June 20, 1939. E. E. HOWE 2,163,323

HINGE MECHANISM

Original Filed March 15, 1937

Fig. 1

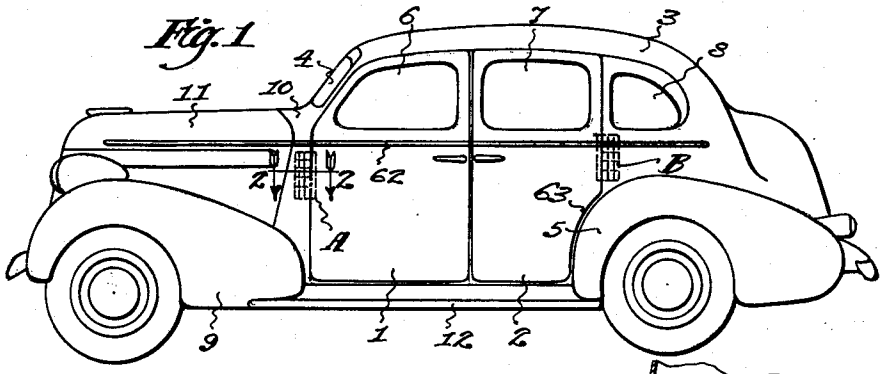


Fig. 2

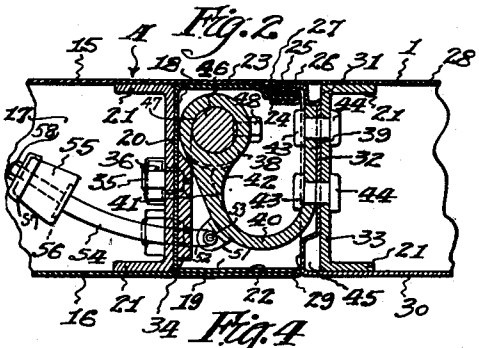


Fig. 3

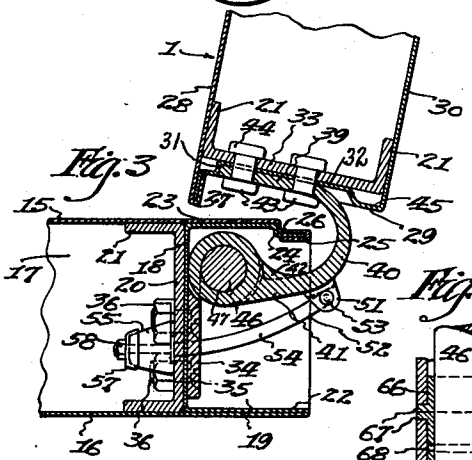


Fig. 7

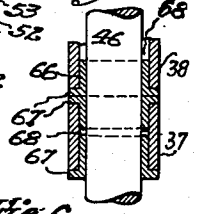


Fig. 4

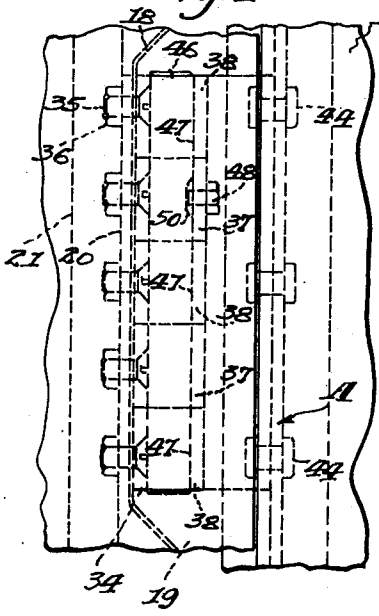


Fig. 5

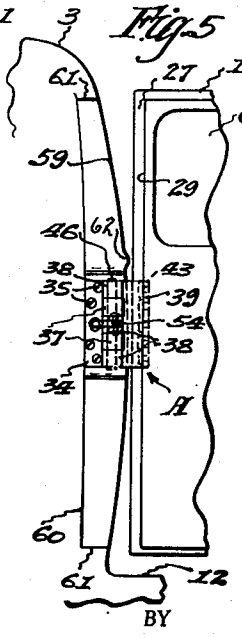
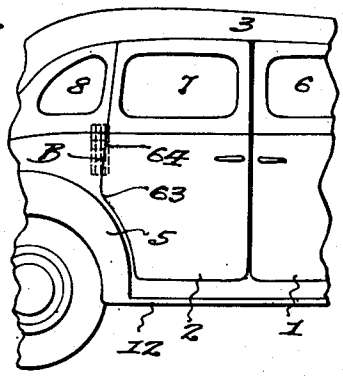


Fig. 6



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HINGE MECHANISM

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3 Claims. (Cl. 296—44)

This application is a refiling of application Serial Number 130,977, filed March 15, 1937, which became abandoned for failure to answer within the six months period.

My invention relates to improvements in hinge mechanisms for doors of vehicle bodies in which the hinge mechanisms are concealed in portions of the structure of the bodies; and the objects of my improvements are, first, to provide a hinge mechanism that will provide considerable economy in its assembly with a body structure, second, to provide hinged support means for a door of a vehicle body and comprising a sole hinge mechanism for each door, third, to provide a hinge mechanism for a body structure that will provide a minimum of distortion or replacement of the portions of the body structure due to concentration of points of assembly of the hinge mechanisms relative to the doors and supporting portions of the body structure to which the hinge mechanisms are connected, fourth, to provide a hinge mechanism for a door of a body and which is located adjacent the maximum or widest portions of the body, fifth, to provide a hinge mechanism that will provide increased streamlining characteristics of a body with which it is utilized, sixth, to provide a hinge mechanism for a door of a body and which is located adjacent the maximum or thickest portions of the door, seventh, to provide a door and sole hinge assembly which can be assembled in a bench assembly operation and then assembled to a door post structure by a sole fastening operation of one of the cooperating portions of the sole hinge assembly to said door post structure, eighth, to provide a hinge mechanism for a door which can be assembled in a sole chamber of a door post structure, ninth, to provide a hinge mechanism for supporting a door assembly of a body with a stop or check mens for limiting the opening movement of the door assembly and exerting its resultant reactions on portions of the body adjacent said hinge mechanisms, tenth, to provide a hinge mechanism for supporting a door assembly of a body with a stop or check means for limiting the opening movement of the door assembly and extending through the hinge mechanism, eleventh, to provide a hinge mechanism for supporting a door assembly of a body with a stop or check means for limiting the opening movement of the door assembly and connected directly with the hinge mechanism, twelfth, to provide a hinge mechanism for a door for a body that will prevent sagging of the door.

I attain these objects by the mechanism illustrated in the accompanying drawing, in which:

Figure 1 is a side view of a vehicle provided with a body structure having doors supported by my hinge mechanisms,

Figure 2 is a sectional view of the body structure of the vehicle taken on the line 2—2, Figure 1, said sectional view disclosing the hinge mechanism and door in their closed positions;

Figure 3 is a sectional view of the body structure disclosed in Figure 2 but with the hinge mechanism and door in open positions,

Figure 4 is a partial side view of the body structure together with the hinge mechanism concealed therein,

Figure 5 is a partial sectional view of the body in a vertical plane through its door opening and looking directly at that portion of the hinge mechanism secured to a door post of the body structure, the door thereof being disclosed in an open position,

Figure 6 is a partial side view of a vehicle and its body structure together with a door and door post having their adjacent sides located in a plane inclined relative to the vertical, and

Figure 7 is a partial vertical section through the hinge mechanism on the axis of the hinge pin.

Similar numerals refer to similar parts throughout the several views.

Figure 1 discloses an automotive vehicle having a body structure incorporating the front door 1, the rear door 2, top 3, windshield 4, rear fender 5, windows 6, 7 and 8, front fender 9, cowl 10, hood 11, and running board 12, together with the remaining portions and units of body and vehicle.

The front door 1 and rear door 2 are respectively supported each by a sole hinge mechanism indicated respectively at A and B, Figure 1.

Figure 2 and 3 disclose the sectional view of the hinge mechanisms, the right hand side hinge mechanisms being disclosed in Figures 2 and 3. The rear side of the cowl 10 and the front side of the body structure adjacent the rear door 2 are constructed with outer and inner panels or wall portions 15 and 16 forming the space or chamber 17 therebetween, the end portion of the space or chamber 17 being closed by a wall portion or member 18 which forms a door post structure, the wall portion or member 18 being provided with an indented space or chamber 19 in the side of the door post structure adjacent the front and rear sides of the doors 1 and 2, the wall portion or member 18 being reinforced

by a support member 20 within the chamber 17 and suitably connected as by welding, riveting or similar fastening means to the member 18, the support member 20 being also constructed with a shape to conform to the chamber 19, the support member being preferably constructed with an U shaped section with its side flanges 21 respectively secured as by welding or similar fastening means to the outer and inner panels or wall portions 15 and 16.

The inner panel or wall portion 16 will be extended and bent upon itself to form as at 22 a double wall portion at the inside of the chamber 19, the material of the double wall portion 22 being further extended to form the wall member 18, which is further extended to form the side wall portion 23 adjacent the inside of the outer panel 15 to form an outer double wall portion for the chamber 19.

The side wall portion 23 is provided with a depressed portion 24 at its edge which is enclosed by a similar depressed portion 25 which is formed along the edge of the outer panel 15 in a manner to extend on opposite sides of the depressed portion 24 of the panel 23, thus providing an interlocking feature which is provided with the depressed surface 26 which is adapted to be engaged by the inner surface of the double wall flange 27 constructed at the outside corner, sealing or weatherstrip portion of the front and rear doors 1 and 2.

It is thus to be noted that the chamber 19 will be closed by the front door 1 when the front door 1 is in its closed position as disclosed in Figure 2, the doors such as the front and rear doors 1 and 2 each being provided with an outer wall panel 28 which is folded over into a convoluted construction as disclosed above relative to the flange 27, the inner side wall portion of the flange 27 being extended to form the end wall portion 29 which is extended at its inner side to form the inner wall panel 30, the end wall 29 of the door 1 being provided with a depressed portion to form the chamber 31 which has its bottom wall 32 suitably secured to the reinforcing support member 33 which is preferably constructed with an U shape having side flanges 21 similar to the support member 20, the side flanges 21 being adapted to be respectively secured to the inner and outer panels 30 and 28 of door 1.

It is now to be noted that the front and rear doors 1 and 2 of the vehicle body are each supported by a sole hinge mechanism or assembly, the respective hinge assemblies for the front and rear doors 1 and 2 being disclosed as front hinge assembly A and rear hinge assembly B in Figure 1.

The right hand front hinge assembly A is disclosed in Figures 2 and 3 and comprises a flange 34 which is secured to the wall member 18 and to the support member 20 by the screws 35.

The nuts 36 are mounted at the inside of the support member 20 and within the chamber 17 for retaining the screws 35 in their position for securing the flange 34 within the chamber 19 in its fixedly supported position for solely supporting the front door 1.

The flange 34 is provided with a pair of ears or bosses 37 which extend between the ears or bosses 38 which are each connected to the flange 39 by a curved or circular portion 40 which in turn is connected by substantially straight flange portion 41 to the ears or bosses 38.

The ribs or webs 42 may be utilized for connecting the curved or circular portions 40 together with the straight portions 41 with the ears or bosses 38 to provide suitable strength for supporting the door 1 from the bosses or ears 37 of the flange 34 mounted within the chamber 19 of the door post structure.

Thus it will be seen that the flange 39 is seated in the recess 31 which forms a pocket or recess therefor in the end walls 45 of the door, the flange 39 being rigidly secured to the wall portion 32 as well as the support member 33 by the screws or rivets 43 and the nuts or heads 44 or similar fastening means.

The hinge pin 46 is assembled within and through the bores 47 of the ears or bosses 38 and 37 respectively of the flanges 39 and 34, the hinge pin 46 being suitably locked against longitudinal movement by a set screw 48 which may extend through the wall portions of one of the bosses or ears 37 to engage a notch or groove 50 in the hinge pin 46. Thus the hinge pin 46 is adapted to be constructed of bar stock material having a uniform diameter and which may be held to a nominal size with a reasonable close limit, thus permitting the hinge pin 46 to be very economical in construction and at the same time providing maximum and extended bearing areas advantageously positioned to efficiently and rigidly support the door members each in a sole hinge mechanism.

It is to be noted that when the door 1 or similar door member is in its open position as disclosed in Figure 3, the flange 27 of the door 1 will move to a position forwardly or rearwardly of the depressed surface 26, dependent upon whether the swinging door 1 is a front or rear door, and the curved or circular portion 40 connected to the flange 39 and forming the door hinge member will have moved to a position where the depressed wall portions 24, 25 and 26 lie substantially at the center of a radius defining the curved or similar portion 40 as viewed in Figure 3.

Also where desired, the boss or lug 51 may be suitably connected integrally or removably with the portions 40 and 41 of the door hinge member to provide means for connecting the yoke or similar member 52 with the lug or boss 51 by means of a pivot pin 53.

The yoke or similar member 52 which is suitably connected with the rod 54 which may be of suitable shape to extend through suitable slots or openings in the flange 34 and wall portion 18 and support member 20 so that the other end of the rod member 54 may be suitably connected with a stop member 55 which is located in the chamber 17 and adapted to engage and abut the support member 20 to prevent the door 1 from opening beyond a predetermined position such as that disclosed in Figure 3.

The stop member 55 is preferably constructed of resilient or similar material such as rubber or similar composition having cushioning characteristics.

The rod 54 may be suitably shouldered to provide means for mounting the washer 56 for locating the stop member 55 in one direction, the stop member 55 being retained from longitudinal movement in the other direction by means of the retainer member or cap 57 which is constructed with a suitable form to accommodate a tapered or conical construction of the stop member 55, the cap member 57 being secured to the rod 54 by the nut 58.

Thus the rod 54 is adapted to slidably or movably engage and extend through the flange 34 together with its adjacent wall portions with which

it is connected to permit the stop member 55 to move back and forth in the chamber 17 with the opening or closing movements of the door 1 and by the abutting engagement of the stop member 55 with the support member 20 to limit the opening movement of the door 1 as disclosed in Figure 3, thus providing not only a sole hinge mechanism for supporting a door and which is substantially enclosed for concealment within a chamber 19 of the door past structure but also the door stop means coupled with the hinge mechanism which is also concealed within the chamber 19 and between the panels of the body or cowl structure incorporating the chamber 17.

It is now to be noted that I have provided a sole hinge mechanism adapted to support a door from and at one main point or location as indicated by the position of the hinge assemblies A and B in Figure 1, thus not only decreasing the number of parts necessary to construct the hinge assemblies but also materially reducing the cost of installation of the hinge mechanism due to the fact that only one hinge mechanism has to be installed for each individual door. Also it is to be noted that the construction of conventional bodies of automotive vehicles require curvatures of different shapes and sizes to provide a blended and harmonious body design to provide streamline and other suitable characteristics in appearance, this being disclosed in Figure 5 in which the top of the body 3 is shown connected with the side of the body which is disclosed as having a curved surface 59 connected between the top portion 3 and the running board 12, the apex of the curved surfaces 59 at each and opposite sides of the body representing the maximum overall width or dimension of the body.

Figure 5 discloses the door 1 in its open position and it is to be understood that the flange portion 27 will be formed with a shape to conform to the curved surface 59 so that the flange portion 27 and the outline or shape of the door 1 will conform to the curved surface 59 and blend with the remaining portions of the body when the door 1 is in its closed position as disclosed in Figures 1 and 2.

Therefore it will be noted that in order to accommodate various curved formations of the body, together with its door structure, the hinge mechanisms A and B will be respectively mounted at the wide portion of the body and also at the wide or maximum thickness of the door structure.

Thus it will be noted that the space or area occupied by the door 1 will enable the door 1 to be positioned flush with the vehicle body when it is closed as indicated by the lines 60 and 61, which together with the curved surface 59 defines a space having somewhat of a rectangular shape or outline into which the door 1 fits when closed, thus clearly discolsing that the hinge mechanism A is mounted so that it is intersected by a horizontal plane bisecting the door and hence located at the maximum width or thickness of the body as well as the door 1.

Also it is to be noted that when the hinge assembly A is assembled, the hinge pin 46 will be inserted in such an assembly operation through the ears or bosses of the door post and door hinge members before the door 1 is mounted on the vehicle body as may be done by a bench assembly and in this bench assembly operation the flange 39 will be rigidly secured to the door 1 while the flange 34 will be supported from the door 1 by means of the hinge pin 46 being assembled with the ears and bosses of the two cooperating hinge members and locked in position by the set screw 48.

Then the door 1, together with the two hinge members assembled together thereon will be inserted through the open side of the chamber 19 so that the flange 34 will rest against the wall portion 18, whereupon the screws 35 may be assembled through the wall portion 18 and the support member 20, it being assumed that the inner wall portion of the chamber 17 is not closed entirely at this period of the assembly operation when the set screws 35 and nuts 36 are used.

It is to be noted that the assembly of the five screws 35 represent the total work necessary to completely install the door and its hinge mechanism on the door post structure and such work is carried on substantially at a sole portion of the body asembly, thus insuring that the body structure will not be warped or displaced from its initial or assembled positions as might be caused by the use of a plurality of hinges at different points along the door post.

Also it will be noted that the hinge assembly A is substantially midway in an up and down direction between the top and bottom portions of the front door 1 and very close to the lower portion of the window 6, or in other words, very close to the upper corner of the cowl structure 1 as indicated by the belt line 62, as well as the point of maximum width of the body.

Also the hinged assembly B is located just above and adjacent the curved surface 63 which is formed on the lower corner of the rear door 2 to clear the bulge of the rear fender or wheel housing 5, the hinge assembly B thus being located just above the rear fender 5 and below the window 8, the location of the hinge assembly A and the hinge assembly B of course being located at the front and rear side portions of the doors 1 and 2 respectively.

Figure 6 discloses an opposite side of the vehicle body with the right hand side front and rear doors 1 and 2 but with the hinge assembly B supporting the door 2 which has its rear end or edge surface 64 disclosed as being inclined upwardly and forwardly relative to the curved portion 63 of the door and also relative to a vertical plane extending through the body of the vehicle, thus indicating that the edge portions of the doors 1 and 2 may be varied to suit the curvature or similar conditions of the vehicle body and yet permitting the hinge assembly to be assembled rigidly and efficiently for efficiently supporting a door assembly solely by means of a single or sole hinge mechanism for each individual door assembly.

Figure 7 discloses a partial vertical section through the center of the hinge on the axis of the hinge pin to disclose a plurality of bushings 66 which may be inserted in larger bores of the ears or bosses 37 and 38 of the coupling bosses of the hinge mechanism, the bushings 66 being provided with head or flange portions 67 which may engage one another and form increased areas for supporting the weight of the door assembly.

Also the use of the bushings 66 will provide a lubricant chamber 68 between the bushings 66 to provide a container for lubricant for the hinge pin 46 over long periods of time.

It is also to be noted that the mounting of a sole hinge mechanism for supporting a door assembly permits the location of the sole hinge mechanism to be selected at a point below the uppermost portion of a conventional door assembly to which must be connected or conventionally

mounted a supplementing or complementary hinge mechanism where a plurality of hinge members are used for each door assembly, thus permitting the sole hinge mechanism of my invention to be located at a lower and more substantial portion of the structure of the vehicle body, thus localizing the stresses and strains necessary to support a door assembly at a lower point than would be the case in which a plurality of hinged members are used for supporting a door assembly, thus further providing for the ability to locate the supporting portions of the door post structure at the most advantageous and rigid points of the cowl or body construction.

It is also to be noted that the construction and installation of my hinge mechanism, due to its totally concealed position, will increase the streamlining characteristics of the vehicle due to no portions of the hinge mechanism extending out from the contour of the body to develop wind resistance, thus eliminating wind resistance and whistling noises developed by conventional hinge mechanisms which protrude from the contour or surface of the vehicle body.

Also the mounting of the door assemblies each on a sole hinge assembly will provide for the squaring of the doors in their final assembled positions more easily than is possible where a plurality of hinge mechanisms are conventionally used on a single door assembly and in which the alignment of the plurality of hinges requires considerable difficulty due to the tendency of the door and body assemblies to depart and to be displaced from their initial assembled or theoretical positions.

Also it is to be noted that the tendency of the design of the bodies for vehicles have developed into what is commonly known as "tear drop" construction in which curved side surfaces such as 59 in Figure 5 develop a decided maximum width of the body substantially midway of its height and this has further developed considerable difficulty in the mounting of the door assemblies to fit such curvature where a conventional plurality of door hinges for each door assembly are utilized, thus disclosing the efficiency of supporting a door assembly solely by one hinge assembly mounted at the maximum or wide part of the body construction.

Also it is to be noted that the operation of the different stop means of my invention permit the resultant reactionary load or thrust from the stop member 55 to be contained within the hinge mechanism due to the abutting engagement of the stop member 55 with the support member 20 at a point substantially in a plane extending horizontally through the hinge mechanism, thus eliminating the distortion and similar tendency developed where such a stop or similar means is attached to a door at a remote point from conventional hinge assemblies.

In operation, the hinge assembly is secured to the hinge pin 46 and to its companion hinge mechanism which is assembled and secured to the door assembly such as 1 and then the hinge assembly, comprising its cooperating portions, is inserted through the open side of the chamber 19 after which the flange 34 of the hinge mechanism is secured to the inner wall portions of the chamber 19, the hinge assembly being located substantially at the wide portion of the body and of the door assembly. Then the rod member 54, together with its end 52 and its pivot pin 53 are connected to the boss 51 in a manner to permit the rod member 54 to extend through suitable openings in the rear wall portions of the chamber 19 to permit the rod member 54 to be movably operated when the door 1 is opened and closed, the stop member 55 abutting the rear wall portions of the chamber 17 to limit the opening movement of the door 1 as indicated in Figure 3.

What I claim is:

1. The combination of a vehicle body curved in vertical transverse section and having window openings therethrough, a door for said body, and a unitary concealed hinge assembly having a fixed axis of swing supporting said door from said body intermediate the height thereof, said hinge assembly being of limited length with the top thereof being at the approximate height of the lowermost edge of said window openings and the bottom thereof substantially above the bottom of the door.

2. The combination of a vehicle body having outwardly curved side walls with the widest portion thereof being restricted to a narrow zone substantially midway of the height thereof, a door for said body having a window opening therein, and a unitary concealed hinge assembly of limited length and having a fixed axis of swing for swinging said door from said body located at the region of greatest curvature of said body and intersected by a horizontal line extending through the center of gravity of said door, said hinge assembly being limited in vertical height to a length such that it extends slightly below said horizontal line and such that the top thereof resides below said window opening.

3. The combination of a body of a vehicle curved in vertical transverse section and provided with a curved wheel housing, a door for said body having a window opening therein and having a curved portion at its lower corner portion for clearing said wheel housing, a unitary concealed hinge assembly having a fixed axis for relative swinging movements of the members thereof, one of said members being connected to said door, the other of said members being connected to said body immediately above said wheel housing, said unitary concealed hinge assembly being located vertically entirely between said window opening and said lower corner portion.

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