Aug. 17, 1937. A. G. LARSON 2,090,133

WINDOW CONSTRUCTION

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FIG. 1.

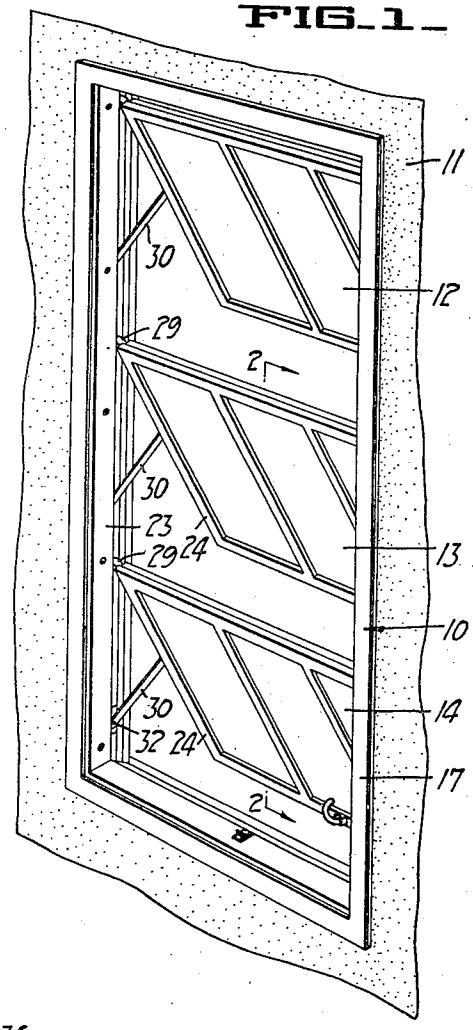
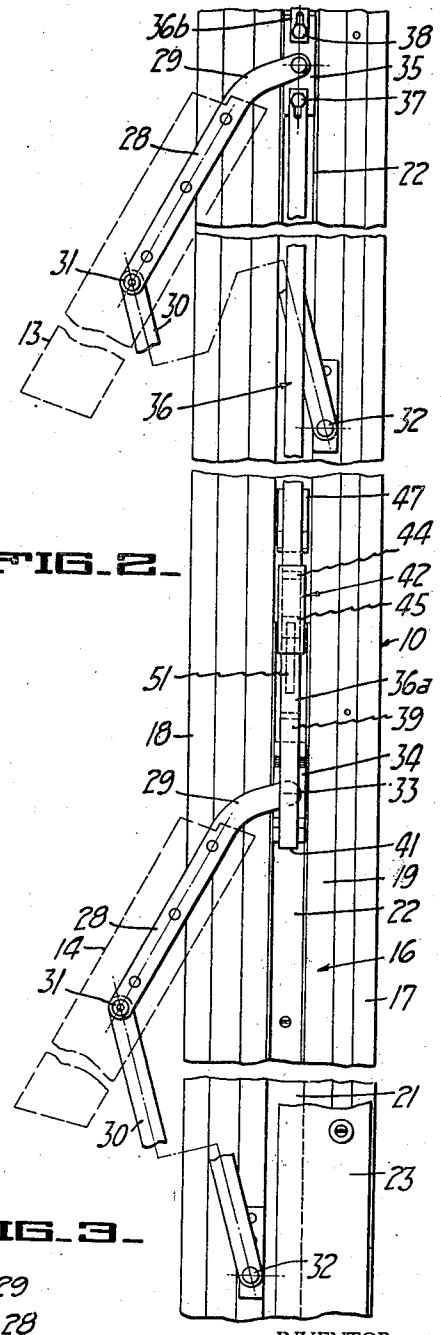


FIG. 2.



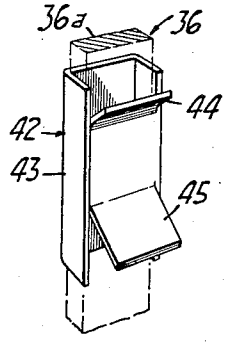


FIG. 4.

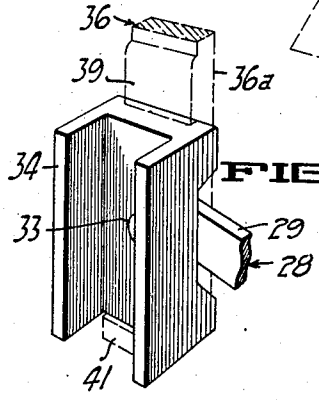


FIG. 3.

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FIG. 5. FIG. 6 FIG. 7 FIG. 8 FIG. 9.

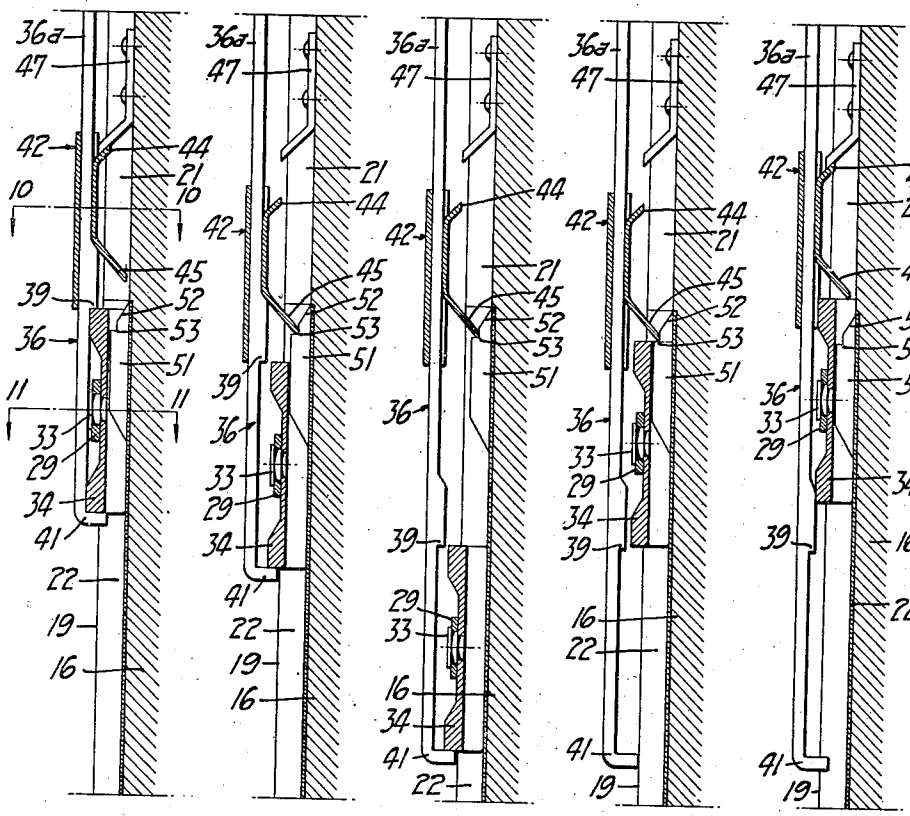


FIG. 10.

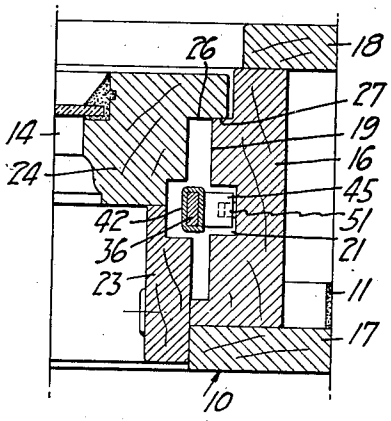
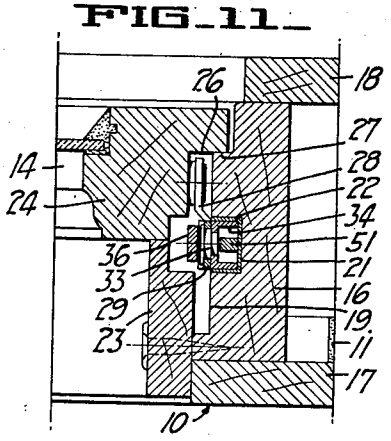


FIG. 11.



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FIG_12_ FIG_13_ FIG_14_ FIG_15_

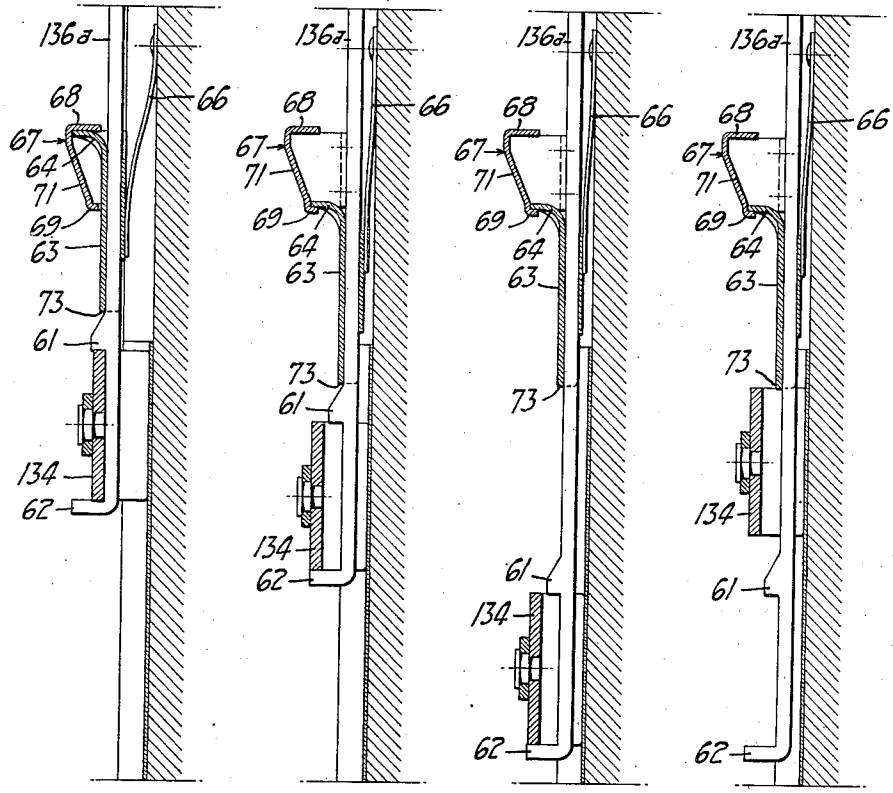


FIG_16_

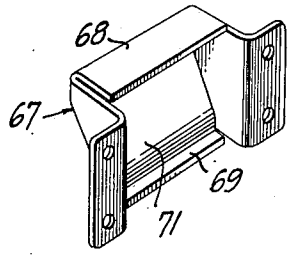
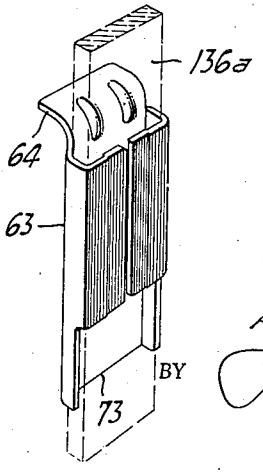


FIG_17_



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FIG. 18.

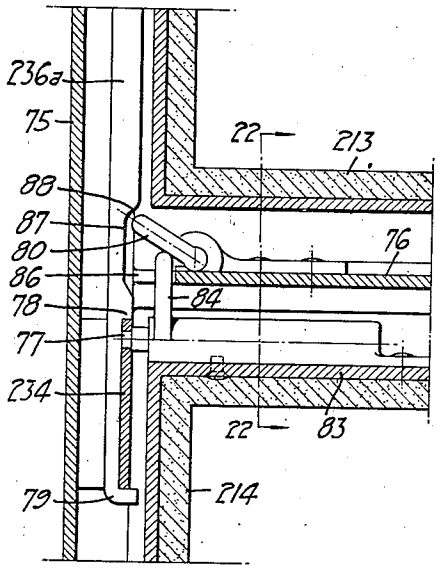


FIG. 19.

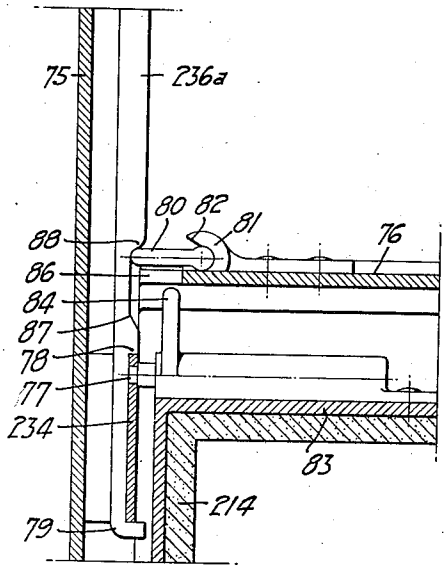


FIG. 20.

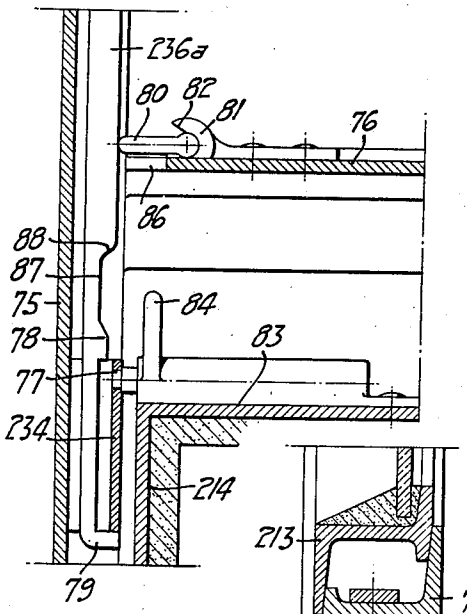


FIG. 21.

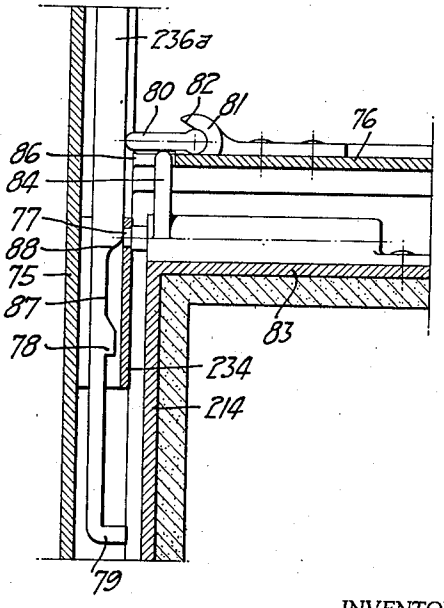
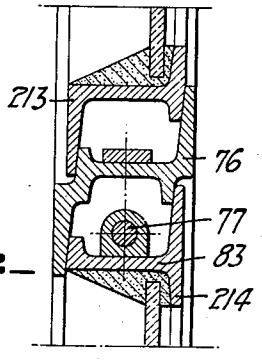


FIG. 22.



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UNITED STATES PATENT OFFICE

2,090,133

WINDOW CONSTRUCTION

Albert G. Larson, Larkspur, Calif., assignor to Dalmo Sales Corporation, San Francisco, Calif., a corporation of California

Application August 14, 1935, Serial No. 36,099

12 Claims. (Cl. 20—42)

This invention relates generally to windows making use of a plurality of sashes carried by a single frame. It is particularly concerned with mechanism by means of which the sashes are moved between open and closed positions.

It is an object of the invention to provide a window of the above character having improved automatic mechanism for securing a definite cycle of operation upon manual manipulation of one of the sashes. As will be presently explained, the cycle of operation is such that by manipulation of one of the sashes the other can be left in open or partially open position while the sash being manipulated is closed. In connection with this automatic cycle of operation, a further object of the invention is to enable positioning of one or more of the upper sashes, other than the particular sash being manipulated manually, at any point within a substantial range of opening movement. In other words, with the present invention an upper sash may be left in full open position, or in partially open position, or at some intermediate point between such limits, by manipulation of a lower sash.

More specifically, it is an object of the invention to provide improved cam means for effecting automatic disengagement and engagement of clutch mechanisms, which in turn enable conjoint operation of all of the sashes by the manipulation of one of them, or independent manipulation of the one sash.

Another object of the invention is to provide an automatic multiple sash window of simple, reliable and rugged construction, which will not be subject to detrimental wear in usage and which will perform its desired functions over a long period of time without servicing.

Further objects of the invention will appear from the following description, in which the preferred embodiments of the invention have been set forth in detail in conjunction with the accompanying drawings.

Referring to the drawings:

Fig. 1 is a perspective view, illustrating a window incorporating the present invention.

Fig. 2 is a side elevational detail, on an enlarged scale showing the manner in which the sashes are carried by the frame for swinging movement, together with mechanism for securing the desired automatic cycle of operation.

Fig. 3 is a perspective detail, illustrating a sliding shoe of the type utilized in the window construction of Figs. 1 and 2.

Fig. 4 is a perspective detail, illustrating one type of camming means utilized with the window construction of Figs. 1 and 2.

Figs. 5, 6, 7, 8 and 9 are side elevational detail views, in cross section, showing various operating positions for the clutching mechanism.

Fig. 10 is a cross-sectional detail taken along the line 10—10 of Fig. 5.

Fig. 11 is a cross-sectional detail taken along the line 11—11 of Fig. 5, and on an enlarged scale.

Figs. 12, 13, 14 and 15 are side elevational details, in cross-section, showing various operating positions for a modified type of clutching mechanism.

Fig. 16 is a perspective detail, illustrating one element of the modified cam means, incorporated in the modification of Figs. 12 to 15 inclusive.

Fig. 17 is a perspective detail, illustrating the other part of the cam means incorporated in the modification of Figs. 12 to 15 inclusive.

Fig. 18 is a side elevational detail, in cross-section, showing a further modified form of cam and clutching mechanism.

Figs. 19, 20 and 21 are detail views in cross-section, similar to Fig. 16, but showing the parts in different operating positions.

Fig. 22 is a cross-sectional view taken along the line 22—22 of Fig. 18.

Referring first to Fig. 1, my window consists of a suitable rectangular frame 10, which is adapted to be mounted within the wall 11 of a building. The frame 10 serves to carry a plurality of sashes 12, 13 and 14 for swinging movement between open and closed positions. The number of swinging sashes employed may vary in accordance with requirements. In some instances, more than three sashes will be required, while in other cases two sashes will suffice. Where two sashes are employed, one sash may be carried independently above the other, or the sashes may be spaced a substantial vertical distance apart with an intermediate panel or independently mounted sash. While the type of swinging movement employed may be modified, the movement is preferably about generally horizontal axes.

The particular type of frame illustrated is formed of wood, although it is to be understood that other material can be employed, as for example suitable steel structural members. As will be evident from Figs. 10 and 11, the wood construction illustrated includes the main vertical framing member 16, the inner and outer edges of which carry the finishing or cover strips 17 and 18. The inner face 19 of each member

16 is provided with a vertical groove 21, to accommodate vertically extending metal channels 22. As will be presently explained, certain of the working parts of the window are slidably mounted within the channels 22, so that the channels in effect form guide-ways. When all of the sashes are mounted for outward swinging movement to open the same, the sash jamb may be formed by a strip 23 extending the full height of the window frame. It will be noted that the side members 24 of the sashes are adapted to engage one vertical edge of the strip 23 when closed, and, in order to afford better weather-proofing, complementary rabbeting is provided in the side sash members 24 and the frame members 16, to provide the contacting surfaces 26 and 27.

To mount the sashes for the type of swing movement desired, the side edges of each sash are provided with sash plates 28, the upper ends of which afford projecting and laterally extending arms or brackets 29. Two support arms or links 30 are also provided for each sash. The upper end of each link 30 has a pivotal connection 31 with the corresponding sash plate 28, while the lower end of each link 30 has a fixed pivotal connection 32 with the side of the window frame.

The brackets or arms 29, for each sash are pivotally connected to shoes, which in turn are mounted for vertical sliding movement in the channels 22. Thus, referring to Fig. 2, arms 29 for the sash 14 are shown provided with pivotal connections 33 to the shoes 34. Similar shoes 35 are provided for the sash 13 and for the uppermost sash 12.

Extending vertically through each channel 22 there is a travel bar 36. Each bar 36 is formed in two sections 36a and 36b, with the lower section 36a extending in front of the lower corresponding shoe 34, as shown in Figs. 3, 5 to 9 inclusive. The upper end of bar 36a is attached to the shoe 35 for sash 13, by means of a bolt 37 or like means. Bolt 38 is shown for attaching the lower end of the uppermost section 36b to the shoe 35. The upper end of bar section 36b is similarly attached to the uppermost shoe 35, for the top sash 12. Bolts 37 and 38 are shown accommodated in slots provided in the bar sections, in order to afford a latitude of adjustment.

With the arrangement described above, it is evident that the upper sashes 12 and 13 will be swung between open and closed positions by vertical movements of the travel bars 36. Downward movement of the travel bars serves to swing the upper sashes 12 and 13 outwardly, while upward movement of the travel bars serves to swing the sashes towards closed position.

The shoes 34 for the lower sash 14 are adapted to be engaged or disengaged with respect to the lower extremities of the travel bars, that is to the travel bar sections 36a, by means of novel clutch and camming mechanisms. Thus, referring to Figs. 3, 5 to 9 inclusive, each bar section 36a is provided with upper or lower shoulders 39 and 41, which are spaced apart a distance slightly greater than the length of the associated shoe 34. Bar sections 36a are sprung in such a manner that they are normally urged toward the associated shoes 34, and thus shoulders 39 and 41 are urged toward engaged position with respect to the shoes.

In addition to the above clutching means, camming mechanisms are also provided. Thus, referring to Figs. 4, 5 to 9 inclusive, a device 42 is slidably mounted upon each travel bar section 36a, there being however a certain amount of friction resisting against such relative sliding movement. Each device 42 consists of a pressed metal body 43, fitted upon the associated bar section 36a, and provided on its one side with projecting portions 44 and 45. Another element of each camming mechanism, serving to cooperate with device 42, consists of a projecting tab 47, which is relatively stationary and which is mounted upon the side of the window frame (Figs. 5 to 9 inclusive). In addition to the parts just described, there is an element 51 (Figs. 5 and 11), which is in the form of a vertically extending rib. This element is mounted on the channel 22, between the side flanges of the same, and its upper end is provided with an inclined cam surface 52. Immediately adjacent cam surface 52, there is a stop shoulder 53.

Operation of the clutch camming mechanism described, is as follows: Fig. 5 shows the positioning of the parts when all of the sashes are fully closed. At this time the shoes 34 are engaged by the upper and lower shoulders 39 and 41, and they pull down upon the travelling bar sections 36a with sufficient force to retain the upper sashes 12 and 13 tightly closed. Upon unlatching and moving the lower sash 14 outwardly, the lower shoes 34 initially move downwardly, and such movement is accompanied by downward movement of the travel bars to cause simultaneous outward movement of the upper sashes 12 and 13. Devices 42 likewise move downwardly together with the travel bar sections 36a to bring projecting portions 45 into engagement with the inclined cam surfaces 52. Thereafter further downward movement of devices 42 causes portions 45 to ride upon the cam surfaces 52, to final positions in engagement with shoulders 53, as shown in Fig. 6. This serves to swing the travel bar sections 36a towards each other, (toward the lower sash) whereby the shoulders 39 of the travel bars are freed with respect to the upper ends of shoes 34, without however freeing the shoulders 41 with respect to the lower ends of shoes 34. Further continued opening movement of the lowered sash is still accompanied by downward movement of the travel bars, and by simultaneous outward movement of the sashes 12 and 13. The positioning of the parts after initial opening movement of the lower sash, to free shoulders 39 with respect to the upper ends of shoes 34, is shown in Fig. 6, while full open position of all of the sashes is shown in Fig. 7. Upon closing the lower sash manually, after such opening movement, it is evident that since the shoes 34 are free to travel upwardly independently of the travel bars, the lower sash is closed independently, while the upper sashes 12 and 13 remain open. The positioning of the shoes 34 after such independent closing movement of the lower sash has been substantially completed, is shown in Fig. 8. For the last portion of such independent closing movement of the lower sash, the upper ends of shoes 34 contact the projecting portions 45 of devices 42, thus causing these devices to slide upwardly upon the travel bar sections 36a. Such movement causes portions 45 to be disengaged with respect to shoulders 53 and cam surfaces 52, with a final positioning of each device 42, as shown in Fig. 9. Likewise, disengagement of portions 45 with respect to cam surfaces 52, permits the travel bar sections 36a to swing against the shoes 34. When the lower sash is again swung towards open position, shoes 34 move downwardly independently of the travel bars, until the upper

ends of these shoes arrive at a point immediately below these shoulders **39**. At this time the travel bar sections **36***a* spring towards shoes **34**, thus again establishing engagement with the shoes, whereby when the lower sash is now swung to closed position, the travel bars are forced upwardly, and the upper sashes **12** and **13** are likewise closed. During such closing movement devices **42** come into contact with the stationary stops **47**, whereby during the remaining part of the closing movement of the sashes, devices **42** remain relatively stationary while the travel bars move upwardly.

In the cycle of operation described above, it has been presumed that the lower sash is initially moved to substantially full open position. However, when the opening movement of the lower sash is only sufficient to bring the shoes **34** to the positioning shown in Fig. 6, which is a small fraction of the total opening swinging movement, the lower sash can be moved to closed position, independently of the upper sashes. Likewise upon again opening the lower sash, to such partially open position, the upper sashes can be picked up in the same manner described above, so that upon subsequently opening and closing the lower sash, the upper sashes will be closed. The same cycle is carried out for intermediate opening positions of the lower sash, or for any positioning of the shoes **34** between the positioning shown in Fig. 6, and the positioning illustrated in Fig. 7. Thus, the automatic cycle of operation is not confined to a definite amount of opening movement of the lower sash, and pick-up of the upper sashes occurs in a positive manner in the normal opening movement of the lower sash.

Figs. 12 to 17 illustrate a modification in which a part taking the place of stop **47**, also serves the function of cam element **51**. Likewise, in this instance the lower end of the travel bars are swung away from each other when being disengaged from the shoes for the lower sash, as distinguished from movement towards each other in the first modification described. Thus in this instance the lower ends of the travel bar sections **136***a*, are provided with shoulders **61** and **62** which are spaced apart a distance slightly greater than the length of the associated lower shoes **134**. Slidably mounted upon the travel bar sections **136***a* are the devices **63**. Each of these devices is formed of pressed metal formed to embrace the associated travel bar (Fig. 17), and affording a laterally bent portion **64**. Suitable means, such as a leaf spring **66**, mounted upon the frame of the window, presses against each device **63**, in order to insure sufficient friction between this device and the associated travel bars. Operating in conjunction with device **63**, there is a clip **67**, which spans each travel bar section **36***a*, and which is mounted upon the adjacent frame of the window. Clip **67** affords an upper stop shoulder **68**, a lower shoulder **69**, and an intermediate cam surface **71**. Projecting portion **64** of the device **63** at all times operates between the limits of shoulders **68** and **69**.

Operation of the modification illustrated in Figs. 12 to 17 inclusive, is as follows:—The positioning of the parts for closed position of all of the sashes is shown in Fig. 12. Upon opening the lower sash the shoes **134** are moved downwardly, and downward movement of the travel bar section **136***a* causes simultaneous opening movement of the upper sashes **11** and **12**. The initial part of such opening movement causes downward movement of each device **63**, until portion **64** is stopped by engagement with shoulder **69**. However, in travelling downwardly from shoulder **68** to shoulder **69**, cam surface **71** is engaged, to swing the associated travel bar section **63***a* outwardly to a position as shown in Fig. 13. Thereafter upon further opening the lower sash, all of the sashes move outwardly in unison, but shoulder **61** is transposed out of the path of the upper end of the associate shoe **134**. Fig. 13 illustrates positioning of the parts immediately after the initial opening movement of the lower sash, described above. Fig. 14 illustrates positioning of the parts after the sashes have been moved to full open position. Now upon moving the lower sash towards closed position, it is evident that shoes **134** move upwardly independently of the travel bars, and therefore the upper sashes remain stationary. Immediately before the lower sash has been moved to fully closed position, as illustrated in Fig. 15, the upper ends of shoes **34** come into contact with the lower ends **73** of device **63**, so that for the remainder of the closing movement of the lower sash, each of the devices **63** is shifted upwardly and back to the positioning shown in Fig. 12. Now if it is desired to pick up and close the upper sashes, the lower sashes again move downwardly a distance sufficiently far to permit the shoulders **61** to snap back over the upper ends of the shoes **134**. Now upon closing the lower sash, the travel bars are moved upwardly, the upper sashes are likewise closed in unison.

Figs. 18 to 22 inclusive illustrate a modification which affords substantially the same cycle of operation insofar as manipulation is concerned, but which utilizes a pivoted camming lever, in place of the cam elements described for the first two modifications. In this instance the sashes and frame of the window have been indicated as made of structural steel members in place of wood. Thus, channel shaped structural members **75** form the sides of the window frame, and horizontal bars **76** extend between the sashes. The lower shoes **234** for the bottom sash **214** and also the shoes for the upper sashes are slidably mounted within the channels formed by members **75**. The channels also serve to receive the vertically operating travel bars. As illustrated in the drawings the lower section **236***a* of the travel bars extends through the lower shoes **234**. These shoes are connected to the corners of sash **214**, by suitable means such as pivot pins **77**. The upper and lower ends of each shoe **234** are adapted to be engaged by the shoulders **78** and **79**. Near each end of that bar **76** which overlies the lowermost sash, there is a camming lever **80**, the pivotal mounting **81** of which permits the lever to swing in a vertical direction, about a horizontal axis, normal to the plane of the window frame. Upward swinging movement of each lever is limited by a shoulder **82**. Mounted on each end of the sash rail **83**, there is a trip finger **84**. When the lowermost sash **214** is swung to closed position, each of the trip fingers **84** is accommodated by an opening **86** in the fixed bar **76**. Each of the lower travel bars **236***a* is formed to provide a notch or recess **87**, the bottom surface of which merges with the outer face of the travel bar, by means of a suitably curved cam surface **88**. Closed positions of the sashes **213** and **214** are shown in Fig. 18. Upon moving the lower sash **214** to its open position, lowering of finger **84** permits each finger **80** to swing downwardly to the position shown in Fig. 19. Furthermore opening movement of the lower sash causes each of the

travel bar sections 236a to be sprung outwardly, as shown in Fig. 20. Such springing movement transposes shoulder 78 to one side of the upper end of shoe 234. The lower sash can now be closed independently of the upper sashes, but during the final portion of such closing movement, fingers 84 again engage levers 80 to trip the same upwardly, and thereby permit the travel bar sections 236a to again spring towards shoes 234. When the lower sash is again swung outwardly, shoulders 78 latch over the top of shoes 234, whereby when the lower sash is subsequently swung towards closed position, the travel bars are moved upwardly to simultaneously close the upper sashes.

It will be noted from Fig. 18 that when each of the levers 80 is swung to the limit of its upward movement, it is still within the path of downward movement of the cam surface 88. However, when each lever 80 is tripped upwardly from the position shown in Fig. 21, the associate travel bar can swing inwardly a distance sufficiently far to enable its associated shoulder to latch over the upper end of shoe 234. In the event, upon initial opening movement of the lower sash, each of the levers 80 should not drop down by gravity, they are forced to move to their lowered positions when the travel bar moves downwardly, by virtue of engagement of cam surfaces 88 with the free ends of the levers 80. Thus it is not necessary to rely upon gravity or springs to secure proper action of levers 80, and if metal corrosion or foreign matter should retard their free movement, they are nevertheless positively operated to secure the desired cyclic action.

I claim:—

1. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement upon manually swinging one of them, a clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is dis-engaged one of said sashes can be swung independently of the other, said clutch mechanism being engaged when both said sashes are closed, and means conditioned by direct opening movement of the one sash accompanied by conjoint movement of the other sash for effecting automatic dis-engagement of said clutch mechanism, whereby said one sash can thereafter be independently closed, and conditioned by subsequent direct and independent opening movement of the one sash to automatically re-engage said mechanism.

2. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement upon manually swinging one of them, said last means including vertically moving travel bars disposed in the sides of the frame, clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is dis-engaged said one sash can be swung independently of the other, and cam means for effecting automatic dis-engagement and engagement of said clutch mechanism as the sashes are manipulated, said cam means serving to disengage said clutch mechanism when the two sashes are moved conjointly towards open position, and serving to permit re-engagement of said clutch mechanism when said one sash is independently moved to closed position and subsequently moved back to open position.

3. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement upon manually swinging one of them, said last means including vertically moving travel bars disposed in the sides of the frame, clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is dis-engaged said one sash can be swung independently of the other, and cam means for effecting automatic disengagement and engagement of said clutch mechanism as the sashes are manipulated, said cam means serving to automatically disengage said clutch mechanism when the two sashes are swung conjointly towards open position, and means operating upon said cam means and serving to condition the clutch mechanism for automatic re-engagement when said one sash is independently swung back towards closed position after a conjoint opening movement.

4. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement upon manually swinging one of them, said last means including vertically moving travel bars disposed in the sides of the frame, a clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is disengaged said one sash can be swung independently of the other, and means including a pair of cam elements for effecting automatic disengagement and engagement of said clutch mechanism as the sashes are manipulated, one of said cam elements having a lost motion friction engagement with one of the travel bars.

5. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of slidable travel bars mounted in the side of the frame, clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is disengaged said one sash can be swung independently of the other, means including cam elements for effecting cyclic release and re-engagement of said clutch mechanism, responsive to movement of the one sash, the cycle of operation consisting of disengagement of said clutch mechanism upon swinging the one sash towards open position with conjoint opening movement of the other sash, tripping of the cam elements when the one sash is independently swung to full closed position, and re-engagement of said clutch mechanism when the one sash is again swung to open position, whereby upon subsequently closing the one sash the other sash is likewise closed.

6. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement about generally horizontal axes, means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of slidable travel bars mounted in the sides of the frame, clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is disengaged said one sash can be swung independently of the other, said clutch mechanism being disengaged when said travel bars are sprung laterally with respect to the frame, means for effecting automatic springing of the travel bars laterally with respect to the frame, when the travel bars are caused to slide in one direction, said cam means permitting substantial continued movement of said travel bars

in said one direction after causing the same to be sprung laterally, and means operated only by the final part of complete independent closing movement of said one sash for tripping said cam means, to effect release of said travel bars.

7. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement upon manually swinging of one of them, said means including two pairs of members slidably mounted in the sides of the frame, clutch mechanisms interposed between said pairs of slidable members whereby when said clutch mechanisms are disengaged, said one sash can be swung independently of the other, and means for effecting cyclic disengagement and re-engagement of said clutch mechanisms by manipulations of said one sash, said last means including two pairs of cam elements, one cam element of each pair being frictionally carried by one of said slidable members, the other cam element being carried by the frame.

8. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, and means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of slidable travel bars mounted in the sides of the frame, clutch mechanism interposed in said interconnecting means whereby when said clutch mechanism is disengaged said one sash can be swung independently of the other, and means including a camming lever pivotally carried by the frame for effecting cyclic release and re-engagement of the clutch mechanism responsive to movement of the one sash through a substantial range from full open position to a partially open position.

9. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of travel bars slidably mounted for vertical movement in the sides of the frame, clutch mechanism interposed in said interconnecting means whereby when such clutch mechanism is disengaged said one sash can be swung independently of the other, said clutch mechanism being disengaged upon springing the travel bars laterally relative to the frame, and means for effecting lateral springing movement of the travel bars and automatic release of the same, said last means including a pair of camming levers pivotally carried by the frame, each of said levers having limited movement from one position in which it extends substantially horizontal, to a second elevated position at an angle of less than 90% to the horizontal, cam surfaces formed on the travel bars adapted to engage said camming levers whereby when said travel bars are moved downwardly, such engagement causes the travel bars to be swung laterally, and trip fingers carried by said one sash and adapted to trip said levers to said second position upon closing of said one sash.

10. In a multiple sash window, a frame, an upward sash carried by the frame for swinging movement on a generally horizontal axis, a pair of travel bars slidably mounted in the sides of the frame for vertical movement and connected to said sashes whereby said sashes can be swung between open and closed positions by vertical sliding movement of said travel bars, a lower sash carried by the frame for opening and closing swinging movements, means including clutch mechanisms serving to detachably interconnect the lower sash with said travel bars whereby when said clutch mechanisms are engaged manipulation of the lower sash causes conjoint movement of the upper sash, while when the clutch mechanism is disengaged the lower sash can be manipulated independently, said clutch mechanisms being disengaged by lateral swinging movement of the lower ends of said travel bars, and means for effecting automatic and cyclic disengagement and engagement of said clutch mechanisms responsive to manipulation of the lower sash, said last means including a pair of camming levers pivotally carried by the frame adjacent the travel bars, each of said levers having limited movement from one position in which it extends substantially horizontal, to a second elevated position in which it extends at an angle of less than 90% to the horizontal, cam surfaces formed of said travel bars whereby when said travel bars are moved downwardly said surfaces are caused to engage said camming levers to cause the lower ends of said travel bars to be sprung laterally to disengage said clutch mechanisms, and a pair of trip fingers mounted upon said one sash and adapted to engage and trip said camming levers from said one position when said one sash is moved to fully closed position.

11. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, and means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of slidable travel bars mounted in the sides of the frame, clutch mechanism interposed in said interconnecting means, whereby when said clutch mechanism is disengaged one of said sashes can be swung independently of the other, means including a camming member pivotally carried by the frame for effecting release of the clutch mechanism responsive to opening movement of the other sash, and means acting between said one sash and said camming lever, to effect tripping of said camming lever upon closing movement of said one sash, thereby enabling re-engagement of the clutch mechanism.

12. In a multiple sash window, a frame, at least two sashes carried by the frame for swinging movement, and means serving to interconnect said sashes for conjoint swinging movement, said means including a pair of slidable travel bars mounted in the sides of the frame, a pair of clutch mechanisms interposed in said interconnecting means whereby when said clutch mechanisms are disengaged one of said sashes can be swung independently of the other, said clutch mechanisms being normally urged towards engaged positions, means including a pair of camming members pivotally carried by the frame for effecting automatic release of both said clutch mechanisms responsive to movement of the other sash towards open position, and means acting between said one sash and both said camming members serving to trip said camming members and thereby enable automatic re-engagement of said clutch mechanisms, said last means operating responsive to independent movement of the one sash to closed position.

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