Jan. 16, 1940. G. S. PIPER 2,187,095

APPARATUS FOR MOVING SLIDING PARTITIONS, WINDOWS, AND THE LIKE

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FIG. 2.

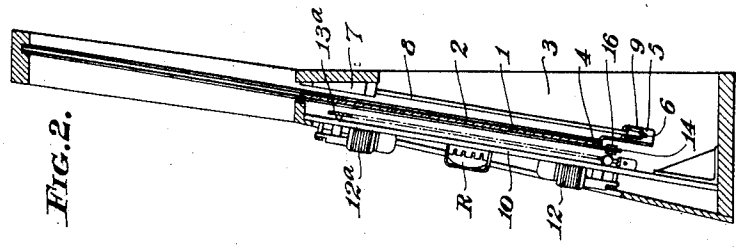
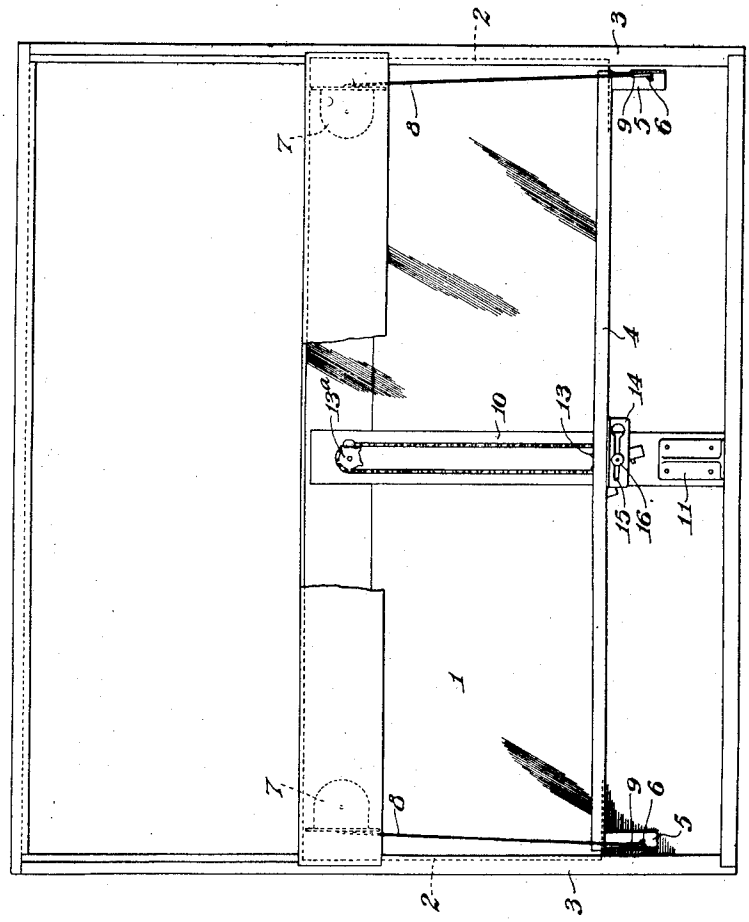


FIG. 1.



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FIG. 4.

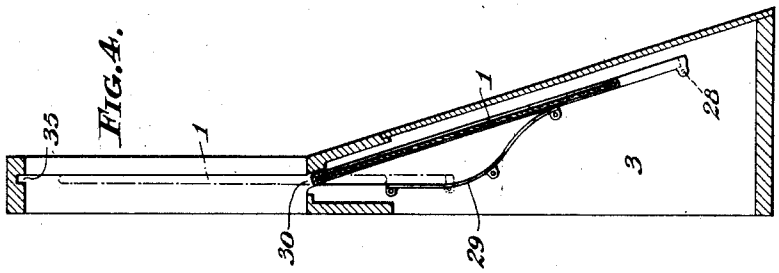
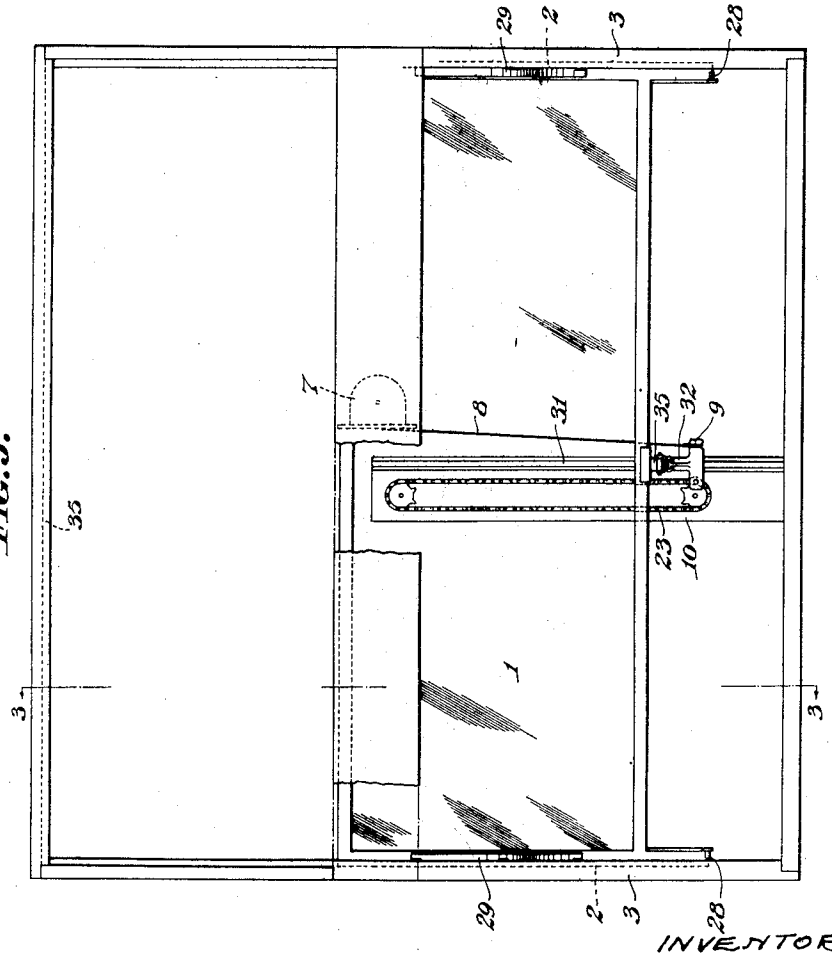


FIG. 3.



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FIG.6.

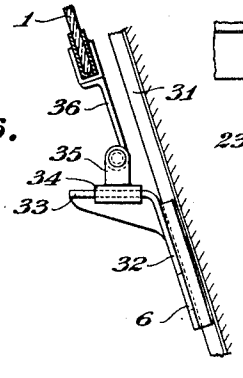


FIG.5.

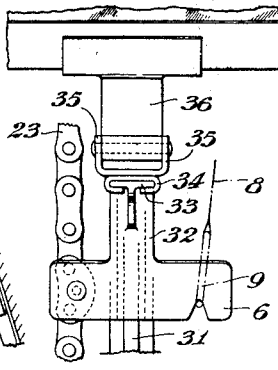
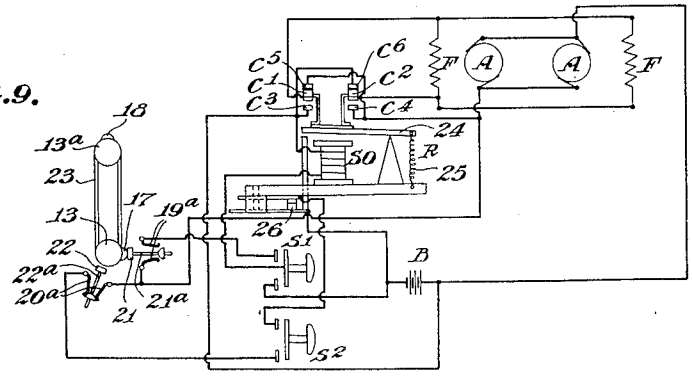


FIG.9.



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FIG. 7.

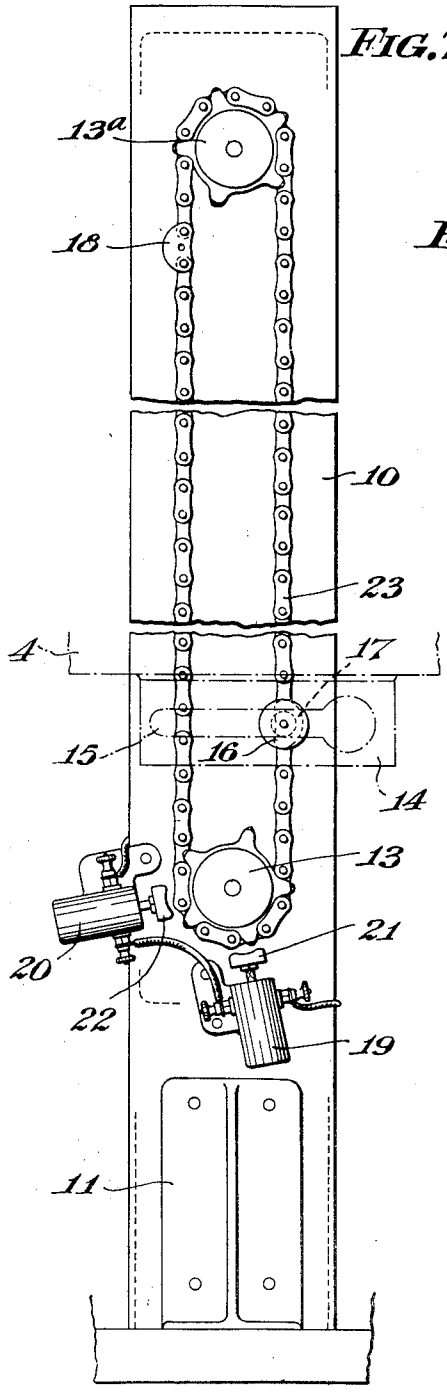
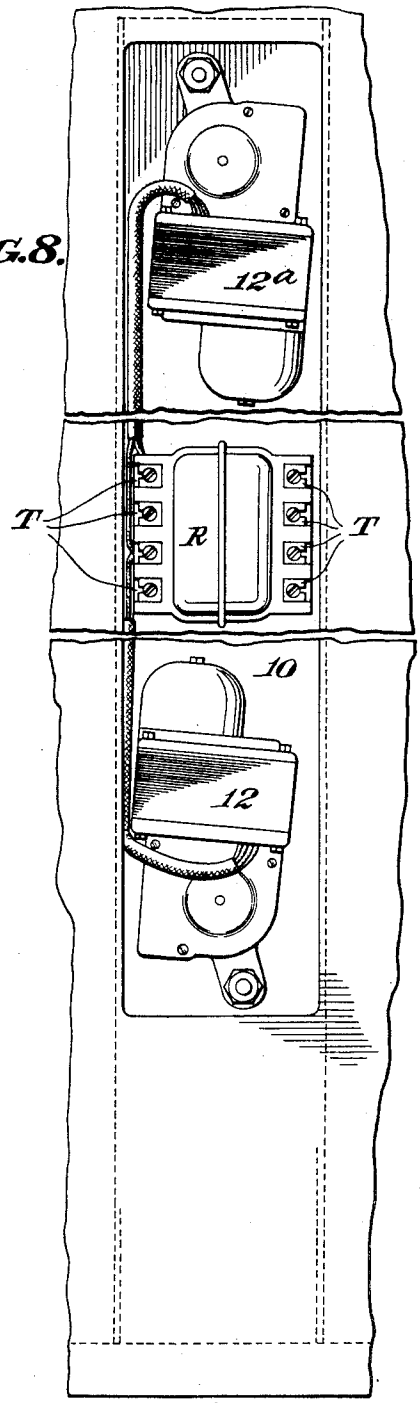


FIG. 8.



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UNITED STATES PATENT OFFICE

2,187,095

APPARATUS FOR MOVING SLIDING PARTITIONS, WINDOWS, AND THE LIKE

George Stephen Piper, London, England

Application April 9, 1938, Serial No. 201,139
In Great Britain April 9, 1937

5 Claims. (Cl. 268—124)

This invention relates to an improved apparatus for moving sliding partitions, windows and the like electrically. The invention is particularly applicable to an apparatus for raising and lowering windows of automobile bodies, train or other carriages or the windows of buildings.

The invention is primarily intended, however, for use in connection with automobiles, especially for raising or lowering the drop-glass division of automobiles, in which the rear seats are separated from the front seats by a glass division, a part or all of which behind the driver is constructed so as to be raised or lowered, or a part moved sideways. The invention may also be used to raise and lower the side windows of automobiles.

According to the invention, the means for moving a sliding partition or window comprises an electric motor (or motors) driving an endless band or chain which is coupled to the partition or window, a pair of manually-operated switches which control the motor and consequently the movement of the partition or window, a relay device for reversing the direction of rotation of the motor, said device operating upon the depression or operation of one of the switches to reverse the direction of current through the motors in relation to the direction of current when the other switch is depressed. The partition or window can be moved in either direction, depending upon which switch is operated and stopped at any position upon release of the switch, and in order to arrest the movement of the said partition or window instantly when the limit of movement in either direction is reached, the means in accordance with this invention include a pair of circuit breakers and members on the chain positioned so that the supply to the motor is cut off owing to the actuation of a circuit breaker by a member on the chain upon the partition or window reaching its limit of movement in either direction.

Thus, if each circuit breaker is wired in series with each switch, then the operation of a switch will cause the motor to be energized (assuming, of course, the power source, e. g. an accumulator, is wired up in circuit) provided the circuit breaker in series with the switch is closed, until the partition or window reaches its limit of movement in the direction controlled by the said switch when the member on the chain will open the circuit breaker to break the circuit to the motor. The arrangement is such, therefore, that in any intermediate position either switch can be operated to move the partition or window, but when the partition or window has reached its limit of movement in one direction only the switch controlling movement in the other direction is effective to cause movement until the member on the chain releases the contact breaker.

In the application of the invention to windows, partitions or the like which are adapted to be raised or lowered and are guided in side channels, the sprockets are suitably mounted so that the chain is disposed substantially parallel with the plane of the window and said chain carries a projection which is arranged to enter a slot horizontally disposed in a plate mounted at the bottom of the window.

Movement of the chain will raise or lower the window and the slot will allow for slight lateral movement with respect to the normal movement of the projection when the portion of the chain carrying the projection is passing around a sprocket.

The invention may be applied to windows which are raised and lowered and are constrained to move angularly during raising and lowering so as to reside in the lower position in a plane at an angle with respect to the plane in the raised position. In one form of window to which the invention particularly applies, i. e. the raising and lowering of the division window between the driver's seat and the rear compartment of an automobile, the window is vertically disposed in the raised position, but is held at an angle with respect to the vertical in the lowered position in a housing behind the driver's seat so that a minimum of space is occupied. In this application of the invention, the lower edge of the window is coupled to the chain by means which allow for a movement of the lower edge of the window towards or away from the chain dependent upon the angular movement of the window.

In order that a clear understanding of the invention can be obtained, reference will now be had to the accompanying drawings which illustrate a preferred form of the invention and its application to two constructions of sliding glass division windows of automobiles.

In the drawings, in which the invention is shown applied to a partition window between the driver's seat and rear seats of a road vehicle:—

Figure 1 is an elevation of one construction of window, certain normal fittings not shown or broken away for clearness.

Figure 2 is a sectional view on the line 2, 2, Figure 1.

Figure 3 is an elevation, similar to Figure 1, of the second construction of window.

Figure 4 is a sectional view on the line 3, 3 of Figure 3.

Figure 5 is a front view of the coupling between the chain and window.

Figure 6 is a side view thereof.

Figure 7 is a front view of the window-raising-and-lowering device, shown in both the constructions, built up as a unitary structure for ready fitting.

Figure 8 is a rear view thereof; and,

Figure 9 is a diagram showing the electrical circuit.

In the application of the invention illustrated in Figures 1 and 2 of the drawings, the window 1 runs in side channels 2, carried on the supporting frame 3 which is of usual construction. The bottom edge of the window 1 is carried in a channel 4, and depending from said channel are lugs 5, one at each side, each lug having a hook-like member 6. The window is counter-balanced by means of spring devices 7, 7, each of which is loaded by a tape 8 carrying at its end an eye 9, one said eye engaging a hook-like member 6. It will be understood that any convenient form of counter-balance may be employed.

The raising and lowering mechanism (see especially Figures 7 and 8) is mounted on a plate 10 to form a unitary and readily mounted assembly. The plate is supported in the frame 3 by means of a bracket 11 and screws (not shown), if necessary. Two electric motors 12, 12*a*, respectively, are mounted on the plate driving sprocket wheels 13, 13*a*, respectively, said wheels being connected by an endless chain 23. It will be understood that one motor only can be employed, one of the sprockets only being drven.

A plate 14 is carried by the channel 4, said plate having a horizontal slot 15, and mounted on the chain 23 is a runner 16 which engages in the said slot, one end of which is enlarged to allow the said runner to enter. Also mounted on the chain are two projections 17, 18, and mounted on the plate 10 are two switches or circuit breakers 19, 20, having projecting heads 21, 22 respectively. The disposition of the circuit breakers is such that when the chain moves in one direction the projection 17 will contact with and depress the head 21 when the window is completely lowered or open, and when the chain moves in the other direction the projection 18 will contact with and depress the head 22 when the window is closed.

Referring now to Figures 3 to 6, the application of the invention to a sliding division which is mounted so as to be vertically disposed in the closed position and is constrained to move angularly and be housed in the supporting frame or housing 3 at an angle with respect to the vertical as shown, is illustrated. The window 1 is mounted in the side channels 2 and said window carries a depending arm at each side having an upwardly projecting pin 28. When the window is raised it will move in the plane defined by the channels until the pin 28 at each side reaches its associated curved guide 29 when each said pin will contact with the face of its guide 29 farthest from the window. Continued movement upwardly will cause the window to assume a vertical position when almost closed, as shown in broken lines in Figure 4.

The channels 2 extend only from the lower ends of the rails to the bottom of the window in its lowered position, the window moving angularly and pivoting on the edge 30 of the frame 3 after the window frame is clear of the channels.

It will be clear that the coupling between the chain and window must be such as to allow the lower edge of the window to move away from the chain. Whilst any suitable form of coupling may be provided, in the modification illustrated, a rail 31 is mounted on the side of the plate 10 and a runner or slide 32 is arranged thereon so as to be capable of moving along said rail. The rail may be mounted on the front board of the frame 3. Said rail 31 is undercut and the runner 32 so channelled to engage thereon. Projecting from the runner 32, towards the chain 23 is a horizontal arm 33 and slidably mounted on said arm is a sleeve member 34 having upstanding lugs 35 between which is pivoted one end of a plate 36, the other end being of channel form and mounted centrally on the bottom of the window frame. The runner 32 has an extension at each side and mounted to one said extension is the chain 23, and to the other said extension the eye 9 of the counter-balance tape 8. When the window is raised and moving angularly, the sleeve 34 will slide outwardly on the arm 33, and away from the runner 32. The plate 10 is mounted within the frame or housing 3 so that the chain is in a plane parallel with the rail 31.

It will be understood that the circuit breakers and actuating projections are so disposed on the chain 23 that the movement of the window is arrested when either fully closed or open and the distance between the spindles of the sprockets 13, 13*a* is equal to or greater than the distance of movement of the runner 32, so that the connection between the chain and extension of the runner always moves vertically.

A similar disposition of parts may be provided in the application of the invention described with reference to Figures 1 and 2, in which the connection between the chain and plate 14 may be by plain pivot, or the construction illustrated in Figures 3 to 6 may be such that the connection between the chain 23 and the extension of the runner 32 moves partly round the sprockets, in which case a slotted pivot similar to the arrangement illustrated in Figures 1 and 2 will be provided.

As will be seen from Figure 4, a rebate 35 is provided into which the window fits snugly in the raised position.

Referring now to Figure 9, each circuit breaker 19, 20 includes a pair of contacts 19*a*, 20*a* respectively, each pair 19*a*, 20*a* being electrically connected by members 21*a*, 22*a* respectively, when the head 21 or 22 is not depressed. Two stitches S_1, S_2, suitably mounted to be depressed by an operator, control the circuit to the motor, the switch S_1 upon depression when the window is in any position but fully closed causing the window to be lowered, the switch S_2 upon depression when the window is in any position but fully open causing the window to be raised. In order to reverse the direction of movement of the motors, a relay or reversing device R is provided, said device including a solenoid S_0 which is energized to move the armature 24 upon depression of the switch S_1. This movement causes contacts C_1, C_2 to contact with contacts C_3, C_4, respectively and reverses the direction of current through the fields F, F of the motors compared with the direction of current when the contacts C_1, C_2 contact with the contacts C_5, C_6 respectively. The armature 24 is returned to this latter position by means of a spring 25.

Assuming it is desired to lower the window, the switch S_1 is depressed. The current from the battery B energises the solenoid, thereby pulling the armature downwardly, closing pairs of contacts

C_1, C_3; C_2, C_4. The circuit is also completed through the armatures A of the motors via the contacts 19a and the motors will rotate, moving the chain 23 in a clockwise direction until the projection 17 depresses the head 21, thereby breaking the circuit to the armatures and so stopping the motors.

When it is desired to raise the window, the switch S_2 is depressed. The solenoid is not energised and the pairs of contacts C_1, C_5; and C_2, C_6, are closed as shown. The circuit to the armatures of the motors is closed through the contacts 20*a* and the motors will rotate until the circuit to the armatures is broken by the projection 18 depressing the head 22. It will be observed that in the case of raising the window, the circuit is completed through a pair of contacts associated with the reversing relay. These contacts are provided to ensure that no damage or strain is placed on the motors should both switches S_1, S_2, be depressed simultaneously.

It will be clear that the depression of either switch will cause the window to be raised or lowered as the case may be, and the movement may be arrested immediately by releasing the switch. The current is, however, automatically cut-off when the window is completely raised or lowered.

The main parts of the apparatus, in accordance with the invention, may be constructed so as to form a unitary structure which can be fitted readily in the bodywork of an automobile. As illustrated in the drawings, the motors, sprockets, chain, circuit breakers and current-reversing device R, and in Figures 3 to 6 the rail 31, are all mounted upon the plate 10 and as much of the wiring as possible is carried out between the parts of the plate before fitting.

Terminals T on the device R (Figure 9) are utilized for connecting to the apparatus the battery leads, and the fire switch connections.

I claim:

1. An apparatus for moving sliding windows or partitions, comprising a window frame including guide means having a vertical upper portion and an angularly disposed lower portion, a window slidable in said guide means, an elongated supporting plate arranged centrally within and below the lower half of the frame, a pair of motor-driven sprocket wheels supported in spaced relation on the plate, a guide rail on the plate, an endless chain passing around said sprocket wheels, means mounted on the plate for controlling the operation of the motor-driven sprocket wheels including a reversing switch and a pair of circuit breakers mounted on the plate, a projection on the chain, coupling means for pivotally connecting the projection and window, including a portion carried by the lower edge of the window and a portion slidable in said guide rail and connected to the projection whereby the window may be moved and tilted upon movement of the chain, and spaced members on the chain each to actuate one of the circuit breakers.

2. Means for moving a sliding partition or window according to claim 1 wherein the coupling means includes a guide rail mounted on the elongated plate adjacent the chain, a runner connected to the chain and slidable on the rail and having an offset portion, a sleeve slidable on said portion and the lower edge of the window being pivotally mounted on said sleeve.

3. Means for moving a sliding partition according to claim 1 wherein the coupling means includes a rail arranged parallel to one flight of the chain, a runner connected to the chain and slidable on the rail, an arm on said runner, a sleeve slidable on said arm, a plate carried by the partition, and pivot means connecting the sleeve and the plate whereby the partition may assume an angular position as determined by the guide means therefor.

4. Means for moving a sliding window or partition according to claim 1 wherein the coupling means comprises a member connected to the chain and having a limb projecting towards the window and a runner device adapted to engage the limb so as to be capable of movement towards or away from the chain, said runner being pivotally connected to the lower edge of the sliding window.

5. Means for moving a sliding partition or window according to claim 1 wherein the coupling means includes a rail parallel to one flight of the chain, a runner of substantially T-shaped formation and having an arm at its upper portion projecting toward the window, and one wing of the T connecting with the chain and the opposite wing connected to counterbalancing means, and means carried by the partition or window and having a pivotal and sliding connection with said arm.

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