The present invention relates to locking mechanism for folding tops of vehicle bodies of the convertible type.

It is an object of the present invention to provide a locking mechanism for a folding top for a motor vehicle in which the front edge portion of said folding top is provided with a movable header bar which moves substantially horizontally into proximity to a fixed header bar located above the windshield and in which means are provided for drawing the two header bars into abutting relation.

It is a further object of the present invention to provide locking mechanism for drawing the header bars into abutment which comprises camming and over-center locking mechanism.

It is a further object of the present invention to provide locking mechanism for folding tops characterized by its economy of manufacture, its attractive appearance, its ease of operation and by the fact that it may be employed to effect final movement of the movable header bar into abutting relation with the fixed header bar.

Other objects and features of the invention will become apparent as the description proceeds, especially when taken in conjunction with the accompanying drawings, wherein:

Figure 1 is a fragmentary side elevation of a portion of a motor vehicle showing the folding top in closed position;

Figure 2 is a top plan elevation of the locking mechanism;

Figure 3 is a section on the line 3—3 of Figure 2;

Figure 4 is a section on the line 4—4 of Figure 3;

Figure 5 is a section on the line 5—5 of Figure 2; and

Figure 6 is a fragmentary longitudinal section through the linkage illustrating the adjustment means provided therefor.

Referring first to Figure 1, there is illustrated a motor vehicle 10 having a windshield 11 provided with a transversely extending fixed windshield header 12. Secured adjacent the rear portion of the body is a folding top 13 which comprises a movable header 14 at the forward edge thereof, a plurality of transversely extending crossbows 15 and a flexible cover material 16 which may be waterproof fabric or the like.

Referring now to Figures 3 and 5, the fixed windshield header 12 is formed of shaped flat metal stock and is of hollow cross section. It is provided with a rearwardly facing wall 20, at the lower edge of which is provided a rearwardly and upwardly inclined flange 21. The forward edge of the folding top comprises a movable header 14 which is of hollow cross section as indicated and is provided with a forwardly and downwardly opening recess 23 at its lower edge. Adjacent its upper corner is an upwardly opening channel 25 in which is mounted a resilient strip 26 to which the forward portion of the cover material 16 is tacked or otherwise secured as indicated at 27. Intermediate the channel 25 and the recess 23 the movable header 14 is provided with a generally vertically extending front face 28. The flange 21 is preferably provided with a sealing gasket 29 shaped to interfit with the recess 23 so as to form therewith a weather-tight seal. The construction just described forms a drainage gutter 30, the bottom of which is provided by the flange 21 and the sides of which are provided by the confronting faces 20 and 28 of the two header bars.

The movable header bar 14 is mounted on the vehicle by suitable linkage (not shown) which serves to guide the movable header bar in a predetermined path and causes the header bar, as it approaches the fixed header bar 12, to move in a substantially horizontal path. This permits much easier closing of the top since the final forward position of the top is determined solely by engagement with the fixed header bar at the top of the windshield. The present invention further improves the ease of operation, inasmuch as it provides camming mechanism between the two header bars which interengage and serve to draw the movable header bar horizontally into abutting relation with the fixed header bar.

Inasmuch as the upwardly and rearwardly inclined flange 21 is to some degree flexible, the movement of the movable header bar 14 into proper seating and sealing relation with the fixed header bar 12 need not be at a precisely predetermined point. Thus, for example, if the movable header bar 14 is moved slightly forward from the closed position illustrated in Figure 3 it will have the effect only of effecting compression of the gasket 29 and possibly slight upward and forward flexing of the flange 21. This is to be contrasted with previously known constructions in which the top was extended to a definite predetermined position as a result of extension of linkage mechanism, after which the header bar was drawn downwardly over upwardly extending posts carried at the upper surface of the windshield header bar. This usually resulted in some lack of registration between the openings in the movable header bar which were supposed to receive the posts and considerable difficulty was not unusual in effecting engagement between the header
bars. In the present construction the header bar is moving forwardly directly toward the fixed header bar and the guide linkage provided therefor does not render difficult movement of the movable header bar into engagement with the fixed header bar.

The camming and locking mechanism previously referred to comprises forwardly extending lugs 32 of substantially J-cross section bolted or otherwise secured to the front wall 28 of the movable header bar 14, as clearly illustrated in Figures 2 and 5. The lug 32 has an upwardly extending cam-engage post 33. Located inside the hollow fixed header 12 is a mounting bracket 35 to which is attached a camming and locking lever 36, the pivot being illustrated at 37. The lever 36 is provided with a downwardly extending camming and locking flange 38. The lever 36 is illustrated in locked position Figure 2 and from an inspection of this figure it is apparent that the mounting plate 54 of the plate face 39 has engaged the post 33, continual rotation of the lever 36 to the position illustrated will serve to draw the movable header bar 14 forwardly.

The brackets 35 are located within the hollow interior of the fixed header bars 12 and the rearwardly facing walls thereof are provided with openings 40 through which the camming and locking portions of the levers 36 extend. Suitable mechanism now to be described for operating the levers 36 is also housed within the hollow interior of the fixed header bars 12.

The operating mechanism comprises links 41, each of which is made up of a pair of link elements 42 and 43 which are interconnected, as best illustrated in Figure 6, to provide for adjustment as to length. For this purpose a portion of the links 42 and 43 adjacent the ends thereof is serrated as indicated at 44 to provide a firm interlock between the serrated surfaces. The link 42 is provided with elongated slots 45 through which extend clamping screws 46 which are threaded into tapped openings 47 provided in the other link element 43. By virtue of this construction, the length of the links may be adjusted so as to vary the final position of the movable header bar 14 or to compensate for wear of the parts.

As best seen in Figures 2 and 4, a single operating handle 50 is provided which operates both of the camming and locking mechanisms simultaneously. The handle 50 extends downwardly from the underside of the fixed header bar 12, as well illustrated in Figure 1. The handle 50 is provided with an operating shaft 52 which is keyed or otherwise secured thereto and which extends through a mounting journal 53 provided within mounting plate 54. The plate 54 is located at the underside of the header bar 12 and has a central projection 54' that extends through an opening in said header bar and through a backing plate 55, the plates 54 and 55 being interconnected by suitable means such as the screws 56. A double actuating toggle plate 60 is mounted on the upper end of the shaft 52, the reduced portion of the shaft 52, as seen in Figure 4, being square ended and received in a correspondingly shaped opening in the toggle plate 60. As illustrated in this figure, the end of the reduced portion of the shaft is riveted over to retain the toggle plate 60 in position. The toggle plate 60 has a first arm 62 to which one of the links 41 is pivoted, as indicated at 64 and has a second arm 66 which is offset upwardly above the plane of the first arm 62. The other link 41 is pivoted to the arm 66 as indicated at 68.

As best seen in Figure 2, which illustrates the parts in the relationship which they occupy when the top is in fully closed or extended position, it will be observed that the center lines of the links 41 have both passed over-center so that the camming levers 36 are firmly locked in the illustrated position. In order to release the movable header bar for opening movement of the top, the operating handle 50 will be rotated in counterclockwise direction, as seen in Figure 2 and as indicated by the arrow 70. This will cause the inner ends of the links 41 to move over-center with respect to the pivot axis provided by the shaft 52. The mechanism is designed such that levers 36 are moved from the closed position shown to their releasing position and vice versa by approximately 90° of movement of the operating handle 50.

The drawings and the foregoing specification constitute a description of the improved locking mechanism for folding tops in such full, clear, concise and exact terms as to enable any person skilled in the art to practice the invention, the scope of which is indicated by the appended claims.

What we claim as our invention is:

1. In a vehicle body of the convertible type, a pair of hollow transversely extending bars arranged side by side in substantially a horizontal plane with the opposed walls thereof spaced apart in substantially parallel relation to each other, one of said bars being a fixed windshield header, and the other being a header of a folding top for said vehicle body and movable substantially horizontally to and from said fixed windshield header, and mechanism for locking said movable header to said windshield header, including two lugs of substantially J-cross section located in the space between the opposed walls of said header bars, said lugs respectively having their longer leg portions fixed to the front wall of said movable header bar adjacent opposite ends thereof and having their shorter front leg portions providing cam posts, two levers respectively adjacent opposite ends of said fixed header bar, said levers extending, freely through the rear wall of said windshield header and mounted within the latter to swing substantially horizontally, the outer free ends of said levers having downwardly extending cam flanges engageable with the cam posts aforesaid to cam said movable header substantially horizontally into the side by side relation aforesaid with said windshield header, a rotateable operating handle beneath said windshield header at a point substantially midway the ends thereof and having a shaft extending upwardly into said windshield header, a toggle plate rigid with said shaft and having two arms at substantially diametrically opposite points of said shaft, one of said arms being offset relative to the other, and means within said windshield header and operable by said toggle plate for actuating said levers.

2. In a vehicle body of the convertible type, a pair of hollow transversely extending bars arranged side by side in substantially a horizontal plane with the opposed walls thereof spaced apart in substantially parallel relation to each other, one of said bars being a fixed windshield header, and the other being a header of a folding top for said vehicle body and movable substantially horizontally to and from said fixed windshield header, and mechanism for locking said movable header to said windshield header, including two
hugs of substantially J-cross section located in the space between the opposed walls of said header bars, said lugs respectively having their longer leg portions fixed to the front wall of said movable header bar adjacent opposite ends thereof and having their shorter front leg portions providing cam posts, two levers respectively adjacent opposite ends of said fixed header bar, said levers extending freely through the rear wall of said windshield header and mounted within the latter to swing substantially horizontally, the outer free ends of said levers having downwardly extending cam flanges engageable with the cam posts aforesaid to cam said movable header substantially horizontally into the side by side relation aforesaid with said windshield header, a rotatable operating handle beneath said windshield header at a point substantially midway the ends thereof and having a shaft extending upwardly into said windshield header, a toggle plate rigid with said shaft and having two arms at substantially diametrically opposite points of said shaft, one of said arms being offset relative to the other, a link terminally connected to one of said arms and to one of said levers, and a link terminally connected to the other of said arms and to the other of said levers, said links being movable by said arms to an over-center position with respect to the axis of said shaft to hold said levers in engagement with said posts.

3. In a vehicle body of the convertible type a pair of hollow transversely extending bars arranged side by side in substantially a horizontal plane with the opposed walls thereof extending substantially vertically and spaced apart in substantially parallel relation to each other, one of said bars being a fixed windshield header, the other of said bars being a header for a folding top for said vehicle body and movable substantially horizontally to and from said fixed windshield header, and mechanism for locking said movable header to said windshield header, including two lugs of substantially J-cross-section located in the space between the opposed vertical walls of said headers, said lugs respectively having their longer leg portions fixed to the vertical wall of one of said header adjacent opposite ends thereof and having their shorter leg portions providing cam posts, two levers respectively adjacent opposite ends of the other header, said levers extending freely through the vertical wall thereof and mounted within the said other header to swing substantially horizontally, the outer free ends of said levers having downwardly extending cam flanges engageable with the cam posts aforesaid, to cam said movable header substantially horizontally into the side by side relation aforesaid with said fixed header, a rotatable operating handle beneath the header containing said levers at a point substantially midway the ends thereof and having a shaft extending upwardly into the interior thereof, a toggle plate rigid with said shaft and having two arms at substantially diametrically opposite points of said shaft, one of said arms being offset relative to the other, and links connecting said arms and said levers for actuating said levers upon rotation of said operating handle.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Re. 23,007</td>
<td>Vigmostad et al.</td>
<td>June 15, 1948</td>
</tr>
<tr>
<td>2,155,275</td>
<td>King</td>
<td>Apr. 18, 1939</td>
</tr>
<tr>
<td>2,261,530</td>
<td>Wernig et al.</td>
<td>May 21, 1940</td>
</tr>
<tr>
<td>2,305,715</td>
<td>Keller</td>
<td>Dec. 22, 1942</td>
</tr>
<tr>
<td>2,360,824</td>
<td>Simpson</td>
<td>Oct. 17, 1944</td>
</tr>
<tr>
<td>2,486,905</td>
<td>Ackermans</td>
<td>Nov. 1, 1949</td>
</tr>
</tbody>
</table>

FOREIGN PATENTS

<table>
<thead>
<tr>
<th>Number</th>
<th>Country</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>306,817</td>
<td>Italy</td>
<td>Apr. 1, 1933</td>
</tr>
<tr>
<td>323,065</td>
<td>Great Britain</td>
<td>Dec. 24, 1929</td>
</tr>
<tr>
<td>528,303</td>
<td>Great Britain</td>
<td>Oct. 25, 1940</td>
</tr>
<tr>
<td>691,066</td>
<td>Germany</td>
<td>May 15, 1940</td>
</tr>
</tbody>
</table>