May 29, 1962 J. ADAMSKI 3,036,859

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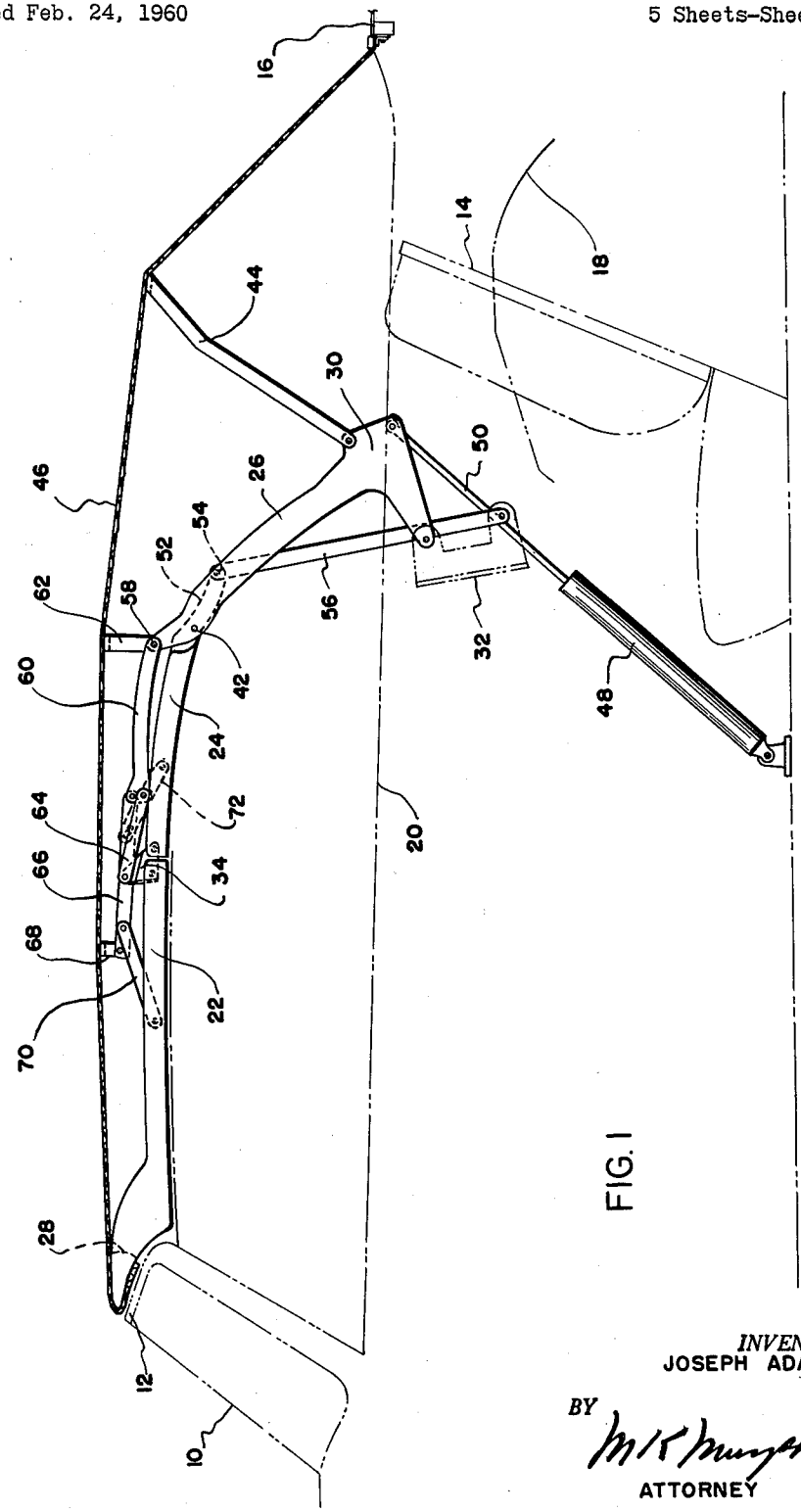


FIG. 1

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FIG. 2

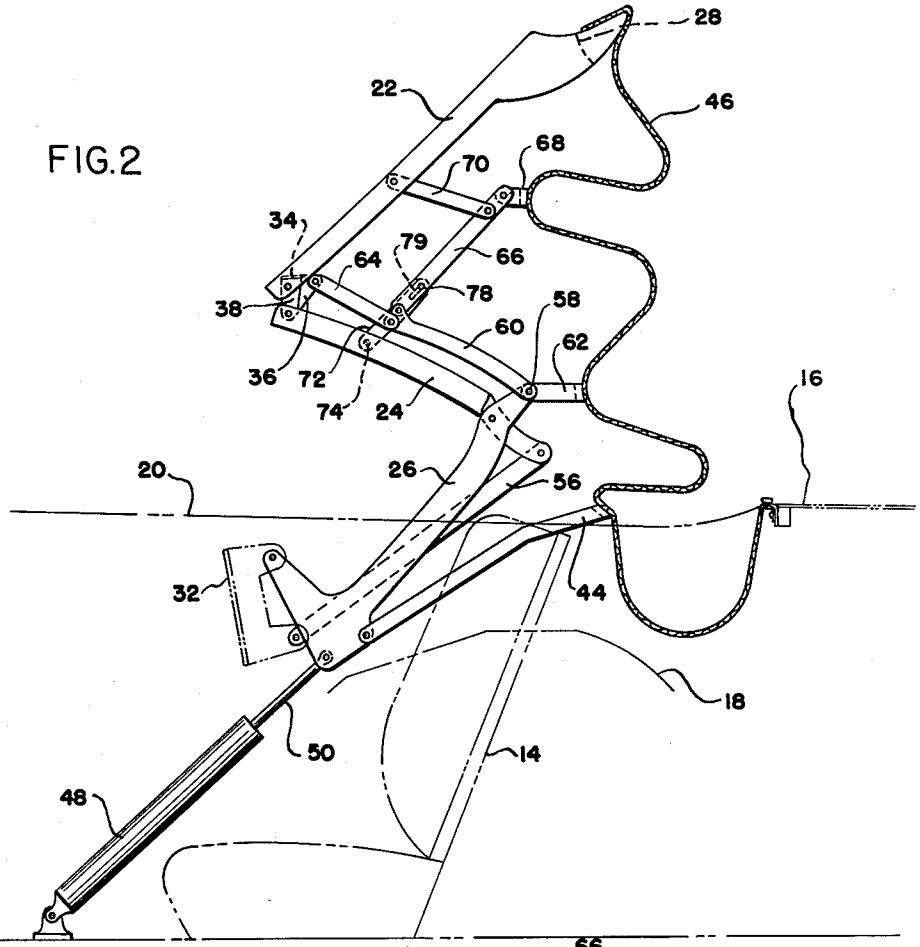
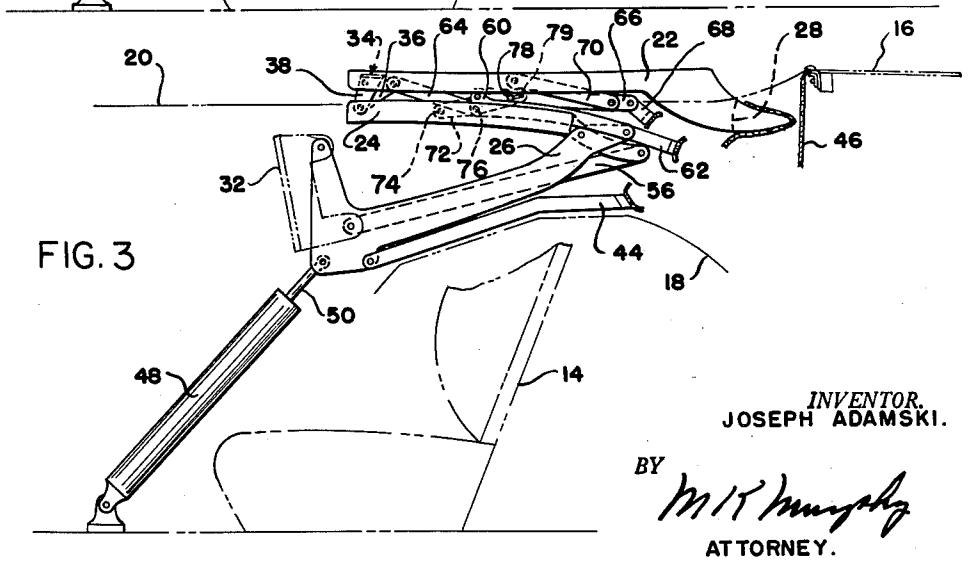


FIG. 3



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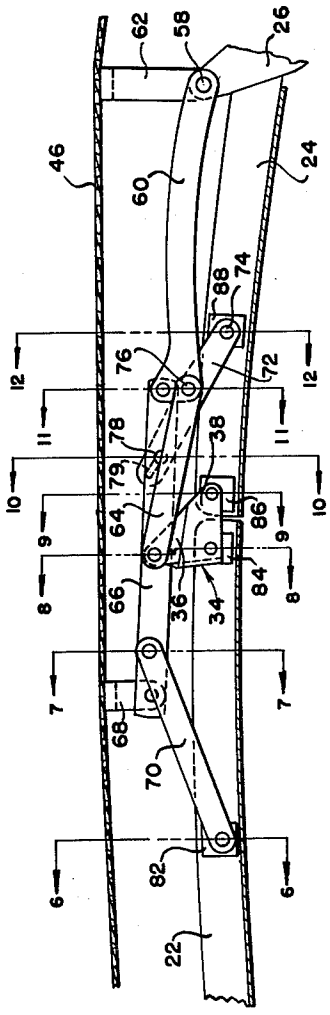


FIG. 4

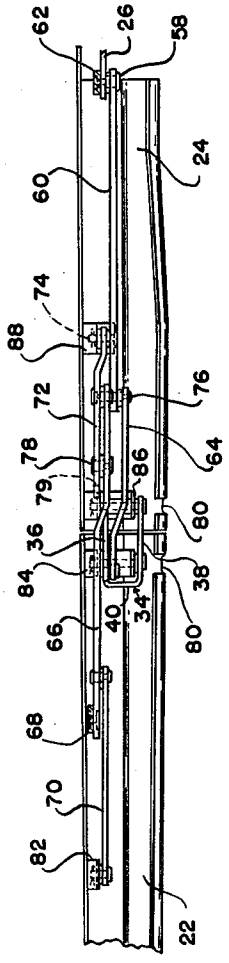


FIG. 5

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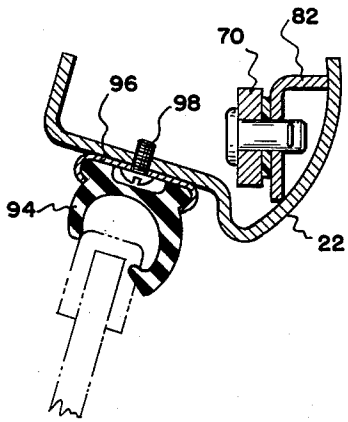


FIG.6

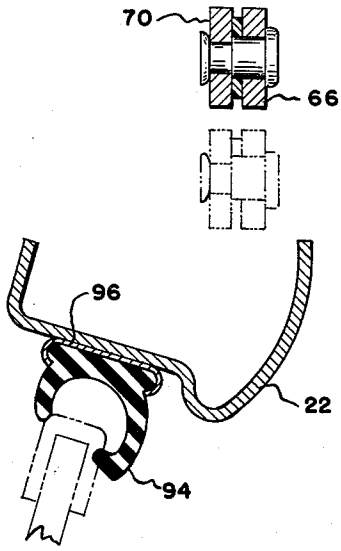


FIG.7

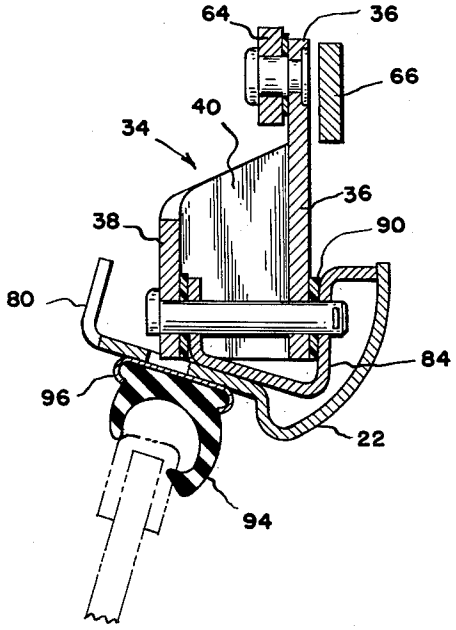


FIG.8

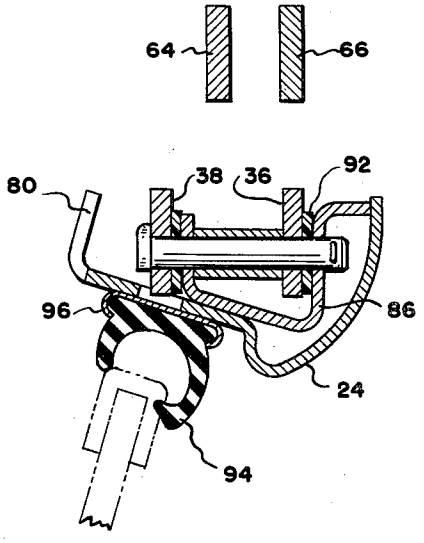


FIG. 9

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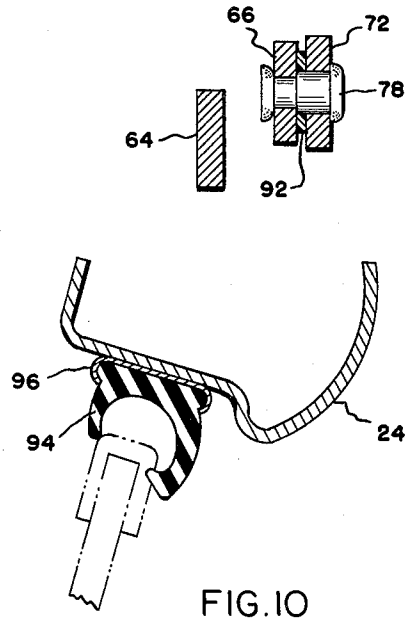


FIG. 10

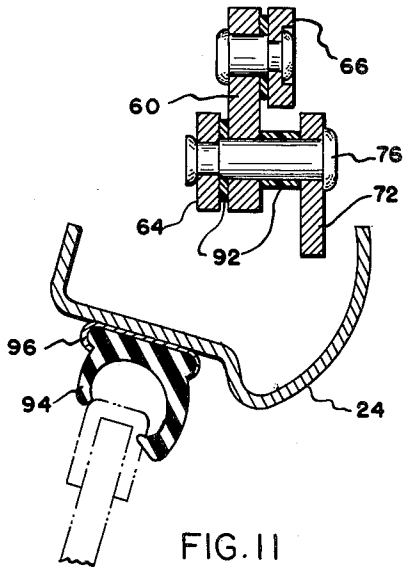


FIG. 11

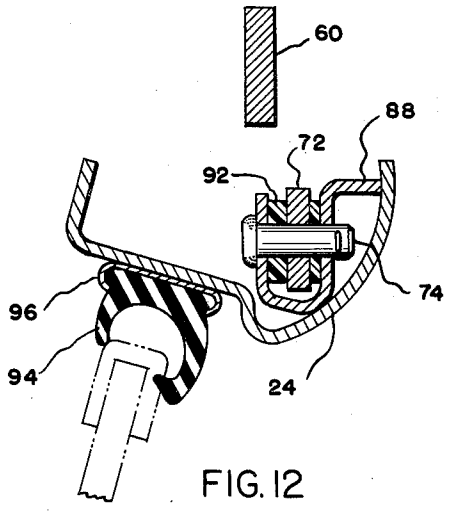


FIG. 12

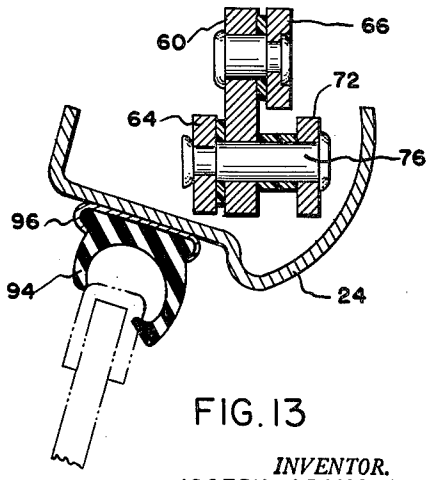


FIG. 13

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United States Patent Office 3,036,859 Patented May 29, 1962

3,036,859

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Filed Feb. 24, 1960, Ser. No. 10,731
4 Claims. (Cl. 296—116)

This invention relates to an improved folding top for motor vehicles.

Vehicle tops of the fabric covered, power operated, folding type comprise sectional side rails, cross bows, and links which are pivoted to the side rail sections and to each other for applying force to the side rail sections when the top is being erected or folded by the power means.

Because of space considerations, the links must be small and compactly assembled, so they operate with comparatively small mechanical advantage. During recent years, the profile of the motor vehicle has been lowered to improve appearance, while at the same time the seating space has been increased in width and length. Because of this, the top operating links have become somewhat bulky and have extended into the passenger compartment when the top is erect, to such an extent that the available headroom has been reduced.

It is the object of the present invention to provide a more compact top rail and linkage assembly which has increased mechanical advantage and improved appearance when compared with those of the prior art.

A further object is to provide a top rail and linkage assembly wherein the operating links are within the vertical plane defined by the side rail sections, and wherein the side rail sections are of channel form such that the links are substantially nested therein when the top linkage is in folded position.

A still further object is to provide a geometrical linkage construction which permits the top linkage to be folded more compactly such that it can be folded into the top well in such manner that a silhouette of flatter proportions is attained.

Other objects and advantages of the invention will become apparent from the following specification which, taken in conjunction with the accompanying drawings, describes a preferred form of the device.

In the drawings:

FIG. 1 is a vertical section through the top showing the top in erected or extended position with certain parts being shown in phantom, it being understood that the near side linkage is shown, which linkage is duplicated on the far side of the vehicle;

FIG. 2 is a similar view showing the top in an intermediate position;

FIG. 3 is a similar view showing the top in folded position;

FIG. 4 is an elevational view, partly in section and on a larger scale, of the central portion of the side rail and linkage assembly;

FIG. 5 is a plan view of the FIG. 4 assembly;

FIGS. 6 to 12 inclusive, are sectional views on an enlarged scale taken as indicated by the corresponding section lines on FIG. 4; and

FIG. 13 is a view similar to FIG. 11, but showing the parts in folded position.

Referring now to the drawings, it will be seen that the top is illustrated in connection with a typical vehicle body having a windshield **10**, a windshield header **12**, a rear seat **14**, and a rear deck **16**. The upper edge of the rear wheel housing is indicated by the line **18**, and the top edge or belt line of the body by line **20**.

When reference is made herein to "forward" or "rear" ends of links, rail sections, etc., it is meant the positions

of these parts when the top is in its unfolded position as shown in FIG. 1.

The top itself comprises sectional side rails, cross bows and operating links. The side rails are identical for each side of the vehicle and consist of a front side rail section **22**, a center side rail section **24** and a rear or power side rail section **26**. The front rail section **22** is attached to the top header **28** which overlies the windshield header **12** and has means (not shown) for clamping to the windshield header when the top is in its "up" or erect position.

The rear rail section **26** is provided with an integral angularly disposed portion **30** which is pivotally attached to a support bracket **32**. The latter is rigidly attached by welding or other suitable means to the body panel at this point.

The front side rail section **22** is pivotally attached to the center rail section **24** by means of a bracket or pivot plate **34**. As will be more clearly seen from FIGS. 4, 5, 8 and 9, this bracket is of U-shape and has an inside wall **36** of triangular shape, an outer wall **38**, and a vertical web **40** which connects the two walls and the bottom web to form a very strong structure.

The rear side rail section **26** overlies the center side rail section for a portion of its length and is pivotally connected thereto by a pin **42**. The rear bow **44** of the top is pivotally attached to the portion **30** of the rear side rail section **26** and, as may be seen from FIGS. 1, 2 and 3, swings about its pivot points when the top folds and unfolds in accordance with the tension on the cover material **46**.

A hydraulic cylinder **48** having a reciprocable piston rod **50** is mounted on the floor of the body for swinging movement, the rod **50** being pivoted at its outer end to the portion **30** as shown.

Center rail section **24** has a rearwardly extending portion **52** which overlaps the forward end portion of rear side rail section **26** and is pivotally connected at **54** to balance link **56**. The latter is pivoted at its lower end to bracket **32** below the pivotal connection of the rear rail section thereto.

The extreme front end portion of the rear or power rail section **26** is pivotally connected at **58** to a power link **60** and to one end of the center cross bow **62**. A second power link **64** (or power link extension) extends forwardly from the forward end of the power link **60** to a pivotal connection with the plate **34**. The power link **60** has a second pivot (FIGS. 4 and 5) vertically adjacent the first pivot which connects with a bow support link **66**. The forward cross bow **68** is supported at the extreme forward end of link **66**. A front rail control link **70** pivotally connects the front side rail section **22** with the link **66** as illustrated.

A rocker arm **72** pivoted to the center rail section at **74** and to the links **60** and **64** at **76** has a pin and slot connection at **78**, **79**, with the link **66**. This is an important feature of the invention and will be referred to again.

It will be observed that the front and center side rail sections **22**, **24**, are channel shaped in section, the inner web being continuous in section while the outside web has cutouts **80** to facilitate placing of pivot pins for connecting the rails to the bracket **34** (FIGS. 5, 8 and 9). It will be further observed that all of the linkage which actuates the side rails in their folding and unfolding operation lies in the vertical plane of the side rail channels and none of it protrudes outside the confines thereof. This provides a top of compact design, with more headroom and one which presents a clean appearance when viewed from the interior of the car.

The top is extremely rugged although it comprises fewer parts than conventional tops. The side rails may be of stamped or cast construction and, because of their chan-

nel section, are rigid although of light weight. Reinforcing channel brackets **82**, **84**, **86** and **88**, are welded in the side rail channels at points of greatest stress as shown in FIGS. 6, 8, 9 and 12, and nylon spacers **90**, **92**, etc., are used to provide quiet operation without lubrication.

Window channel members **94** of resilient material are attached by conventional attaching means to the side rails as shown in FIG. 6.

Operation of the top may be readily understood from FIGS. 1 to 3 inclusive. When the top is in its FIG. 1 position, the operator may lower the top by releasing the clamps which secure the top header to the windshield header and actuating the switch which controls the power source for hydraulic cylinders **48**. Because these components have nothing to do with the present invention and are standard on present day convertible automobile bodies, they have been omitted from the drawing.

Admission of pressure fluid to cylinder **48** on the top side of the piston thereof will cause the piston rod **50** to be moved downwardly thereby swinging rail section **26** about its pivot on plate **32** in clockwise direction. FIG. 2 shows an intermediate position of the linkage when the top is about half folded. It will be noted that balance link **56** has caused side rail **24** to swing counterclockwise about its pivot on rail **26**, and power link **60** has pulled extension link **64** in a rearward direction to cause plate **34** to swing clockwise about its pivot on rail section **24** and has pulled bow support link **66** rearwardly.

Because the front rail section control link **70** connects link **66** and rail section **22**, the latter is caused to fold upon rearward movement of the linkage. Rocker link **72**, because of its pivotal connection **74** with rail **24** and with link **60** at **76**, and its lost motion connection at **78** with link **66**, exerts a breaking force upon initial movement of the linkage which is of utmost importance.

It will be noted that in the erect position of the top (FIGS. 1, 4 and 5), the pin **78** is in the extreme bottom of slot **79** of link **72**, having been forced into such position by interaction of link **60** with rails **26** and **24**. When the linkage is in this position, the pin **78** exerts a locking force which tends to rigidify the whole side rail structure and thus prevent rattles. Upon initial movement of the power rail **26** and power link **60**, rocker link **72** immediately exerts an upward force through pin **78** which tends to "break" the linkage at all pivot connections and thereby facilitate folding action.

As the linkage folds, the pin **78** slides in the slot **79** to permit free movement of bow support link **66** about its pivot on link **60** (see FIG. 2), and when the linkage reaches its folded position in the top well (FIG. 3), pin **78** again moves to the bottom of slot **79** and exerts a locking force on the linkage which prevents movement of the links with consequent rattle and chafing of the top fabric **46**.

Erection of the top from its folded position to its "up" position is accomplished by proper manipulation of the top control switch (not shown) whereupon the piston rod **50** is moved upwardly, swinging power rail section **26** counterclockwise about its pivot on bracket **32**. Initial movement of rail section **26** will interact with power link **60** to produce an upward thrust on pin **78** which provides sufficient breaking force to start the unfolding action. When the header **28** seats on the windshield header, the driver may clamp the headers and the top is locked in full erected position.

It may thus be seen that we have provided an improved folding top having the features set forth above.

I claim:

1. In a folding top construction for a vehicle, a pair of oppositely disposed articulated side rails each comprising front, center and rear rail sections, a plate connected by spaced pivots to the adjacent ends of said front and center rail sections and providing relative swinging movement between said sections and said plate, means pivotally connecting the rear rail section at a point intermediate its ends with the center rail section at a point intermediate its ends, a balance link pivotally connected at one end to the rear end of said center rail section, means pivotally mounting said rear rail section and said balance link on the vehicle at their respective inner ends, a power link pivotally mounted at its rear end on the outer end of said rear rail section, a power link extension pivotally connected at its rear end to the front end of said power link and at its front end to said plate at a point spaced from said spaced pivots, an articulated control linkage pivotally connecting the front end of said power link with said front rail section intermediate the ends of said front rail section, and a rocker arm pivotally mounted at its rear end on said center rail section intermediate the ends of said center rail section, said rocker arm having a pivotal connection intermediate its ends with the front end of said power link and a sliding pivotal connection at its forward end with said articulated control linkage.

2. The combination set forth in claim 1 wherein said sliding pivotal connection consists of a pin and slot connection arranged such that the pin is engaged at the same portion of the slot in both the folded or unfolded positions of the top.

3. The combination set forth in claim 1 wherein said plate is comprised of a U-shaped cross-section and includes an inside wall of triangular shape, an outside wall, a vertical web portion connecting said inside and outside walls, and a bottom web.

4. The combination set forth in claim 3 wherein the adjacent ends of said front and center rail sections and the front end of said power link extension are pivotally connected at spaced points to the outside wall of said plate.

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