May 14, 1940. S. B. ATWOOD 2,200,441

HINGE

Filed Sept. 17, 1938

Fig. 1

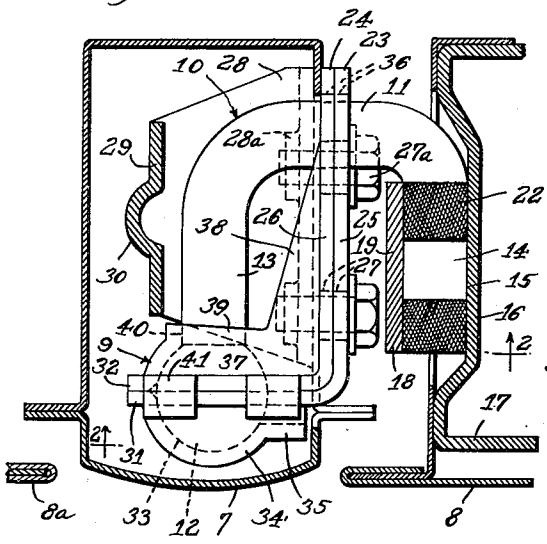


Fig. 5

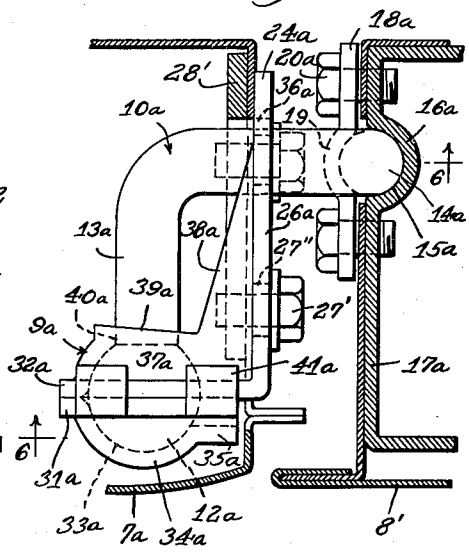


Fig. 2

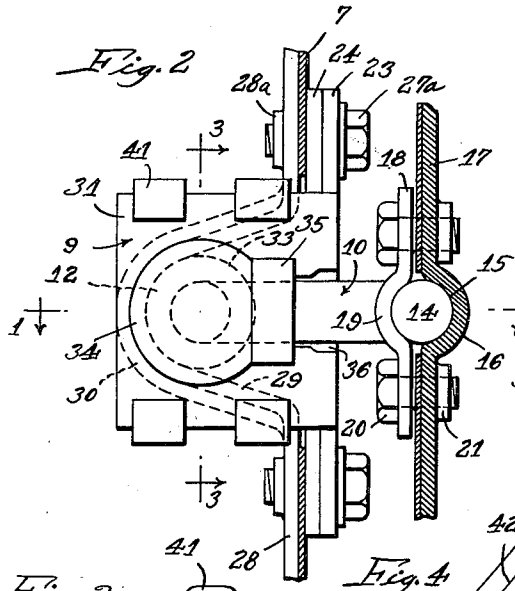


Fig. 6

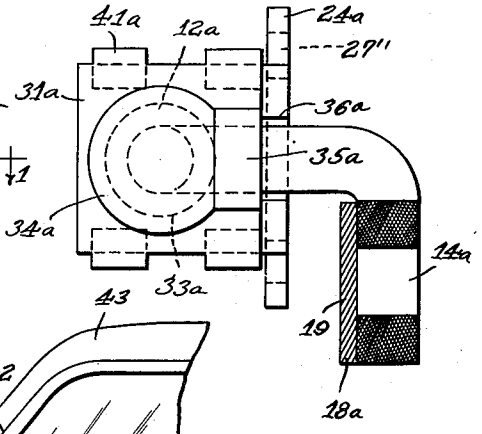


Fig. 3

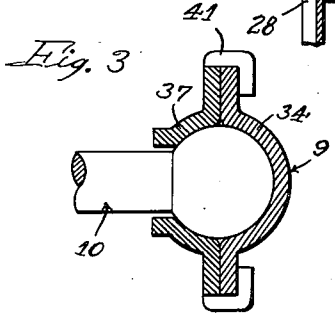
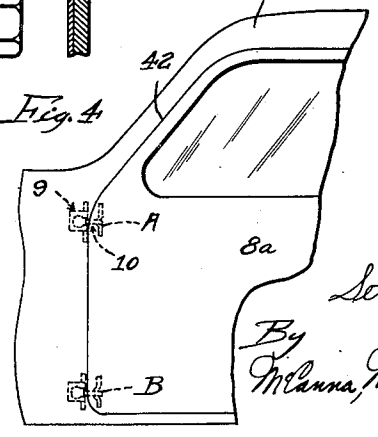


Fig. 4



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2,200,441

HINGE

Seth B. Atwood, Rockford, Ill.

Application September 17, 1938, Serial No. 230,457

11 Claims. (Cl. 16—129)

This invention relates to improvements in concealed ball and socket hinges for the doors of motor vehicles.

One of the principal objects of my invention is to improve and at the same time reduce the cost of manufacture of the sheet metal socket members. These have been made heretofore in two stamped pieces, generally L-shaped in form, nested together and riveted at four points around the socket portion. While that construction is commercially practical and satisfactory, generally speaking, there are the objections that the design is too costly because of the amount of sheet metal required and because of the labor involved in riveting.

In the hinge of my invention, I propose having integral lugs or arms on one of the socket parts, arranged to be bent over the edge of the companion part at spaced points around the socket to clinch the parts together, thus simplifying the construction by eliminating the necessity of piercing holes for the rivets and lowering the cost further by eliminating the rivets and the costlier riveting operation.

I further propose to simplify the socket member and reduce the cost thereof by providing only one L-shaped sheet metal stamping with a semi-spherical socket portion in the one leg thereof, and then instead of having a second L-shaped socket piece to nest on the first, I propose to provide merely a small cap piece for the socket portion of the L-shaped piece, the cap piece having a complementary semi-spherical socket portion to register with the semi-spherical socket portion in the L-shaped piece.

In the ball and socket hinge as heretofore constructed, the ball-headed gooseneck member was heretofore L-shaped, the attaching shank portion provided on the one leg of the L being arranged to be clamped onto the inner side of the door in substantially parallel relation to the outside of the door and body. However, that construction was objectionable because it interfered with having the upholstery finished on the inside of the doors until after the doors were hung and it made it necessary to make special provision otherwise for upholstering over the hinge fastenings. In the hinge of my invention, I propose to provide a gooseneck member that is adapted to be fastened onto the hinge of the door just as securely and with the same ease and range of adjustability with respect to the door as was possible heretofore with the old construction.

The invention is illustrated in the accompanying drawing, in which—

Figure 1 is a horizontal section through a portion of a door panel and door showing a concealed ball and socket type hinge made in accordance with my invention, this view being partly in section on the line 1—1 in Fig. 2, but showing the socket member in plan view;

Fig. 2 is a vertical section on the broken line 2—2 of Fig. 1, showing the hinge in front elevation;

Fig. 3 is a sectional detail on the line 3—3 of Fig. 2;

Fig. 4 is a fragmentary side view of an automobile, the door of which is equipped with concealed hinges, like those shown in Figs. 1 and 2, the hinges appearing in dotted lines, and

Figs. 5 and 6 are views similar to Figs. 1 and 2, respectively, showing another hinge construction, Fig. 5 being a horizontal section with the entire hinge appearing in plan view and Fig. 6 being a vertical section on the broken line 6—6 of Fig. 5.

Similar reference numerals are applied to corresponding parts throughout the views.

Referring first to Figs. 1 to 4, 7 designates the pillar and 8 the door, but it will soon be evident that it is immaterial whether the socket member 9 and gooseneck member 10 of my improved ball and socket hinge are mounted on the pillar and door, respectively, or vice versa. The pillar 7 is of the type that will be provided in a four-door car between front and rear doors, the door 8 being a rear door and there being also a front door 8a, a portion of whose flange appears in Fig. 1. The gooseneck member 10 is formed from a single piece of rod material to provide a generally U-shaped shank 11 terminating at one end in a ball head 12 formed as an integral enlargement of the end of the shank. One arm 13 of the U carries the ball head, and the other arm 14 in spaced parallel relation thereto constitutes the attaching shank portion. An elongated horizontal recess 15 of semi-circular form to accommodate one half of the cylindrical attaching portion 14 is provided by indenting a portion 16 of a sheet metal reenforcing member 17 in the door 8. A sheet metal clamp member 18 has an intermediate generally semi-circular portion 19 to embrace the other half of the cylindrical attaching shank portion 14 and is adapted to be secured to the edge of the door by screws 20 entered through holes in the ends of the clamp member 18 and threaded in swedged holes 21 provided in the reenforcing

member 17 in the door. The holes at 21 are first pierced and then swedged by means of a punch, and thereafter are tapped to receive the screws 20, whereby to provide longer threaded holes and consequently better anchorage for the screws 20 than would be provided in the thickness of the reenforcing member 17 otherwise. The attaching shank portion 14 is preferably knurled, as at 22, to provide good gripping surfaces and accordingly avoid danger of the shank turning out of position or moving endwise out of position after it has been clamped.

The socket member 9 is formed from two L-shaped sheet metal stampings 23 and 24 providing abutting attaching portions 25 and 26 parallel to the edge of the door pillar through horizontally elongated slots 27 in which bolts or cap screws 27a are passed to secure the hinge to the pillar by means of an inner reenforcing anchor plate 28 welded or otherwise rigidly secured inside the pillar 7. The plate has swedged and tapped holes 28a to receive the bolts or screws 27a. The plate 28 has a U-shaped yoke portion 29 bridging the gooseneck member 10 and ribbed lengthwise, as indicated at 30, to stiffen and strengthen the same. The other portions 31 and 32 of the sheet metal stampings 23 and 24 provide the socket 33 therebetween and are at right angles to the attaching portions 25 and 26, in a plane substantially parallel to the outside of the body. One half of the socket 33 is formed by a hemi-spherical socket portion 34 struck from the portion 31 of the stamping 23, the portion 34 having a channel-shaped portion 35 extending radially therefrom toward the edge of the door 8 in register with the longitudinal horizontal slots 36 provided in the portions 25 and 26 of the stampings, through which the gooseneck member 10 extends and is swingable in the opening and closing of the door. The channel formation 35 provides extra clearance for the arm 13 of the gooseneck member so that the door can be opened approximately 90°. The other hemispherical socket portion 37 registering with the socket portion 34 to define the socket 33 therebetween is provided in the portion 32 of the stamping 24. There are inturned flanges 38 on the stamping 24 on opposite sides of the slot 36, and these flanges are joined to the semi-circular flange 39 surrounding the hole 40 through which the arm 13 of the gooseneck member 10 extends from the ball head 12 disposed in the socket 33. The L-shaped flanges, interconnected as described, give the desired reenforcement for the socket member 9 and enable use of proportionately thinner sheet metal for the present purposes than would otherwise be feasible.

In accordance with my invention, instead of piercing the portions 31 and 32 in circumferentially spaced relation around the socket 33 and then riveting said portions together, I provide integral lugs or ears 41 on the edges of one of said portions, in this case the portion 32, adapted to be bent at right angles alongside the edges of the other portion 31 and again at right angles to clinch the portions together. This construction is simpler and more economical, and furthermore takes less time to assemble. The lugs hold the socket parts together just as securely as rivets, if not more securely. The portions 31 and 32 in assembling are pressed together at the edges, in radially spaced relation to the socket portions 34 and 37, so that the sheet metal between these points is free to flex, it being the practice to have the socket depressions in the portions 34 and 37 slightly under size with reference to the ball head 12, so that the ball head and socket parts will wear away as the ball head in its first stage of service wears away the minor irregularities in the socket 33 and on the ball head in seating itself. There will still be a slight amount of clearance between the portions 31 and 32 around the socket 33 after the ball head 12 has developed its seat in the socket portions 34 and 37, and in that way there is an automatic take-up for wear and consequently no danger of play developing and causing rattling. Graphite or other lubricant is spread on the ball head or in the socket portions at the time the hinge is assembled, and this lubrication lasts indefinitely.

In Fig. 4, the door 8a in the opening 42 in the body 43 is shown equipped with two hinges A and B constructed as illustrated in Figs. 1 and 2. The bolts or screws 20 and 27a are given a preliminary tightening part way, enough to allow the gooseneck members 10 to turn with respect to the door and also permit the door to slide inwardly or outwardly endwise with respect to the shanks 14 of the gooseneck members. The socket members 9 under these conditions are also free to shift slightly with respect to the bolts or screws 27a. The slots 36, as clearly indicated in Fig. 2, are wide enough in relation to the gooseneck members 10 extending therethrough to permit the desired range of angular adjustment of the gooseneck members required in vertical centering adjustment of the door. Ordinarily the socket members 9 can be located accurately enough so that whatever in or out adjustment of the doors may be desired to secure alignment thereof with respect to the body and with respect to one another can be secured by sliding adjustment of the doors endwise with respect to the shanks 14. However, such adjustment of the doors is obtainable also by sliding the socket members 9 in or out with respect to the body 43 and pillar 7. Wedge-shaped shims may be used in the adjustment of the door, as described in my copending application Serial No. 135,068, filed April 5, 1937, entered in the door opening around the door and adjusted by a workman inside the car until each door has been wedged in approximately the desired position, centrally located in its door opening and properly lined up with the body and the other door, whereupon the bolts or screws 20 can be tightened from inside the car to clamp the gooseneck members 10 in their adjusted relationship to the door, before the doors are opened and the shims removed. When the doors are opened, the other bolts or screws 27a are tightened up and then the door can be closed again to re-check the adjustment, and any minor adjustment of either hinge can be made by loosening and re-tightening the bolts or screws thereof. Once the bolts or screws are tightened firmly, there is no danger of the doors sagging or shifting in any way from their adjusted positions in the door openings.

The hinge construction illustrated in Figs. 5 and 6 is generally similar to that of Figs. 1 and 2. However, the socket member 9a has only one L-shaped stamping 24a which is generally similar to the stamping 24 of Figs. 1 and 2, and, instead of the companion stamping 23 shown in Figs. 1 and 2, a stamping 31a is provided as a companion piece for the portion 32a and having a socket portion 34a formed therein to register with the socket portion 37a on the stamping 24a to complete the socket 33a for the ball head 12a. In this case, there is also a channel formation 35a

on the stamping 31*a* extending radially from the socket portion 34*a* and registering with the slot 36*a* in the stamping 24*a*. The clinching lugs or ears 41*a* in this case are provided on the stamping 31*a* and bent over the edges of the portion 32*a* of the stamping 24*a*. The bolts or screws 27' are entered through slots 27'' in the attaching portion 26*a* of the stamping 24*a*, and are entered in a tapping plate 28' provided in the pillar 7*a*. The stamping 24*a* has flanges 38*a* on opposite sides of the slot 36*a* joined at their wide ends to the ends of the semi-circular flange 39*a* surrounding the hole 40*a* in the socket portion 37*a* through which the arm 13*a* of the gooseneck member extends from the ball head 12*a*. This construction of the socket member involves the use of less sheet metal and results in a substantial saving in cost of manufacture, even though heavier gauge sheet metal is employed. This hinge is just as strong and rigid as one constructed along the lines of Figs. 1 and 2.

The gooseneck member 10*a*, illustrated in Figs. 5 and 6, has the attaching shank portion 14*a* thereof extending at right angles to the plane of the rest of the gooseneck member to fit in a vertical depression 15*a* provided by an indented portion 16*a* in the sheet metal reenforcing member 17*a* in the edge portion of the door 8'. The clamp 18*a* cooperating with the shank 14*a* is similar to the clamp 18 previously described and is arranged to be secured by screws or bolts 20*a*. With this construction, there is less danger of the gooseneck member shifting from its adjusted position once the bolts or screws have been tightened. The vertical centering adjustment of the door 8' is obtained by sliding the door endwise with respect to the two shanks 14*a* on the two hinges provided, while in or out adjustment of the door to align the same with respect to the body and other door is obtainable either by rotation of the shanks 14*a* relative to the door or by sliding the socket members 9*a* in or out with respect to their bolts or screws 27'. The procedure in mounting the door is otherwise the same as described above with reference to the door 8*a* in Fig. 4.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. The appended claims have been drawn with a view to covering all legitimate modifications and adaptations.

I claim:

1. As an article of manufacture, a hinge of the ball and socket type comprising an L-shaped plate conformed to provide a ball socket portion on one leg of the L and having a registering slot in the other leg of the L opening at one end into the socket, said plate also having holes provided in the latter leg of the L adapted to receive fastening means for fastening the same to a door pillar, the socket portion having an opening in the wall thereof also communicating with the aforesaid slot, a gooseneck member having an L-shaped end projecting through the slot and through the opening into the socket and carrying a ball head on the extremity thereof fitting movably in the socket, the other end of said gooseneck member having means for securing the same to a door to be hinged, a plate engaging only the first-mentioned leg of the L-shaped plate conformed to provide a complementary socket portion for the first-mentioned socket portion to retain the ball head in the socket, and means for securing the plates together.

2. An article of manufacture as set forth in claim 1, wherein the second plate has a channel portion formed thereon extending radially from the socket portion with the inside of the channel portion communicating with the inside of the socket portion and also registering with the end of the slot in the other plate so as to provide additional working clearance in the channel for the ball end of the gooseneck member in the pivotal movement of the gooseneck member relative to the socket.

3. As an article of manufacture, a hinge of the ball and socket type comprising two nested L-shaped plates conformed to provide a ball socket therebetween on one leg of the L, and having registering slots in the other leg of the L, said plates also having registering holes provided therein in the latter leg of the L adapted to receive fastening means for fastening the same to a door pillar, a gooseneck member having an L-shaped end projecting through the registering slots and into the socket and terminating in a ball head fitting movably in the socket, means for securing the other end of said gooseneck member to a door to be hinged, and means for fastening the two L-shaped plates together by their first-mentioned leg portions comprising lugs projecting from the edges of one of said plates and adapted to be bent over the adjacent edges of the other plate.

4. As an article of manufacture, a hinge of the ball and socket type comprising two nested L-shaped plates conformed to provide socket portions defining a ball socket therebetween on one leg of the L and having registering slots in the other leg of the L opening at one end into communication with the ball socket, said plates also having registering holes provided therein in the latter leg of the L adapted to receive fastening means for fastening the same to a door pillar, the socket portion in the inner one of said plates having an opening provided in the wall thereof also communicating with the slots, a gooseneck member having an L-shaped end extending through the slots and through said opening into the ball socket and terminating in a ball head fitting movably in the socket, means for securing the other end of the gooseneck member to a door to be hinged, and means for securing the two L-shaped plates together by the first-mentioned leg portions comprising lugs projecting from the edges of one of said plates and adapted to be bent over the adjacent edges of the other of said plates.

5. As an article of manufacture, a hinge of the ball and socket type comprising two sheet metal plates to form a socket member disposed in a substantially vertical plane and having flat abutting portions centrally oppositely conformed to provide a ball socket therebetween the outer circumference of which is in spaced relation to the edges of said flat abutting portions, at least one of said plates having openings provided therein adapted to receive fastening means for fastening the same to a door pillar, and a gooseneck member adapted to be secured to a door to be hinged and having one L-shaped end disposed in a substantially horizontal plane and terminating in a ball head fitting movably in the socket, said socket member having a slot provided therein opening into said socket through which said gooseneck member projects and is movable, said ball head being of sufficient size in relation to the socket and the sheet metal of said plates being sufficiently thin and resilient to permit flexing

the outer edge portions toward one another to bring the flat abutting portions into abutment after the ball head is entered in the socket, and at least one of said plates having bendable lugs integral therewith and projecting from the edges thereof around the adjacent edges of the other plate to hold the plates together independently of other fastening means with the ball head retained in the socket under spring pressure of the plates toward one another.

6. As an article of manufacture, a hinge of the ball and socket type comprising two plates disposed in a substantially vertical plane and conformed to provide a ball socket therebetween, and at least one of said plates having means for securing the same together and having openings provided therein adapted to receive fastening means for fastening the same to a door pillar, and a gooseneck member the opposite ends of which are L-shaped, having one L-shaped end portion disposed in a substantially horizontal plane terminating in a ball head fitting movably in the socket, the other L-shaped end portion of said gooseneck member being an attaching end portion disposed in a substantially vertical plane, and means for securing the attaching portion to the edge of a door to be hinged.

7. A hinge as set forth in claim 6, wherein at least one leg of the attaching end portion is of cylindrical form and wherein the means for securing the same to the edge portion of a door comprises clamping means with relation to which said leg is adjustable rotatably and endwise.

8. In a hinge construction for automobile doors, the combination of a socket member and a ball headed gooseneck member, the socket member having means for securing the same to a door pillar, the gooseneck member comprising a shank portion, opposite ends of which are L shaped, one L-shaped end portion being disposed in a substantially horizontal plane and having a ball head thereon received in the socket of the socket member with a swivel fit, the other L-shaped end portion being of cylindrical form and adapted to be clamped to the edge portion of a door in a plane substantially at right angles to the planes of the inner and outer faces of the door, and clamping means adapted to be secured to the door with relation to which the last named end portion of the gooseneck member is adjustable rotatably and endwise.

9. In a hinge construction for automobile doors, the combination of a socket member and a ball headed gooseneck member, the socket member having means for securing the same to a door pillar, the gooseneck member comprising a shank portion, opposite ends of which are L shaped, one L-shaped end portion being disposed in a substantially horizontal plane and having a ball head thereon received in the socket of the socket member with a swivel fit, the other L-shaped end portion being of cylindrical form and adapted to be clamped to the edge portion of a door in a vertical plane substantially parallel to the planes of the inner and outer faces of the door, and clamping means adapted to be secured to the door with relation to which the last named end portion of the gooseneck member is adjustable rotatably and endwise.

10. In a hinge construction for automobile doors, the combination of a socket member and a ball headed gooseneck member, the socket member having means for securing the same to a door pillar, the gooseneck member comprising a shank portion, opposite ends of which are L shaped, one L-shaped end portion being disposed in a substantially horizontal plane and having a ball head thereon received in the socket of the socket member with a swivel fit, the other L-shaped end portion being of cylindrical form and adapted to be clamped to the edge portion of a door in a plane substantially at right angles to the planes of the inner and outer faces of the door, and clamping means adapted to be secured to the door with relation to which the last named end portion of the gooseneck member is adjustable rotatably.

11. In a hinge construction for automobile doors, the combination of a socket member and a ball headed gooseneck member, the socket member having means for securing the same to a door pillar, the gooseneck member comprising a shank portion, opposite ends of which are L shaped, one L-shaped end portion being disposed in a substantially horizontal plane and having a ball head thereon received in the socket of the socket member with a swivel fit, the other L-shaped end portion being of cylindrical form and adapted to be clamped to the edge portion of a door in a vertical plane substantially parallel to the planes of the inner and outer faces of the door, and clamping means adapted to be secured to the door with relation to which the last named end portion of the gooseneck member is adjustable rotatably.

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