United States Patent [19]

Krause

[11] **3,870,361**

[45] **Mar. 11, 1975**

[54] **HINGING SYSTEM FOR AUTOMOBILE DOORS WITH HINGE HALVES WELDED TO BODY AND DOOR**

[75] Inventor: **Herbert Krause,** Rockford, Ill.

[73] Assignee: **Atwood Vacuum Machine Company,** Rockford, Ill.

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[21] Appl. No.: **331,817**

[52] **U.S. Cl.** **296/146,** 16/129, 16/145

[51] **Int. Cl.** **E05d 7/04**

[58] **Field of Search** 296/146; 16/129, 130, 131, 16/145

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Primary Examiner—Robert J. Spar
Assistant Examiner—Leslie J. Paperner
Attorney, Agent, or Firm—Wolfe, Hubbard, Leydig, Voit & Osann, Ltd.

[57] **ABSTRACT**

In the present system the hinge halves for an automobile door are welded to the pillar and door for economy and to speed up assembly work. This, however, eliminates the usual form of adjustability previously available where the door hinges were fastened by screws to the body and door, and, with oversized holes or slots in the pillar or door, the hinges could be adjusted in and out and/or fore and aft to correctly fit and align the door to the body. The new eccentric bushings herein disclosed permit welding of the hinge halves in normal position, and then adjusting the door by turning the eccentric bushings in the companion upper and lower hinges, so that the proper fore and aft and/or in and out adjustments can be achieved, whereupon the bushings are easily locked in place by lock or jam nuts. Also, where there is a torsion-bar holdopen, the proper relationship between the torsion-bar and detent rollers is maintainable because the adapter plate on which the detent rollers are carried is pivotally connected with the pintle to shift as the bushing is adjusted so as to maintain the proper relationship of the rollers with the torsion-bar regardless of the bushing adjustment.

13 Claims, 8 Drawing Figures

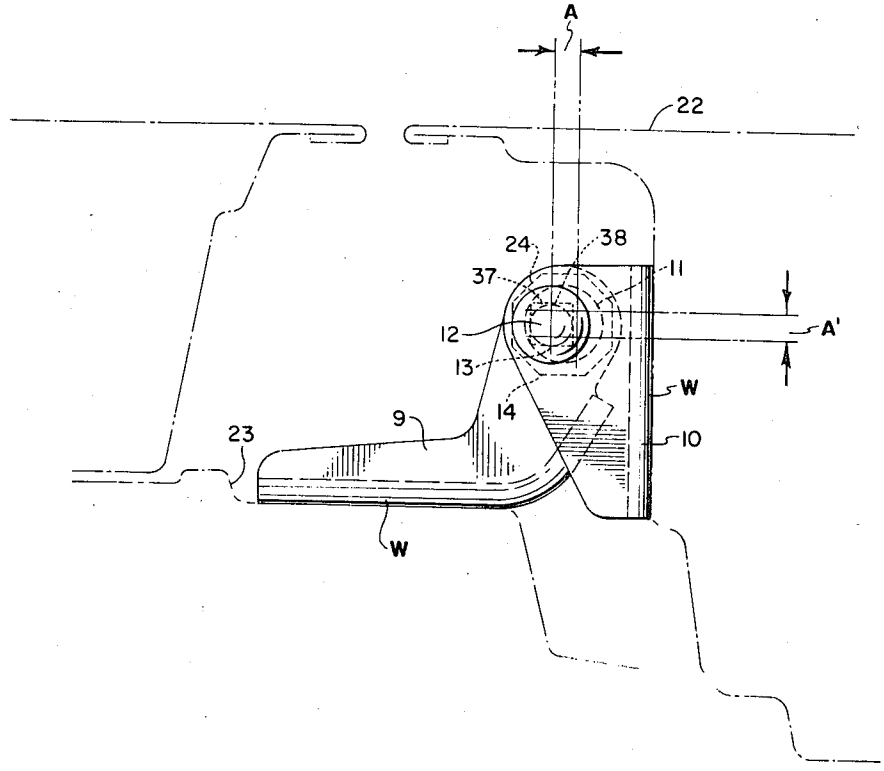


FIG. 1

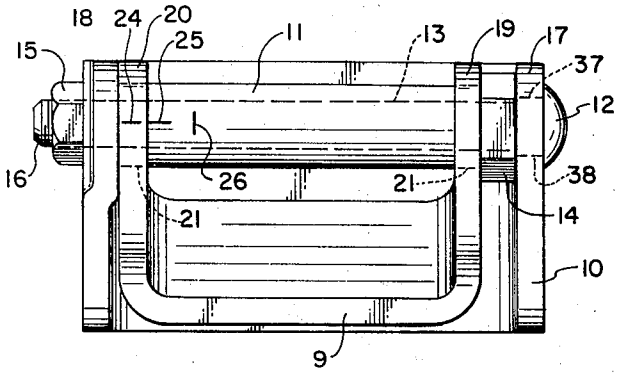


FIG. 2

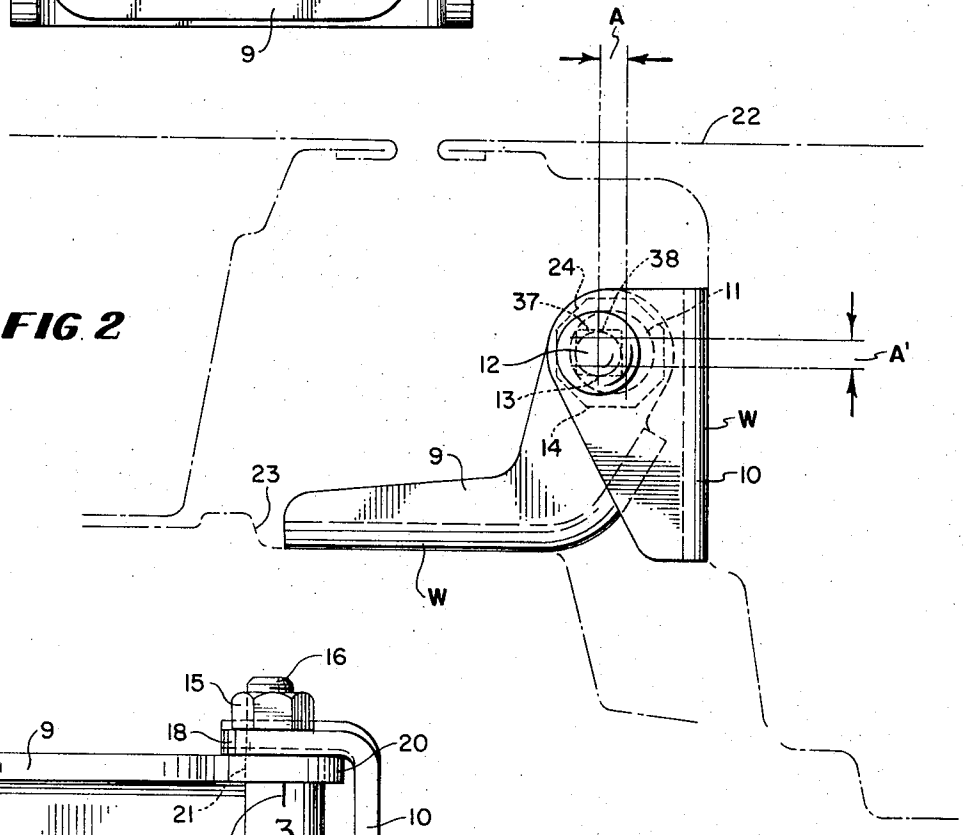


FIG. 3

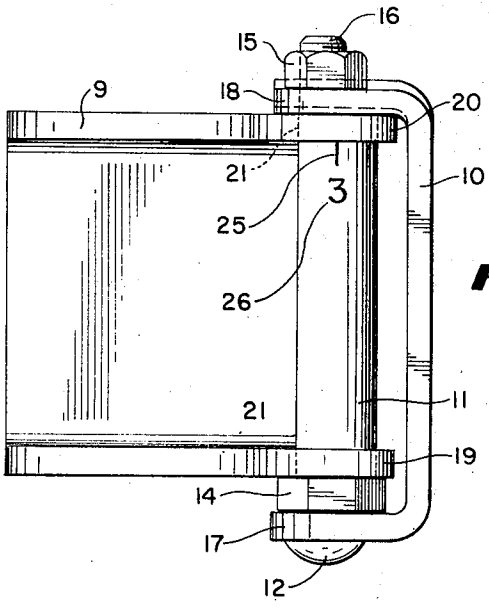


FIG. 4

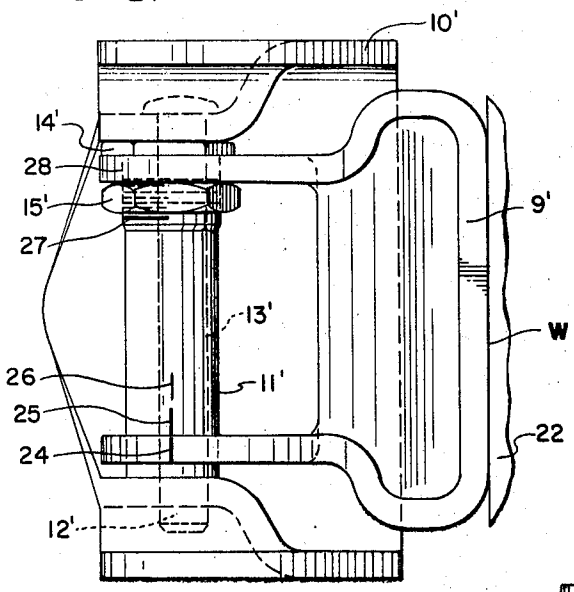


FIG. 5

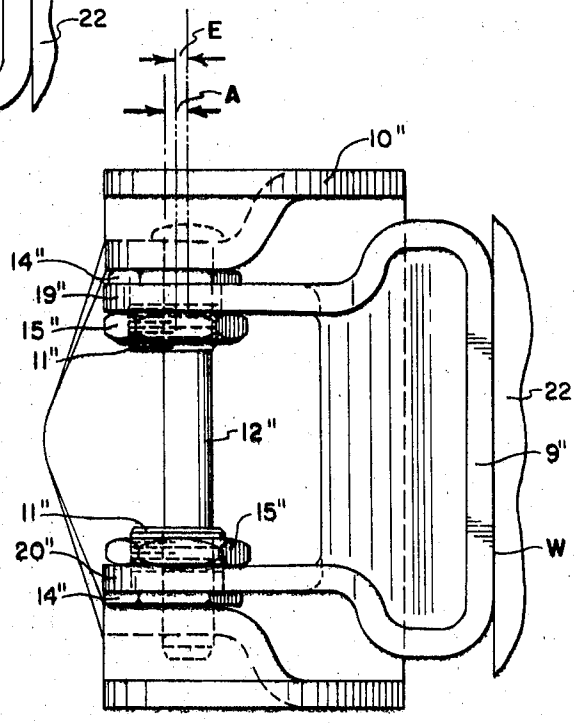


FIG. 6

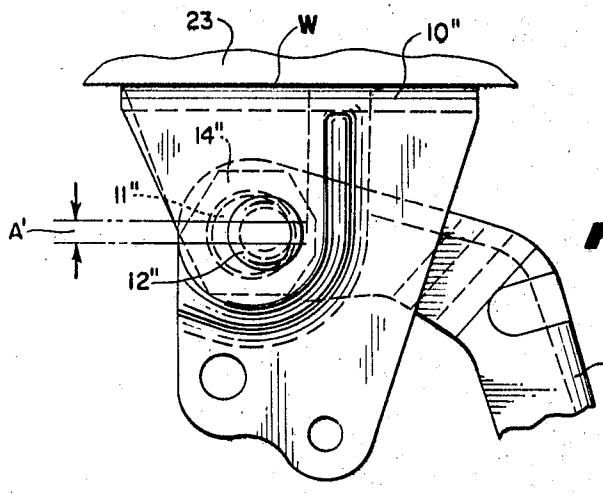


FIG. 7

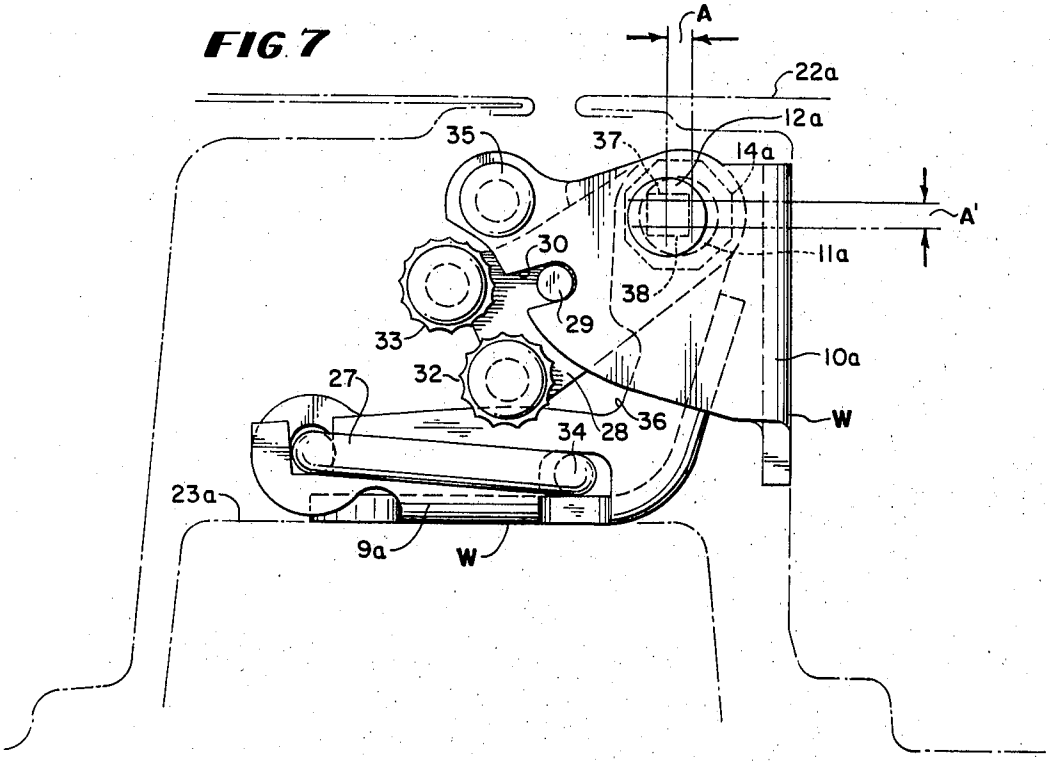
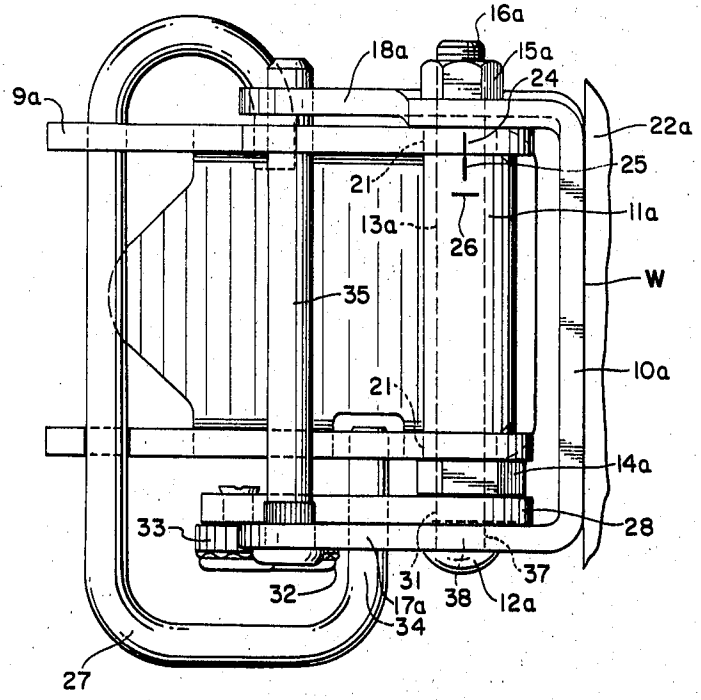

A
22a
12a
35
37
14a
A'
11a
30
38
29
33
10a
32
27
W
34
28
36
23a
9a
W

FIG. 8


16a
18a
15a
9a
24
22a
25
21
13a
11a
26
W
35
10a
21
14a
33
28
31
37
32
17a
38
12a
34
27

HINGING SYSTEM FOR AUTOMOBILE DOORS WITH HINGE HALVES WELDED TO BODY AND DOOR

This invention is the subject matter of Disclosure Document No. 16,026, filed Jan. 11, 1973.

The invention relates to a new and improved hinging system for automobile doors with hinge halves welded to the body and door, respectively.

Automobile door hinges have for a long time been fastened by screws to the body and door, and, with oversized holes or slots in the pillar or door, in and out and/or fore and aft adjustment of the upper and lower hinges was possible to correctly fit and align the door to the body, whereas, with hinge halves welded to the pillar and door, respectively, an appreciable saving in cost is realized, but the welding eliminates this previous adjustability so a change in hinge construction was needed to correct improper door fit. It is, therefore, the principal object of the present invention to enable the welding of the hinge halves to the door and body, respectively, by providing rotatably adjustable eccentric bushings for the pintles so that the necessary adjustability to correctly fit and align the door to the body is obtainable. A head on one end of each bushing enables rotary adjustment thereof for the proper fore and aft and/or in and out adjustment of the pintle, after which, while the adjusted bushing is still held by the first wrench, a lock or jam nut threaded on the projecting end of the pintle is tightened with another wrench to lock the bushing in adjusted position.

Two separate bushings with eccentric holes for the opposite ends of the same pintle may be employed on each hinge separately adjustable with a wrench and separately locked with a jam nut for a double lock.

In the case of a hinge with a torsion-bar hold-open feature the same adjustability of an eccentric bushing is permitted, while the proper relationship between the torsion-bar and the detent rollers is maintained by having the adapter plate, on which the rollers are mounted, pivotally connected with the pintle to shift the rollers with it as the bushing is adjusted so they always remain in the right relationship to the torsion-bar regardless of the bushing adjustment.

The invention is illustrated in the accompanying drawings, in which:

FIGS. **1, 2,** and **3** are views at right angles to one another showing an automobile door hinge, the halves of which are welded to the body and door, as indicated in FIG. **2,** and in which the rotatably adjustable bushing of my invention is illustrated, arranged to be clamped between the knuckles of the outer hinge member by tightening of a jam nut threaded on the projecting end of the pintle after the right adjustment is made, the extent of adjustability of the bushing for fore and aft and in and out adjustment relative to the pintle being indicated at A and A', respectively, the hinge shown happening to be an upper hinge, it being understood, however, that the same construction and amount of adjustment is provided in the companion lower hinge;

FIG. **4** shows a modified or alternative construction in which the lock-nut for securing the bushing to the one knuckle of the inner hinge member in adjusted position is on the same end with the octagonal head used in adjusting the bushing relative to the pintle;

FIG. **5** shows another modification in which a double locking action is obtained on both knuckles of the inner hinge member, as there are two separate bushings on one pintle with separate lock-nuts, both in closely spaced relationship to the related hexagonal heads used in turning the bushings in adjusting the same;

FIG. **6** is a top view of FIG. **5**;

FIG. **7** is a top view of another hinge of the same general type as that shown in FIGS. **1** to **3** in which the two halves are again welded to the door and body, respectively, this hinge, however, embodying a torsion-bar hold-open means, the two detent rollers that cooperate with the deflectable end portion of the torsion-bar being mounted on a plate that is pivoted to the pintle so as to shift radially with the pintle relative to the inner hinge member with the torsion-bar in the adjustment of the bushing and thereby maintain the correct relationship of the rollers to the torsion-bar regardless of the extent of rotary adjustment of the bushing, and

FIG. **8** is a third angle projection of FIG. **7,** and, therefore, bears the same relationship to FIG. **7** as FIG. **3** bears to FIG. **2.**

The same or similar reference numerals are applied to corresponding parts throughout these views.

Referring first to FIGS. **1** to **3,** the inner hinge member **9** is adjustable relative to the outer hinge member **10** by rotary adjustment of bushing **11,** in which the pintle **12** is entered with a working fit in the eccentric longitudinal hole **13.** The octagonal head **14** on one end of the bushing can be engaged by a wrench to turn this bushing in its adjustment and, finally, when the bushing is properly adjusted, the jam nut **15** threaded on the protruding end **16** of the pintle is tightened to clamp the bushing **11** between the knuckles **17** and **18** of the outer hinge member **10.** The bushing **11** has the knuckles **19** and **20** of the inner hinge member **9** pivotally connected therewith in holes **21.** The outer hinge member is welded on line W to the door **22,** a portion of which is indicated in FIG. **2.** Inner hinge member **9** is welded along line W to the body pillar, a portion of which is indicated at **23** in FIG. **2.** An index mark **24** appears in FIG. **1** on the body half **9** of the hinge relative to which four index marks **25** provided on the adjacent end of the bushing **11** at 90° intervals and numbered **1** to **4,** as indicated at **26,** are arranged to move in the rotary adjustment of the bushing **11.** These index numbers **1** to **4** are clearly visible when the door **22** is fully opened and adjustments of the bushings are being made. Usually, it is found to be a good practice in making the adjustments to start with the bushing for the upper hinge set 180° in the opposite direction relative to the bushing for the lower hinge, and then adjust the bushings in opposite directions to whatever extent is found to be necessary until the door fits correctly and is properly aligned relative to the body.

Referring next to FIG. **4, 12'** is the pintle received in the eccentric hole **13'** in bushing **11',** and **9'** indicates the hinge half welded to the door **22,** and **10'** is the other hinge half welded to the body pillar **23,** similarly as in FIG. **2.** However, in this construction, lock-nut **15'** is threaded on the same end **27** of the bushing **13'** where the octagonal head **14',** to which the wrench is applied in turning the bushing, is located. Obviously, the tightening of the lock-nut **15'** grips the knuckle **28** of the hinge half **9'** between the nut **15'** and the octagonal head **14'** so as to maintain the desired adjustment of the bushing **13'.** In this construction the index mark **24** is on the body secured half **9'** and the graduations **25** at 90° intervals are on the bushing **11'.**

Referring next mostly to FIG. 5, I have shown two separately adjustable bushings 11'' provided on opposite ends of a single pintle 12'', both having eccentric pintle holes provided therein and being arranged to be separately locked in adjusted condition to the knuckles 19'' and 20'' of the door hinge half 9'' by tightening of lock-nuts 15'' toward the hexagonal heads 14''. I have not shown an index mark 24 on the knuckles of the outer hinge member 20'' and cooperating index marks 25 on the bushings 11'', but it will be understood that these may be added. The line of welding of inner hinge member 9'' to the door 22 is indicated at W in FIG. 5, and likewise in FIG. 6 the line of welding W of the outer hinge member 10'' to the body 23''. The extent of fore and aft adjustment possible with bushings 11'' is indicated in FIG. 5 at A with the extent of eccentricity indicated at E. The extent of in and out adjustment possible is indicated at A' in FIG. 6. Referring back to FIG. 2, the same extent of adjustability is similarly indicated at A and A', respectively, for bushing 11.

Referring now to FIGS. 7 and 8, the construction shown there is generally the same as in FIGS. 1 to 3 and corresponding parts are numbered similarly, thus, the door welded hinge half is 10*a* and the body welded hinge half is 9*a*, and so forth. Here, again, the extent of fore and aft adjustability by virtue of the novel eccentric bushing 11*a* is indicated at A, and the extent of in and out adjustability is indicated at A'. In this instance, however, in addition to the hinge halves being welded to the door and body, respectively, along lines W, the lower hinge of a pair for the door, which is the one shown in these two views, has a torsion-bar 27 for hold-open purposes. There is no novelty claimed for this hold-open feature per se, over the disclosure of Marchione U.S. Pat. No. 3,370,317, for example, other than that the elongated adapter plate 28, slidably guided intermediate its ends by a stud 29 in the open end slot 30 in the door welded half 10*a* of the hinge and pivotally connected at one end with the pintle 12 *a*, as at 31, carries the two spaced scalloped detent rollers 32 and 33 relative to which the deflectable end portion 34 of the torsion-bar 27 is movable in the door opening and closing movements to hold the door releasably in an open position, as disclosed in the aforesaid patent. By virtue of the fact that the plate 28 maintains a fixed radial relationship to the pintle 12*a* in the rotary adjustment of the bushing 11*a*, the plate shifts with the inner hinge member 9*a* as the bushing 11*a* is turned in its adjustment so that, since the inner hinge member 9*a* is correspondingly adjusted relative to the pintle 12*a*, there is no change in the operating relationship of the detent rollers 32 and 33 with respect to the torsion-bar 27. The pintles 12 and 12*a* are carriage bolts and have square shank portions as indicated at 37 fitting in square holes 38 in the walls defining the knuckles 17 and 17*a* to hold the pintles 12 and 12*a* against turning while the jam nuts 15 and 15*a* are being tightened. Here again, as in FIGS. 1 – 3, the jam nut 15*a* is tightened after the bushing 11*a* is properly adjusted, whereby to clamp the bushing 11*a* between the knuckles 17*a* and 18*a* of the outer hinge member 10*a*. The stop pin 35 fixed in the door welded half 10*a* limits the door opening movement by striking the stop 36 on the body welded half 9*a* of the hinge after the deflectable end 34 of the torsion-bar has engaged and passed the detent rollers 32 and 33.

It is believed the foregoing description conveys a good understanding of the objects and advantages of my invention. While a preferred embodiment of the invention has been illustrated and described, this is only for the purpose of illustration, and it is to be understood that various modifications in structure will occur to a person skilled in this art.

I claim:

1. In a hinging system for an automobile door in which there are hinge members on the door and body that are permanently and nonadjustably fixed to said door and body, respectively, and in which said hinge members are adapted to be pivotally connected together by a pintle, the pintle being pivotally received in aligned holes in knuckles on one of said hinge members, the improvement which consists of a bushing having a hole provided therein longitudinally thereof in which the pintle is received with a rotatable fit, the bushing being rotatably adjustable in a hole provided in the other of said hinge members, the axis of the hole in said bushing being eccentrically positioned with respect to the axis of said bushing, said bushing having a polygonal portion on which a wrench may be engaged for rotary adjustment of the bushing, said bushing being of a length to reach from the inner side of one outer hinge knuckle to the inner side of the other outer hinge knuckle, said pintle having a head on one end abutting the outer side of one knuckle of the outer hinge member and a threaded portion on the other end projecting from the outer side of the other knuckle of the outer hinge member, and a jam nut threaded on the projecting threaded end of said pintle and tightenable so as to clamp the bushing endwise between said knuckles in its rotatably adjusted position.

2. A hinging system as set forth in claim 1 wherein said polygonal portion is in the form of a head on one end of said bushing spacing one of the knuckles of the inner hinge member from the adjacent knuckle of the outer hinge member.

3. A hinging system as set forth in claim 1 wherein the pintle is held against turning relative to the knuckles of said outer hinge member.

4. A hinging system as set forth in claim 3 wherein the pintle is held against turning relative to the knuckles of said outer hinge member by a polygonal shank portion next to the head received in a polygonal hole provided in the adjacent one of the knuckles mentioned.

5. A hinging system as set forth in claim 1 including an index mark on one of the knuckles of the inner hinge member relative to which the bushing is rotatably adjustable, and cooperating index marks provided on the bushing in circumferentially spaced relation with captions adjacent each to indicate the extent of rotary adjustment of the bushing.

6. A hinging system as set forth in claim 1 wherein the metallic hinge members on the metallic door and body are welded to said door and body, respectively.

7. In a hinging system for an automobile door in which there are hinge members on the door and body that are permanently and nonadjustably fixed to said door and body, respectively, and in which said hinge members are adapted to be pivotally connected together by a pintle, the pintle being pivotally received in aligned holes in knuckles on one of said hinge members, the improvement which consists of a bushing having a hole provided therein longitudinally thereof in

which the pintle is received with a rotatable fit, the bushing being rotatably adjustable in a hole provided in the other of said hinge members, the axis of the hole in said bushing being eccentrically positioned with respect to the axis of said bushing, means for adjustably fixing said bushing in a given position of rotary adjustment in the last mentioned hinge member, a torsion-bar for hold-open purposes mounted in prestressed condition on one of said hinge members and having a resilient deflectable bar portion which in the opening of the door engages and is deflected by a striker detent on the other of said hinge members as the deflectable bar portion moves past the same, said striker detent being mounted on an elongated plate pivotally connected at one end to the pintle and guided for endwise movement relative to the latter hinge member, whereby to maintain a predetermined operative relationship with the torsion-bar regardless of the extent of rotary adjustment of the bushing.

8. A hinging system as set forth in claim **7** wherein the bushing has a polygonal portion on which a wrench may be engaged for rotary adjustment of the bushing and is of a length to reach from the inner side of one outer hinge knuckle to the inner side of the other outer hinge knuckle, and said pintle has a head on one end abutting the outer side of one knuckle of the outer hinge member and a threaded portion on the other end projecting from the outer side of the other knuckle of the outer hinge member, and there being a jam nut threaded on the projecting threaded end of said pintle and tightenable so as to clamp the bushing endwise between said knuckles in its rotatably adjusted position.

9. A hinging system as set forth in claim **7** wherein the bushing has a polygonal portion on which a wrench may be engaged for rotary adjustment of the bushing and is of a length to reach from the inner side of one outer hinge knuckle to the inner side of the other outer hinge knuckle, and said pintle has a head on one end abutting the outer side of one knuckle of the outer hinge member and a threaded portion on the other end projecting from the outer side of the other knuckle of the outer hinge member, and there being a jam nut threaded on the projecting threaded end of said pintle and tightenable so as to clamp the bushing endwise between said knuckles in its rotatably adjusted position, the polygonal portion being in the form of a head on one end of said bushing spacing one of the knuckles of the inner hinge member from the adjacent knuckle of the outer hinge member.

10. A hinging system as set forth in claim **7** wherein the pintle is held against turning relative to the knuckles of said outer hinge member.

11. A hinging system as set forth in claim **7** wherein the pintle is held against turning relative to the knuckles of said outer hinge member by a polygonal shank portion next to the head received in a polygonal hole provided in the adjacent one of the knuckles mentioned.

12. A hinging system as set forth in claim **7** including an index mark on one of the knuckles of the inner hinge member relative to which the bushing is rotatably adjustable, and cooperating index marks provided on the bushing in circumferentially spaced relation with captions adjacent each to indicate the extent of rotary adjustment of the bushing.

13. A hinging system as set forth in claim **7** wherein the metallic hinge members on the metallic door and body are welded to said door and body, respectively.

* * * * *