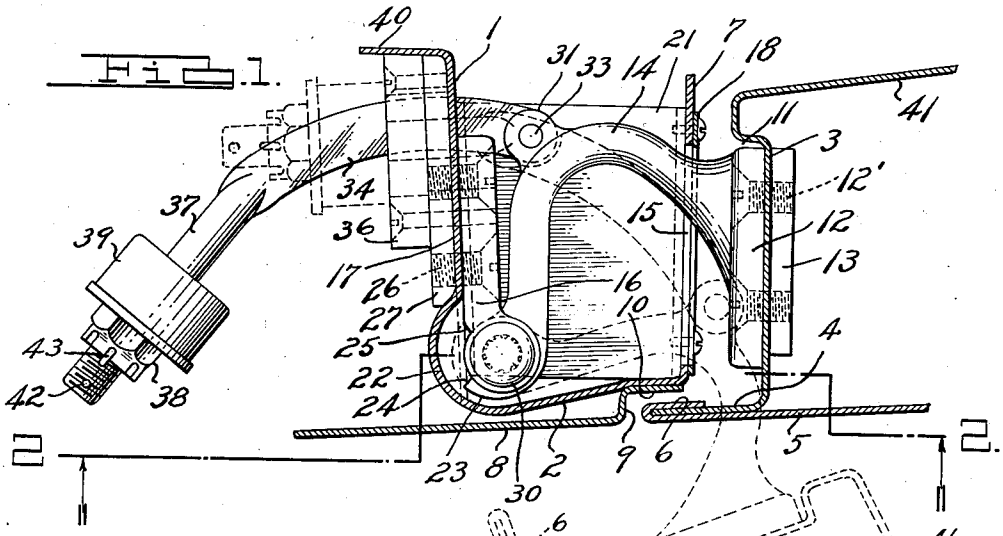
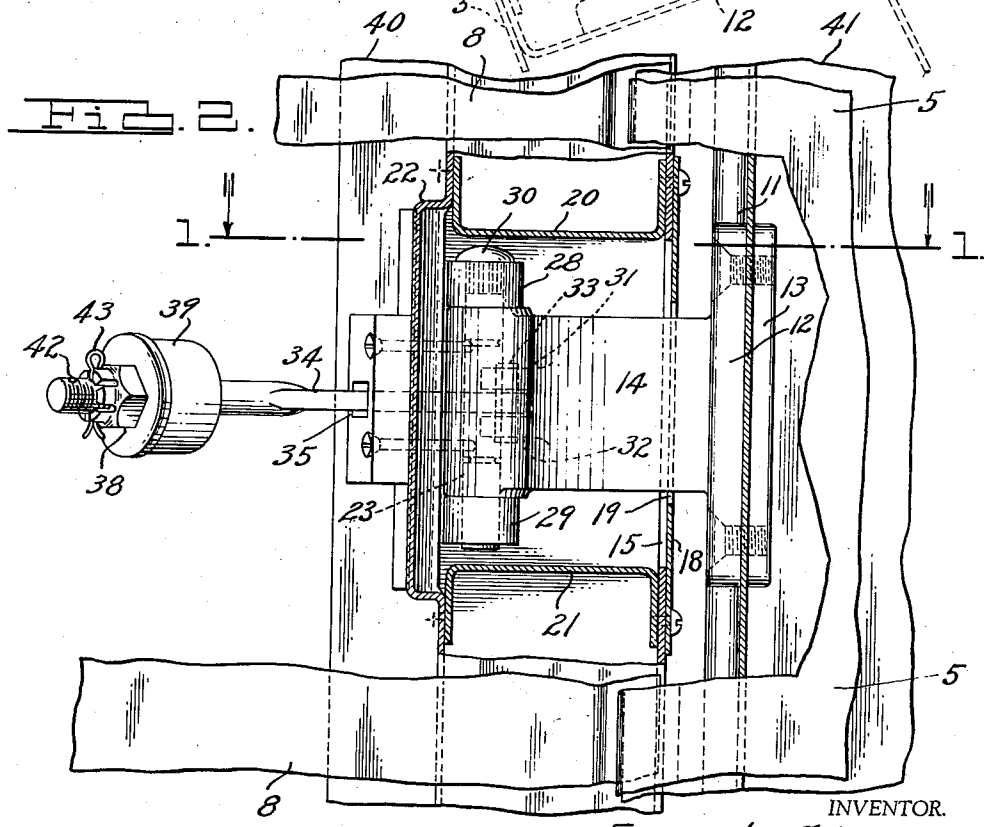


Fig. 2.



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HINGE AND PILLAR CONSTRUCTION FOR VEHICLE DOORS

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11 Claims. (Cl. 296—44)

This invention relates to hinge and pillar construction for vehicle doors, as for instance automobile doors, and the object of the invention is to provide an improved hinge and pillar construction in which the hinge element is concealed and lies within the body and door panels whereby the outer surface of the body is uninterrupted by protruding hinge portions as is usual in present day automotive vehicle construction.

A further object of the invention is to provide in conjunction with such concealed hinge a metal pillar constructed of certain structural characteristics permitting introduction of the hinge element therein, the pillar being constructed to provide a housing for the hinge by elements forming a reinforcement for flanges of the pillar to one of which the fixed leaf of the hinge is screwed and through an aperture in the other of which the hinge is introduced in the assembly thereof with the pillar whereby the pillar is of equal or greater strength at the hinge supporting section than the strength of the pillar prior to the provision of the aperture for introduction of the hinge.

A further object and feature of the invention is to provide in conjunction with the hinge a door check carried by the hinge and adjustable to vary the extent of opening of the door.

It is also an object and feature of the invention to provide a concealed hinge pivotally connecting the door with the door pillar in which the metal plates forming the outer face of the door and of the body at the pillar are in an edge to edge relation when the door is closed and which, through the opening of the door, the outer metal face of the door is moved outwardly in respect to its position relative to the body panel on the pillar and thence rearwardly to such degree as to permit the door to be swung to its full extent as permitted by the check without the edge of the door panel engaging the body panel with which it is aligned when in the closed position.

These and other objects and novel features of the invention are hereinafter more fully described and claimed, and the preferred form of construction of a hinge and pillar structure embodying my invention is shown in the accompanying drawing in which—

Fig. 1 is a plan view partly in section taken on line 1—1 of Fig. 2 showing my improved hinge and pillar construction.

Fig. 2 is a section partly in elevation taken on line 2—2 of Fig. 1.

In present day construction of automobile bodies, metal frames are used with metal panels secured to the outer faces thereof as by welding and in which the framing for the door, including the pillar to which the door is hinged, is usually formed of metal channel members.

The purpose of this invention is to provide a hinge and metal pillar construction of channel form united in such manner as to position the hinge element entirely on the inside of the panel members that are attached to the door frame and to the pillar so that no portions of the hinge member are exposed to view or project from the body surface. Where the hinge point is externally of the body panels as is the usual practice, a difficulty arises in paint or lacquer finishing the body, it being difficult to properly paint or enamel the same and the constant use of the door tends to chip off portions of the enamel and as such projecting portions are exposed to weather conditions, they tend to rust and become unsightly.

Concealed hinges per se have been constructed in the general form of hinge here shown but in the former constructions, so far as my knowledge extends, a casing or cage is used to carry the fixed leaf and pintle and is secured to the pillar while the hinged leaf has the goose-necked portion pivoted therein. An example of such previous form of hinge construction is shown in the U. S. Patent to Joseph H. Bourgon, No. 1,589,620 issued June 22, 1926 which illustrates generally the commonly known form of concealed hinge and its mounting in respect to the pillar. My invention differs in the pillar construction and the manner of mounting the hinge parts to the pillar and to the door and the length and form of the goose-neck. I have here shown the usual metal pillar construction now used in automotive vehicle body construction.

The pillar is shown in section at 1 in Fig. 1 being what may be generally termed a U form closed by the web 2 in the outer edge and open at the inner edge which is covered by the interior finish of the body. The hinged edge of the door is indicated in section at 3 and this hinged edge of the door has a longitudinally extending outturned edge 4 to which the panel 5 of the door is secured by inturning an edge of the panel 5 over the outturned edge or flange 4 as is indicated at 6. In my improved construction, this edge is extended to overlap the adjacent flange 7 of the pillar. To the web 2 of the pillar is secured the body panel 8 which is offset as at 9 providing a recess 10 into which the return-bent edge 6 and edge of the flange 4 are positioned when the door is closed. The parts as here shown are about full

size and the terminal edge of the inturned portion 6 of the door panel 5 may in practice be even closer to the portion 9 of the body panel 8 than is here shown but it will be observed from the drawing that the outer face of the door panel 5 and of the body panel 8 are practically in alignment and that no hinge parts project beyond the panel surfaces in my improved construction and arrangement of parts. The hinged edge of the door is recessed as at 11 to receive the base 12 of the pivoted hinge leaf which is secured as by screws 12' shown by dotted lines passing through the portion 3 of the door edge and into a plate 13 on the inside face thereof, the portion 13 preferably being welded in place in manufacture of the door. There are, of course, two or more such recesses, depending upon the number of hinges that are to be used with the door.

Integrally formed with the base 12 of the pivoted hinge leaf is what I have termed a "goose-neck" portion 14 which extends in the position of the parts shown through an aperture 15 in the flange 7 of the pillar. The aperture is sufficiently large to permit the other hinge leaf 16 to be passed therethrough and attached to the opposite flange 17 of the pillar. Such aperture is required to permit assembly of the parts and tends to weaken the pillar structure. Therefore, after the fixed leaf 16 of the hinge has been secured to the pillar flange 17, a plate 18 is passed over the base 12 forming the pivoted leaf of the hinge and covers the opening leaving an aperture 19 of a vertical height slightly greater than the width of the goose-neck 14 and thus reducing the aperture to its least dimension to prevent unsightliness as this face of the pillar is visible when the door is swung to the open position shown by dotted lines in Fig. 1. There is no casing or cage in my construction of the type used in the old art to which the goose-neck is hinged but in order that the pillar may be even stronger at this point of hinging than at other points, reinforcing plates 20 at the upper side of the hinge and at 21 at the lower are secured therein preferably by welding to form a recess for the hinge and to strengthen and support the apertured flange as well as the flange 17 to which the leaf 16 is secured which supports the weight of the door. These plates 20 and 21 therefore support the flanges 7 and 17 from deflection and strengthen the pillar at the hinge point.

A further strengthening feature of the pillar is provided by the offset semi-circular portion 22 which permits the pivotal end portion 23 of the goose-neck to turn therein to a plane beyond the plane of the flange 17 of the pillar 1. This will be seen more clearly in Fig. 2 and permits the hinge portion 23 to be formed with a projecting radial edge portion 24 which may abut a companion portion 25 formed on the hinge plate 16 as shown more clearly in Fig. 1. This provides a positive limit to the swinging of the door and permits the use of a longer goose-neck and deeper curve than in prior art structures so far as I am aware. The fixed leaf 16 is apertured to receive screws indicated by dotted lines 26 which pass through the flange 17 of the pillar and into a plate 27 on the opposite face of the flange. The leaf 16 has terminal eyed portions 28 and 29 between which the eyed portion 23 of the goose-neck is positioned and the pintle is indicated at 30 extending therethrough, all of which will be understood from Fig. 2.

The hinge may be made with the parts as so far described and the pillar construction provides a rigid support for the hinge element 16 which carries the weight of the door without deflection and it will be observed from the dotted line showing of the hinge in Fig. 1 that the door swings in such manner that the part 6 is brought outwardly of the recess 10 and then turns about the door panel 8 and is spaced materially therefrom. This is one of the reasons of making the goose-neck of such length and depth of curvature from pintle to the points of the inner curve as such form permits the same to come to a stop before the inner face of the curved neck 14 engages the side of the aperture in the flange 7 or the plate 18 positioned thereover.

The spacing of the projecting edge 6 of the door panel from the plate 8 in the full open position will be greatest at about the upper or lower hinge points or both but, as the body panels of the present day are curved outwardly from a vertical plane, the edge 6 may ride closer to the panel 8 in some part of its vertical length than is indicated by the dotted open position in Fig. 1.

It is usual with automobile doors particularly, to provide a door check to prevent the swinging of the door with such force as to injure the hinge member. These door checks in the past have been of various types and are separately constructed and require mounting in addition to the mounting of the hinges. I avoid much of the cost of such previous checks, particularly installation cost as well as material, by combining a door check with at least one of the hinges of the door thus enabling the same to be installed at the time the hinge is installed and requires little material as will be understood from the following.

For the purpose of checking the door, I provide preferably a pair of eyes 31 and 32 on the back of the goose-neck near the point of bend and I secure, as by means of the pin 33, an end of the door check arm 34 which is preferably flat-like in form as will be understood from the drawing. This arm rides through an aperture 35 in the bumper plate 36 and a corresponding slot or aperture in the plate 27 and in the flange 17 of the pillar. This arm 34 is freely pivoted on the pin 33 and is curved in form so that it readily swings through the slots and apertures in the plates 36, 27 and 17 as the door is swung to the open position.

The terminal end of the check arm 34 is cylindrically formed providing a stem 37. The outer end of the stem is threaded as indicated to receive a nut 38 which is adjustable longitudinally of the stem 37. This adjustment may be secured by forming a series of apertures 43 spaced longitudinally of the stem 37 and through which a cotter pin 43 may be introduced to retain the nut in the adjusted position, the nut being castellated to receive the cotter pin as shown more clearly in Fig. 2. The nut provides a backing for a rubber bumper 39 which is apertured to pass over the stem 37 and which, when the door is open, strikes the bumper plate 36 as shown by dotted lines 32. This tends to check the movement of the door prior to the time the edge 24 on the hinge portion 23 strikes the abutment 25 on the hinge plate 16 and thus avoids deforming the pillar through forcible opening of the door. By pivotally mounting this check arm 34 at the position shown relative to the goose-neck 14, it may move readily through the aperture 15 in the flange 7 of the pillar and thus in no way interferes with the swinging movement of the hinge elements and due to the short length of the arm 34, the terminal end portion 37 is always within the space be-

tween the outer panel 8 and the inner flange 40 of the pillar to which the inside paneling of the vehicle is secured. Thus in a single instrumentality I may provide both a hinge and door check of a new form and avoid the costs of installation of the separate checks as heretofore mentioned.

No attempt has been made in the drawing to show full elevation of an automobile body as it would simply show the continuation of the panels 8 and 5 as shown in partial elevation in Fig. 2 while in the said figure the inner flange 41 of the door member is shown as well as the flange 40 on the pillar flange 17.

From the foregoing description of the several parts of the pillar, hinge and door check and functional relationship thereof, it is believed evident that the various objects of the invention are attained by the structures described and it is also to be understood that various changes may be made in the structure of the parts in size and somewhat varied in form to fit the hinge for different sizes of pillars and doors without departing from the spirit and scope of the invention as set forth in the appended claims.

Having thus fully described my invention, what I claim and desire to secure by Letters Patent of the United States is—

1. A hinge and pillar construction for vehicle doors comprising a sheet metal pillar of channel form having substantially parallel side walls connected at one edge by a web, the open side of the pillar facing inwardly of the door, one of the said side walls facing the door member and having an aperture, a hinge element comprising a fixed leaf and a leaf pivoted thereto, said last named leaf having a "gooseneck" portion terminating in an eye for alignment with similar eyes on the fixed leaf, a pintle extending through the said eyes, the aperture in said apertured wall permitting introduction of the fixed leaf therethrough into the pillar, the fixed leaf being secured to the opposite side wall, a plate above, and a plate below the fixed leaf secured to the side walls and providing a recess in which the hinge parts are positioned and supporting the walls of the pillar against deflection.

2. A hinge and pillar construction for vehicle doors comprising a sheet metal pillar of channel form having substantially parallel side walls connected at one edge by a web, the open side of the pillar facing inwardly of the door, one of the said side walls facing the door member and having an aperture, a hinge element comprising a fixed leaf and a leaf pivoted thereto, said last named leaf having a "gooseneck" portion terminating in an eye for alignment with similar eyes on the fixed leaf, a pintle extending through the said eyes, the aperture in said apertured wall permitting introduction of the fixed leaf therethrough into the pillar, the fixed leaf being secured to the opposite side wall, a plate above and a plate below the fixed leaf secured to the side walls and providing a recess in which the hinge parts are positioned and supporting the walls of the pillar against deflection by weight of the door, and an apertured plate secured to the apertured side wall, the aperture of the plate being less in width and length than the aperture of the flange and providing an aperture of approximately the least dimension to permit the "gooseneck" portion to move therethrough in the opening or closing of the door.

3. A hinge and pillar construction for automotive vehicle door and body construction comprising a sheet metal channel shaped pillar having substantially parallel side walls and a web connecting the same at one edge, the open side of the pillar facing inwardly of the body, a body panel having an offset edge secured to the said web, a hinge comprising a fixed leaf and a pivoted leaf, said pivoted leaf being fixed to the door edge facing one of the side walls of the pillar, the said wall being apertured to permit introduction of the fixed leaf therethrough for securement to the other side wall of the channel, the fixed leaf and the base of the pivoted leaf lying in substantially parallel relation when the door is closed, the door being formed of sheet metal and the edge thereof adjacent the apertured wall of the pillar being recessed to receive the base of the pivoted leaf, said pivoted leaf having a gooseneck shaped arm extendible through the aperture of said apertured channel wall to pivotal relation with the fixed leaf, the door edge to which the pivoted leaf is fixed having a flange extending toward and overlying the offset edge portion of the body panel, a door panel secured to the flange of the door edge and lying substantially flush with the body panel when the door is closed and covering the space between the door edge and apertured plate of the pillar.

4. A hinge and pillar construction for automotive vehicle door and body construction comprising a frame for the door opening including a pillar having substantially parallel side walls and a connecting wall at one edge, the pillar being positioned with the connecting wall facing the exterior of the vehicle body, the side wall of the pillar facing the door opening having an aperture, a hinge having a fixed leaf insertable through the said aperture and secured to the opposite side wall of the pillar and a pivoted leaf having a base secured to the edge of the door facing the said apertured wall of the pillar, the fixed leaf and base of the pivoted leaf being in substantially parallel relation when the door is in closed position said pivoted leaf including a gooseneck portion extending through the said aperture to pivotal relation with the fixed leaf, said door including an outer panel having an edge portion extending across the gap between the apertured pillar wall and the door edge, a metal plate providing a body panel secured to the web of the pillar and being offset at its edge providing a recess in which the extending edge of the door panel lies when the door is closed, the arrangement providing that the panel of the door and the panel secured to the pillar occupy the same general plane, the hinge construction being such that as the door opens the said panel edge is moved outwardly of its recess to overlie the body panel in spaced relation therewith when the door is fully open.

5. A hinge and pillar construction for vehicle doors comprising a metal pillar of channel form having substantially parallel side walls connected at one edge by a web, a hinge element comprising a fixed leaf and a leaf having a curved gooseneck portion pivoted thereto, the pivoted leaf being secured to the edge of the door and the side wall of the pillar adjacent thereto having an aperture permitting introduction of the fixed leaf therethrough for attachment to the opposite side wall of the channel, said pillar at the junction of the wall to which the fixed leaf is secured and the web having an outcurved portion, the fixed leaf being positioned with the eye thereof located in the curved portion, the gooseneck end having an eye associated with the eyes of the fixed leaf, a pintle

extending through the eyes of the fixed leaf and gooseneck, the eye of the gooseneck having an outwardly extending portion providing a radially faced abutment and the base of the fixed leaf having a corresponding abutment engageable by the abutment of the gooseneck eye and limiting movement of the pivoted leaf and door about the pintle.

6. A hinge and pillar construction for vehicle doors comprising a metal pillar of channel form having substantially parallel side walls connected at one edge by a web with one of the walls facing the door member, the last named wall having an aperture, a hinged element comprising a fixed leaf and a leaf pivoted thereto by a gooseneck portion, the pivoted leaf being secured to the door edge and the said aperture permitting introduction of the fixed leaf therethrough for attachment to the opposite wall of the channel, and metal reinforcing elements secured to the said side walls of the pillar between which the hinge leaf is mounted thereby supporting the side walls against deflection by the weight of the door.

7. A pillar and hinge construction for vehicle doors comprising a sheet metal pillar of channel form in cross section forming one side of the door frame, the door having an edge portion adjacent one of the channel walls, said wall having an aperture, a hinge comprising a fixed leaf and a pivoted leaf, the fixed leaf being introducible through the aperture in the said channel wall and mounted upon the inner face of the opposite channel wall, the pivoted leaf having a base attached to the door and a gooseneck portion extending into the aperture of the first named channel wall to pivotal relation with the fixed leaf, said channel wall carrying the fixed leaf having an aperture, a door check comprising a curved bar extending through the aperture and pivoted to the gooseneck at one end, a rubber bumper on the opposite end of said bar, and means for adjusting the position of the bumper longitudinally of the said last named bar end, the arrangement providing that as the door is swung to open position, the bumper provides a check for limiting the swinging movement.

8. A hinge and pillar construction for vehicle doors comprising a vertical pillar element substantially U shaped in cross section and defining part of the door opening, the door having an edge portion positioned adjacent a side wall of the pillar when in closed position, a hinge comprising a fixed leaf connected with the pillar and a leaf pivotally attached to the fixed leaf and secured to the door edge, said side wall of the pillar having an aperture, an upper and a lower reinforcing plate extending between and attached to the flanges of the pillar above and below the aperture therein to sustain the side walls from deflection and between which the fixed leaf is positioned, a door check comprising a bar extending through the aperture in the pillar and having an end pivotally connected with the pivoted leaf, the construction permitting the same to pass readily through the aperture of the pillar as the pivoted end is moved through an arc by swinging the door in opening or closing the same, and a resilient and compressible bumper on the end of the bar opposite the pivoted end for engaging the pillar as the door is swung to open position, and means reinforcing the pillar from deflection by the bumper shock and weight of the door.

9. A hinge and pillar construction for vehicle doors comprising a vertical pillar element formed of sheet metal in the shape of a U in cross section providing substantially parallel side walls and defining part of the door opening, the door having an edge portion positioned adjacent a side wall of the pillar when in closed position, a hinge comprising a fixed leaf connected with the pillar and a leaf pivotally attached to the fixed leaf and secured to the door edge, said side wall of the pillar having an aperture, reinforcing members extending between the side walls of the pillar at the upper and lower edges of the said aperture, said other side wall also having an aperture and a door check comprising an arcuate bar extending through the last named aperture in the pillar and having an end pivotally connected with the pivoted leaf, the curvature of the bar and point of connection with the pivoted leaf permitting the same to pass readily through the aperture of the pillar as the pivoted end is moved through an arc having a radius equal to the distance between the pivot point of the pivoted leaf and pivotal point of the bar in swinging the door in opening or closing the same.

10. A hinge and pillar construction for vehicle doors comprising a sheet metal pillar having a pair of approximately parallel walls, one of the said walls facing the door opening and having an aperture, a hinge element comprising a fixed leaf and a hinged leaf having a gooseneck portion attached thereto, the fixed leaf being introducible through the said opening in the one pillar wall and attached to the other pillar wall, and a metal reinforcement for supporting the wall of the pillar at the aperture, the gooseneck portion being pivoted at one end to the fixed leaf and permitting the door to be swung to open position with the gooseneck connecting the hinged and pivoted leaves straddling the pillar wall at the aperture and carrying the door member at its hinged edge outwardly and away from the pillar as the door is opened.

11. A hinge and pillar construction for the door opening of an automobile body, comprising a sheet metal pillar at a vertical side of the door opening, said pillar being of a substantially U form with the open side of the U facing inwardly of the vehicle body, one of the pillar walls defining an edge of the opening and having an aperture therein, the door having an edge portion positioned substantially parallel with the said wall when in closed position, a hinge comprising a fixed leaf and a pivoted leaf, said fixed leaf being insertable through the opening in said pillar wall and attached to an opposite wall facing the same and said pivoted leaf having a base attached to the door edge and a gooseneck portion in pivotal relation with the fixed leaf, a door check comprising a curved bar having one end pivotally secured to the bend of the gooseneck portion at a distance from its point of pivoting with the fixed leaf and movable through the pillar aperture as the door is moved on the hinge, said door check bar extending through an opening provided therefor in the said pillar wall to which the fixed leaf is attached, and a bumper on the end of the curved arm opposite that attached to the gooseneck portion.

EDWARD L. ACKERMAN.