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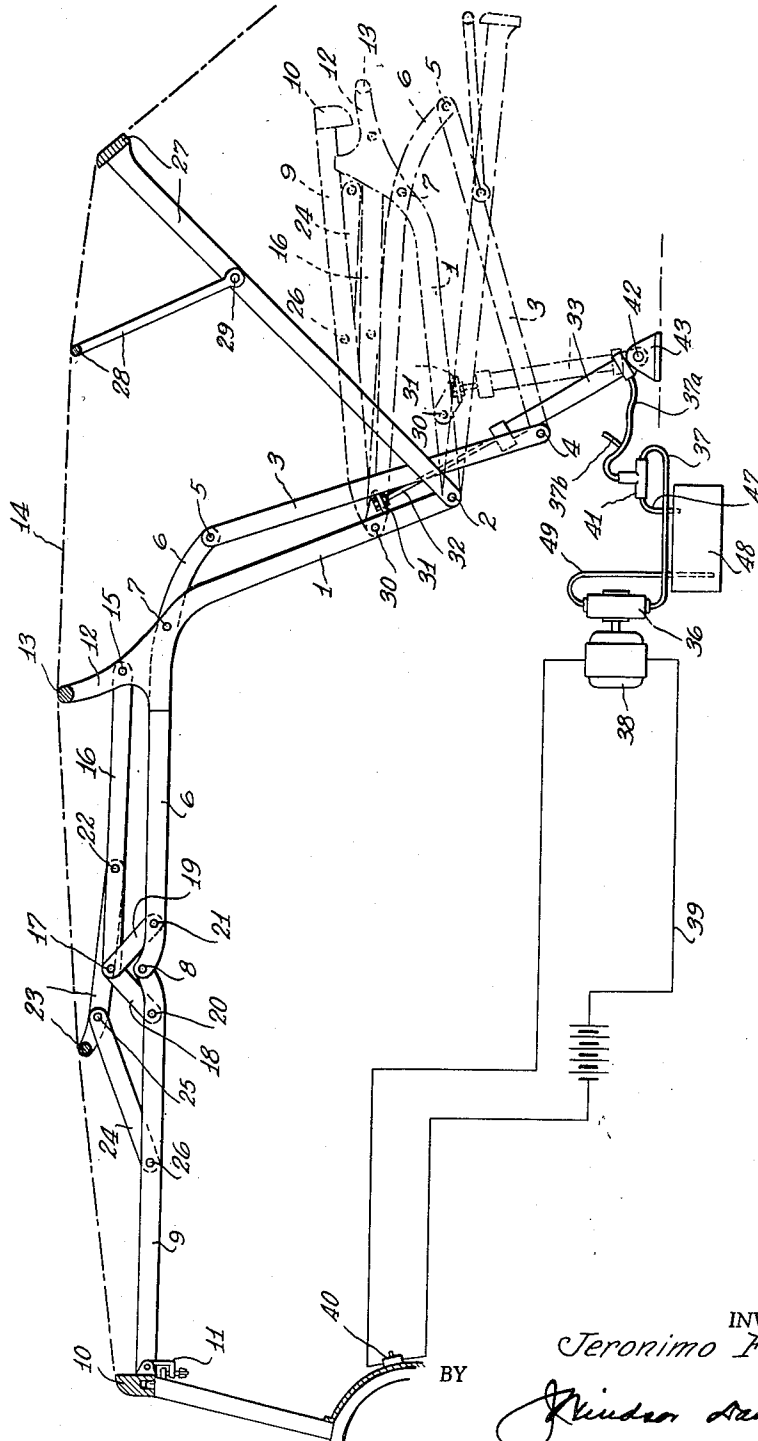
J. FALCON

2,331,603

CONVERTIBLE TOP FOR VEHICLES

Filed Dec. 26, 1940

2 Sheets-Sheet 1



INVENTOR.

Jerónimo Falcon

BY

Wm. L. Davis

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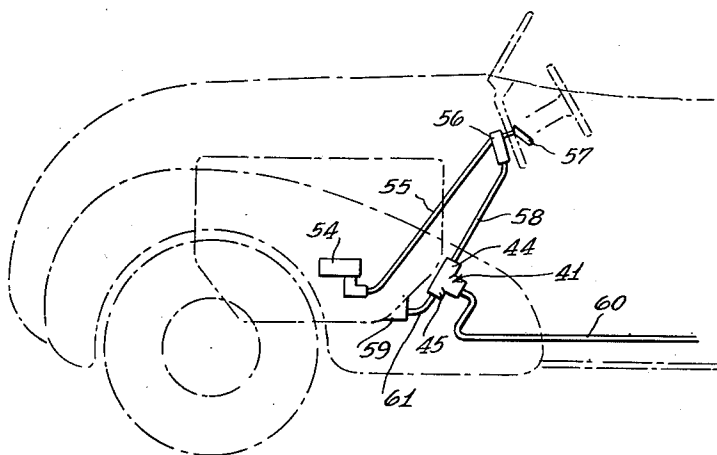
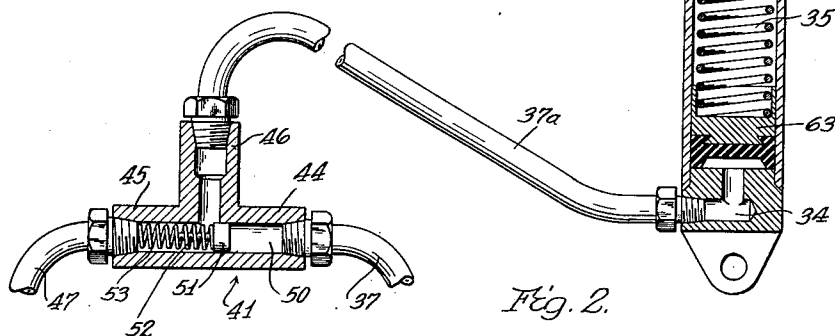
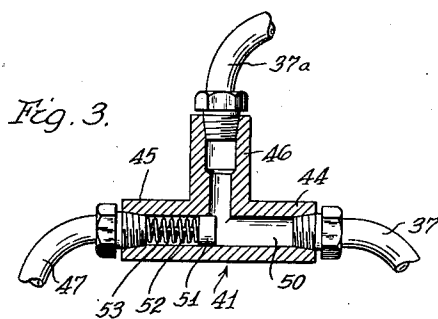
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INVENTOR.

Jeronimo Falcon

BY

Wieder Davis

UNITED STATES PATENT OFFICE

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CONVERTIBLE TOP FOR VEHICLES

Jeronimo Falcon, Buenos Aires, Argentina

Application December 26, 1940, Serial No. 371,710

3 Claims. (Cl. 296—117)

This invention relates to convertible tops for vehicles and has for its primary object to provide a top having power actuated means for raising the top which after it has raised the top and the top has been secured automatically resumes its original position corresponding to the lowered position of the top so that the top may be subsequently lowered manually or by gravity without interference by the power means. This application is a continuation in part of application Serial No. 282,510, filed July 1, 1939, since abandoned.

A more specific object is to provide a top of the character above mentioned embodying hydraulic means for elevating the top. According to this object a convertible top is provided having collapsible supports including a movable member adapted by movement in one direction to move the top from its lowered position to its raised position and adapted by movement in a reverse direction to permit lowering of the top. The movable member extends into a hydraulic cylinder having a piston adapted to be moved in one direction by hydraulic pressure and in a reverse direction by a spring. A hydraulic pressure system is provided which comprises means for pumping liquid to the cylinder to reciprocate the piston and to raise the top and means for allowing discharge of liquid from the cylinder when the pumping means is inoperative so that the spring restores the piston to its lowered position while the movable member remains in its raised position. Thus when it is subsequently desired to lower the top there is no interference to movement of the movable member offered by the piston and the top may be lowered by unfastening its securing elements and giving it a shove manually, after which gravity will cause completion of the lowering movement. In the case of failure of the hydraulic means the top may be raised and lowered manually without any added friction resulting from presence of the hydraulic means.

A further object is to provide hydraulic means of the character above mentioned which may be optionally operated by a separate hydraulic unit or by the oil pump which is standard equipment on automobiles.

Other objects and advantages will become more fully apparent as reference is had to the accompanying drawings, wherein my invention is illustrated, and in which

Fig. 1 is a schematic view illustrating the convertible top, its power actuating means, and the controls therefor,

Fig. 2 is a vertical section of the power cylinder and its control valve,

Fig. 3 is a vertical section of the control valve, illustrating a different position thereof, and

Fig. 4 is a schematic view illustrating use of the standard automobile oil pump as the hydraulic pressure source.

The convertible top illustrated in Fig. 1 is composed of two series of pivotally connected links, with the links disposed at opposite sides of the vehicle body. Only one of these series of links is shown in the drawings because the two series are exact duplicates. The two opposed series of links are connected together by cross bows, hereinafter described, so that they tend to move in unison, but it is necessary for practical purposes that each series of links have an independent raising means. It is obvious, however, that the two top raising means may be operated by a single power source.

More specifically, 1 designates a main standard which is pivotally mounted in the body of the automobile as indicated at 2. Extending substantially parallel to the standard 1 is an anchoring link 3 which has one end pivotally connected to the automobile at 4 and its other end pivotally connected at 5 to a link 6. The link 6 is pivotally connected intermediate its ends at 7 to the standard 1 and at its front end is pivotally connected at 8 to the forward link 9 which is connected at its front end to a header 10. The header 10 constitutes a cross bow which connects the links 9 at opposite sides of the automobile as above mentioned. The header 10 is secured to the windshield by releasable clamping means illustrated at 11.

The standard 1 has an upwardly extending projection 12 carrying a cross bow 13 which extends across the automobile to support the top fabric 14, and to connect the duplicate projections 12. Pivotally connected at 15 is the front control link 16 which is pivotally connected at 17 to two links 18 and 19 which in turn are connected at 20 and 21 to the links 9 and 6 respectively. Pivoted at 22 to the control link 16 is a cross box 23 which functions to support the fabric 14 and also to fold the fabric when the top is collapsed. A link 24 is pivotally connected at 25 to the cross bow 23 and at 26 to the forward link 9.

Pivotally mounted on the automobile at 11 is a rear cross bow 27 having an auxiliary rear cross bow 28 pivotally mounted thereon at 29.

The convertible top above described is intended as an example of any conventional or special top

construction movable from a lowered position to a raised position and vice versa. The example chosen is like that shown in my co-pending application Serial No. 305,349, filed November 20, 1939, now Patent #2,230,140, dated January 28, 1941. The manner in which the top collapses may be readily understood by comparing the full line position with the position shown in broken lines.

Pivotally connected to the standard 10 at 30 is a bracket 31 to which a rod 32 is attached. The rod 32 by upward movement causes the top to be raised from the broken line position to the full line position, and when moved downwardly permits movement of the top from its raised position to its lowered position. Power means, hereinafter described, is provided for moving the rod 32 in a top raising direction and for allowing the top to collapse under manual pressure assisted by gravity.

As illustrated in Fig. 2 the rod 32 extends into a cylinder 33 and its lower end is adapted to engage a piston 63 slidable in the cylinder. The cylinder 33 is pivotally connected at 42 to a bracket 43 which is mounted in a suitable part of the automobile. The piston 63 is adapted to be moved upwardly, in a top raising direction, by fluid pressure admitted to the cylinder through a port 34, and in the absence of fluid pressure in the cylinder is moved downwardly by a spring 35. Liquid, preferably oil, is supplied by a pump 36 through a conduit 37, 37a to the cylinder port 34. The pump 36 is operated by an electric motor 38 which has an electric supply circuit 39 with a manual control switch 40 mounted on the dash of the automobile.

In the conduit 37 is a control valve 41 having three branches 44, 45 and 46. The branch 44 is connected by the conduit portion 37 to the pump 36 and the branch 46 is connected by the conduit 37a to the cylinder 35. The branch 45 is connected by a conduit 47 to a liquid reservoir 48 from which a conduit 49 extends to the inlet of the pump 36.

The branches 44 and 45 are in alignment and are connected by a bore 50 having a piston 51 slidable therein. The piston has a stem 52 on which a spring 53 is sleeved. The spring normally holds the piston 51 in the position shown in Fig. 2, thus permitting communication between the branches 45 and 46, and when the piston is in the position shown in Fig. 3 communication is permitted between the branches 44 and 46. The piston 51 assumes the position shown in Fig. 2 when the pump is idle, and is moved to the position shown in Fig. 3 by fluid pressure when the pump is operating.

Assuming that the top is lowered and it is desired to raise the same the operator closes the switch 40 and thus causes operation of the pump. The liquid under pressure forces the piston 51 to the position shown in Fig. 3 and the liquid is thus directed through the branch 46 to the cylinder 33. The piston 63 is elevated against the pressure of the spring 35 and through upward movement of the rod 32 raises the top. When the top is raised the operator releases the switch 40 to stop the pumping action and fastens the top with the fastening means 11. The spring 53 then moves the piston 51 to the position shown in Fig. 3 and the spring 35 forces the piston 33 downwardly, thus forcing the liquid from the cylinder 33 back to the reservoir 48. When it is subsequently desired to lower the top the fastening means 11 is released and the top is given

a rearward shove after which gravity will continue its movement to its lowered position. This lowering operation is made possible because liquid will have drained from the cylinder 33 and the piston 63 will be lowered at this time, so that there is no interference to downward movement of the rod 32.

Each of the two sets of linkages necessary for the complete assembly is provided with a separate cylinder 33. Each cylinder may be provided with a separate valve 41 or both may be controlled by a single valve 41 by connecting the cylinder of the linkage which is not illustrated to the conduit 37a by a branch conduit 37b.

Fig. 4 illustrates a modification which differs from that above described in that instead of providing a special pump 36 the usual oil pump 54, which is standard equipment on the automobile, is used. The pump 54 is connected by a conduit 55 to a conventional two-port valve 56 mounted on the dash of the vehicle for manual operation by a handle 57. A conduit 58 extends from the manual valve 56 to the branch 44 of the valve 41, a conduit 61 extends from the branch 45 to the crank case 59, and a conduit extends rearwardly from the branch 46 for connection to cylinders 33.

When the automobile engine is running and the valve 56 is operated to connect the two conduits 55 and 58 the valve 41 directs oil to the conduit 60 and causes the top to be raised. When no pressure is present in the conduit 58, as is the case when the valve 56 is closed, oil may drain from the conduit 60 through the valve 41 and conduit 61 to the crank case.

Although specific embodiments of the invention have been illustrated and described, it will be understood that various changes may be made within the scope of the appended claims without departing from the spirit of the invention, and such changes are contemplated.

What is claimed is:

1. In a power operated convertible top for vehicles, a movable member at each side of the vehicle and connected to the top for raising the same, power actuated elements adapted to engage said movable members to raise the same, manually controlled power means for moving said power actuated elements in a direction to raise said movable members, means for fastening said top in a raised position, and means for retracting said power actuated elements when said top is fastened whereby when subsequently released the top is free to drop into collapsed position without resistance from said power actuated elements.

2. In a power operated convertible top for vehicles, a cylinder having a piston movable axially thereof, a source of fluid pressure supply connected with said cylinder for impelling said piston in one direction, spring means opposing movement of said piston by said fluid supply, a cylinder rod coaxial with said cylinder and said spring means abutting said piston at one end and connected to the convertible top at its outer end, said rod elevating said top when said piston is impelled by the fluid under pressure, means for locking said top in elevated position, said piston automatically emptying said cylinder of fluid under the influence of said spring while leaving contact with said cylinder rod, and while said top is in elevated position whereby said top may be returned to collapsed position upon release of said locking means without resistance by the power elevating mechanism.

3. In a power operated convertible top for vehicles, a cylinder having a piston movable axially thereof, a source of fluid pressure supply connected with said cylinder for impelling said piston in one direction, spring means opposing movement of said piston by said fluid supply, a cylinder rod coaxial with said cylinder and said spring means abutting said piston at one end connected to the convertible top at its outer end, said rod elevating said top when said piston is impelled by the fluid under pressure, means for locking said top in elevated

5 position, a fluid return line, a spring pressed relief valve opposing the passage of fluid from said source to said cylinder operable under the pressure of its spring to connect said cylinder to said fluid return line upon desistance of pressure from said source, said spring in said cylinder impelling said piston to return position and out of contact with said cylinder rod upon opening of said return line whereby to remove resistance to the lowering of said top. 10

JERONIMO FALCON.