May 14, 1940. S. B. ATWOOD 2,200,251

HINGE

Filed May 12, 1937

Fig. 1

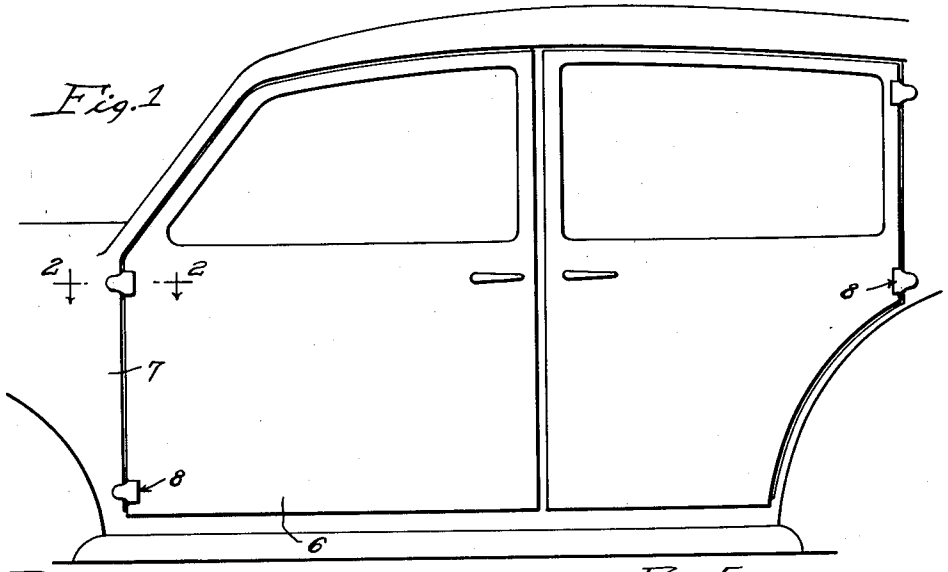


Fig. 2

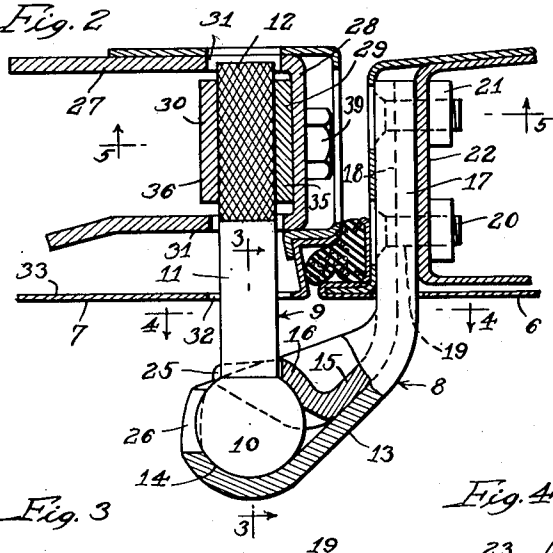


Fig. 5

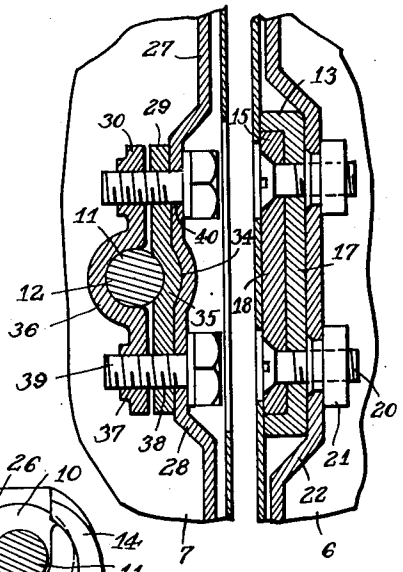


Fig. 3

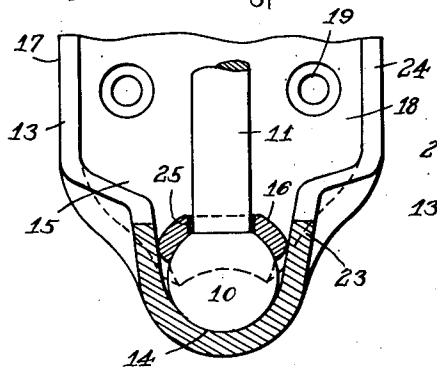
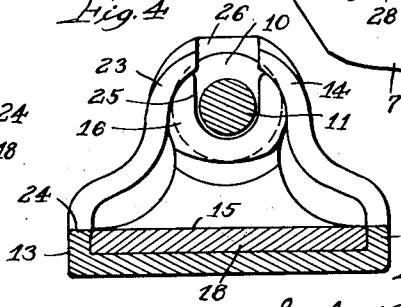


Fig. 4



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UNITED STATES PATENT OFFICE

2,200,251

HINGE

Seth B. Atwood, Rockford, Ill.

Application May 12, 1937, Serial No. 142,111

7 Claims. (Cl. 16—135)

This invention relates to new and improved ball-and-socket hinges for mounting doors on motor vehicles.

It is common practice now to use pintle type hinges on the doors of motor vehicles, and, due to the curvature of the bodies and the amount of deviation from standard body specifications occurring in quantity production, there has been considerable difficulty in mounting doors with these hinges. It is customary to bend the hinges enough to center the doors and line them up relative to one another and to the body, but with that type of hinges, it is apparent that binding is inevitable, due to the pintle bearings being thrown out of alignment by the bending, and it is generally conceded that most of the wear on the hinge pintles and the consequent play and door rattling is directly traceable to this bending of the hinges in the mounting of the doors. It is therefore the principal object of my invention to provide a pair of exposed ball-and-socket hinges on each door of a motor vehicle, whereby to eliminate the problems going with misalignment of pintles and accordingly insure easier operation of the doors.

In mounting a door with the improved ball-and-socket type hinges of my invention, I contemplate bending just the ball head members to the extent that may be necessary in centering the doors, and it is another important object of my invention to provide means for frictionally clamping the shanks of said ball head members so as to permit in and out adjustment thereof to the extent required for aligning the doors with one another and with the body.

A further object of my invention is to provide a hinge of the kind mentioned of generally improved and simplified construction and one which may be made economically.

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

Figure 1 is a partial side view of an automobile, the doors of which are mounted on hinges made in accordance with this invention;

Fig. 2 is a horizontal section on the line 2—2 of Fig. 1, on a larger scale;

Figs. 3 and 4 are sectional details of the hinge on the correspondingly numbered lines of Fig. 2, and

Fig. 5 is a cross-section on the line 5—5 of Fig. 2.

The same reference numerals are applied to corresponding parts throughout the views.

Referring first to Figs. 2 to 5, 6 designates the door and 7 the pillar, but it will soon be evident that it is immaterial whether the socket member 8 and ball head member 9 of my improved ball-and-socket hinge are mounted on the door and pillar, respectively, or vice versa. The ball head member 9 is formed in one piece to provide a ball head 10 on the outer end of a cylindrical shank 11. The inner end 12 of the shank is knurled to facilitate clamping of the member, as hereinafter described. The socket member 8 is of sectional construction consisting of an outer or main section 13 formed at the extremity of the angled end to provide the socket 14 therein for the ball head 10, and an inner or ball head retaining section 15 formed at the extremity of its angled outer end with the forked projection 16 engaging the outside of the ball head 10 around the shank 11 to retain the head in the socket. The shank 17 of the outer section 13 is of channel-shaped cross-section and the attaching shank portion 18 of the inner section 15 fits in and is clamped between the flanges of the channel of the outer section, as shown. The registering holes 19 in the shanks 17 and 18 receive screws 20 that thread into nuts 21, welded or otherwise suitably secured on the inner side of an indented portion 22 on the edge of the door 6, whereby to fasten the socket member 8 securely to the door. Now, in the forming of the socket 14, it will be seen that the nearly half round pocket to receive the ball head 10 is formed by walls 23 that are coextensive with the flanges 24 of the attaching shank portion of the part 13. In other words, the channeled cross-section is continued throughout from the shank through the angled outer end portion of the socket member up to the socket 14. The angular outer end tapers from the width of the shank 17 down to the diameter of the socket 14, as clearly appears in Figs. 3 and 4, and this affords the additional width in the walls 23 required to form the sides of the socket, even though a sheet metal blank of substantially uniform width is used. The forked projection 16 on the outer end of the inner section 15 of the socket member, it will be observed, is rounded to spheroidal shape to conform to the ball head 10, and is of a width to fit neatly between the opposed walls 23 of the socket 14, as clearly indicated in Figs. 3 and 4. The fact that this projection is forked provides for the maximum area of contact with the ball head. The slot 25 made in the end of the projection 16 is approximately of the same length as the slot 26 made in the wall of the socket 14, and these two slots are aligned, as shown, and they provide for approximately 90° of door opening movement with-

out unnecessarily diminishing the amount of bearing contact of the ball in the socket in any position.

The pillar 7 has a channel-shaped member 27 therein. The web of this channel member has an indented portion 28 the inside of which provides a seat for one of the clamping members 29 and 30 for securing the knurled shank 12 of the ball head member 11 of the hinge to the pillar. Registering holes 31 in the opposite side walls of the channel member are aligned with a hole 32 in the outer wall 33 of the pillar through which the shank 12 of the ball head member is extended to the clamping means. The hole 32, while not large enough to be unsightly, or expose to view the inside of the pillar, is nevertheless large enough to allow the shank 11 of the ball head member 9 to be bent laterally one way or the other from a central position, for the purpose of centering the door, as hereinafter described. A transverse arcuate depression 34 is formed in the middle of the indented portion 28 to receive the arcuate intermediate portion of the clamp member 29 in which one side of the knurled shank 12 engages, as shown in Fig. 5. The other clamp member 30 has an arcuate intermediate portion 36 engaging the knurled shank from the other side, and the opposite ends of this clamp member are pierced, swedged, and tapped to provide threaded holes 37 in register with smooth holes 38 in the ends of the clamp member 29. Bolts 39 are passed through holes 40 in the indented portion 28 and extend through the holes 38 and thread in the holes 37. The clamp members 29 and 30 are thereby drawn together tightly to clamp the knurled portion 12 of the ball head member 11 therebetween, while at the same time clamping the assembly securely to the indented portion 28 of the pillar. The indentation at 28 provides a space therein for the heads of the bolts 39 so that they do not project into the door opening. The ball head member is secured firmly enough to the pillar in the manner illustrated and described to permit application of a special tool to the protruding portion of the ball head member 11 to bend it to the right or left, as may be required in the centering of a door. In this bending operation, some or all of the bend may occur either in the shank of the ball head member or in the channel member 27 of the pillar. The bending of the ball head member, or its deflection from a normal right-angle relationship to the pillar 7, will, of course, affect the position of the door 6 with respect to the body and the other door, so far as alignment of the outside surfaces thereof is concerned, and usually after the door is centered it will be found necessary to loosen the bolts 39 so as to allow the knurled shanks 12 of the ball head members 11 to be adjusted endwise with respect to the clamping means, so that the door can be adjusted in or out, as the case may be, into alignment with the other door and the body. Then the bolts 39 can be tightened again and the door is permanently positioned. In practice, the indented portions 22 and 28 on the doors and pillars can be located accurately enough so that there is no question at all about the doors being hung at the proper elevation at their hinged edges. If the outer ends of the doors don't come to the proper elevation, that can be easily remedied by bending one of the ball head members, or both, depending on the amount of adjustment necessary. Obviously, if one ball head member is bent in one direction and the other in the opposite direction, the outer end of the door is adjusted appreciably, even though each of the ball head members is given a slight bend or deflection. The bending of the ball head members 9 is preferred to bending the socket members 8, because the former are one-piece members, whereas the latter are two-piece members, and in the bending of the ball head members there is no danger of distorting or otherwise damaging the sockets. In view of the fact that each hinge determines only one point of suspension, it is clear that the bending of the ball head member will not result in binding, as in the case of the pintle type hinges where it was obviously always necessary to maintain the pintles of two or more hinges in exact alignment for smooth and easy operation of the doors.

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. In a hinge fastening for motor vehicles, a hinge seat provided in a substantially vertical plane on a sheet metal wall of a supporting member, the wall being conformed intermediate the ends of the seat to provide an arcuate recess transversely thereof in a substantially horizontal plane, a hinge clamp comprising a pair of flat sheet metal clamping members of arcuate form intermediate their ends adapted to fit on opposite sides of a substantially horizontally disposed cylindrical hinge element adapted to be clamped therebetween to support a door, the arcuate portion of one of said members projecting from the vertical plane of the member into the arcuate depression in the seat with the flat ends of said member in full engagement with the wall above and below the seat, the seat having bolt holes provided therein and the ends of said clamping members having openings provided therein in register with the aforesaid openings, and fastening means entered through the registering holes and serving to draw the clamping members toward one another and into tight engagement with the hinge seat.

2 A hinge of the character described comprising a ball head member having an attaching shank and a ball head extending outwardly therefrom and connected with the shank by a neck portion whereby to space the ball head a predetermined distance outwardly with respect to the outside of an automobile body or the like, and a socket member formed from sheet metal to provide an attaching shank portion normally in spaced substantially parallel relation to the first shank and an outer end portion formed to generally channel-shaped cross-section disposed at an angle of approximately 45° with respect to the first shank, the channel-shaped outer end portion having its extremity further formed so that the trough of the channel and the opposed flanges thereof provide a substantially semi-spherical socket to receive and partially retain the ball head, and a ball head retaining member comprising a shank portion abutting the inside of the last named shank portion and an angular outer end abutting the inside of the last named angular outer end portion, the angular outer end terminating in a projection engaging the ball head to positively retain the same in the socket, said projection having a slot provided therein at the middle thereof extending inwardly from the end thereof, and the wall of said socket having a like slot provided therein in alignment with the first slot to provide an approximately 90° range

of operating clearance for the neck portion of the ball head member.

3. In an automobile construction comprising a body and a door therefor, a ball and socket hinge comprising interfitting ball and socket members for mounting the door on the body and projecting outwardly from said body and door, said hinge members comprising a ball socket member fixed to one of said door and body and terminating in an offset outer end portion having a socket therein, and the other member comprising a ball-headed member having a straight attaching shank fixed to the other of said door and body and terminating at its outer end in a ball head entered in the socket of the socket member with a swivel action, the shank of the ball-headed member extending substantially at right angles to the plane of the outside of the door and body but adapted to have the projecting portion thereof bent to an acute angle relationship to said plane, the inner attaching end portion of said shank being cylindrical and knurled and having means for frictionally clamping the same in different positions of endwise and rotary adjustment thereof relative to the associated one of said door and body.

4. A ball-and-socket hinge for mounting a door on a vehicle body comprising a ball head member having an attaching shank adapted to be secured to one of said door and body and a ball head projecting outwardly therefrom and connected with the shank by a neck portion whereby to space the ball head a predetermined distance outwardly with respect to the outside of the body, and a socket member formed from sheet metal to provide an attaching shank portion adapted to be secured to the other of said door and body and an angular outer end portion formed to generally channel-shaped cross-section, the channel-shaped outer end portion having its extremity further conformed so that the trough of the channel and the opposed flanges thereof provide a semi-spherical socket to receive and partially retain the ball head, and a ball head retaining member secured to the attaching shank of the socket member and extending outwardly therefrom and engaging behind the ball head to positively retain the same in the socket, said socket member and ball head member being adapted to have pivotal movement relative to one another through a predetermined angular range afforded by an elongated clearance slot in which the neck portion of the ball head member is movable, said clearance slot being provided partly by a cutaway portion in the semi-spherical socket portion longitudinally relative to the socket member and partly by a longitudinally cutaway portion in the outer end of the ball head retaining member.

5. A hinge comprising a pair of hinge parts having a universal swivel connection, said parts comprising spaced attaching shanks, one of said hinge parts having a ball projecting therefrom carried on an end portion disposed in angular relationship to the related attaching shank, the angularity of which end portion in relation to the shank determines the spaced operating relationship of the two shanks with respect to one another, the other of said hinge parts having a socket projecting therefrom open laterally in the direction of the first-named attaching shank and adapted to receive the aforesaid ball with a swivel fit, the socket being carried on a hollow angular extension on the other attaching shank, means entered in said hollow angular extension serving to retain the aforesaid ball in the socket, the ball carrying end portion on the first-named shank being movable in the socket opening which is of sufficient width to permit adjustment of said end portion transversely to the hinging movement of the hinge parts relative to one another, said hinge parts being adapted to have pivotal movement relative to one another through a predetermined angular range determined by the length of the socket opening in which the ball carrying end portion on the first-named shank is movable, said socket opening being elongated and a portion of said opening being provided by a longitudinally cutaway portion in the socket on the hollow angular extension of the second shank and the remainder by a longitudinally cutaway portion in the retaining means for said ball.

6. As as article of manufacture, a sheet metal socket member for a ball-and-socket hinge comprising a two-piece body, one of which pieces is formed to provide a flat attaching shank portion and an angular channel-shaped extension integral therewith opening at its outer end into the side of a ball socket portion which is adapted to receive a ball head carried on a shank, the other piece being formed to provide a flat attaching shank portion superimposed on the first shank portion, and an angular extension adapted to be received in the aforesaid channel-shaped extension and having the outer end thereof disposed in the open side of the ball socket portion and adapted to retain the ball head therein, said socket portion and ball head retaining extension being both cut away longitudinaly to provide an elongated socket opening to afford clearance for the aforesaid ball head shank to permit approximately 90° relative movement between the ball head and socket portion.

7. As an article of manufacture, a sheet metal socket member for a ball-and-socket hinge comprising a two-piece body, one of which pieces is formed to provide a flat attaching shank portion and an angular channel-shaped extension integral therewith and terminating in a socket portion adapted to receive a ball head therein carried on a shank, the socket portion having enclosing flanges which are a continuation of the side walls of the channel-shaped extension adapted to enclose and retain approximately half of the circumference of the ball head in the socket portion, and the other piece being formed to provide a flat attaching shank portion adapted to be secured to the first attaching shank portion in superimposed relation, and an angular extension integral therewith adapted to be received in the channel-shaped extension of the first piece and terminating alongside the socket in a transverse portion projecting outwardly from the channel-shaped extension of the first piece and formed arcuate for engagement with a portion of the circumference of the ball head so as to prevent displacement of the ball head from the socket portion, said socket portion in the one piece and the transverse portion on the end of the other piece being cut away at the adjoining edges longitudinally thereof to provide an elongated slot to afford operating clearance for the shank of the ball head to permit approximately 90° relative movement between the ball head and socket portion.

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