May 16, 1939. G. MADLAND 2,158,336

LOCKING, OPENING, AND CLOSING DEVICE

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FIG 1

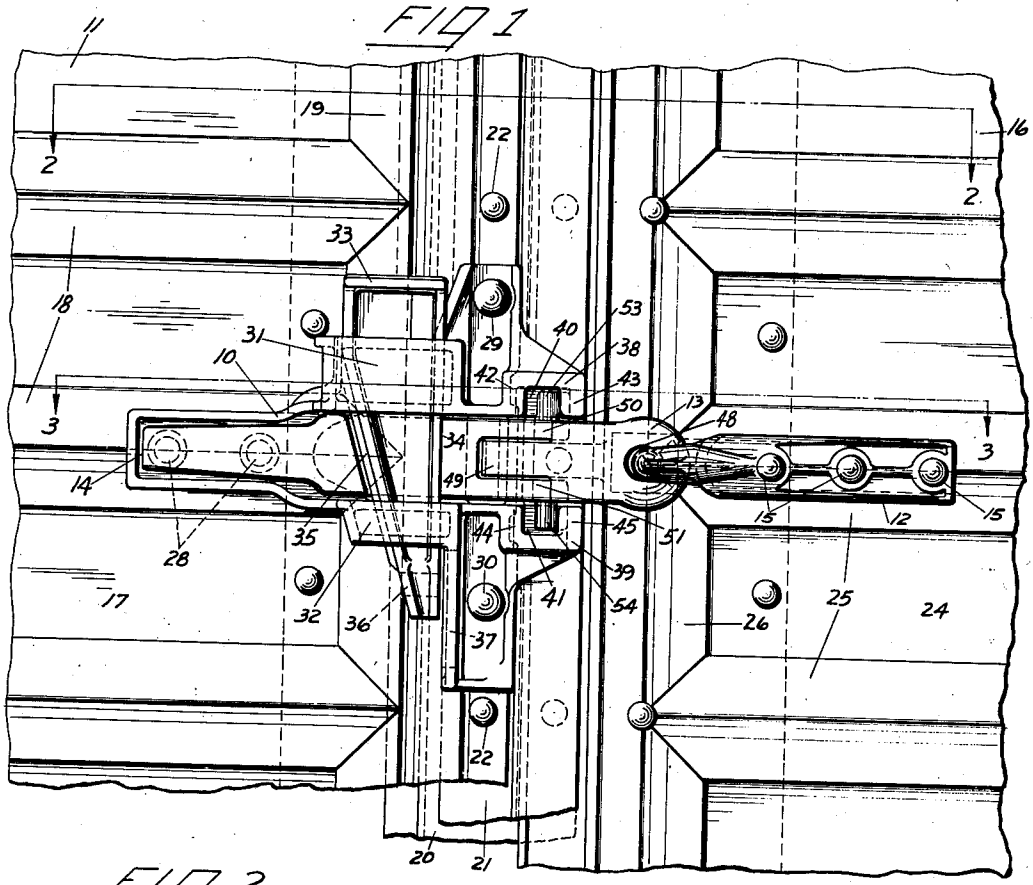
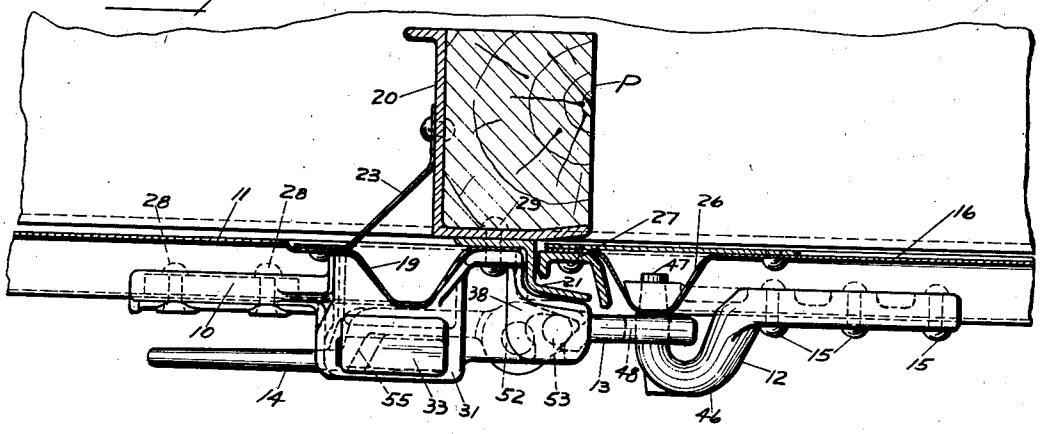


FIG 2



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FIG 3

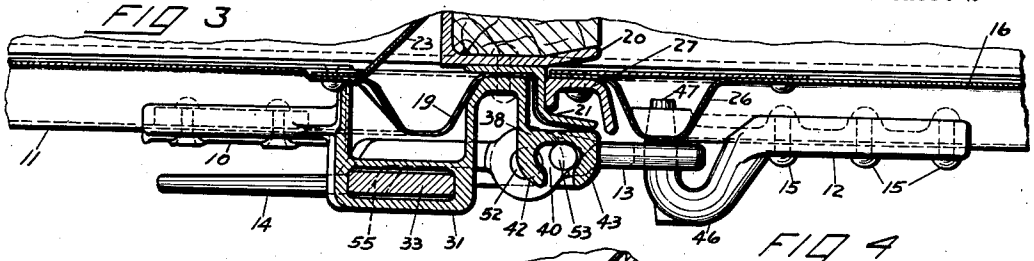


FIG 4

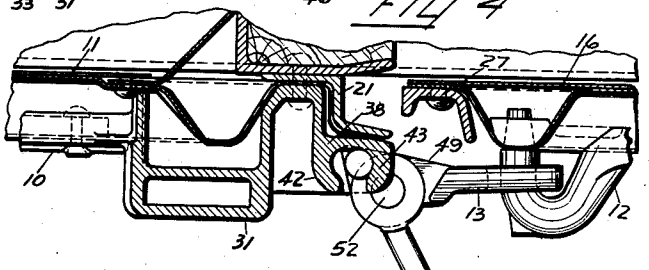
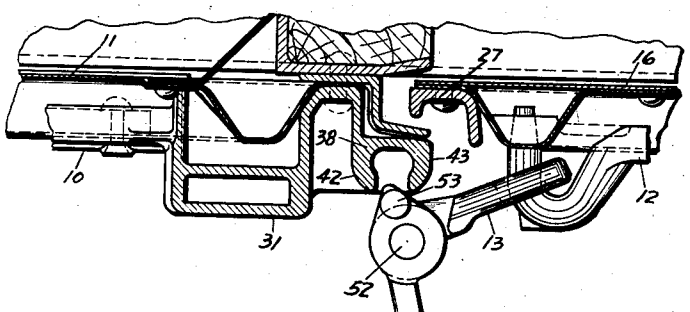


FIG 5



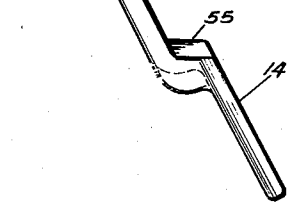
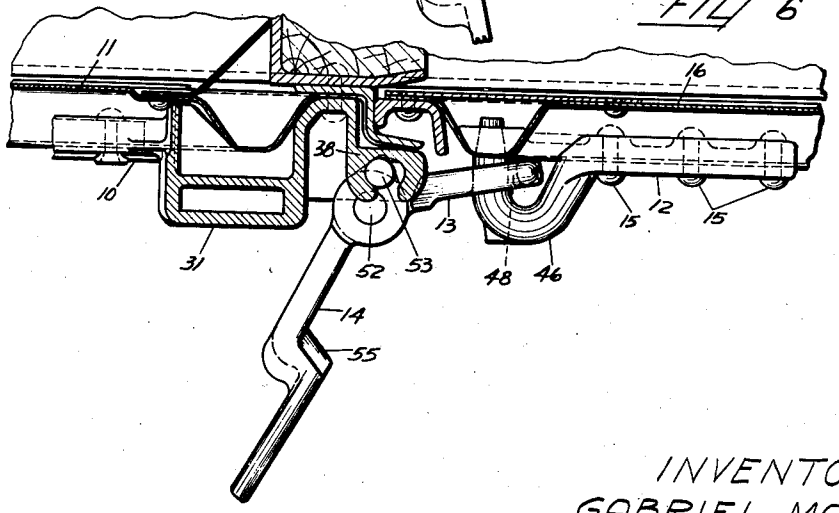


FIG 6



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UNITED STATES PATENT OFFICE

2,158,336

LOCKING, OPENING, AND CLOSING DEVICE

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Application July 1, 1937, Serial No. 151,378

7 Claims. (Cl. 292—240)

This invention relates to locking, opening and closing devices.

It is an object of this invention to provide a device which shall combine the functions of locking, closing and/or opening sliding doors.

A further object is to provide a device of this character which shall effect a substantial savings in weight of approximately 35% over similar devices in which the locking device is separate from the opening and closing device.

A further object is to provide a combined locking and closing device having separable means and designed to secure full closing operation before the door is completely closed and automatic closing movement of said door and separation of said means when said device is in door locking position.

A further object is to provide a combined locking and closing device for sliding doors including separable means cooperable to secure door closing movement wherein said means are spaced apart in the fully closed and locked position of said device.

A further object is to provide a locking, opening and closing device for sliding doors embodying lugs and cooperable abutments for obtaining opening and closing door movements, said device being designed to relieve said lugs of strain when said door is locked.

A further object is to provide a combined locking and closing device having separable means and designed to secure full closing operation before the door is completely closed and separation of said means and transference of the locking function to other parts of said device when the door is thereafter moved in closing direction.

Other objects of the invention will become clear as the description thereof proceeds.

In the drawings forming part of this specification:

Figure 1 is a fragmentary elevation of the main and auxiliary doors of a railway house car showing a device of the invention applied thereto.

Figure 2 is a horizontal section taken on line 2—2 of Figure 1.

Figure 3 is a horizontal section corresponding to the plane indicated by line 3—3 of Figure 1 but showing the relationship of the lugs on the lever with the cooperating bracket when the door is fully closed.

Figure 4 is a partial horizontal section illustrating the engagement between parts of the device when the main door is to be moved to closed position, this door being shown in its maximum spaced position from the auxiliary door.

Figure 5 is a partial horizontal section illustrating the engagement between parts of the device embodying the invention in order to impart closing movement to the main door when said main door is separated from the auxiliary door less than the maximum distance.

Figure 6 is a partial horizontal section showing the disposing of the parts of the device of the invention when opening movement is to be imparted to the main door.

Referring to the drawings in which a preferred embodiment of the invention is illustrated, it will be seen that the device of the invention is shown applied to the double doors of a railway house car commonly employed to close a door opening of extraordinary width provided in the sides of such house cars where they are utilized for the shipment of bulky lading, such as automobiles, furniture and the like. In such application of the device of the invention the lock plate 10 is preferably secured to the left hand or auxiliary door 11. The hasp fastener 12, hasp 13 and operating and locking lever 14 are then fastened as by means of rivets 15 to the right hand or main door 16. The auxiliary and main doors which are shown for purposes of illustration only are of well known construction, the auxiliary door 11 embodying a metallic panel 17 provided with spaced horizontal corrugations 18 merging into vertical corrugations formed in the panel adjacent the vertical edges thereof. The vertical corrugation adjacent the front edge of the auxiliary door is illustrated and is designated by the reference numeral 19. An auxiliary door post 20 and a front stop angle 21 are fastened to the front margin of the auxiliary door as by means of rivets 22. The knee brace 23 secured to the panel 12 and to the auxiliary door post 20 serves to prevent rotation of said post under impact.

The main door 16 embodies a metallic panel 24 formed with a plurality of spaced corrugations 25 which merge into vertical corrugations adjacent the vertical edges of the door. The front vertical corrugation of the main door is designated by the reference numeral 26. The front margin of the main door 16 is reinforced by a channel member 27 which in the closed position of the doors is received by the auxiliary door post 20 and the front stop angle 21. A nailing block P is carried by the auxiliary door post 20.

The opening, closing and locking device illustrated may as readily be utilized with a single sliding car door. In this case the lock plate 10 will preferably be fastened to the car side, where-

as the hasp fastener, hasp and operating and locking lever will be secured to the door.

The lock plate 10 which is preferably in the form of a casting is secured to its supporting member as by means of horizontal rivets 28 and vertical rivets 29 and 30. The lock plate 10 is provided with vertically spaced housing members 31 and 32 in which a locking pin 33 is received and retained. As clearly illustrated in Figure 1 of the drawings, the locking pin 33 is provided with a straight or vertical side 34 adapted to abut against the adjacent sides of the housing members 31 and 32 and an inclined side 35 adapted to cooperate with a similarly inclined shoulder provided on the operating and locking lever 14 as hereinafter explained. The lower portion of the pin 33 is formed with a slot 36 adapted to aline with a slot 37 formed in the lock plate 10 for the purpose of receiving a seal.

Extending from the lock plate 10 and preferably formed integral therewith are upper and lower bracket members 38 and 39 in the form of sockets. The bracket member 38 is provided with an opening 40 while the bracket member 39 is formed with an opening 41 whereby entry into the sockets may be had and the side flanges 42 and 43 of the bracket 38 and the side flanges 44 and 45 of the bracket 39 may serve as abutments as will later more clearly appear.

The hasp fastener 12 is provided with a neck portion 46, the free end 47 of which extends through the vertical corrugation 26 and through an eye 48 formed in the hasp or link 13 for securing the link to the main door 16. The outer end of the hasp or link 13 is reduced in thickness as indicated at 49 and is received between the flanges 50 and 51 of the operating and locking lever 14, these flange being formed by bifurcating the end of the lever. The lever is pivotally secured upon the reduced end of the link by means of a rivet 52. A lug 53 extends upwarly from the lever flange 50 and a lug 54 extends downwardly from the lever flange 51. Intermediate its ends the operating and locking lever is provided with a shoulder 55 having an inclination similar to that of the inclined side 35 of the locking pin 33.

With particular reference to Figure 4 of the drawings, it will be seen that the main door 16 has been moved relative to the auxiliary door which is shown in its closed position a sufficient distance to permit the entry of the lugs 53 and 54 on the lever into the socket brackets 38 and 39 so that the said lugs may engage the side flanges 43 and 45 of said brackets. With said flanges of the brackets serving as fulcrums, a force exerted upon the free end of the lever toward the left as viewed in Figure 4 will be transmitted to the hasp fastener 12 through the link 13 so as to impart closing movement to the main door. This force will be continued to be applied to the lever 14 until it assumes the position illustrated in Figure 2 of the drawings at which time the locking pin 33 will be lowered so that its vertical side 34 will engage the adjacent sides of the housing members 31 and 32 and the inclined side of the pin will engage the inclined shoulder 55 formed on the lever.

It will be observed from Figure 2 of the drawings that the main door is spaced somewhat from the front stop angle 21 thereby insuring the proper positioning of the operating and locking lever 14 and the engagement therewith of the locking pin 33. At this time the door is locked and the stress occasioned by the opening tendency of the door will be carried by the lugs 53 and 54 and by the locking pin 33.

It is desired, however, and the instant invention provides for the transference of the locking stress from the lugs 53 and 54 to the locking pin 33 and its associated elements. In other words, the operation of the device of the invention is such that when the door is fully closed, the lugs 53 and 54 will be separated from their abutments. This is clearly illustrated in Figure 3 of the drawings and may be obtained in any one of a plurality of ways.

With the locking, opening and closing device associated as shown in Figure 2 of the drawings, it will be apparent that opening movement of the door cannot occur. However, should the door move in the closing direction, separation of the shoulder 55 on the lever 14 from the inclined side 35 of the locking pin 33 will permit said pin to lower automatically so as to take up the clearance thus provided. Therefore the device is capable of automatic operation to effect separation of the lugs 53 and 54 from the abutments and the transference of the locking stress to the locking pin 33 and the lock plate.

It will be clear, moreover, that where desired, separation of these lugs from their abutments may be obtained either by forcing the locking pin 33 downwardly or by moving the door to fully closed position by a force applied directly to the door.

With reference to Figure 5 of the drawings, the flexibility of the device is illustrated. It will be observed that the spacing of the main and auxiliary doors is less than the space shown in Figure 4 of the drawings. However, by a proper angular relationship between the link 13 and the door and between said link and the lever 14, engagement of the lugs 53 and 54 on the lever with the side flanges 43 and 45 can be obtained so that closing movement may be imparted to the main door.

The operation of the device of the invention in securing initial opening movement of the main door is illustrated in Figure 6 of the drawings. However, the lever 14 has been disengaged from the locking pin 33 by raising the latter. The lever is swung toward the right as viewed in this figure until engagement between the lugs 53 and 54 and the side flanges 42 and 44 of the brackets 38 and 39 is had. Upon further swinging movement of the lever in the same direction, these side flanges will provide fulcrums for the lugs so that the force applied to the free end of the lever will be transmitted through the pivotal connection between the lever and the link to the hasp fastener thereby exerting a force upon the hasp fastener and upon the door to which it is fastened, which will move the door in opening direction. When the device has performed its function in this regard it is permitted to hang vertically from the neck of the hasp fastener.

It will be apparent that numerous changes and modifications in the details of the invention will be clear to those skilled in the art. It is intended, therefore, that all such modifications and changes be comprehended within this invention, which is to be limited only by the scope of the claims appended hereto.

I claim:

1. In a railway house car having a sliding door and a relatively stationary member associated therewith, the combination comprising a link carried by said door, a lever pivoted intermediate

its ends to said link, lugs on one end of said lever, a member secured to said relatively stationary member having abutments, said lugs being releasably engageable with said abutments to effect movement of said door in closing direction upon swinging said lever in one direction, said lugs being spaced from said abutments in the closed position of said door and means on said relatively stationary member associated with said lever for preventing opening movement of said door.

2. In a railway house car having a sliding door and a relatively stationary member associated therewith, the combination comprising means carried by said door, a lever pivotally secured to said means, an abutment on said member, said lever and said abutment being separably engageable to effect movement of said door in closing direction upon swinging of said lever in one direction, said door being partly open at the end of the operation of said lever and means on said member cooperable with said lever at the end of its operation to secure spacing of said lever from said abutment for the purpose set forth.

3. In a railway house car having a sliding door and a relatively stationary member associated therewith, the combination comprising means carried by said door, a lever pivotally secured to said means, an abutment on said member, said lever and said abutment being separably engageable to effect movement of said door in closing direction upon swinging of said lever in one direction, said door being partly open at the end of the operation of said lever and means on said member cooperable with said lever at the end of its operation for preventing opening movement of said door, said door being movable in closing direction when said latter means and said lever are in cooperative relationship to effect separation of said lever from said abutment, said latter means being biased to engagement with said lever to maintain said separation for the purpose set forth.

4. In a railway house car having a sliding door and a relatively stationary member associated therewith, the combination comprising a link secured to said door for swinging movement in vertical and horizontal planes, a lever pivotally connected to said link, a lug on said lever, an abutment on said member, said lug being engageable with said abutment and said lever being swingable in a horizontal plane to move said door in closing direction and means carried by said member cooperable with said lever to relieve said lug and abutment of forces tending to open said door.

5. In a railway house car having a sliding door member and a relatively stationary member associated therewith, means on one of said members, a lever pivotally connected to said means for horizontal swinging movement, a lug on said lever, a bracket secured to the other of said members, an abutment on said bracket, said lug being engageable with said abutment and said lever being swingable to impart closing movement to said door, said bracket having means engageable with said lever to relieve said lug and abutment of forces tending to open said door.

6. In a railway house car having a sliding door member and a relatively stationary member associated therewith, a lever pivotally connected to one of said members for horizontal swinging movement, a lug on said lever, a bracket secured to the other of said members, an abutment on said bracket, said lug being separably engageable with said abutment and said lever being swingable to impart closing movement to said door member, said door member being partly open at the end of the swinging movement of said lever, a vertically movable pin carried by said bracket, said pin being engageable with said lever at the end of its swing and cooperating therewith to secure said lug in spaced relation to said abutment.

7. In a railway house car having a sliding door member and a relatively stationary member associated therewith, a link fastened to one of said members for horizontal and vertical swinging movements, a lever connected to said link for horizontal swinging movement, said lever having an inclined shoulder, a lug on said lever, a bracket fastened to the other of said members, said bracket being formed with an abutment, said lug and said bracket being separably engageable and said lever being swingable to impart closing movement to said door member, said door member being partly open at the end of the swinging movement of said lever, a vertically movable pin having one side inclined correspondingly to said shoulder carried by said lever, said pin being engageable with said shoulder at the end of the swinging movement of said lever and cooperating automatically with said shoulder to secure said lug in spaced relation to said abutment.

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