Oct. 1, 1940. R. L. McKINNEY 2,216,445

AUTOMATIC DECK SUPPORT

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Fig. 1.

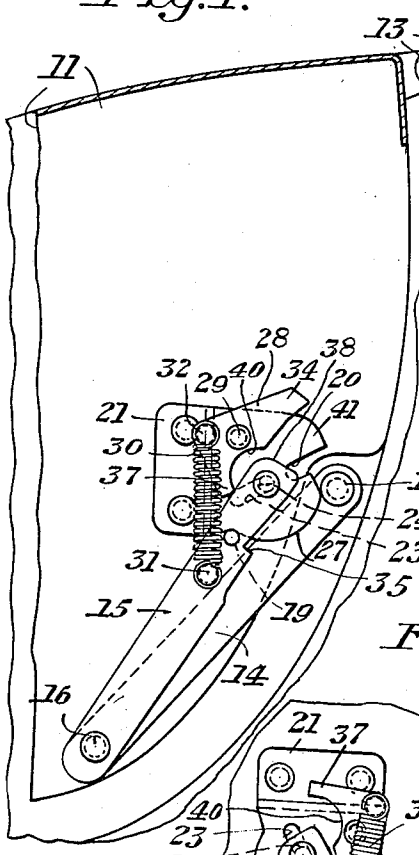


Fig. 2.

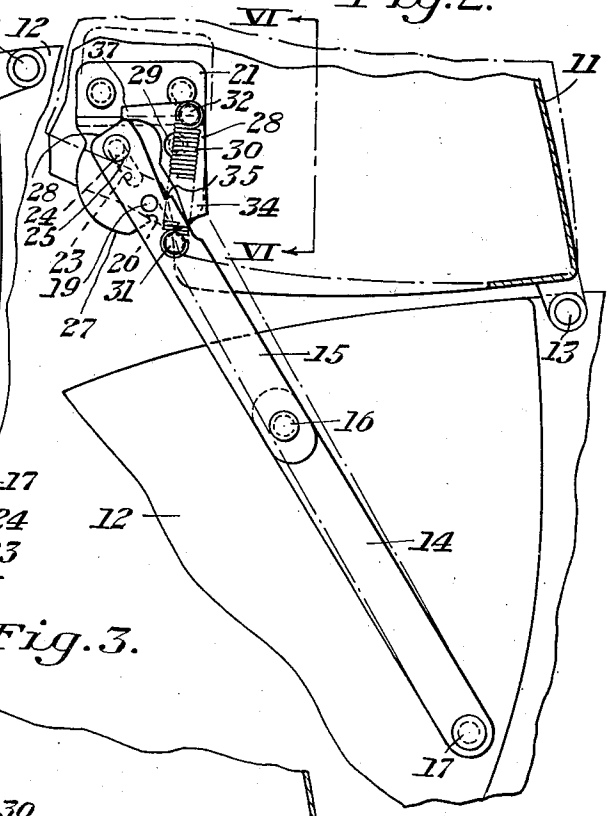
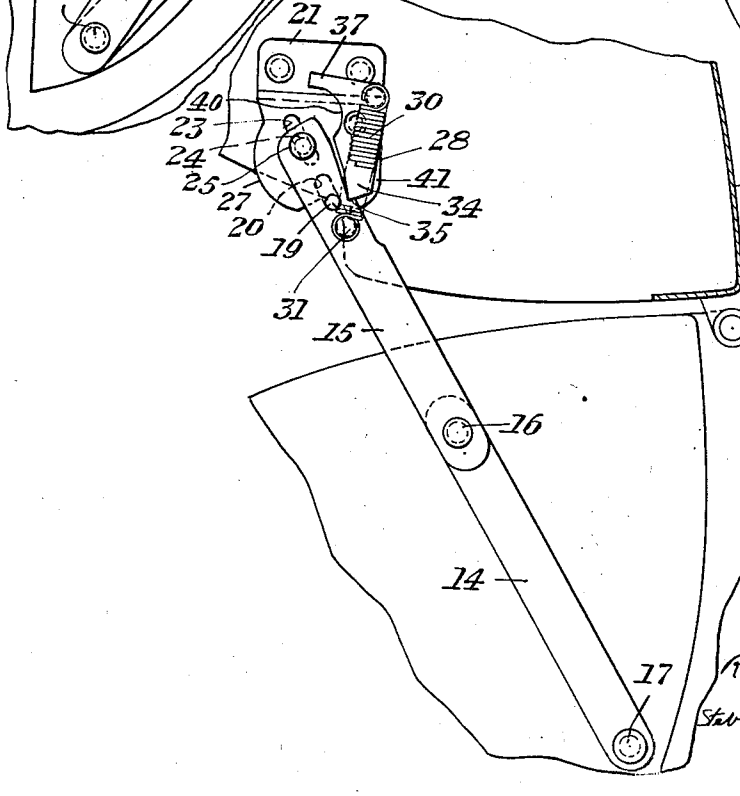


Fig. 3.



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Fig. 6.

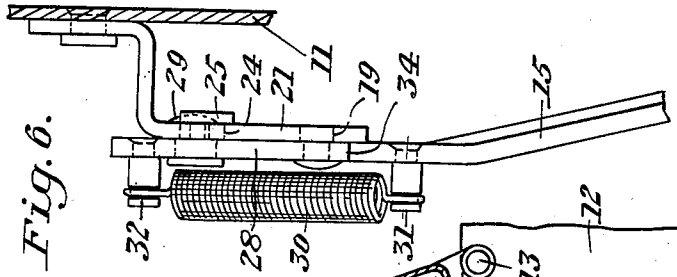


Fig. 5.

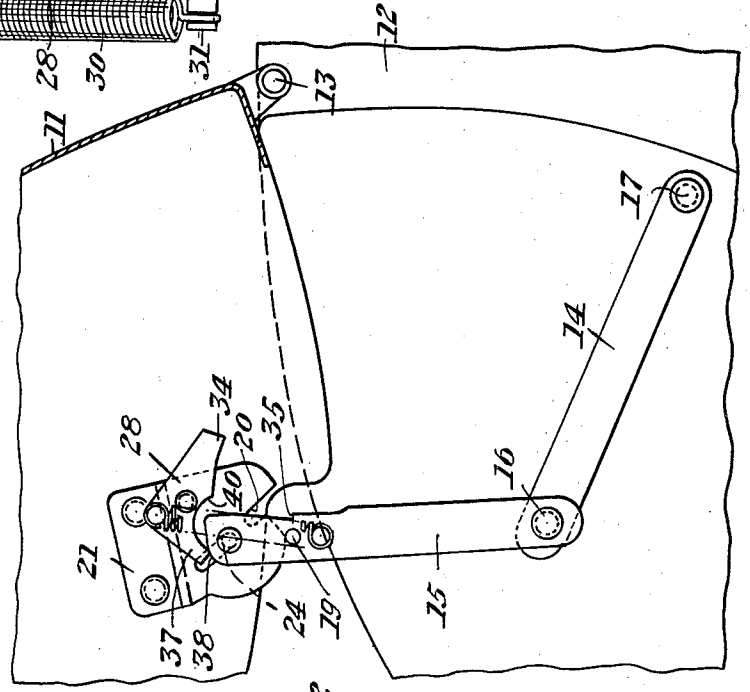
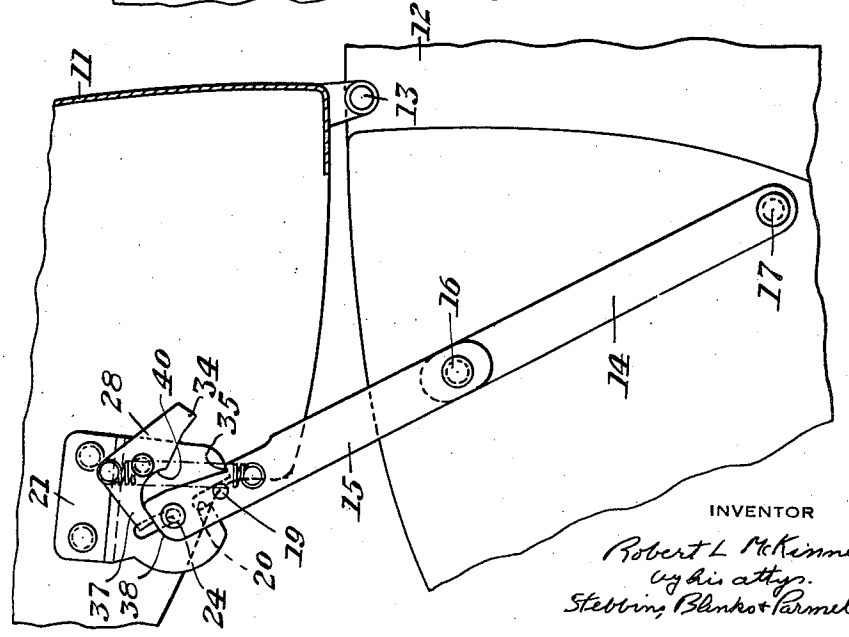


Fig. 4.



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Fig. 8.

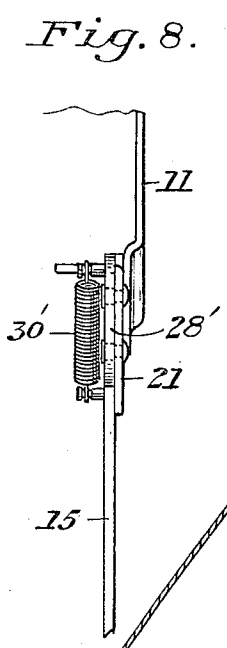


Fig. 7.

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AUTOMATIC DECK SUPPORT

Robert L. McKinney, Pittsburgh, Pa.

Application June 22, 1936, Serial No. 86,469

4 Claims. (Cl. 217—60)

The present invention relates to improvements in apparatus for automatically holding or propping apart portions of a structure and for automatically releasing the propping apparatus when the propped portion of the structure is moved past its propped-open position, whereby the portions of the structure may be moved freely toward each other. More particularly, the present invention relates to apparatus of the character referred to for automatically holding or propping a hinged or pivoted closure, such as the deck of an automobile, in open position when the closure is raised or opened and for automatically releasing the closure whereby the latter will gravitate or may be moved freely into closed position.

An object of the invention is to provide a simplified construction which is positive in its locking and which can be relied upon not to jam or fail to release when the portions of the structure are to be brought toward each other.

In the accompanying drawings, which illustrate two embodiments of my invention:

Figure 1 is a view of apparatus for propping open a pivoted closure such as the deck of an automobile, the prop being in contracted position and the closure being shown in section;

Figure 2 illustrates in full lines the normal position of the portions of the structure and of the bars of the prop when the closure is propped up, and in chain lines their positions when an element of the control mechanism has been rendered operative for breaking the toggle.

Figure 3 illustrates this latter position of the mechanism;

Figure 4 illustrates the position of the parts of the mechanism when the closure has been raised to the fullest extent from closed position;

Figure 5 illustrates the position of the parts of the mechanism during lowering, just after the above mentioned element of the control mechanism has been shifted due to the spring passing dead center;

Figure 6 is a view of the control mechanism taken from the right of Figure 2 and looking in the direction of the arrows;

Figure 7 is a view in side elevation of a modified embodiment of my invention;

Figure 8 is a view thereof corresponding to the view of the first embodiment shown in Figure 6.

The present improvements, although having application in a variety of fields, have been developed more particularly to meet the demands of the automobile trade for a device automatic in operation which will, at the same time, be sturdy and compact in construction, certain in its operation and positive in its locking, even though the closure, such as the deck of an automobile, is pushed on beyond propped position to the extreme upper limit of swing of the closure. In the drawings, these improvements are illustrated in the form of apparatus for automatically propping open a closure, such as the deck of an automobile. Such closure is illustrated in Figure 1 at 11, this closure being pivoted to the body 12 at 13. Two bars 14 and 15 are pivoted together at 16 so as to be swingable relative to each other to provide a releasable toggle prop between the portions 11 and 12 of the structure.

In the embodiments illustrated, the bar 14 is pivoted at 17 to the body 12 and the bar 15 is connected to the closure 11 by mechanism operative to releasably lock the toggle prop in the position shown in full lines in Figure 2. More particularly, mechanism is provided at this end of the prop for automatically controlling locking and releasing of the prop, this mechanism including in the embodiments illustrated a pin 19, engageable in a recess 20 in a bracket 21, secured to the closure 11, whereby the bar 15 is positively locked against swinging movement relative to the bracket 21 and closure 11.

In order to afford relative movement between the bar 15 and bracket 21 to permit the pin 19 to enter and leave the recess 20, the bar 15 is not connected to the bracket 21 by the usual pivot, but by a pin and slot connection. In the embodiment illustrated in Figures 1 to 6, inclusive, the slot 23 is in the bracket 21 and a post 24 having a head 25 (see Figure 6) is carried by the end portion of the bar 15. It is apparent, therefore, that the end of the bar 15 may move relative to the bracket 21 to the extent permitted by the slot 23 and that the head 25 holds the end of the bar 15 against lateral displacement from the bracket 21.

The control mechanism furthermore includes an element for guiding the bar 15 during lowering of the closure 11, so that the pin 19 does not return into the recess 20, but instead follows the periphery 27 of a cam portion of the bracket 21. In accordance with my invention, this control element is not rendered operative until the bars 14 and 15 have first come into the operative propping position shown in full lines in Figure 2. In the construction shown, this element takes the form of a pawl 28, pivotally mounted at 29 on the bracket 21. A tension spring 30 extends between a pin 31 on the bar 15 and a pin 32 on the pawl 28, the relation of the pins 31 and 32 to the pivot 29 being carefully chosen so that in the normal position assumed by the parts

when the closure is propped up (Figure 2), the nose 34 of the pawl will have swung into engagement with the bar 15 below a notch 35 therein, but so that during lifting of the closure 11 from closed position, this nose 34 will be in the "out" position shown in Figure 4. A review of the figures so as to follow the apparatus through its several positions will assist in an understanding of the operation of the pawl 28.

The pawl 28 has, in addition to its nose 34, a cam follower portion 37, and the end 38 of the bar 15 is formed as a cam. In the retracted position of the parts illstrated in Figure 1, the cam follower portion 37 of the pawl 28 is held in engagement with the bar 15 by the spring 30, the pivot 29 being at this time considerably to the right of the line of pull of the spring 30. As the closure 11 is swung toward open position, the cam follower portion 37 of the pawl 28 rides over the end 38 (see Figure 5), the pin 19 guiding the movement of the toggle prop 14, 15. No matter how far open the closure 11 is swung, the pivot 29 does not cross the line of pull of the spring 30 between the pins 31 and 32, as is clear from Figure 4, which illustrates the extreme position to which the closure 11 can be swung. In other words, the pull of the spring 30 on the pawl 28 is such that the nose 34 does not swing over against the bar 15 unless and until the end 38 of the link 15 pushes against the cam follower portion 37 (due to travel of the post 24 along the slot 23), so as to positively swing the pawl 28 about its pivot 29. This positive swinging of the pawl 28 cannot take place by movement of the closure 11 from closed position to the position shown in Figure 4, but occurs when the closure 11 is in a somewhat lower position, by which time it is impossible for the nose 34 to drop into notch 35, so that instead, the pawl engages the bar below the notch and the pin 19 moves into the recess 20.

As is evident from the construction illustrated, the lowering of the closure 11 from propped-up position can be effected in a simple manner. By lifting the closure 11 from the full line position indicated in Figure 2 to the chain line position indicated in that figure, the nose 34 of the pawl 28 is moved along the bar 15 so as to drop into the notch 35 in the position indicated in Figure 3. The operator now merely releases the closure 11 so that its own weight carries it downwardly, or he can freely swing the closure to closed position. The pawl 28 at this time (see Figure 3) imparts thrust from the downwardly moving closure 11 to the bar 15 through the notch 35, so as to break the toggle. At the same time, this thrust causes the pin 19 to be deflected from the recess 20 and to move along the cam surface 27 instead.

During this movement and in the retracted position shown in Figure 1, the spring 30 pulls on the prop; and inasmuch as the pin 19 is maintained snugly against the cam surface 27, it allows no looseness in the apparatus even in retracted position. This prevents vibration in the parts or other cause of noise.

The pawl 28 is carried by the bracket 21, and as the toggle 14, 15 continues to bend, due to lowering of the closure 11, the notched portion of the bar 15 leaves the nose 34 by an easy releasing movement. This is of advantage because if the pawl 28 snapped out of the notch, there would be considerably more wear. When the toggle has bent far enough to reach approximately the position shown in Figure 5, the pivot 29 is far enough to the side of the line of pull of the spring 30 so that friction in the pivot is overcome and the pawl snaps over into the position shown in Figure 5. The cam follower portion 37 of the pawl then follows the cam 38 to the side of the bar 15. If desired, the portion 40 of the pawl 28 may be formed as a cam follower for engaging with the end of the bar 15 and throwing the pawl to the position shown in Figure 5 early in the downward travel of the closure 11.

The successive positions assumed by the post 24 in the slot 23 are illustrated in the several figures of the drawings. As shown in Figure 1, the spring 30 so pulls on the bar 15 as to maintain the post 24 in what will be called, for the sake of convenience, the lower end of the slot 23. As the closure 11 is raised, the pin 19 rides along the cam surface 27 of the bracket. As the closure 11 nears the upper limit of its travel, the spring 30 pulls the bars 14 and 15 of the toggle into straightened relation, the nose 41 on the bracket cooperating with the pin 19 to prevent over-travel. The position assumed by the post 24 in the slot 23 at this time depends upon how far the closure 11 is swung open. In the position shown in Figure 4, the post 24 is in the extreme lower end of the slot 23. The closure 11 comes to rest in propped position when the post 24 engages the other end of the slot 23, as illustrated in Figure 2.

The spring 30 is not relied upon to hold the closure "up," and therefore, its tension is selected merely for its control function. The slot 23 is extensive enough, as is clear from Figures 2 and 3, both to permit the pin 19 to engage in the recess 20 and to permit the pin 19 to move out of the recess 20, provided the nose 34 enters the notch 35, as shown in Figure 3. The remaining operation of the apparatus has been fully explained above.

The embodiment illustrated in Figures 7 and 8 has substantially the same principle of operation; and on the drawings, parts are given the same numbers as corresponding parts in the first embodiment, but with a prime attached. The pin and slot connection in the embodiment illustrated in Figure 7 differs from the first embodiment, in that the slot 23' is in the bar 15', while the post 24' is carried by the bracket 21'.

My invention provides mechanism for automatically controlling locking and releasing of a toggle type prop, which mechanism positively locks the prop in extended position. In the particular embodiments illustrated, this positive locking is accomplished mechanically by a pin which engages in a recess in the bracket connecting the prop to a portion of the structure.

Certain advantages of the device arise out of the principle of its operation which permits the closure, such as the deck of an automobile, to be pushed up to the fullest extent before dropping into locking position, such opening of the closure interfering in no way with the positive locking of the prop.

Further advantages of the invention arise out of the arrangement for releasing the prop, the pawl for effecting such release being rendered operative only by movement of the portions of the structure from propped-apart position past said position. The centers are so arranged that no matter whether the deck or other closure is lifted merely to locking position or whether it is pushed on beyond as far as it will go, the pawl is not thrown into operative position until the bars con-

stituting the prop come into operative propping position. In other words, it is possible to render the pawl operative only by first passing into propped position and then again lifting from propped position.

I prefer the arrangement of the slot in the bracket rather than in the bar for the smaller and lighter devices. The balance of forces in such supporting mechanisms is more delicate; and I have found that the control mechanism in such cases can be made more positive with this arrangement, in which the prop moves along the slot in a bracket which is fixed to a portion of the structure. This arrangement has the further advantage that the bar need not be weakened by forming a slot therein.

The forming of the bracket with a cam portion has the advantage that it keeps the bars of the prop in predetermined relation to the other moving parts, instead of their wandering without control other than the friction in the pivots. Due to the control of the rods by this cam portion of the bracket, the device is rendered less sensitive to lack of uniformity in the dimensions of the body. It is not uncommon for the fit of the body to vary as much as a quarter of an inch.

Further advantages are derived from the cooperation of the spring with the rods as they are guided by the cam portion of the bracket. This spring holds the bars in snug contact with the periphery of the cam portion of the bracket, so that there is freedom from rattle. It is well known that a rattle in one portion of the car body may appear to have its source in a far different part of the body, hence it is objectionable to have loose parts anywhere which are free to rattle.

This spring is so arranged as to be easily replaceable. This increases the life of the device, since it is not necessary to remove any other part if the spring is broken, but merely to stretch the new spring into place.

My improved apparatus is unusually compact, folds into a small space, and projects to a minimum extent into the storage space within the body.

While I have illustrated and described two illustrative embodiments of my invention, it will be understood that my invention may be otherwise embodied and practiced within the scope of the following claims.

I claim:

1. A prop for holding in open position a closure member pivoted on a body member, said prop including a pair of bars pivoted together, one bar being pivoted to one of said members, a bracket secured to the other, said other bar having a sliding connection with said bracket and a pin adapted to enter a notch therein when the closure is initially raised and released, and a pawl pivoted on said bracket for movement to engage a detent on said other bar to prevent movement of said pin into said notch after a further raising and releasing of said closure, said pawl having a projection engageable by a portion of said other bar on downward movement of the bracket as the pin enters said notch on the initial release of the closure effective to shift said pawl into position to engage said detent.

2. A prop as defined in claim 1 characterized by tension means secured to said other bar effective on lowering of the closure and tilting of said other bar to restore said pawl to a position in which it does not engage said portion of said other bar.

3. A prop for holding open a closure member pivoted to a body member comprising a bracket secured to one of said members, a supporting link adapted to cooperate with said bracket and having a sliding connection therewith, a pin on said link and a notch in said bracket adapted to receive said pin and hold the link rigid when the closure is raised initially and released, thereby propping it in uplifted position, a pawl pivoted on said bracket adjacent said link, a detent on said link engageable by said pawl to prevent the bracket from sliding on the link and thereby prevent entry of said pin into said notch when said closure is raised and released again after the initial propping operation, and means for actuating said pawl into detent-engaging position on initial entry of said pin into said notch.

4. A prop as defined by claim 3 characterized by a tension spring secured to said pawl and said link effective on lowering of the closure and tilting of said link to shift said pawl to a position in which it does not engage said link on initial raising and release of said closure.

ROBERT L. McKINNEY.