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J. H. KOONS

AUTOMOBILE DOOR HINGE

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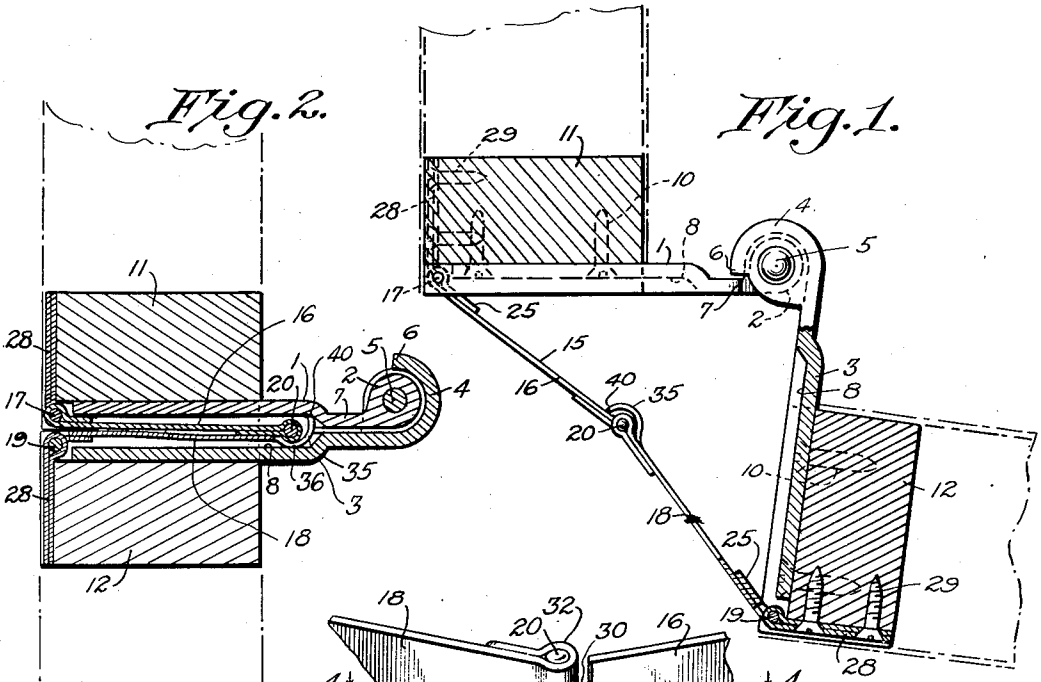


Fig. 2.

Fig. 1.

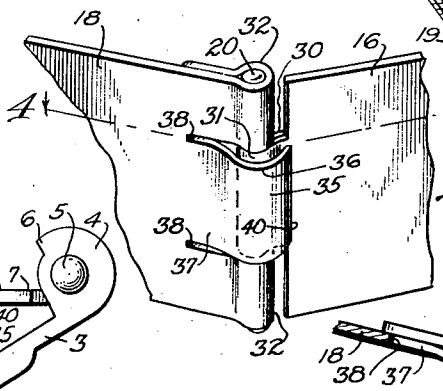


Fig. 3.

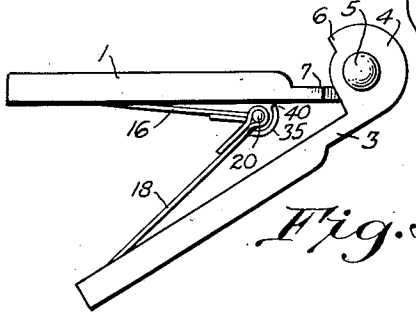


Fig. 5.

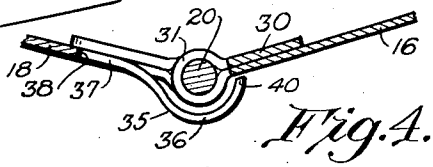


Fig. 4.

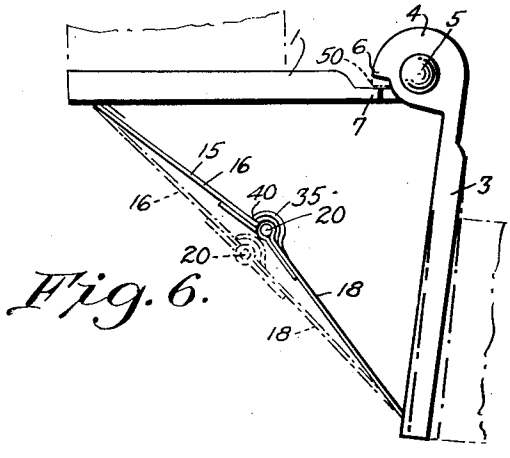


Fig. 6.

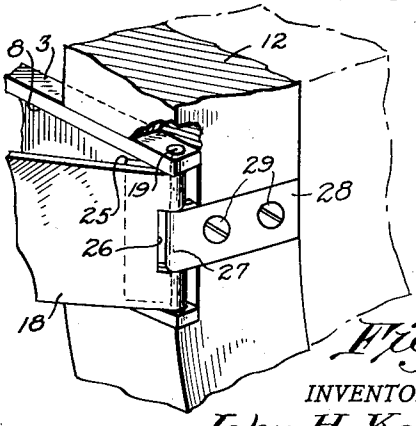


Fig. 7.

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AUTOMOBILE DOOR HINGE.

Application filed February 7, 1925. Serial No. 7,520.

This invention relates to door hinges of a type adapted for use on automobiles and has for its object to provide a construction that is stronger and more efficient than those heretofore proposed.

With these and other objects in view the invention consists in the novel details of construction and combinations of parts as will be more fully hereinafter disclosed and particularly pointed out in the claims.

Referring to the drawings forming a part of this specification and in which like numerals designate like parts in all the views;

Figure 1 is a horizontal view partly in section of a hinge embodying the invention;

Figure 2 is a horizontal sectional view of the parts shown in Figure 1 in closed relation;

Figure 3 is a perspective view in elevation of a detail of construction;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3 and looking in the direction of the arrows;

Figure 5 is a diagrammatic top plan view of a hinge made in accordance with this invention showing the parts in semi-closed position;

Figure 6 is a diagrammatic top plan view, similar to Figure 5, of a hinge in full open position; and

Figure 7 is a perspective view of a detail of the supporting and strengthening construction used in this hinge.

This hinge comprises one leaf 1 provided at one end with a cylindrically formed knuckle 2, and a second leaf 3 provided at one end with the cylindrical and chambered portion 4 adapted to receive and hold said knuckle 2 in hinged relation as by the pintle 5. The chamber or socket 4 has an abrupt edge 6 forming a shoulder which is adapted to take against the web portion 7 of the leaf 1. The leaves 1 and 3 of the hinge are recessed as at 8 for a purpose to be disclosed hereafter and are suitably secured, as by the screws 10, respectively to the jamb 11 of the side of the automobile and the framing member 12 of the door thereto. Thus it will be seen that there is provided a hinge having pockets 8 and so constructed as to limit the degree of opening between the leaves thereof.

Connecting the unhinged extremities of each leaf 1 and 3 is the brace member 15 which may be made of any thin sheet material possessing a spring like quality such as hard rolled brass. This brace member 15 is formed in two halves or parts, one part 16 hinged as at 17 to the extremity of the leaf 1, and the other part 18 hinged as at 19 to the extremity of leaf 3. These two parts 16 and 18 are hinged to each other as at 20. The two halves 16 and 18 of the brace member are adapted to fold inwardly between the leaves 1 and 3, see Figure 5, when the hinge is being closed, and occupy the recessed portions 8 thereof.

The members 16 and 18 as above stated are made from thin sheet metal and, as clearly indicated in the drawings, may be stamped as blanks out of said material and die formed at a minimum expense. The outer extremity 25 of each blank 16 and 18 is turned back, see Figures 1 and 7, and welded or otherwise secured in a strong substantial manner to the main portion of the blank. An opening 26 is provided in each turned-over end portion 25 to receive the knuckle 27 of an anchoring strap 28 which will be described later. The brace member 18 and its anchoring strap 28 are secured in hinged relation to the extremity of the leaf 3 as by the pin 19, see Figure 1, while the pin 17 similarly secures the brace member 16 and its associated anchoring strap 28 in hinged relation to the extremity of the leaf 1.

The opposite end of the blank 16 is provided with a centrally disposed extending tongue 30 likewise turned back upon the main body portion of the blank and welded or otherwise secured thereto to form the knuckle 31, while the corresponding end of the blank 18 is provided with the knuckles 32 similarly formed from the lateral edge portions of the blank 18, said knuckle 31 fitting between the knuckles 32 and secured, as by the pin 20, thereto.

The portion of the brace member 18 lying between the knuckles 32 is formed by suitable dies into the spring 35 having the cylindrical portion 36 normally substantially concentric with the knuckles 32 and integrally connected as by the portion 37 to the main body portion of the member 18 at the end of the slots 38 separating said spring 35 from the adjacent knuckles 32, see Figures 3 and 4. The cylindrical portion 36 has an edge 40 adapted to contact with the face of the brace member 16 when the members 16 and 18 are in open position. The spring 35 is in fact of such a size and of such a tension as will tend to prevent the two mem-

bers 16 and 18 from assuming a full, 180° open position as shown in dotted lines in Figure 6 and therefore the greatest degree to which the brace member 15 may be normally opened is that illustrated in full lines in Figures 1 and 6. Thus it will be seen that the brace member 15 is always flexed under normal conditions.

The entire hinge structure is mounted as best illustrated in Figure 1. That is to say, the leaf 1 is secured by the screws 10 to one side of the jamb or frame member 11 of the side of the automobile and the anchor strap 28 secured as by the screws 29 to the inner face of the said jamb 11. The other leaf 3 is secured as by the screws 10 in a similar manner to one face of the frame member 12 of the door of the automobile and the anchor strap 28 associated with said leaf 3 secured as by its screws 29 to another face of the frame member 12 of the door of the automobile. The two members 16 and 18 of the brace 15 are then brought together and the pin 20 inserted to hold the knuckles 31 and 32 in hinged relation. When the door is closed the flexed brace 15 will fold into the hinge proper and occupy the pockets or recesses 8 provided in the leaves 1 and 3 therefor. In this position, see Figure 2, it will be observed that the curved cylindrical surface 36 of the spring 35 will contact with the surface of the pocket 8 of leaf 3 while the edge 40 of said spring 35 will contact with the surface of the pocket 8 of the other leaf 1, thus preventing the brace member 15 from rattling in its folded position by rebounding from one leaf to the other.

The operation of this hinge will be apparent from the foregoing description but may be briefly described as follows. The hinge having been mounted as above disclosed and the door of the automobile opened, it will be observed that said door will assume a position as indicated in Figure 1 with relation to the side of the automobile. That is to say, the hinge will open, but before the shoulder 6 takes against the web 7 of the leaf 1, the brace member 15 will function. In other words, before the door could be violently, accidentally, or otherwise opened with such a force as would not only cause the shoulder 6 to contact with the web 7, but most likely would cause the hinge to break, the brace 15 would open into such a position as shown in Figure 1 and place the strain, counteracting said force on the jamb 11 and the frame member 12 through the anchoring straps 28. In this respect it will be observed that the anchoring straps 28 are so secured to the structural elements 11 and 12 of the automobile that when any such forceful action as above described takes place, the strain through the brace member 15 and said anchoring straps will be placed upon said frame members in a line of force approximately at 45° to the surfaces of said members 11 and 12, thus minimizing to almost a negligible degree any splitting of the said members 11 and 12 that might ordinarily occur. Further, this resisting line of force is intensified by the fact that the screws 29 securing the straps 28 to the said members are disposed at right angles to the screws 10 securing the leaves 1 and 3 of the hinge.

When the door of the automobile is opened the brace 15 will more or less gradually ease the door into its full open position or in other words prevent the door stopping or coming to a full open position with a jerk. This is accomplished through the function of the spring 35, see Figure 6. That is to say, Figure 6 illustrates by solid lines the door just before it reaches its full open position, whereas the dotted lines of said figure represent the door and brace member 15 in the full extent of their opening position. With reference to this Figure 6 it will therefore be seen that just before the door is fully opened, the leaf 1, which will remain in the same position as when the door is fully opened, and the leaf 3 and the brace member 15 will be in such a position that the shoulder 6 will be slightly separated from the web 7 of the leaf 1. Also the edge 40 of the spring 35 integral with the half member 18 will be contacting with the face of the half-portion 16 of the brace member 15.

When this position of parts occurs the inertia of the door will continue the movement thereof to its fullest opened position indicated in dotted lines in said Figure 6, and therefore cause the spring 35 to function. As will be understood with reference to Figures 3, 4 and 6, when the member 16 turns about the pin 20 as a center until it contacts with the edge 40 of the spring 35, any continued motion of the member 16 about said pin 20 in the same direction will be resisted by the spring 35. The fullest extent to which the door can be opened will be reached when the two halves 16 and 18 of the brace 15 will lie in the same plane, or when they have opened, with respect to each other, to 180° as shown in dotted lines in Figure 6. When this position of the brace member 15 is attained the spring 35 will be under tension, and the shoulder 6 will have advanced to the dotted line position 50 substantially in contact with the web 7 of the leaf 1. When the door ceases movement in its opening direction, the spring 35 being under tension will exert pressure against the portion 16 of the brace member and cause said brace member to flex, and the members 16 and 18 thereof will assume the full line positions shown in Figures 1 and 6. Thus it will be seen that the spring 35, when under compression, will serve to aid in moving the members 16 and 18 from their dotted line positions to their

full line positions as shown in said Figure 6 and thus will all danger of the parts getting on a dead center be obviated.

If for any reason the brace 15 should give away at the moment when it was under strain, then the shoulder 6 having advanced to the dotted line shown at 50 in Figure 6 would serve to stop the opening of the door, and the brace 15 having materially decreased the force with which the door opened, said shoulder 6 would take against the web 7 with little danger of breaking the hinge.

It is obvious that one skilled in the art can vary the details of construction as well as the arrangement of parts without departing from the spirit of the invention, therefore it is not desired to be limited to the foregoing except as may be demanded by the claims.

What is claimed is:

1. In a hinge comprising a pair of leaves hinged together the combination of a pair of brace members hinged together and to the extremities of said pair of leaves, said brace members provided with a spring adapted to normally prevent said leaves from opening beyond a predetermined point; and a shoulder and a web portion, against which said shoulder may take and associated with said leaves, constituting a stop for said leaves when said hinge is opened beyond said predetermined point due to a rupture between said brace members.

2. In a hinge comprising a pair of leaves hinged together the combination of a pair of brace members hinged to said leaves and to each other adapted to limit the opening between said leaves; and means comprising a spring integral with one of said brace members adapted to prevent said brace members from normally occupying a straight line position when said hinge is opened.

3. In a hinge comprising a pair of leaves hinged together the combination of a pair of brace members hinged to said leaves and to each other adapted to limit the opening between said leaves; means comprising a spring associated with said brace members adapted to prevent said brace members from normally occupying a straight line position when said hinge is open; and means hinged to said brace members to aid in resisting the strain thereon when said hinge is fully opened.

4. In a hinge of the character described the combination of a pair of leaves provided with recesses and hinged together at one of their extremities; a pair of brace members hinged to said leaves at the other extremities thereof and hinged to each other between said leaves, said brace members adapted to enter and occupy said recesses when the hinge is in its folded position; yieldable means associated with said brace members adapted to prevent said members from normally lying in the same plane; and means hinged to said brace members to aid in resisting the strain thereon when said hinge is fully opened.

In testimony whereof I affix my signature.

JOHN H. KOONS.