

Dec. 21, 1954

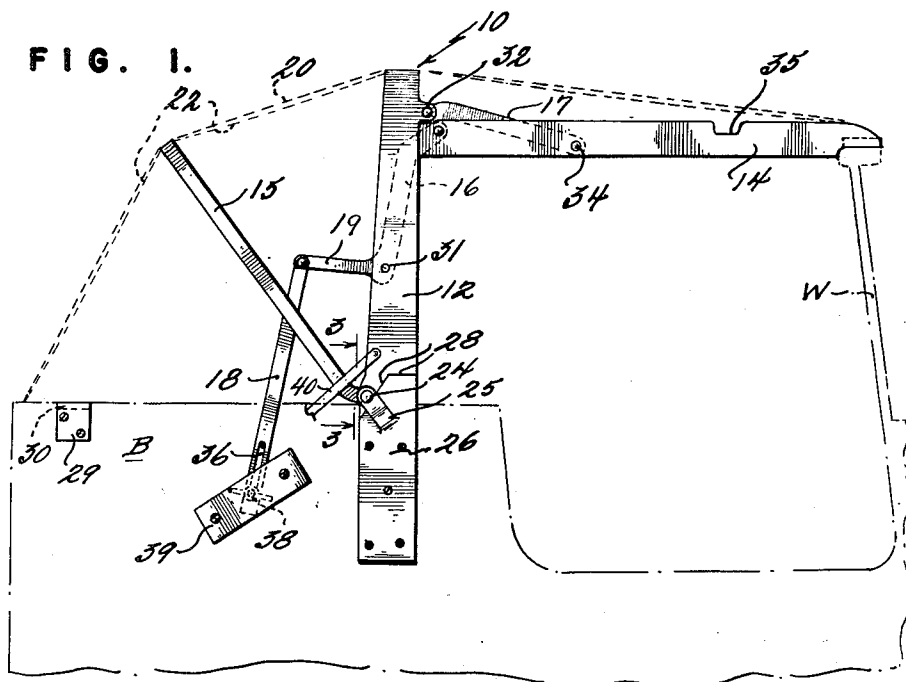
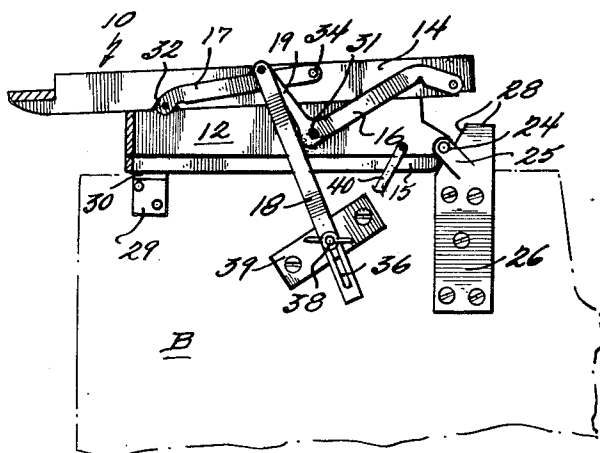
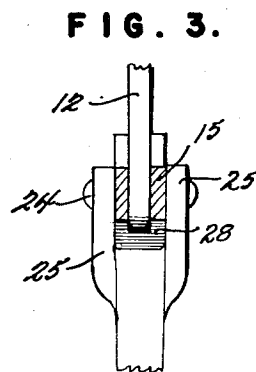
F. K. SLASON

2,697,633

COLLAPSIBLE VEHICULAR TOP FRAME

Filed April 1, 1952

2 Sheets-Sheet 1



INVENTOR
FRANK K. SLASON

BY
Lemmas, Hegin, Robinson & Lemmas
ATTORNEYS

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F. K. SLASON

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FIG. 4

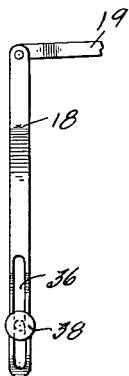


FIG. 5

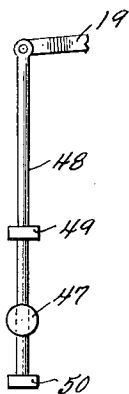


FIG. 7.

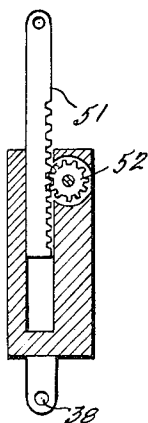


FIG. 6.

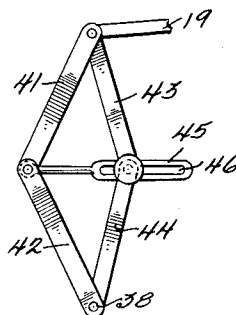
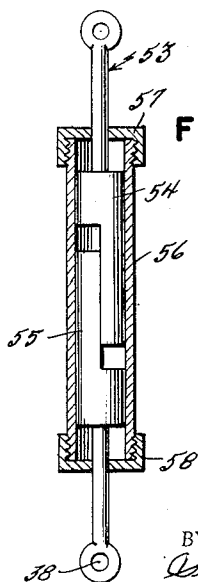


FIG. 8



INVENTOR
FRANK K. SLASON

BY

Clemens, Klayton, Robinson & Clemens
ATTORNEYS

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2,697,633

COLLAPSIBLE VEHICULAR TOP FRAME

Frank K. Slason, West New Brighton, N. Y., assignor of one-tenth to Clinton B. D. Brown, Washington, D. C.

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4 Claims. (Cl. 296—116)

This invention relates generally to supports for cover members and more particularly to supports for vehicle tops which may be readily folded or raised without interfering with the vehicle windows, etc.

Devices of this general type are most frequently used on convertible automobiles and as a rule characterized by a number of inherent disadvantages. Among these are an overly complex linkage system resulting in an unnecessary cost and a lack of understanding among users of how to manipulate the structure. In most instances, when the tops heretofore available were in the extended position, the supporting structure was in a near "dead center" position making it difficult to move the top from the extended to the folded position.

Accordingly, the chief object of the present invention is to provide an improved folding structure for the support of a cover member which will obviate the aforementioned objectionable characteristics.

Another important object of the present invention is to provide a folding supporting structure which may be easily installed on vehicles to support a cover member without interference with other parts of the vehicle.

A further important object is to provide an improved top for vehicles which will be simple in construction but include members so arranged as to cooperate in a novel manner to result in a more efficient operation during raising or lowering thereof.

Other objects and advantages of the invention will become apparent during the course of the following description.

With these and other objects in view, as will become apparent from the following detailed description, this invention resides in a folding supporting structure for a cover member in which a pivotally supported standard is linked to an outrigger member by a pair of pivotally connected linkages of different length whereby the outrigger member may be moved from a position substantially parallel to a position substantially perpendicular to the standard, and a variable length or extendible and retractable anchor member connected to one of the linkages to control the rotation of the outrigger member as the standard moves around its pivotal support. This anchor member is in the form of a delayed action control, designed to so time the initiation of the folding and unfolding of the outrigger member, that interference with other parts of the vehicle, such as windows, is avoided.

In the drawings, I have shown one embodiment of the invention. In this showing:

Figure 1 is a view in side elevation showing the invention in extended position upon a vehicle;

Figure 2 is a view of the invention in the folded position showing the structure on the opposite side of the vehicle;

Figure 3 is a vertical sectional view of the main bow pivot, taken on the line 3—3 of Figure 1;

Figure 4 is a detail view in elevation of one embodiment of the delayed action control member;

Figure 5 is another detail view of an embodiment of the delayed action control member;

Figures 6, 7 and 8 are elevations of still other delayed action control linkages which may be used with the structure of this invention.

Referring to the drawings, reference numeral 10 designates generally the invention which comprises a standard or main bow 12, an outrigger bow 14 and linkage members 16 and 17. Each of linkages 16 and 17 is pivotally connected to each of the main bow 12 and outrigger

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bow 14. The linkage members 16 and 17 are of different lengths so that on movement of the outrigger bow 14 from the main bow 12 the outrigger bow will move from a position substantially perpendicular to the main bow to a position substantially parallel to the main bow, in the manner hereinafter described. Linkage member 16 is provided with an arm 19 opposite the end of linkage member 16 connected to the outrigger bow 14. A delayed action control member in the form of an extendible and retractable anchor rod 18 is pivotally connected at one end to the end 19 of the linkage member 16, and at the opposite end, to a fixed member which may be the body of an automobile or other vehicle. It will be appreciated that each of the link members 16 and 17 and the anchor rod 18 has a corresponding part on the other side of the vehicle and is attached to the other ends of the bows 12 and 14.

The basic structure is covered by a fabric cover member 20 of flexible material which is supported by the main and outrigger bows and, preferably, also by a pair of spaced fabric tapes 22 extending from main bow 12 over and attached to an auxiliary bow 15, and then downwardly to be secured to the vehicle body, indicated by reference numeral B. Any conventional means may be employed to connect the outer end of the outrigger bow 14 to the vehicle windshield indicated by the letter W. While this invention is described as applied to a motor vehicle, it will be appreciated that it is not limited thereto, and is described in that manner only for purposes of illustration. The structural elements of this invention may be employed for supporting cover members generally when it is desired to provide means for changing the cover member from an extended position to a folded position. When applied to supports for the tops of convertible vehicles, the supporting members 12 and 14 are most conveniently referred to as bows, but in other applications they may be substantially straight or of other convenient shape.

The extremities of the main bow 12 are pivotally mounted at 24 to and between a pair of closely spaced bars 25 forming a part of the main supporting brackets 26 fixed to each side of the vehicle body B. The upper left hand edge of the brackets 26 (as shown in the drawings) is cut off diagonally to permit this special mounting which adds strength and rigidity to the structure and the resultant inclined and horizontal upper edge 28 acts as a stop and increased supporting area for the complementary lower end of the main bow 12 when in the extended position (Figure 1).

A second pair of brackets 29 is also fixed to the inside of the vehicle body B rearwardly of the main brackets 26 and includes laterally projecting flanges 30 which support the top members when in the folded position (Figure 2). Each leg of the main bow 12 has a lug 32 formed thereon to which one end of the pair of linkage members 17 are pivotally connected, their other ends being pivotally connected to the outrigger bow 14 at 34. The outstanding lugs 32 are for increased rigidity of the extended structure as hereinafter described, but are not essential to the structure. Linkage members 17 could be pivotally connected to main bow 12 between the edges of that bow. The legs of the outrigger bow 14 include cut-out portions 35 in which the lugs 32 nest when the top is in the folded position thus enabling the outrigger to lie flat on the main bow.

The auxiliary bow 15 which merely serves to shape the cover 20 is also pivoted to the brackets 25 at 24. The tapes 22 connect it with the body B and the main bow 12 and it will fall of its own weight as the top is folded and be lifted by the tapes to the position shown in Figure 1 when the top 10 is moved to the extended position.

The upper ends of the links 16, which are pivotally mounted on each leg of the main bow between the lug 32 and mounting 24, are pivotally connected to the outrigger bow 14 near each end. The lower ends of the anchor rods 18 are slotted as at 36 to provide for extension and retraction through a sliding and pivotal connection with a post 38 projecting laterally from a supporting plate 39 fixed to the opposite sides of the body B. Disengagement of the anchor rods 18 from the posts 38 is prevented by nuts or other suitable means.

In order to move the top from folded position (Figure 2) to operative position (Figure 1), the main bow 12 is pivoted in a clockwise direction about the pivot 24 either manually or by power means. For example, a connecting rod 40 driven by suitable means such as a hydraulic cylinder or by an electric motor and gear arrangement, not shown, may be pivotally connected to the main bow 12 to rotate it. No unfolding is effected until the posts 38 move from the tops of the slots 36 to the bottoms thereof whereupon the links 16 start to pivot counter-clockwise. This moves the outrigger bow 14 away from the main bow 12 and as the latter continues to pivot, the links 16 being shorter than the links 17, the angular relationship between the two bows changes from parallelism to substantially 90 degrees. In other words, the unfolding action of the outrigger bow is delayed until the anchor rod 18 is extended to a point pre-determined to assure clearance of other parts of the vehicle, such as windows, which might otherwise be jammed and broken by contact with the adjacent portions of the outrigger bow.

The position of the outrigger bow 14 with respect to the main bow 12 when in the extended position is determined by the extendible and retractable anchor link 18. Clockwise rotation of the main bow 12 will continue until the post 38 engages the lower end of the slot 36 in linkage member 18 to prevent the further rotation of linkage member 16, and, consequently, outrigger bow 14. In the embodiment of the invention shown, the rigidity of the structure in the extended position is increased by the engagement of the end of the outrigger bow 14 and the lug 32 as well as the engagement of the lower end of bow 12 with edge 28. The structure illustrated is only a preferred form of the invention, the linkage members 16, 17 and connecting rods 18 being sufficient to fix the position of the outrigger bow 14 with respect to the main bow 12.

It is to be noted that the length of the anchor rod 18 from the point of its connection to the arms 19 of linkage members 16 to the bottom of slots 36 is critical in that it controls the time of initial unfolding of the top as the main bow 12 is rotated from the folded position illustrated in Figure 2 to the final extended position of the outrigger bow 14. When the structure is changed from the extended position illustrated in Figure 1 to the folded position illustrated in Figure 2, the length from the upper end of the slot 36 to the connection with the arms 19 of linkage members 16 is critical in initiating the clockwise rotation of linkage members 16 to begin the folding of the cover member, and yet allowing the structure to move to the fully folded position illustrated in Figure 2. As the main bow 12 rotates in a counter-clockwise direction when the structure is to be changed to the folded position, the outrigger 14 remains substantially perpendicular to the main bow 12 until the upper end of the slots 36 in the anchor rods 18 engage the post 38. At this time the anchor rods 18 force the clockwise rotation of the linkage members 16 to begin the folding operation.

Anchor rods 18 may be any link or mechanism extendible and retractable by some means from a predetermined length in the "top up" or extended position and a shorter predetermined length in the "top down" or folded position. Several forms of anchor means are illustrated in Figures 4, 5, 6, 7 and 8 of the drawings. Figure 4 illustrates the preferred embodiment in which the anchor rod is merely provided with a slot 36 of a predetermined length which engages a fixed post 38 to control the operation of the supporting structure.

In Figure 6 of the drawings a pair of arms 41 and 42 are pivotally connected together at one end each and at their other ends to the arm 19 and post 38 respectively. Another pair of arms 43 and 44 are similarly pivotally connected to one another at one end and to the member 19 and post 38 respectively at the other end. A cross link 45 joins the pivotal connections of the two pairs of arms. The cross link 45 is provided with a slot 46 which controls the operation of the linkage member 16 in a manner similar to the preferred form of variable length connecting rod described above.

In the embodiment illustrated in Figure 5 the post 38 is replaced with a pivotally mounted block 47 through which a connecting rod 48 slidably extends. The connecting rod is provided with spaced collars 49 and 50 secured thereto. The collars 49 and 50 are adapted to engage the block 47 and operate the mechanism in the manner described above.

In Figure 7 the anchor means is formed by a rack 51 and pinion gear 52 arrangement permitting only limited movement. Another anchor structure is illustrated in Figure 8 in which the rod indicated generally by 53 is constructed of two portions 54 and 55 of enlarged diameter housed within a casing 56 provided with end pieces 57 and 58. The portions 54 and 55 engage the end pieces to fix the variable lengths or extension and contraction of the connecting rod in a manner similar to the preferred form of the invention.

It will now be readily apparent that the present invention provides an improved and highly efficient foldable top mechanism for vehicles which may be readily attached thereto without interference with windows, etc.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same and that various changes in the shape, size and arrangement of parts may be resorted to without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. A folding frame for collapsible covers, including a main bow having parallel side arms, pivotally mounted on a fixed support, an outrigger bow having corresponding side arms, a first pair of links pivotally connecting said main bow to intermediate points on respective outrigger bow side arms, a second pair of links pivotally connecting the free ends of said outrigger side arms to intermediate points on respective main bow side arms, offset levers fixed to the pivoted ends of said second links, delayed action control means interposed between respective offset levers and said fixed support, said last named means comprising anchor members, pivotally connected to said offset levers and said fixed support whereby the distance between said last-named pivotal connections at the offset levers and fixed support may be varied, and means for defining the limits of variable distance between said pivots.

2. A folding top frame for vehicles, including a main bow having parallel side arms, pivotally mounted at fixed points on the vehicle, an outrigger bow having corresponding side arms, a first pair of links pivotally connecting said main bow to intermediate points on respective outrigger bow side arms, a second pair of links pivotally connecting the free ends of said outrigger side arms to intermediate points on respective main bow side arms, offset levers fixed to the pivoted ends of said second links, delayed action control means interposed between respective offset levers and said vehicle, said last named means comprising anchor members, pivotally connected to said offset levers and fixed points on the vehicle, offset from said first named fixed points, and extendible and retractable therebetween, and means for defining the limits of extension and retraction of said members.

3. A folding top frame for vehicles as claimed in claim 2, wherein said anchor members comprise links, pivoted at one end to respective offset levers and having longitudinally extending slots at their other ends, and pivot members on said vehicle, engaging said slots, said slots limiting upward movement of the anchor links relative to said last-named pivot members on rotation of the main bow in one direction to unfold the frame and downward movement of the anchor links on rotation of the main bow in the opposite direction to fold the frame.

4. A folding top frame for vehicles, as claimed in claim 2, wherein said anchor members comprise toggle joints, and means associated therewith for limiting the action of the toggle joint in either direction.

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