July 2, 1940. J. LUDWIG ET AL 2,206,326

SELF-LOCKING HINGE

Filed May 10, 1937

Fig. 1.

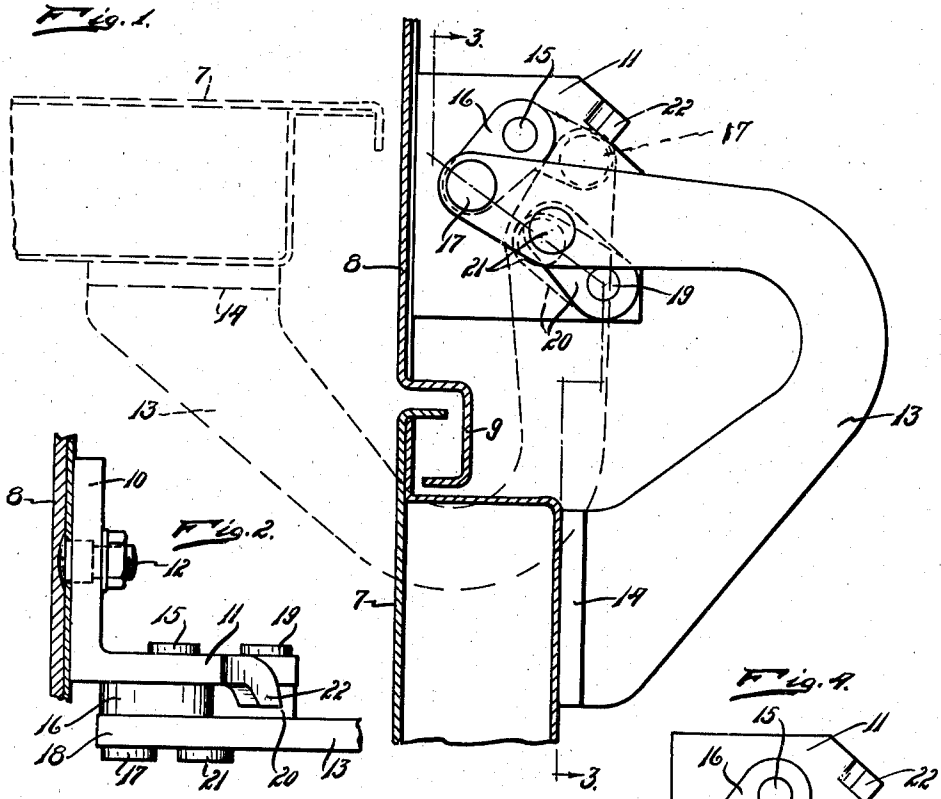


Fig. 2.

Fig. 3.

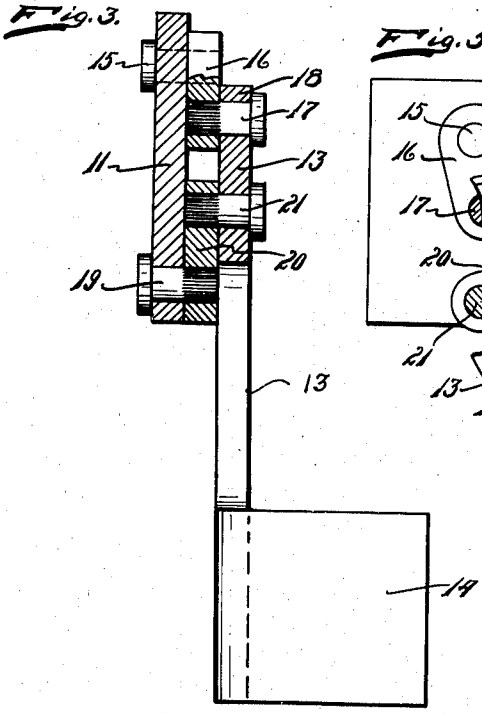


Fig. 5.

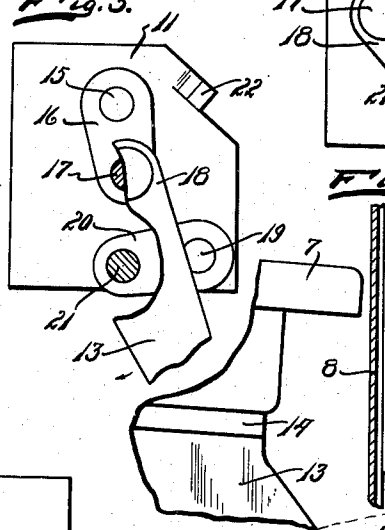


Fig. 4.

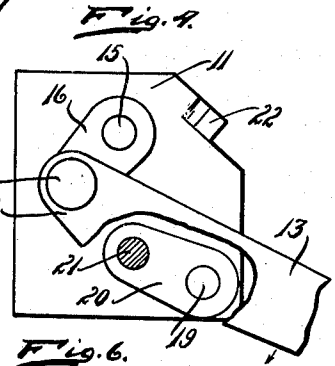
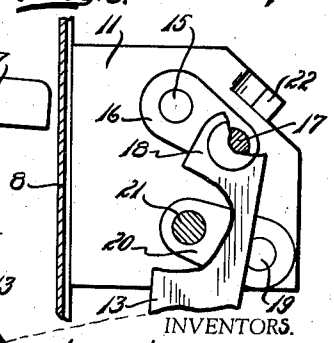


Fig. 6.



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SELF-LOCKING HINGE

John Ludwig and George M. Gebhardt, Detroit, Mich.

Application May 10, 1937, Serial No. 141,603

3 Claims. (Cl. 16—163)

Our invention relates to a new and useful improvement in a self-locking hinge adapted for mounting a swingable body on a stationary body in such a manner that when the swingable closure swings into open position, the hinge automatically will lock itself in open position.

Another object of the present invention is the provision of a hinge of this class so arranged and constructed that after it is moved to open position and locked in open position, a very slight movement in a direction other than the closing direction will release the hinge for movement to closed position.

Another object of the present invention is the provision of a hinge of this class so constructed and arranged that in its initial movement to open position, it will move bodily carrying with it a swingable pivot and after a slight bodily movement swing on an arc determined by more than one pivot of swinging.

Another object of the present invention is the provision of a hinge of this class which will be simple in structure, economical of manufacture, durable, highly efficient in use, compact, and easily mounted in position and removed therefrom.

Other objects will appear hereinafter.

The invention consists in the combination and arrangement of the parts hereinafter described and claimed and will be best understood by a reference to the accompanying drawing, in which,

Fig. 1 is a side elevational view of the invention showing it applied.

Fig. 2 is a fragmentary, top plan view of the invention.

Fig. 3 is a sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a fragmentary side elevational view of the invention with parts broken away showing the hinge in one position of movement.

Fig. 5 is a side elevational view of the invention with parts broken away showing the hinge in another position of movement.

Fig. 6 is a side elevational view of the invention with parts broken away showing the hinge in another position of movement.

In the drawing we have illustrated the invention used for mounting a swingable closure 7 on a stationary part 8 and in the drawing we have indicated a structure which is quite common on automobile bodies having a compartment at the rear, closed by the swingable closure 7 which it is necessary to raise upwardly into a horizontal position in order to obtain access to the compartment. Extending across the edge of the stationary part 8 is a channel iron 9.

The hinge comprises a stationary part which we have illustrated as being formed L-shaped comprising the part 10 and the part 11, these two parts being formed from a single piece of metal and extending at right angles of each other. The part 10 is secured by the bolt 12 to the stationary supporting body 8. The swingable part of the hinge comprises a yoke arm 13 having the angularly turned plate 14 at one end thereof which is attached, by welding or in another suitable manner, to the swingable closure 7. Pivotally mounted at one of its ends to the stationary plate 11 by means of a pintle 15 is a link 16, the opposite end of which is pivotally mounted by means of the pintle 17 to the end 18 of the yoke arm 13. Pivotally mounted to the plate 11 by means of the pintle 19 is one end of the link 20. The other end of this link 20 is pivotally mounted by means of the pintle 21 to the yoke arm 13 inwardly from its end, as clearly appears in Fig. 1. In the construction it thus appears that there is a double toggle linkage, the link 16 and a portion of the member 13 forming one toggle, and the link 20 and the same portion of the member 13 forming the other toggle.

In Figure 1 the hinge is indicated in full lines in a position with the closure 7 fully closed, and in dotted lines it is indicated as being open. It will be noted that when the closure is in closed position, the hinge will be in such a position that the toggle lying between the pivots 19, 21 and 17 will have moved inwardly past center and upon opening movement moves outwardly past center. If pressure is exerted upon the closure 7 to swing it to open position, an attempt to rock the member 13 on either pivot 17, or 21 alone would be resisted. Thus the arm 13 cannot rock on either of these pivots alone. If outward pressure continues, the yoke arm or the movable section of the hinge 13 will have to move and does move bodily outwardly, the link 16 being swung to the left of the drawing on its pivot 15 and the link 20 being swung to the left of the drawing on its pivot 19 until the pivots 19, 21, and 17 align on center. The yoke arm will then swing on the pivot 17, the link 16 remaining momentarily stationary and the link 20 swinging until the toggle defined by the parts lying between the pivots 19, 21, and 17 moves past center, whereupon the link 20 will swing downwardly and the link 16 will be swung inwardly until the pivots 15, 17, and 21 are aligned and as the toggle defined by these pivots swings past center, the link 16 will swing upwardly as will likewise the link 20, and at fully open position the link 16 will engage the abutment tongue 22 struck from the plate 11. Further swinging of the hinge into open position is resisted when the hinge is in this position. The toggle defined by the pins 15, 17, and 21 is broken to the right of the drawing and downward pressure on the member 14 would have a tendency to further swing the link 20 upwardly and to the right of the drawing. But this cannot take

effect because the link 16 would also have to swing further upwardly and toward the right of the drawing and this swinging movement is resisted by the tongue 22. When the hinge is swung to the dotted line position shown in Fig. 1, the yoke arm 13 cannot swing in a manner other than to effect farther upward swinging of the pivot 17, so that were the tongue 22 not present, further swinging of the hinge to open direction or pressure on the hinge toward closing position would effect a swinging of the link 16 farther upwardly so that the pivot 21 of the toggle defined by the pivots 19, 21, and 17 would pass center. In such a movement the inner end of the hinge would swing upwardly, make a loop, and then swing downwardly.

In Fig. 4 the hinge movement is indicated in the initial stage of bodily outwardly swinging of the arm 13 prior to the complete alignment of the pivots 19, 21, and 17. Fig. 5 shows a further step in this swinging movement in which the pivots 15, 17, and 21 are in alignment and Fig. 6 indicates a further step showing the toggle defined by the links 15, 17, and 21 broken to the right. In order to release the hinge for downward swinging movement, it is but necessary to exert force outwardly approximately on the line determined by the pivots 17 and 21, this movement of the arm 13 serving to release the toggles defined by pivots 15, 17, and 21, and by 19, 21, and 17, whereupon the swinging of the closure to closed position may be easily effected. In swinging the yoke arm to the released position, the link 16 will swing on its pivot 15 and the link 20 will swing on its pivot 19, and a very slight outward pressure is necessary in order to move the closure into such position.

With a hinge constructed in this manner, the yoke arm 13 always swings in a defined arc so as to clear the cross bars or channel iron 9, and the closure is always returned, when moved from open to closed position, to its original closing position.

It is believed obvious that the durability and efficiency of the invention referred to is obtained and that a simple, easily operated structure of this type is provided.

While we have shown the preferred form of embodying the invention in a structure of this type, it is recognized that various modifications and changes may be made without departing from the principle and spirit of the invention and we wish it understood that such modifications are contemplated in this specification.

What we claim as new is:

1. A hinge of the class described, adapted for mounting an upwardly swingable closure on a stationary body and for securing said closure in raised open position, said hinge comprising: a pair of hinge sections, one of said hinge sections being fixedly mounted on said stationary body and forming a stationary hinge section; a swingable hinge section mounted at one end on said closure; a pair of links each pivotally mounted at one end on said stationary hinge section in spaced relation to each other; means for pivotally connecting the free end of one of said links to the opposite end of said swingable section; and means for connecting the free end of the other of said links adjacent said opposite end of said hinge section inwardly from the end thereof, the location of the pivotal points of said links on said stationary hinge section and the pivotal connection of said links to said swingable hinge section providing a plurality of toggles, the movement of said closure to open position, breaking one of said toggles beyond center; and means cooperating with said toggle for resisting swinging movement of said closure from its raised open position.

2. A hinge of the class described, adapted for mounting a swingable closure on a stationary body and comprising: a pair of hinge sections, one of said hinge sections being fixedly mounted on said stationary body and forming a stationary hinge section; a swingable hinge section mounted at one end on said closure; a pair of links each pivotally mounted at one end on said stationary hinge section in spaced relation to each other; means for pivotally connecting the free end of one of said links to the opposite end of said swingable section; means for connecting the free end of the other of said links adjacent said opposite end of said hinge section inwardly from the end thereof, the location of the pivotal points of said links on said stationary hinge section and the pivotal connection of said links to said swingable hinge section providing a plurality of toggles, the movement of said closure to open position breaking one of said toggles beyond center and securing said closure in open position; and a stop on said stationary hinge section for engaging said toggle and preventing the breaking of the same beyond center a predetermined distance.

3. A hinge of the class described, adapted for mounting a swingable closure on a stationary body comprising: a stationary hinge section and a swingable hinge section, said stationary hinge section being fixedly mounted on said stationary body and one end of said swingable hinge section being fixedly attached to the closure; a pair of links each pivotally mounted at one of its ends on said stationary hinge section in spaced relation to each other; means for pivotally connecting the free end of one of the links to said opposite end of said swingable hinge section; means for connecting the free end of the other of said links to said swingable hinge section adjacent the opposite end and inwardly therefrom, the points of connection of said links with said swingable hinge section being spaced apart to provide a toggle between the pivot of one of said links on said stationary section and the two pivotal points of the free ends of said links, said toggle being moved past center immediately prior to the termination of the swinging of said closure to closed position and arranged to provide a second toggle between the pivot of the other of said links on said stationary hinge section and the pivotal points of the free ends of said links, said second toggle being moved past center upon the swinging of said closure to open position; and means on said stationary section for limiting the swinging of said second toggle after it has broken beyond center upon the swinging of said closure to open position for securing said closure in open position.

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