May 24, 1966 G. E. BRYNN ETAL 3,252,731

FOLDING TOP HAVING BOW CONNECTING MEANS

Filed Sept. 28, 1964 2 Sheets-Sheet 1

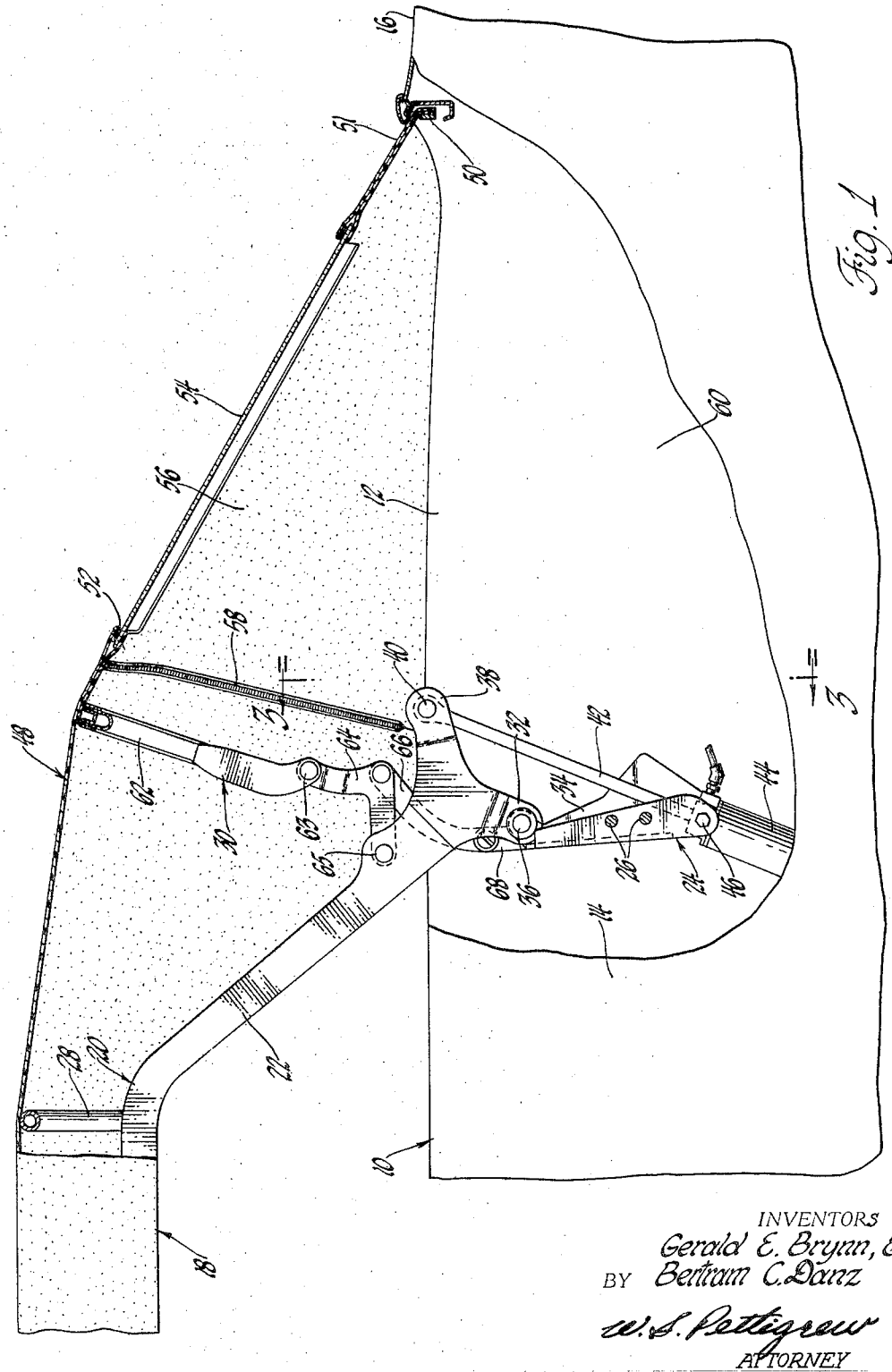


Fig. 1

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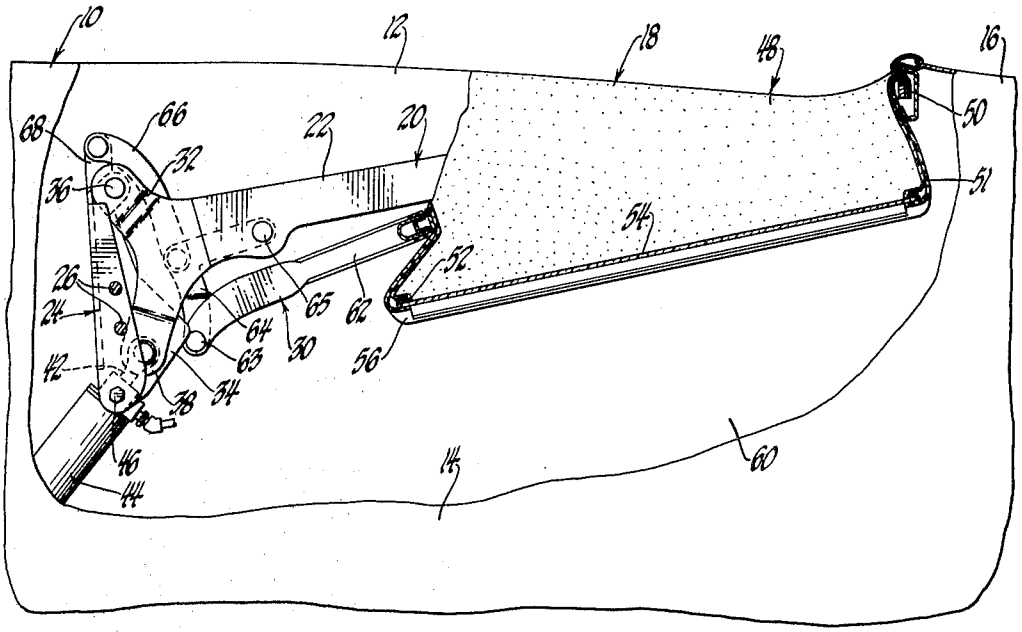


Fig. 2

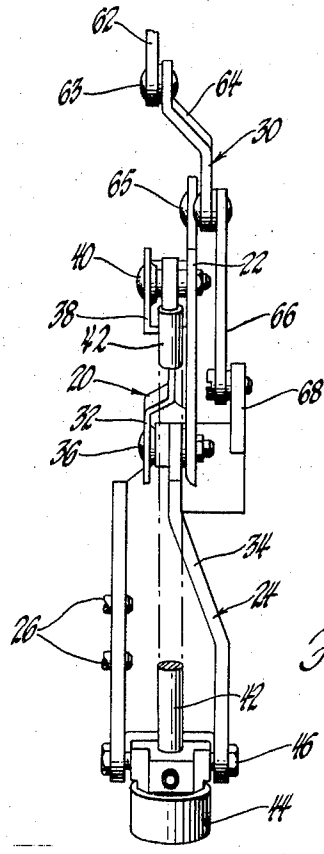


Fig. 3

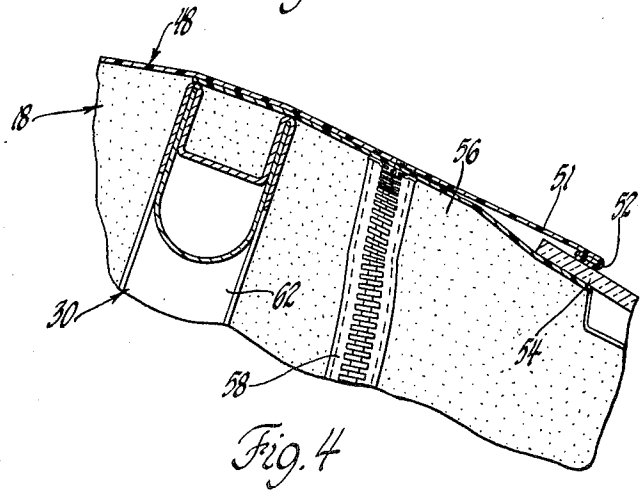


Fig. 4

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FOLDING TOP HAVING BOW CONNECTING MEANS

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5 Claims. (Cl. 296—117)

This invention relates to vehicle bodies and more particularly to folding top structures for vehicle bodies.

The use of thin rigid glass for the back window closures of modern vehicle body folding top structures, although desirable in many respects, has in the past been met with a quite severe limitation on the size to which such closures may be styled. Since these glass closures do not flex with the fabric cover of the folding top, they have of necessity been designed to a size much smaller than stylists would desire, in part, to permit the acceptance thereof within the limited space available in the folding top well, but most notably, to provide large lengths of fabric panel intermediate the closure and the rear bow, and intermediate the closure and the deck structure of the body so that the sweep of the rear bow during movement of the folding top between raised and lowered positions is in no way restricted by the inflexibility of the glass. The extent to which the permissible size of the closure may be increased in a conventional folding top by simply correspondingly decreasing the geometry of the rear bow has, of course, been narrowly circumscribed by the effect such an alteration would have on the operation and overall appearance of the folding tops.

The folding top of this invention answers to the difficulties heretofore encountered in directly incorporating a rigid glass closure of any substantial size in a folding top without impairing the appearance or operation thereof. This is accomplished by providing a rear bow arrangement which is collapsible relative to the folding top frame during movement thereof from raised to lowered position in such a manner as to reduce its sweep and further in such a manner as to undergo a multiplied or more extensive path of retraction to a lowered position located more forwardly of the body than is conventional, thereby to obviate the need for large lengths of fabric panel in order to avoid binding or restriction during folding top movement.

One object of this invention is to provide a new and improved folding top structure. Another object of this invention is to provide a new and improved folding top structure movable between raised and lowered positions in such a manner as to permit the direct incorporation into the fabric cover thereof of a rigid glass back window closure member of maximum size. A further object of this invention is to provide such a folding top structure wherein the rear bow is collapsible relative to the folding top frame in a manner to have a reduced sweep and to undergo a multiplied path of retraction to the lowered position thereof, thereby to permit the direct incorporation into the fabric cover of a rigid glass closure of maximum size.

These and other objects, features and advantages of the invention will be readily apparent from the following specification and drawings wherein:

FIGURE 1 is a fragmentary partially broken away view of a convertible vehicle body including a folding top structure according to this invention and showing the folding top in raised position;

FIGURE 2 is a view similar to FIGURE 1 showing the top in lowered position;

FIGURE 3 is an enlarged view taken generally along the plane indicated by line 3—3 of FIGURE 1; and

FIGURE 4 is an enlarged view of a portion of FIGURE 1.

Referring now particularly to FIGURE 1 of the drawings, there is shown the rear quarter area of a convertible vehicle body designated generally as **10**, the body including a rear quarter portion **12**, an opposite rear quarter portion **14** and a deck **16**. A folding top structure **18** according to this invention is mounted on body **10** in a manner presently to be described for movement between a raised position, as shown in FIGURE 1, and a lowered position, shown in FIGURE 2.

In the form of the invention shown, folding top **18** is generally of the spaced foldable side rail frame and multiple transverse bow type. The frame **20** thereof includes a rear side rail portion **22** pivotally mounted on a generally U-shaped bracket **24** which is secured by one leg thereof to adjacent structure of rear quarter **12** by bolts **26**. A like rear rail is similarly mounted on body **10** adjacent quarter **14**, and as this description proceeds, it will be understood that all reference to the illustrated rear rail and associated parts of frame **20** peculiar to the quarter **12** side of body **10** imply like structure adjacent quarter **14**. Folding top **18** further includes an intermediate bow **28** movably mounted transversely across body **10** on the spaced rails of frame **20**, and a rear bow assembly **30** similarly associated with the spaced rails. The remainder of the folding top **18** which conventionally includes forward rail structure foldable relative to the rear rails **20**, additional transverse bows, and a header adapted to be secured to the windshield of body **10**, is not shown nor described as it is not pertinent to an understanding of this invention.

Referring to FIGURE 3, rear rail **22** is provided with a bifurcated end portion **32** for embracing a leg **34** of bracket **24** and for receiving therethrough and through the leg **34** a bolt **36** which provides the pivot axis for rear rail **22**. The rear rail includes a further bifurcated end portion **38** which receives and has secured thereto by bolt **40** the terminal end of the piston shaft **42** of a double acting hydraulic folding top actuator motor **44** pivotally mounted at **46** between the legs of bracket **24**. Operation of motor **44** pivots the side rail **22** about pivot **36** and moves frame **20** longitudinally of body **10** between raised and lowered positions.

A fabric folding top cover **48** is suitably secured to frame **20** for movement as a unit therewith and as shown in FIGURES 1 and 2, is further secured adjacent its rearward terminal edge to the deck **16** by a tacking strip **50**. Fabric **48** is provided in its rearmost portion **51** with a back window cutout **52**, and a closure **54** of thin rigid glass is provided to close the cutout. Closure **54** is suitably secured to a fabric liner arrangement **56** extending for close engagement with top fabric **48** from tacking strip **50** to the upper end of rear bow assembly **30** and adapted to selectively support closure **54** on fabric **48** for movement as a unit therewith or to provide independent lowering of the closure into the folding top well **60** of body **10**. Reference may be had to Hallenbeck 3,096,117 for a detailed description of this liner arrangement, but generally, it includes a pair of rearward liner panels at the two sides of the body carrying the side and lower edges of the closure, a forward liner panel secured to rear bow assembly **30**, and a zipper **58** for releasably interconnecting the forward edge of the rearward panels and closure **54** to the forward panel.

Proceeding now with a description of rear bow assembly **30**, this assembly includes a generally U-shaped rear bow member **62** suitably adapted in its upper or transverse portion to have fabric **48** and the upper edge of liner arrangement **56** secured thereto, a bellcrank **64** having one leg thereof pivotally connected at **63** to the lower end of a respective vertical leg of bow **62** and having the other leg thereof pivotally mounted at **65** on rear rail **22**,

and a lower bow or support member **66** pivotally connected at one end thereof to bellcrank **64** and pivotally mounted at the other end thereof on an offset flange **68** of bracket **24**, FIGURE 3. Bellcrank **64** and member **66** together provide supporting linkage for bow **62** and are adapted for coordinated movement in response to rotation of rear rail **22** to move the bow between the position shown in FIGURE 1, wherein it is located in a generally upright position tensioning fabric **48** and liner **56** into desired contour, and a lowered position shown in FIGURE 2 wherein the bow is retracted within well **60**.

Bellcrank **64** and member **66** further provide collapsible multiplying linkage operable to collapse the bow relative to rear rail **22** and to move the bow over a path of significantly greater extent than that of the rear rail so that when fully lowered, the bow assumes a position more forwardly of the body than does the rear rail to permit closure **54** to fall nearly vertically into well **60** with folding top **18**. As can be seen upon examination of FIGURE 1, the spaced pivot axes of rear rail **22** and member **66** on bracket **24** cause bellcrank **64** to be rotated clockwise about its pivot connection **65** on the rear rail as the rear rail moves from raised to lowered position. Bow **62** is consequently moved bodily relative to the rear rail, and, in lowered position as shown in FIGURE 2, has translated relative to rear rail **22** in such a manner as to in effect pull fabric portion **51**, liner **56** and closure **54** forwardly of the body while being lowered into well **60**.

When folding top **18** is moved upwardly from lowered position, the pivotal movement of rear rail **22** transferred to bellcrank **64** is again reacted by member **66** so that the bellcrank undergoes a counterclockwise rotation bodily moving bow **62** relative to the rear rail until the parts reach the fully raised position of FIGURE 1.

It can be seen that the arrangement of rear bow assembly **30** provides a great benefit in permitting the use of a rigid glass closure which may be of maximum size without, however, affecting the desired contour of the top in raised position as influenced by the rear bow. Closure **54** falls easily into well **60** during downward movement of folding top **18**, and movement of bow **62** between its two positions is in no way restricted by the inflexibility of the glass, this without the need for large lengths of fabric panel in fabric portion **51**. It can further be seen that the folding top of this invention derives this benefit with great advantage not only over prior folding tops having the rear bow directly pivotally mounted on the rear rail so that the sweep of the bow is directly dependent on the rear rail, but also with great advantage over prior folding tops wherein simple two-piece bows are operably associated with the rear rail but have no multiplying means operable to bodily translate the upper section of the bows relative to the rear rail to provide for extended path of travel.

It will be understood that the possible configurations of the multiplying means provided in rear bow assembly **30** are not limited to that shown but may take any form which provides for response of the linkage to movement of rear rail **22** in a manner to bodily move rear bow **62** relative to the rear rail and over a path of multiplied extent permitting easy settling of closure **54** into well **60**.

Thus a new and improved folding top is provided.

We claim:

1. In a convertible vehicle body, the combination comprising, a folding top frame mounted on said body for movement relative thereto between raised and lowered positions, a bow member adapted to be operatively associated with a portion of said frame for movement in unison therewith between raised and lowered positions, and means connecting said bow member with said frame portion and independently with said body to support said bow member thereon, said connecting means being operable in response to movement of said frame portion to move said bow member bodily relative thereto and over a path of multiplied extent relative to said body between raised and lowered positions over that of said frame portion.

2. In a convertible vehicle body, the combination comprising, a folding top frame mounted on said body for movement relative thereto between raised and lowered positions, a bow member adapted to be operatively associated with a portion of said frame for movement in unison therewith between raised and lowered positions, first connecting means connected between said bow member and said frame portion, and second connecting means movably mounted on said body and connected to said first connecting means, said first and said second connecting means together supporting said bow member and further providing multiplying means operable in response to movement of said frame portion to move said bow member bodily relative to said frame portion and over a path of multiplied extent relative to said body between raised and lowered positions over that of said frame portion.

3. In a convertible vehicle body, the combination comprising, a folding top frame mounted on said body for movement relative thereto between raised and lowered positions and including a side rail portion, a bow member adapted to be operatively associated with said side rail portion and movable in unison therewith between raised and lowered positions, a first connecting member connected between said bow member and said side rail portion, and a second connecting member movably mounted adjacent one end thereof on said body and connected adjacent the other end thereof to said first connecting member, said first and second connecting members together supporting said bow member and further providing multiplying linkage operable in response to movement of said side rail portion to move said bow member bodily relative to said side rail portion and over a path of multiplied extent relative to said body between raised and lowered positions over that of said side rail portion.

4. In a convertible vehicle body, the combination comprising, a folding top frame mounted on said body for movement relative thereto between raised and lowered positions, a first bow member extending transversely of said body, a pair of second bow members each being swingably mounted adjacent one end thereof on said body adjacent a respective side thereof and adapted at the other end thereof to be connected to a respective end of said first bow member, and bow control means pivotally interconnecting said other ends of said second bow members to said respective ends of said first bow member to provide a unitary bow assembly and being further connected to a portion of said frame to operably associate said bow assembly with said frame portion for movement in unison therewith between raised and lowered positions, said bow control means being operable in response to movement of said frame portion to move said first bow member bodily relative to said frame portion and said second bow members and over a path of multiplied extent relative to said body between raised and lowered positions over that of said frame portion and said second bow members.

5. In a convertible vehicle body, the combination comprising, a folding top frame movable relative to said body between raised and lowered positions, said frame including a rear side rail portion pivotally mounted adjacent one end thereof on said body, a bow member adapted to be operatively associated with said side rail for movement in unison therewith between raised and lowered positions, a bellcrank pivotally connected at one end thereof to said side rail and connected at the other end thereof to one end of said bow member, a support lever pivotally mounted adjacent one end thereof on said body at a point spaced from the pivotal mounting of said side rail and pivotally connected adjacent the other end thereof to said bellcrank, movement of said

bellcrank with said side rail upon movement of said frame between raised and lowered positions being reacted by said support lever to rotate said bellcrank about the pivotal connection thereof with said side rail and move said bow member bodily relative to said side rail and over a path of multiplied extent relative to said body between raised and lowered positions over that of said side rail.

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