PATENTED MAY 27, 1952

2,598,619

UNITED STATES PATENT OFFICE

INDEPENDENTLY OPERABLE MULTIPLE WINDOW STRUCTURE

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Application December 10, 1949, Serial No. 132,249

9 Claims. (Cl. 188—67)

This application is a companion of my copending application entitled "Multiple Window Structure," Serial No. 132,250, filed December 10, 1949, to which reference may be had for a disclosure of the entire window and frame. While the present invention partakes of the object and features of my abovementioned application, it constitutes an improvement thereover in providing for a latching mechanism by which one window may be released for independent motion with respect to other windows of the assembly.

Referring to the drawings and more particularly to Fig. 1, a window frame 10 and one of its stiles 11 is there shown. A lowermost or bottom window 13 and an upper window 15 are shown mounted in the frame. Only two windows are shown but, as will be evident from the ensuing description, three or more windows may be provided and operated in the manner described hereinafter.

Each window 13 or 15 comprises the usual sash 14 and pane 15, and the sashes are rabbeded at 16 in the usual manner. The window frame 10 is formed on each side with a longitudinal channel 17 to slidably receive a channel-shaped track member 18. Each window 13 or 15a is connected to the window frame by a pair of arms 19, only one of which is shown, there being one such arm on each side of the window. Each arm 19 is pivotally connected at one end at 20 to the window sash and it is also pivotally connected at its other end (not shown) to the window frame in the usual manner.

Each window 13 or 15a is also connected by means of a pair of sash plates 24, there being one sash plate on each side of the window connected at one end to the window sash. Each upper sash plate 24 is also pivotally connected at its other end, at 25, to a shoe 31 which is adjustable in the track member 18. This shoe is shown in cross section in Fig. 4. It is adjustable within the track member 18 and it is clamped in adjusted position by means of a cap screw 32 and a washer 33.

The sash plates 24 of the lower window 13 are connected to the track members 18 in a different manner. It will be seen that each of the lower sash plates 24 is pivotally connected at 34 to what I call a release shoe 35. The release shoe 35 is slidable within the track member 18 and it is cooperateable with a latch shoe 36 in the manner described hereinafter. The latch shoe 36 is adjustable in the track member 18 and, like the upper shoes 31, it is clamped in adjusted position by means of a cap screw 32 and a washer 33.

Assuming that the slide release shoes 35 and their cooperative latch shoes 36 are latched to-
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gether to operate as a unit, it will be apparent that the upper shoes 31 and the lower latch shoes 36 may be adjusted lengthwise of the track member 18 and then clamped in adjusted positions. Therefore, and still assuming that the slide release shoes 35 are latched to their latch shoes 36, it will be apparent that an open latch mechanism is provided whereby, when the lower window 13 is opened or closed, the track members 18 will slide down or up, respectively, and that all of the windows 13 and 13a will be operated simultaneously.

A latch mechanism is, however, provided for latching the slide release shoes to their latch shoes, or for unlatching the slide release shoes, so as to make it possible to open the upper windows 13a to the desired extent and then close or adjust the lower window 13 independently without disturbing the upper windows. This latch mechanism will now be described.

Referring now to Figs. 2, 3 and 5, it will be seen that the slide release shoe 35 and latch shoe 36 are of channel construction and that each of them is disposed with its web portion adjacent to the window 13 and that the legs of these channels are directed inwardly or toward the window frame 10. Each of these shoes, as mentioned above, is slidable within the track member 18, although the latch shoe 36, after having been suitably adjusted, is clamped in adjusted position by means of the cap screw 32 and washer 33.

Disposed within the latch shoe 36 and projecting upwardly and outwardly therefrom is a latch lever 40, having at its upper end a nose 41 formed with a notch 42 which is engageable with a catch or projection 43 extending from the slide release shoe 35. The latch lever 40 is also formed with a slanting cam surface 44 along one edge thereof and with a notch 45 below the cam surface 44, which is closed at its lower end by means of a lug 45a. Below the lug 45a there is provided another notch 46 which is opened at its lower end by a lug 47. A spring 48 is provided, which is seated at one end on a pin 49 projecting from the latch shoe 36 and at its other end on a pin 50 projecting from the latch lever 40. The spring 48 is intended to pivot the latch 40 to the right or to the left, depending upon, whether the pin 50 is disposed above or below the horizontal center of a fulcrum pin 51 which is fixed to and projects from the latch shoe 36. A lug 52 fixed to and projecting inwardly from the latch shoe 36 is received within the lower notch 46 and it serves to limit travel of latch lever 40 and to retain the latch lever in operative position. An abutment or latch shifting pin 53 is provided which is fixed to and projects inwardly from the web of the slide shoe 35.

Operation of the latch mechanism thus described and illustrated in Figs. 1, 2, 3 and 5 is best explained by reference to Figs. 6 to 9.

When all the windows are closed, each slide release shoe 35 and the cooperable latch shoe 36 and latch lever 40 will occupy the relative positions shown in Fig. 6. As will be seen in Fig. 6, the pivot pin 51 is seated in the notch 45 and abutment 53 in the lug 52a. In this position it will be seen that the pin 50 is located above the pivot pin 51. The spring 48, which forms in effect a toggle joint, will therefore urge the latch lever 40 to the right or in a clockwise position, as viewed in Fig. 6. However, the latch lever 40 is prevented from rocking by reason of the engagement of its notch 42 with the latch bracket 43.

Assuming that it is desired to open the windows 13 and 13a, the lowermost window 13 will be pulled upwardly to the position shown in Fig. 7. Since this window is connected pivotally at 34 to the slide release shoe 35, as the window 13 is opened the slide release shoe 35 will slide downwardly in track member 18 until it abuts the latch shoe 36, the latch mechanism being thereby engaged to the track members 18. Further opening of the window 13 will of necessity slide the track member 18 downwardly in its channel 17. Consequently, the upper windows 13a will be opened simultaneously with the lowermost window 13.

It will also be apparent that in moving the shoe 35 from the position shown in Fig. 6, wherein it is spaced from the latch shoe 36, to the position shown in Fig. 7, wherein it abuts the latch shoe 36, the latch bracket 43 will be moved clear of the notch 42 in latch lever 40. The latter will, therefore, be free to rock to the right under the force of the spring 48 until it is stopped by means of the abutment pin 53 at the position shown in Fig. 7.

Assuming now that the upper windows have been opened to the desired extent and that it is desired to close or adjust the lowermost window 13 without disturbing the upper window, the lowermost window 13 will be pushed downwardly. Since there is now no latching connection between the slide release shoe 35 and the latch shoe 36, the release shoe 35 will be free to move upwardly within the track member 18, and the track member 18 will remain stationary. It will therefore be apparent that the lowermost window can be adjusted or completely closed without disturbing the upper window 13a.

Assuming now that it is desired to close the upper windows 13a, the lowermost window 13 will be re-opened. The slide shoe 35 will be caused to travel downwardly in the channel member 18. It will be seen that the latch lever 40 now lies directly in the path of the lowermost or latch shifting pin 53. Consequently, after a certain degree of downward travel of the slide release shoe has occurred, the abutment pin or latch shifting pin 53 will strike the top of the latch lever 40, as shown in solid lines in Fig. 9. Further opening of the window 13 and downward travel of the slide release shoe 35 will therefore push the latch lever 40 downwardly until the upper end of the notch 45 strikes the pivot pin 51. As the lever 40 passes from the up position shown in solid lines in Fig. 9 to the down position shown in broken lines, the seating pin 50 of the spring 48 will pass from a position above the horizontal diameter of the pivot pin 51 to a position therebelow. This will cause a rocking of the lever 40 to the left or in a counterclockwise position as viewed in Fig. 9 so that it will assume the position shown in broken lines therefor...

In this position it will be apparent that the notch 42 of the latch lever 40 will move into position for engagement with, and will engage the latch bracket 43. Such engagement or catching of the latch lever 40 will be made sensible by reason of the fact that, as the latch lever 40 is rocked out from the notch 45 and abutment pin 53 in the counterclockwise position, a clicking noise will occur which is audible and will inform the operator that the latching operation has been accomplished.

The lower window 13 will now be in more or less fully open position and the latch lever 40 will be in latched position. As the lowermost window 13 is then moved to closed position, its slide release shoes 35 will, of course, move upwardly. The latching connection between the...
slide release shoes 35 and the shoes 36 will cause the track members 18 to also move upwardly, thereby closing all of the windows and causing the operating elements of the window to resume the positions shown in Fig. 6. It will, therefore, be apparent that a latch mechanism and window operating structure have been provided in which several desirable objects are achieved. Thus, a travel bar structure is provided which not only provides a tie between two or more windows arranged in vertical alignment so that they may operate in unison, but an adjustable connection between several windows and the travel bar is provided. It is further evident that a latch mechanism is provided, whereby all of the windows may be operated in unison by operating the lowermost window and wherein the lowermost window, after suitable adjustment of the upper windows, may be operated independently to close it partially or entirely, as desired, thus eliminating drafts but allowing ventilation. The latch mechanism thus described also has a wider field of utility, as will be apparent.

While I have shown the preferred form of my invention, it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus defined my invention, what I claim and desire to secure by Letters Patent is:

1. A window structure of the character described comprising first and second structures which are relatively pivotable to one another, and means for latching the same together comprising a latch lever mounted on the first structure, latch engaging means mounted on the second structure, a fulcrum for the latch lever associated with the first structure, said latch lever being free to shift relatively to said fulcrum, means associated with the first structure for urging the latch lever in a direction to engage said latch engaging means or in a direction to disengage the same according to the position of the latch lever relatively to the fulcrum, and latch shifting means associated with the second structure for shifting the latch member.

2. A window structure of the character described comprising first and second slide members adapted to slide independently and latching means for connecting and disconnecting said slide members to slide together or independently, said latching means comprising a latch lever mounted on the first slide member, a supplemental latch member mounted on the second slide member to engage the latch lever, a fulcrum mounted on the first slide member, said latch lever being shiftable relatively to the fulcrum, means mounted on the first slide member to urge the latch toward or away from the supplemental latch member according to the position of the latch relatively to its fulcrum, and means operated by the second slide member for shifting the latch.

3. A window structure of the character described comprising first and second slide members adapted to slide independently and latching means for connecting and disconnecting said slide members to slide together or independently, said latching means comprising a latch lever and fulcrum therefor mounted on the first slide member, said latch being shiftable relatively to said fulcrum, a cooperating latch member mounted on the second slide member to engage the latch lever as said second slide member is moved away from the first slide member, latch rocking means mounted on the first slide member to rock the latch lever toward or away from said cooperating latch member according to the position of the latch lever relatively to its fulcrum, and latch shifting means mounted on said second slide member, said latch rocking means and latch shifting means being so arranged that when the latch lever and latch member are engaged and the second slide member is advanced toward the first slide member the latch will disengage to allow retraction of the second slide member without movement of the first slide member and when the second slide member is thereafter advanced the latch will rock to latch engagement position.

4. A window structure of the character described comprising first and second slide members, a latch lever and a fulcrum therefor mounted on said first slide member, said lever being shiftable relatively to the fulcrum, latch rocking means mounted on said first slide member to rock the latch lever in one direction or the other according to its position relatively to the fulcrum, a latch engaging member and a latch shifting member mounted on the second slide member, said latch engaging member being engageable with said latch lever when the slide members are in spaced relation to lock them together for unitary movement in one direction, said latch rocking means being operable to rock the latch lever away from the latch engaging member when the second slide member is moved toward the first slide member, said latch shifting member being operable to shift the latch lever and reverse the operation of said latch rocking member when moved clear of and then toward the latch lever.

5. A window structure of the character described comprising first and second slide members, a latch engaging member and a latch shifting member fixed to the second slide member, a latch fulcrum fixed to the first slide member, a latch lever having a notched formed therein engaging said fulcrum, said notch being wider than said fulcrum to allow advancement and retraction of the latch lever and shifting thereof relatively to the fulcrum, one end of said latch lever being engageable with said latch member to latch the first and second slide members in spaced relation for unitary movement in one direction, said one end of the latch lever being also engageable with said latch shifting member when the slide members are moved toward abutting position to thereby retract the latch lever, and latch rocking means mounted on said first slide member operable to rock the latch lever away from said latch engaging member when the latch lever is in advanced position and to rock the latch lever toward the latch engaging member when the latch lever is in retracted position.

6. A window structure of the character described comprising a first slide member and a second slide member, a latch bracket and a latch shifting member fixed to the second slide member, a latch lever mounted on the first slide member and having a fulcrum, said latch lever being rockable on its fulcrum toward and away from said latch bracket and being also shiftable in the line of movement of said slide members to vary the position of its fulcrum relative to said latch bracket having an outer end engageable with said latch bracket when the slide members are in spaced relation and being also engageable with said latch shifting member, and means mounted on said
first slide member operable to rock the latch lever toward the latch bracket when the latch lever is retracted from the second slide member and to rock it away from the latch bracket when the latch lever is advanced toward the second slide member.

7. A window structure of the character described comprising a track member, a first member, means for clamping the first member to the track, a second member slidable in said track, latch means for connecting the members together, said latch means comprising a latch engaging member and a latch shifting member mounted on the second member, a latch lever having a fulcrum on said first member and shiftable relatively thereto in the line of movement of said members between advanced and retracted positions, said latch lever having a projective end engageable with said latch shifting member and also engageable with said latch engaging member when in advanced position, and means mounted on said first member operable to rock the latch lever when retracted toward said latch engaging member and to rock the latch in the opposite direction when it is advanced.

8. A window structure of the character described comprising a track member, a first member, means for clamping the first member to the track, a second member slidable in said track, latch means for connecting the members together, said latch means comprising a latch engaging member and a latch shifting member mounted on the second slide member, a latch lever having an outer end, said latch lever being full-crowned on the first member and being shiftable in the line of movement of the members between an advanced position and a retracted position relatively to said first member, the outer end of said latch lever being engageable when advanced with said latch engaging member to latch the members together in spaced relation for unitary movement in one direction, and a spring mounted on said first slide member and urging said latch lever toward the latch engaging member when the lever is retracted and away therefrom when the lever is advanced, said spring being operable when said members are in spaced relation and the second member is advanced toward the slide member to rock the latch lever out of engagement with the latch engaging member, said latch shifting means being thereafter operable, when the first member is retracted from and then advanced toward the second member to shift the latch lever and reverse the operation of the spring.

9. In a window mounting structure for a lower window and an upper window to be operated in unison, comprising a travel bar to be slidably mounted in the sills of a window frame, arms for pivotally connecting the windows to the window frame and sash plates for pivotally connecting windows to the travel bar, the improvement which comprises a slide member for the lower window slidably mounted on the travel bar and pivotally connected to the sash plate of said lower window, abutment means fixed to the travel bar to limit downward sliding movement of the slide member, latch engaging means and latch shifting means mounted on said slide member, a latch lever having a fulcrum fixed with respect to the travel bar and engageable with said latch engaging means to thereby latch the slide member to said travel bar to cause the slide member and travel bar to travel upwardly in unison, said latch lever being shiftable longitudinally of the travel bar and rockable transversely thereof to and from said latch engaging means, and resilient means urging said travel to or from said latch engaging means according to the position of the latch lever relatively to its fulcrum, the said various elements being so arranged that when the lower window is opened said slide member will engage said abutment member to move the slide bar, when the lower window is then moved toward closed position said resilient means will rock the latch lever away from the latch engaging member, and when the lower window is then re-opened the latch shifting means will engage and shift the lever to reverse the operation of said resilient means and thereby rock the latch lever into engagement with the latch engaging member.

RUSSELL S. STRAND.

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