July 16, 1957 McFERRELL HOLLANSWORTH 2,799,042

MOTOR VEHICLE DOOR HINGES

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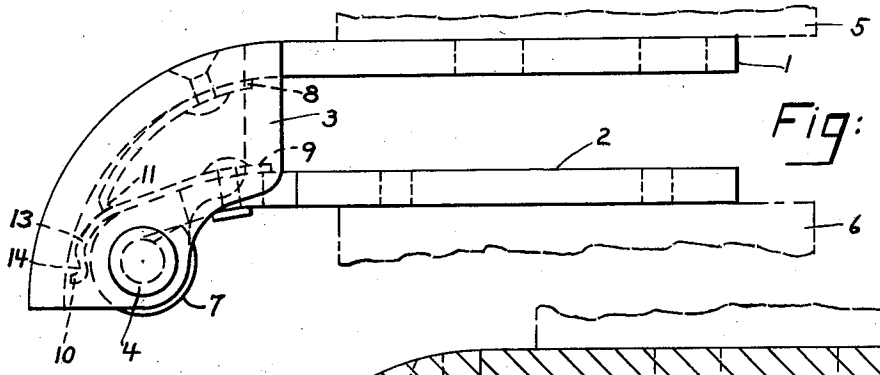



Fig: 1

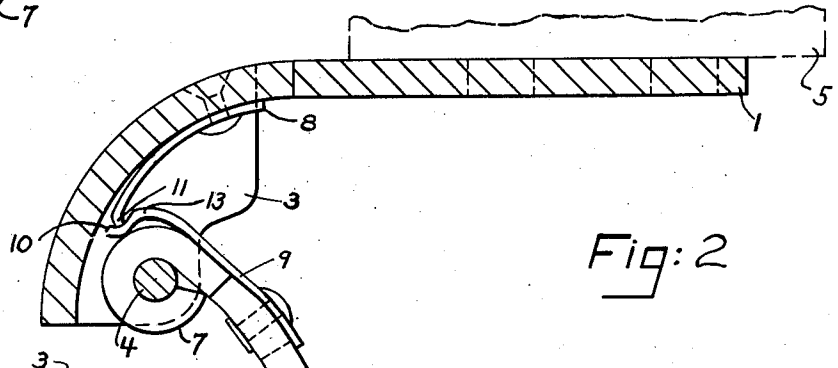



Fig: 2

Fig: 3

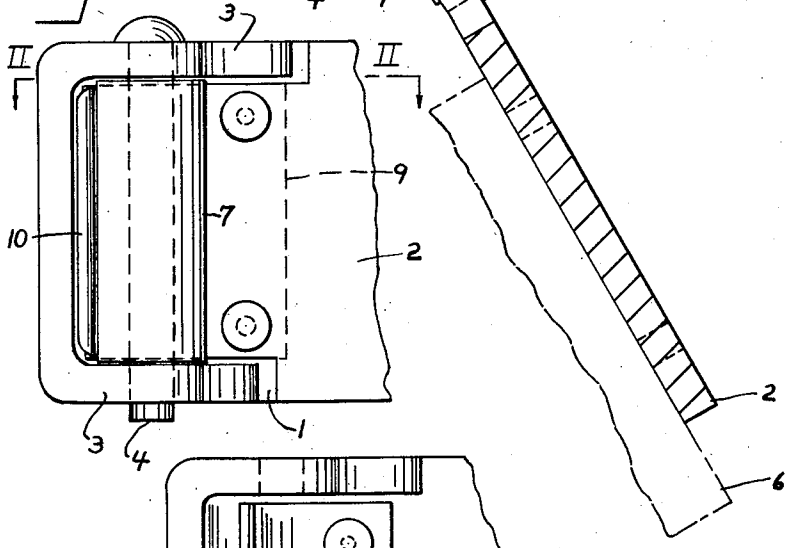
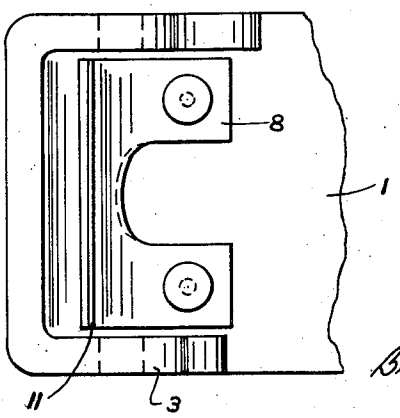



Fig: 4




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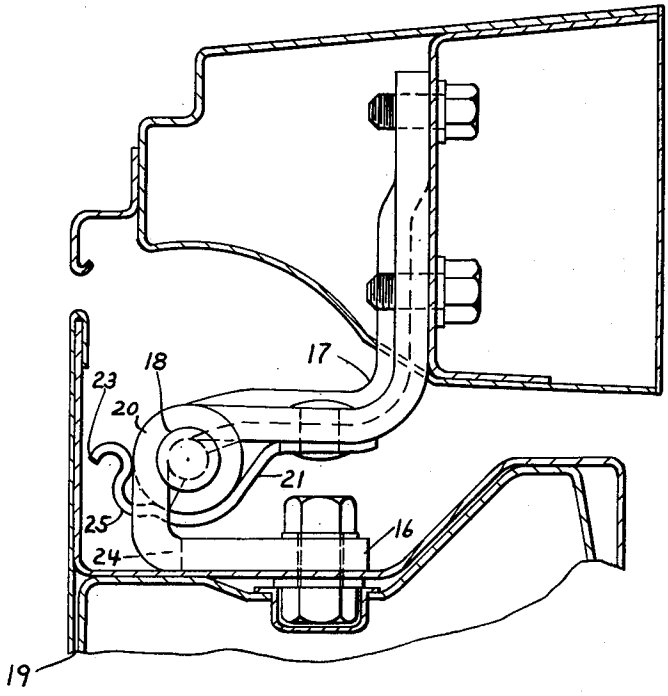
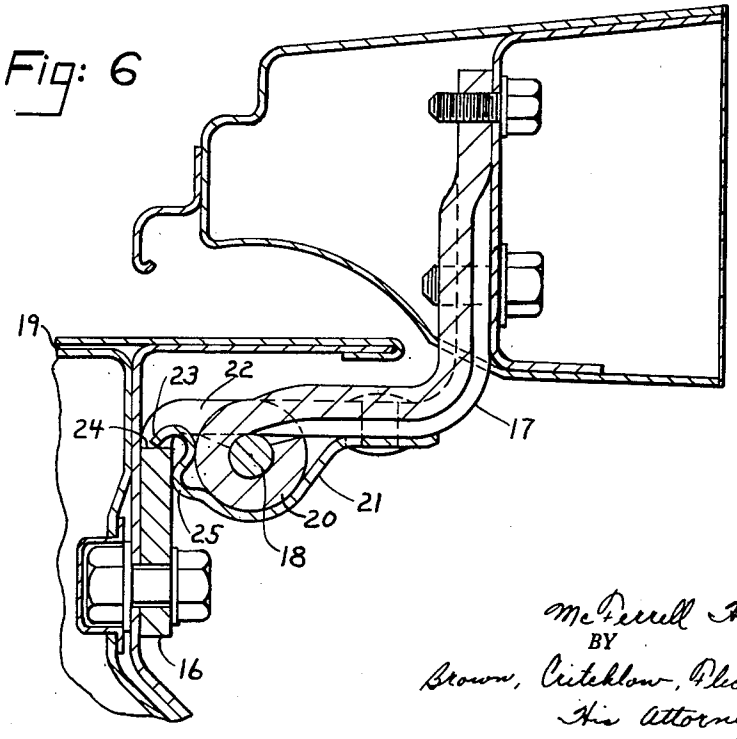



Fig: 5

Fig: 6




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MOTOR VEHICLE DOOR HINGES

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Fig: 7

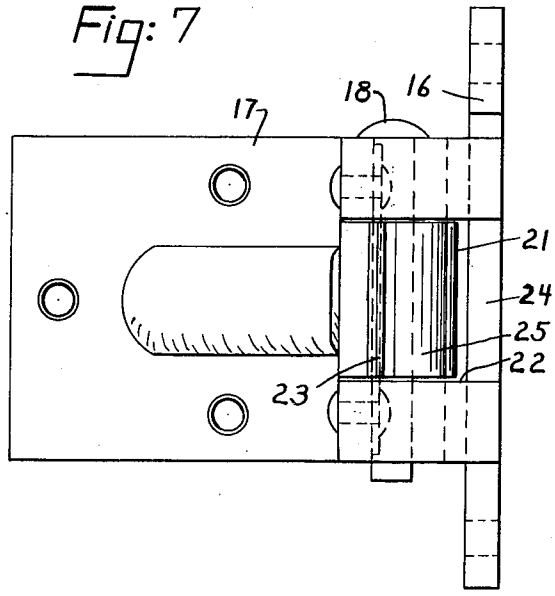



Fig: 8

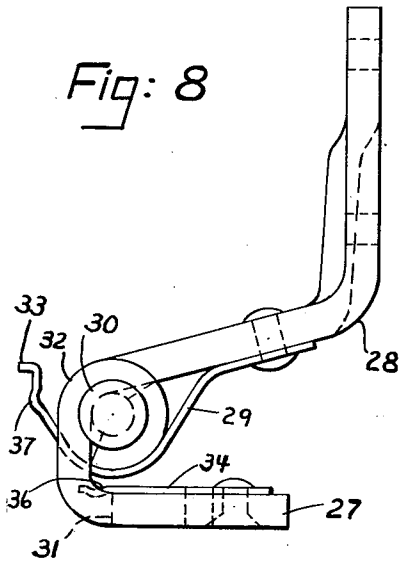



Fig: 9

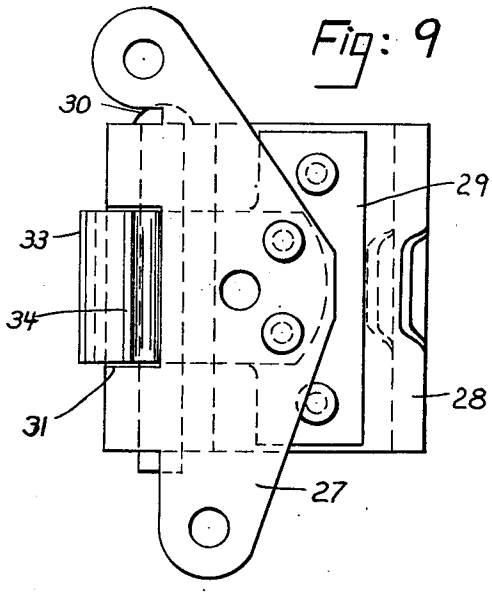
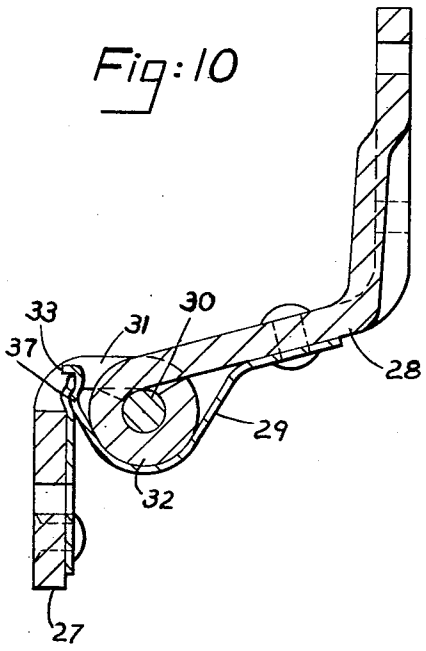



Fig: 10




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# MOTOR VEHICLE DOOR HINGES

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Application October 21, 1954, Serial No. 463,698

7 Claims. (Cl. 16—142)

This invention relates to hinges for the doors of automobiles and other motor vehicles, and more particularly to hinges that also serve as door stops and holders.

It is among the objects of this invention to provide a door hinge of sturdy construction which is easy to make, which can be opened only a predetermined distance, which holds the door by means of friction in open position, which cushions the door as it reaches open position, and which requires materially more force to start the hinge to close than is required for continuing its closing.

In accordance with this invention, a pair of hinge plates have their outer ends connected by a vertical hinge pin supported by one plate and extending through a barrel on the other plate. Between the plates is a leaf spring that has its inner end secured to one of them and has its outer end extending part way around the barrel. The outer end of the spring is provided with a stop, and the other plate is provided with abutting means for engaging the stop when the hinge is opened to thereby limit the distance the hinge can be opened. The spring has a portion that must be flexed by the abutting means as the hinge starts to close, whereby the hinge resists initial closing movement and therefore is held open until it is desired to close the door. The abutting means may be another leaf spring secured to the inner surface of the other hinge plate, or it may be that plate itself.

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

Fig. 1 is a plan view of a hinge;

Fig. 2 is an upper horizontal section showing the hinge open;

Fig. 3 is a fragmentary side view of the outer end portion of the hinge;

Fig. 4 is a similar view of the outer hinge plate;

Fig. 5 is a plan view of a modification of this invention;

Fig. 6 is a central horizontal section through the hinge of Fig. 5, showing it open;

Fig. 7 is an outer end view of the closed hinge;

Fig. 8 is a plan view of a further embodiment of the invention;

Fig. 9 is a side view thereof; and

Fig. 10 is a central horizontal section through the hinge of Fig. 8, but showing it open.

Referring to Figs. 1 to 4 of the drawings, a pair of parallel hinge plates **1** and **2** are spaced apart a short distance but have curved overlapping outer ends. Thus, the outer end portion of one of the plates **1**, referred to herein as the outer plate, curves around the outer end of the other or inner plate **2**. The upper and lower ends of the curved portion of the outer plate are bent inward to provide horizontal flanges **3**, the outer portions of which are provided with aligned holes that receive a vertical hinge pin **4**. The outer end of the inner plate is wrapped around the pin and forms a barrel **7**, so that the two plates are hinged together. Generally, the outer plate is bolted to a door frame **5** and the inner plate is bolted to the door **6**.



In order to control the distance that the hinge can be opened by the door, whereby to limit the distance the door can be opened, a pair of overlapping leaf spring **8** and **9** are disposed between the hinge plates. The inner spring **9** extends along the outer end portion of the inner hinge plate **2** and has its inner end riveted to that plate near the hinge pin. As shown in Fig. 1, this spring extends part way around barrel **7** in the space between the outer ends of the two plates. The outer end of the spring is bent away from the hinge pin to provide a vertical shoulder or stop **10**. The inner end of the other leaf spring is riveted to the outer plate, and the outer end portion is curved toward spring **9** so that its inwardly bent end **11** tightly engages the inner spring a predetermined distance from the stop **10**. When the door is opened, the inner hinge plate **2** is swung outward. This causes the inner spring **9** to slide across the outer end of the other spring until stop **10** strikes the bent outer end **11** of the outer spring, as shown in Fig. 2. This engagement of the outer ends of the two springs limits the distance that the hinge and door can be opened, and yet the door is stopped in a resilient manner instead of abruptly by a rigid stop.

Another feature of this invention is that when the hinge is in its wide open position it will tend to stay there because it requires an abnormal force to start it to close. This is due to the fact that the inner spring **9** has a portion that must be flexed to some extent by the other spring before the hinge can be closed. Thus, the portion of the inner spring near stop **10** is curved outward away from the hinge pin to form a hump **13**, which the outer spring must pass when the hinge starts to close. Between the hump and the stop there is a depression or groove **14** that receives the end of the outer spring. In order for the outer spring to leave this groove and move across the hump, the hump must be flattened to some extent. At the same time the outer spring can be sprung away from the hinge pin. The force required to flex the springs in this manner resists closing of the hinge. Consequently, the hinge not only supports the door, but it also determines how far the door can be opened and it keeps it from being closed by gravity or moderate wind pressures.

In the modification shown in Figs. 5, 6 and 7, the outer ends of the inner and outer hinge plates **16** and **17** likewise are pivotally connected by a vertical hinge pin **18**. However, in closed position the inner plate **16**, which supports the door **19**, first extends away from the hinge pin at right angles to the adjoining portion of the other plate and then extends parallel to that portion. Riveted to the inner surface of the portion of the outer plate just mentioned is the inner end of a leaf spring **21**. The spring extends outward across the hinge barrel **20** and through an enlarged rectangular opening **22** in the outer end portion of the inner plate. This opening is formed by bifurcating the outer end of the plate. The spring projects from the opening and curves back part way around the barrel. The outer end of the spring is bent outward to form a laterally projecting stop **23** which, as shown in Fig. 6, will be engaged by the inner end wall **24** of opening **22** when the hinge is opened the desired extent. This engagement prevents the door from being opened farther.

While the hinge is in its open position, the spring presses tightly against the inner surface of inner plate **16** to hold the door open. For this purpose the spring is provided with an outwardly bent portion or hump **25** near stop **23**. Before the hinge can be closed, enough pressure must be applied to the inner plate to cause it to force the engaging hump of the spring inwardly towards the hinge barrel. The resistance of the spring to being flexed in this manner is what holds the hinge open and resists its closing. As in the first embodiment of this invention, the leaf spring not only forms a stop that limits the dis-

tance the door can be opened, but it also tends to hold the door open after it has been swung outward.

The shape of the hinge plates **27** and **28** in the further embodiment of the invention shown in Figs. 8, 9 and 10 is similar to the plates **16** and **17** just described. The inner end of a leaf spring **29** between the plates is riveted to the outer plate **28** not far from the hinge pin **30**, and the spring then extends outward through an enlarged rectangular opening **31** in the outer end portion of the inner plate. The outer end portion of the spring extends back past the hinge barrel **32** and has its outer end bent outward to form a stop **33**. When the hinge is wide open, as shown in Fig. 10, this stop is not engaged by the end wall of opening **31**, as in the preceding embodiment, but by other means, preferably the outer end of a second leaf spring **34**, which is riveted to the inner surface of the inner hinge plate. The outer end of this spring projects out into opening **31** and is bent to provide its inner surface with a groove **36** that extends from top to bottom of the spring. When the hinge is wide open this groove receives a vertical rib **37** that is formed by bending the other spring in a similar manner. In order to separate these interengaging detents, it is necessary to apply enough force to the inner plate of the hinge to cause the inner spring **34** to flex the outer spring towards the hinge barrel. As soon as the groove moves away from the rib the hinge will close with a normal amount of pressure. It therefore will be seen that the rib and groove hold the hinge in wide open position until an abnormal closing force is applied to it.

According to the provisions of the patent statutes, I have explained the principle of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. A door hinge comprising a pair of hinge plates, a vertical hinge pin and barrel connecting the outer ends of the plates, a leaf spring between the plates having its inner end secured to one of them and having its outer end extending part way around the hinge barrel, the outer end of the spring being provided with a stop, and a second leaf spring between the plates having its inner end secured to the other plate and having an outer end slidable along the first spring and adapted to engage said stop when the hinge is opened, at least one of the springs having a portion that must be flexed by the other spring as the hinge starts to close, whereby the hinge resists initial closing movement.

2. A hinge in accordance with claim 1, in which the outer end of one spring is bent to provide a groove and the outer end of the other spring is bent to form a tongue adapted to project into the groove when the hinge is open.

3. A hinge in accordance with claim 1, in which the spring with the stop is provided with a groove extending along the side of the stop, and the outer end of the other spring is bent to form a tongue adapted to extend into said groove and engage the stop when the hinge is open.

4. A door hinge according to claim 1, in which said other plate is provided with an opening through which said first spring extends.

5. A door hinge comprising a pair of hinge plates, a vertical hinge pin and barrel connecting the outer ends of the plates, a leaf spring between the plates having its inner end secured to one of them and having its outer end extending part way around the hinge barrel, the outer end of the spring being provided with a stop, and a second leaf spring between the plates having its inner end secured to the other plate and having an outer end slidable along the first spring and adapted to engage said stop when the hinge is opened, one of said springs being provided with a vertically extending rib and the other spring being provided with a groove for receiving said rib when the hinge is open, whereby to close the hinge enough force must be applied to it to slide the rib out of the groove.

6. A door hinge comprising a pair of hinge plates having laterally spaced portions, the outer end portion of one of the plates extending substantially perpendicularly from its adjoining portion toward the outer end of the other plate, a vertical hinge pin and barrel connecting the outer ends of the plates, said outer end portion of said one plate having an opening therethrough, a leaf spring between the plates having its inner end secured to said other plate and having its outer end extending part way around the hinge barrel and out through said opening and provided with a laterally projecting stop, a second leaf spring between the plates having its inner end secured to said one plate and having an outer end slidable along the first spring for engaging said stop when the hinge is opened to limit the distance it can be opened, and at least one of the springs having a portion that must be flexed by the other spring as the hinge starts to close, whereby the hinge resists initial closing movement.

7. A door hinge comprising a pair of hinge plates, a vertical hinge pin and barrel connecting the outer ends of the plates, a leaf spring between the plates having its inner end secured to one of them and having its outer end extending part way around the hinge barrel, the outer end of the spring being provided with a stop, the outer end portion of the spring being curved outwardly away from the hinge pin to form a hump spaced from said stop, and a second leaf spring between the plates having its inner end secured to the other plate and having its outer end slidable along the first spring and adapted to engage said stop between the stop and said hump when the hinge is opened, whereby the outer end of the second spring and said hump must slide past each other before the hinge can be closed.

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