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AUTOMOBILE DOOR HINGE EMBODYING HOLD-OPEN MEANS

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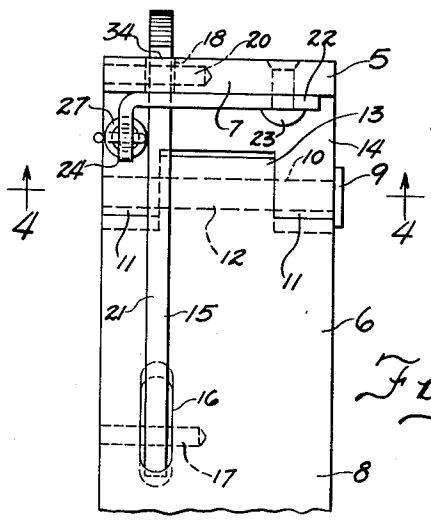


Fig. 2

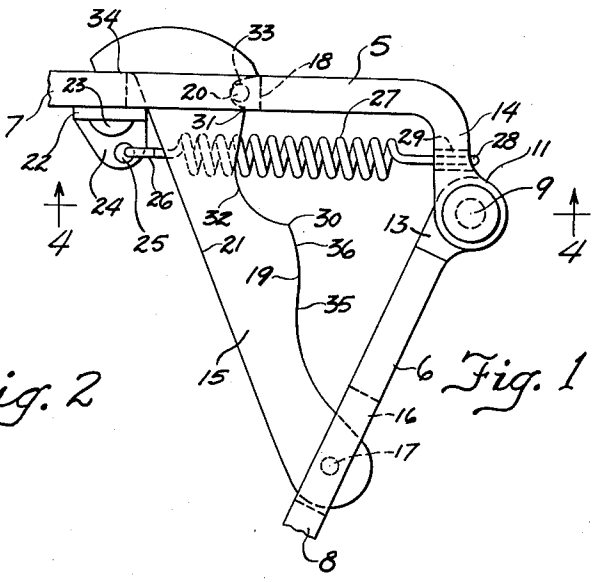


Fig. 1

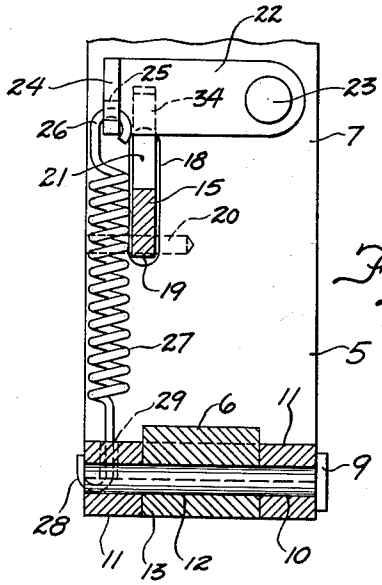


Fig. 4

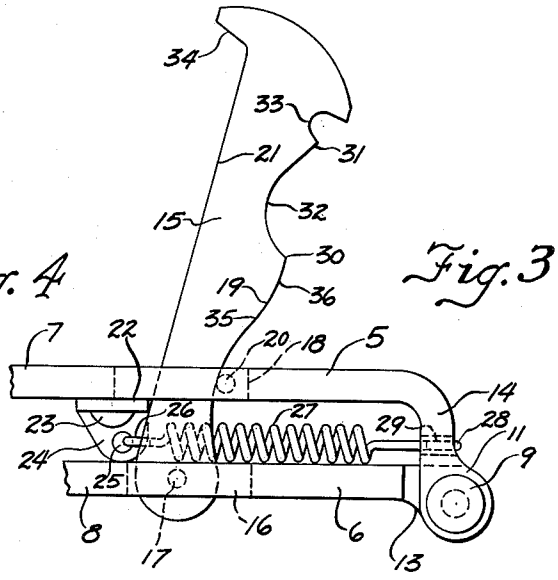


Fig. 3

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AUTOMOBILE DOOR HINGE EMBODYING HOLD-OPEN MEANS

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4 Claims. (Cl. 16—146)

This invention relates to improvements in automobile door hinges and is more particularly concerned with the provision of novel hold-open means.

Various designs of hold-open means have been proposed but many are too complicated and expensive in construction and are not practical for various reasons. It is, therefore, the principal object of my invention to provide hold-open means of simpler and less expensive construction, designed to give satisfactory performance throughout the life of the car without ever being apt to require any attention.

In accordance with my invention, a link that is pivotally connected at one end to one of the hinge members radially from the hinge axis extends through a slot provided in the other hinge member radially from the hinge axis and has one longitudinal edge that is straight and has sliding pivotal engagement with the intermediate portion of a lever pivoted at one end on the slotted hinge member adjacent the slot and urged toward the link by a tension spring connected to the free end of the lever, the other longitudinal edge of the link being profiled and having sliding pivotal engagement with an abutment provided therefor in the adjacent end of the slot, whereby to provide in different portions of the range of door opening movement by the "tailoring" of the profiled edge, the desired amount of light resistance to door movement to hold the door loosely in at least one partway open position and provide an ultimate releasable lockup action to hold the door rather firmly in the fully opened position. The link is, furthermore, provided with a stop shoulder on its outer end arranged to engage the outer side of the slotted hinge member adjacent the slot, whereby positively to limit the door opening movement.

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

Fig. 1 is a plan view of an automobile door hinge embodying a hold-open device made in accordance with my invention showing the parts in what corresponds to the fully opened position of the door;

Fig. 2 is a view of Fig. 1 taken from the left;

Fig. 3 is a view similar to Fig. 1 showing the parts in the other extreme position corresponding to the closed position of the door; and

Fig. 4 is a cross-section on the line 4—4 of Figs. 1 and 2.

The same reference numerals are applied to corresponding parts in these four views.

Referring to the drawing, the reference numerals **5** and **6** designate two members of an automobile door hinge, member **5** being the one attached to the body pillar by its shank portion **7** and member **6** being the one attached to the door pillar by means of its shank portion **8**. A pintle **9** entered in registering holes **10** in a pair of spaced knuckles **11** provided on the outer end of member **5** is received with a working fit in a bearing hole **12** provided in the knuckle **13** that projects from the outer end of member **6** and is received between the knuckles **11** of member **5**. The outer end portion **14** of member **5** is

bent substantially at right angles to offset the knuckles **11** in relation to the attaching shank portion **7**, and the members **5** and **6** are therefore in spaced parallel relation to one another when the door is closed, as illustrated in Fig. 3.

In accordance with my invention, a link **15** is pivotally connected at one end to the hinge member **6** in a slot **16** intermediate the ends thereof, as indicated at **17**. The free end portion of the link extends through a slot **18** provided in the other hinge member **5** intermediate the ends thereof and has one longitudinal edge **19** thereof profiled, as illustrated in Figs. 1 and 3, and slidable on a cross-pin **20** mounted in one end of the slot **18**, this pin providing line contact on the cam-shaped surfaces provided on the profiled edge **19** of the link. The other longitudinal edge **21** of the link is straight and is slidably engaged by the intermediate portion of a lever **22** pivotally mounted at one end as at **23** on the hinge member **5** adjacent the other end of the slot **18**. The lever **22** has its free end portion bent at right angles, as indicated at **24**, and perforated, as at **25**, to receive the hook on one end portion **26** of a coiled tension spring **27**. The hook **28** on the other end portion of the spring **27** is engaged in a hole **29** provided in the opposite outer end portion **14** of the hinge member **5**. The spring **27** is stretched so as to maintain a certain amount of friction drag on the sliding of the straight edge **21** on the lever **22**, and, of course, the tension of the spring **27** is increased when a wide portion of the link **15** measured between the edges **19** and **21** rides on the pin **20**, and, contrariwise, the tension of said spring is reduced when a narrow portion of the link rides on the pin **20**. Thus, there are "high" spots at widely longitudinally spaced points **30** and **31**, and a "low" spot **32** about midway between them, whereby to cause the door to be held loosely in a partway open position, at about the 45° point, considering 60° as the fully opened position. Notice that at the low spot **32** the link **15** is quite narrow. Consequently, there is less tension on spring **27**, and the door is, therefore, movable easily either way in a small range as the door is loosely held in this partway open position. That is highly desirable, because it is only occasionally that one needs to have the door held in a fully opened position. In the majority of instances, it is enough to know that the door will not close when it is opened about two-thirds of the way to fully opened position. At the outer end of the link **15** is a depression **33** that is much narrower than the depression just described and not nearly as deep. This is for the rather firm lockup action in the fully opened position. The link is fairly wide at this point and, therefore, spring **27** exerts more pressure to hold the door more firmly in this position. The outer end of the link has a stop shoulder **34** provided thereon which comes into abutment with the back of the hinge member **5** when the door reaches the fully opened position shown in Figs. 1 and 2, thereby positively limiting door movement when the pin **20** rides into the lockup depression **33**.

In operation, when the door is being opened there is no appreciable frictional drag noticeable during the first 15° or so of door opening movement because of the gradual inclination of the portion **35** of the profiled edge **19**, and then, as the flat portion **36** rides on the pin **20** during the next 5° to 10° of door opening movement, whatever drag has been reached remains constant until the pin rides down the oppositely inclined portion from the high spot **30** toward the low spot **32** in which movement a noticeable assist action is obtained, the assist action being checked as the pin **20** rides up the other incline toward the high spot **31** so as to check the door opening movement before the door reaches its fully opened position. Hence, the door quite easily reaches the 45° position and stays there but is not held rigidly. It is only when the

pin 20 rides into the depression 33 that a real lockup action is obtained. Simultaneously with the engagement of the pin 20 in the depression 33, the shoulder 34 strikes the back of the hinge member 5 and positively limits the door opening movement. To close the door one must exert a sudden heavy push or pull on the door to overcome the resistance to closing movement afforded by the pin 20 in depression 33 and spring 27 holding the link in the lockup position under fairly heavy tension. Of course, as soon as this resistance is overcome and the pin 20 rides down the incline from high spot 31 there is an assist action and the assist action is checked as the pin again rides up the incline toward high spot 30 as the door reaches a nearly mid position. At that point the dwell 36 comes into play again and avoids the likelihood of the door striking a person from behind if he or she has not gotten all the way in. The slight assist afforded thereafter as the pin 20 rides down the incline 35 helps as the door is clammed shut. The link 15 will, of course, be "tailored" to suit the requirements of the door on which the hinge is to be used, and, of course, different weights of springs 27 will be used depending on door weight.

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

I claim:

1. In a hinge comprising a pair of hinge members pivoted relative to one another for relative pivotal movement through a predetermined angularity, the improvement consisting in the provision of an elongated link pivoted at one end on one of said hinge members radially from the hinge axis and having its other end portion extending through a slot provided in the other of said hinge members radially from the hinge axis, one longitudinal edge portion of said link slidably frictionally engaging an abutment in one end of said slot, an elongated lever disposed in a plane in transverse relation to the link and pivoted at one end on the last mentioned hinge member and slidably frictionally engaging intermediate its ends the other longitudinal edge portion of said link, and spring means active against the free end of said lever urging it toward the link to maintain the link in frictional contact with the aforesaid abutment.

2. In a hinge comprising a pair of hinge members pivoted relative to one another for relative pivotal movement through a predetermined angularity, the improvement consisting in the provision of an elongated link pivoted at one end on one of said hinge members radially from the hinge axis and having its other end portion extending through a slot provided in the other of said hinge members radially from the hinge axis, one longitudinal edge portion of said link slidably frictionally engaging an abutment in one end of said slot, an elongated lever disposed in a plane in transverse relation to the link and pivoted at one end on the last mentioned hinge member and slidably frictionally engaging intermediate its ends the other longitudinal edge portion of said link, and spring means active against the free end of said lever urging it toward the link to maintain the link in frictional contact with the aforesaid abutment, the longitudinal edge portion of said link slidably frictionally engaging the abutment being profiled in a predetermined pattern so as to afford different amounts of friction drag on hinge movement in different portions of the range of hinge opening and closing movement, and the other longitudinal edge portion of said link slidable frictionally engaged by said lever being substantially in a straight line.

3. In a hinge comprising a pair of hinge members pivoted relative to one another for relative pivotal movement through a predetermined angularity, the improvement consisting in the provision of an elongated link pivoted at one end on one of said hinge members radially from the hinge axis and having its other end portion extending through a slot provided in the other of said hinge members radially from the hinge axis, one longitudinal edge portion of said link slidably frictionally engaging an abutment in one end of said slot, an elongated lever disposed in a plane in transverse relation to the link and pivoted at one end on the last mentioned hinge member and slidably frictionally engaging intermediate its ends the other longitudinal edge portion of said link, and spring means active against the free end of said lever urging it toward the link to maintain the link in frictional contact with the aforesaid abutment, one of said longitudinal edge portions being substantially in a straight line and slidably frictionally engaged by said elongated lever and the other of said longitudinal edge portions which frictionally engages the abutment being profiled in a predetermined pattern so as to provide a relatively loose hold-open action at an intermediate point of door opening movement and a relatively tight lock-up action when the door is fully opened, the link having a stop shoulder on its outer end arranged to engage the outer side of the slotted hinge member adjacent the slot positively to limit door opening movement.

4. In combination, a hinge comprising an L-shaped hinge member and a substantially straight hinge member pivoted on a pintle carried on the outer end of one arm of the L-shaped member, said L-shaped member having a slot provided in the other arm thereof which is arranged to register substantially with a slot provided in the straight member when the hinge is closed, an elongated link pivoted at one end to the straight member in its slot and extending therefrom through the slot provided in the L-shaped member and having a head on the free end thereof for abutment with the L-shaped member to limit opening movement of the hinge members, one longitudinal edge portion of said link having a predetermined profile and slidably frictionally engaging an abutment in one end of the last mentioned slot, the other longitudinal edge portion of said link being substantially straight, an elongated lever pivoted on the L-shaped member in a plane in transverse relation to the link and slidably frictionally engaging intermediate its ends the straight edge portion of said link, and a tension spring extending substantially parallel to the slotted arm of the L-shaped member and attached at one end to the other arm thereof and being stretched and attached at its other end to the free end portion of said elongated lever.

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