

O. M. EDWARDS.

WINDOW.

APPLICATION FILED OCT. 3, 1903.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 1.

965,995.

Fig. 2

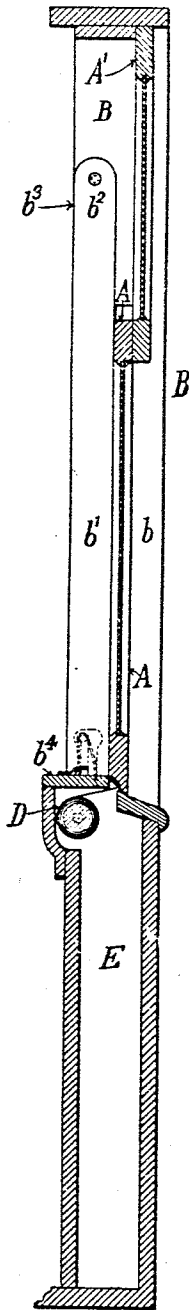
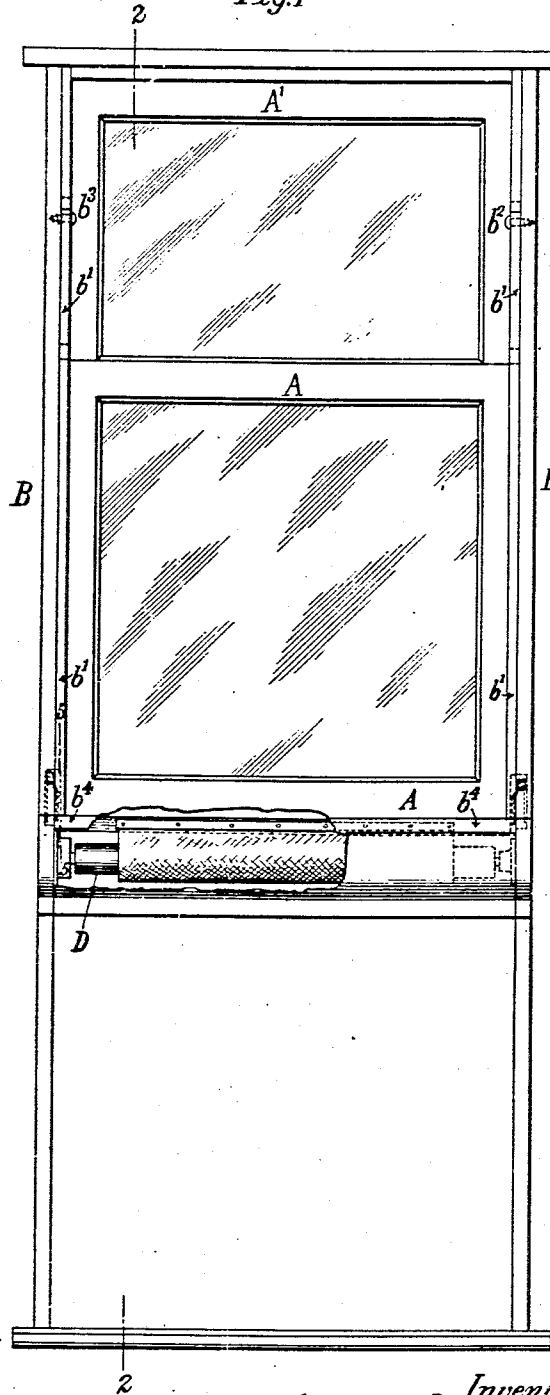


Fig. 1



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3 SHEETS—SHEET 2.

Fig. 3

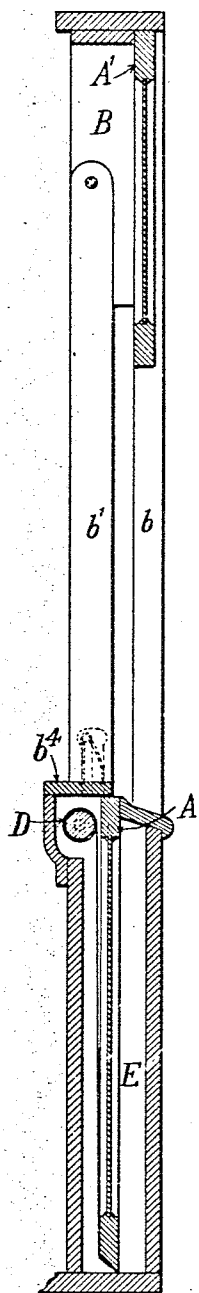


Fig. 4

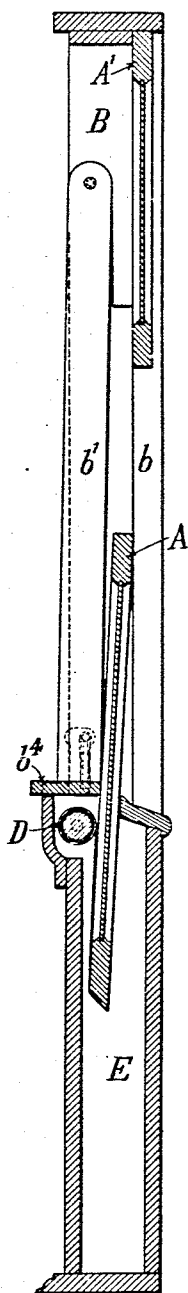


Fig. 6

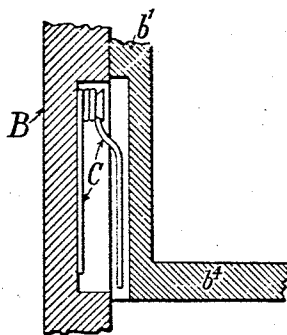


Fig. 5

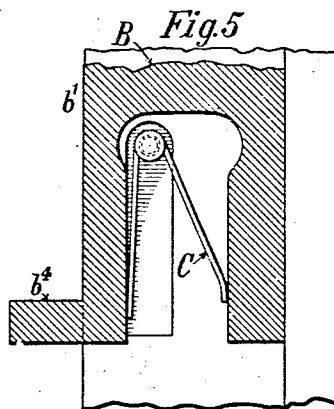
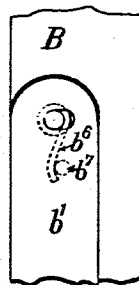


Fig. 7



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3 SHEETS—SHEET 3.

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Fig. 8

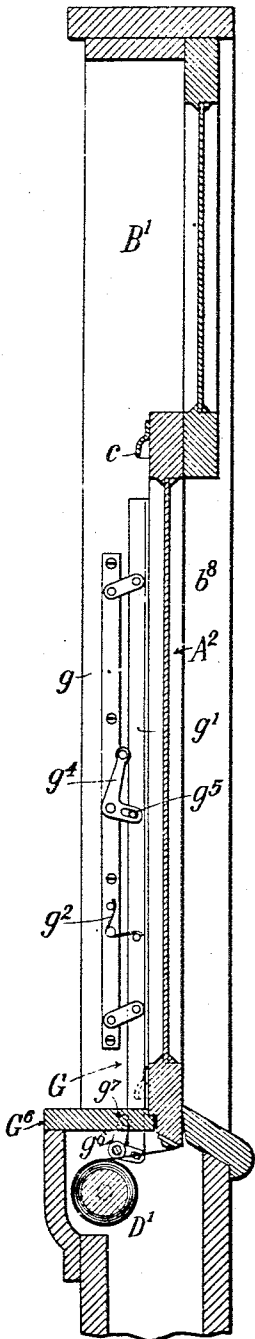


Fig. 9

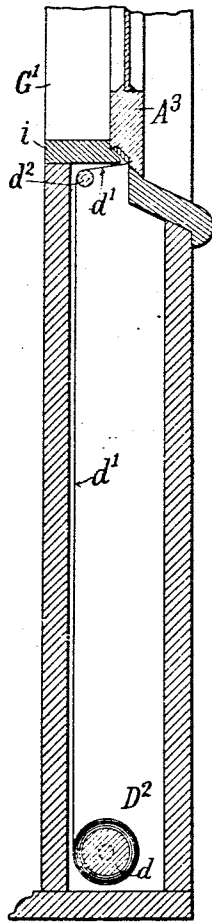


Fig. 10

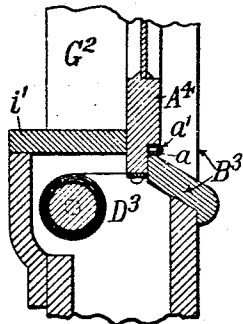


Fig. 13.

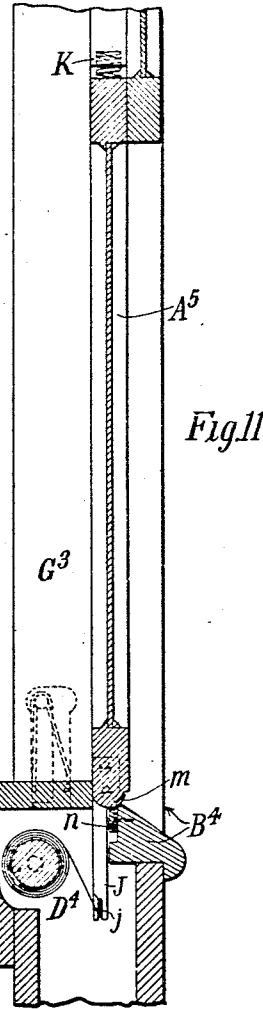
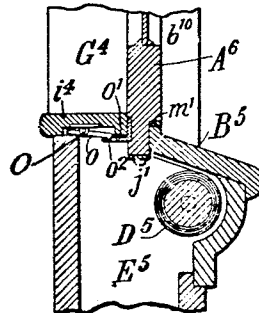


Fig. 12



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Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed October 3, 1903. Serial No. 175,580.

To all whom it may concern:

Be it known that I, OLIVER M. EDWARDS, a citizen of the United States, residing in Syracuse, county of Onondaga, State of New York, have invented certain new and useful Improvements in Windows, of which the following is a clear and exact description, reference being had to the drawings accompanying and forming a part of the same.

The invention relates generally to improvements in windows in which the sashes are tightly held when in the closed position and yet are readily movable to open and close the same.

The objects of my improvements are first, to provide a window having counterbalancing or automatic operating means arranged at one side of the plane or planes of movement of the sash in opening or closing the window opening whereby the sash is enabled to more or less pass by such means as the window is opened; second to provide a window having a sash arranged in cooperating relations with means for holding it in one plane when closed, a portion of which is movable to permit the sash to move out of such plane in opening or closing the window with automatic operating means arranged at one side of such plane or planes of movement of the sash; third, to provide a window having a sash arranged in cooperating relations with means for holding the sash in a tightly closed position, a portion of which is yieldingly held against the sash to hold it tightly in its frame and is movable to permit the sash to move in opening or closing the window, with counterbalancing or automatic operating means arranged in such relation to the sash as to largely cease their counterbalancing or automatic action thereupon when the sash is in the closed position; fourth, to provide a window sash with means for holding it tightly in the closed position and adapted to permit it to move from one plane to another with counterbalancing or automatic operating means arranged in such relation to the sash as to tend to move it from one plane to another as the sash approximately reaches its closed position.

Other objects will appear from the descriptions hereinafter given; and the inven-

tion consists in the combinations of parts or devices hereinafter set forth and particularly pointed out in the claims which form a part of this specification.

Figure 1 shows in front elevation a window with one embodiment of my invention applied thereto, a portion of the casing inclosing the parts being broken away to better illustrate some of the parts and their relations to co-acting parts. Fig. 2 is a vertical section of the construction shown in Fig. 1, on line 2—2, thereof, with the window closed. Fig. 3 is a vertical section, the same as Fig. 2, but with window open and the sash wholly inclosed within that part of the structure below the window opening. Fig. 4 is a similar view, but with the sash shown in the position it may occupy while being moved from the position seen in Fig. 2 to that seen in Fig. 3. Fig. 5 is a sectional view of a portion of the sash holding means, on line 5—5 of Fig. 1, but on an enlarged scale to better illustrate the means which yieldingly hold the sash in the closed position in the construction shown in the foregoing figures. Fig. 6 is a sectional view of the same parts but seen from a point at a right angle to the point of view in Fig. 5, showing the connection of the spring with the movable portion of the sash holding means and the window frame. Fig. 7 is a side elevation of a modification in the construction of the upper portion of one side of the sash holding means seen in Figs. 2, 3 and 4, whereby such portion is yieldingly held in place against the sash if desired. Fig. 8 is a vertical sectional view of a construction wherein the sash moves in a single plane in opening and closing the window, and different holding means are employed. Fig. 9 is a vertical sectional view of another modification wherein the counterbalancing or automatic raising means are differently connected with the sash from what is shown in Figs. 1 to 4 inclusive. Fig. 10 shows in vertical section a somewhat different construction and arrangement of parts, with a yielding seat for the sash when in the closed position and its weight is largely supported by the window frame, as in Figs. 1 and 2. Fig. 11 shows in vertical section another modification wherein the automatic raising or counterbalancing means are somewhat

differently arranged relatively to the sash and a weather strip is applied to contact with the sash as it is moved into the closed position. Fig. 12 shows in vertical section another arrangement of automatic raising means relatively to the sash and means for moving the sash away from the sill of the frame and against the stress of the counterbalancing or automatic raising means, with a modified form of seat for the sash to rest upon, when in the closed position. Fig. 13 shows on enlarged scale the parts seen at the bottom of the sash in Fig. 10.

In Figs. 1, 2, 3, and 4, A is the sash which moves, as there shown, downwardly to open the window and upwardly to close it. A second and stationary sash A' is shown above the movable one, which may be employed or not, as one desires, and as here shown it is arranged in a different plane from that in which the movable sash A is arranged.

B is the window frame in which the sash A moves, there being a fixed portion b and a movable portion b' attached to the frame B, which together form a guideway in which the sash moves and also holding means to hold the sash in the closed position. As shown in these figures the movable portion b' consists of two portions pivoted to the frame at b², b³ on opposite edges of the sash which are connected together at the bottom by a cross sill portion b⁴. This movable portion b' is preferably spring pressed against the sash A, so as to hold the sash against rattling and to prevent the ingress of dirt and cold air. This may be accomplished by the means shown in Figs. 5 and 6, or otherwise, as the constructor desires. As shown the springs C, one connected with each side portion, as b', are arranged with one end bearing against such movable portion and the other end of each spring bearing against an adjacent portion of the frame B, in a direction to force such movable portion against the sash. Any suitable handle, such as is seen in section in Fig. 2, may be attached to the sill portion b⁴, by which such portion may be moved from the position seen in Fig. 2 away from the sash A to the desired extent.

In that portion of the structure shown in the foregoing figures below the sash A a pocket or recess E is formed into which the sash may be moved when the window is opened, as seen in Fig. 3, where the sill portion b⁴, of the movable portion of the holding means is partially overlapping and thereby covering a portion of the upper edge of the sash holding it within the pocket and partially hiding the sash from view, such sill portion b⁴ occupying the same position in Fig. 3 that it does in Fig. 2.

As shown, counterbalancing or automatic raising or operating means D are arranged

slightly beneath this sill portion b⁴ and outside of the path of movement or at one side of the plane or planes of movement of the sash, as it enters or leaves the pocket or recess E. The automatic operating or counterbalancing means here shown consist of a spring roller suitably mounted in the position shown with a band of cloth, or other suitable flexible material, connected at one end to the roller and at the other end to the sash, so as to exert a lifting action upon the sash A, sufficient to counterbalance or partially counterbalance its weight, or to entirely overcome such weight and move the sash from the position seen in Fig. 3 to that seen in Fig. 2, as soon as the sill portion b⁴ is moved away from over the sash A, the sash acquiring sufficient momentum to carry it above its normal resting place, when the window is closed. A comparatively slight pressure against the face of the sash by the sill portion b⁴ overcomes the sidewise pulling action of the spring roller upon the lower edge of the sash and forces this portion of the sash into the plane it normally occupies when closed, so that, as the sash settles downward it rests upon the inclined ledge of the window sill as shown in Fig. 2. The momentum the sash acquires depends upon the tension or stress given to the spring of the roller when this spring is adjusted for the automatic raising, or for counterbalancing the sash. If the sash is simply counterbalanced then it has to be moved in either direction, that is, forced into the closed or into the open position. If the spring is adjusted for automatic closing, or lifting the sash, then the sash is forced down into the pocket or recess E against the stress of the spring of the means D. These means D may be of any desired construction, but I prefer to use such, for example, as are set forth in patents heretofore granted me, Nos. 704,738, or 708,701.

If desired the upper parts of movable portion b' of the sash holding means may be spring pressed against the sash. In Fig. 7 one means of accomplishing this end is shown, but other means of yieldingly holding this portion of the sash may be employed, if desired. In Fig. 7 the parts b' are slightly slotted at their pivotal points to the frame B and springs b⁵ engage with the pivotal point, with the frame, and also with the stud b' on the part b', and consequently this portion is forced toward the sash, it being understood that this portion of the frame is suitably constructed to permit the parts b' to properly bear against the upper, as well as the lower, portions of the sash, when the sash is to be held against rattling &c.

The pivotal points of the movable portion b' of the sash holding means are here shown above the topmost portions of the sash A, 13

and as a result, the entire sash is relieved from the holding action of such portions when the sill portion b^4 is moved to permit the lower portion of the sash to move inward and downward into the recess E. For this reason it is preferred to thus mount the movable portion of the holding means which are moved to release the sash, but any form of sash holding means may be employed, having either all fixed parts, or some pivoted or otherwise made movable and some fixed.

In Fig. 8 a different form of sash holding means are employed and the sash moves down to open in the same plane it occupies when closed. The counterbalancing or automatic raising means, D, may be of a similar construction to those heretofore mentioned. As indicated these means D' consist of a spring roller and band of cloth so connected with and arranged relatively to the sash that the sash is moved downward, or into the open position, by its own weight as soon as it is released from the holding means, the means D' only partially counterbalancing the weight of the sash.

The movable portions of the sash holding means are of the general character of the means set forth in Letters Patent No. 655,332, but they are so arranged as to tend to lock the sash in the closed position notwithstanding that the sash moves downwardly to open in this construction seen in Fig. 8, instead of upwardly, as in Patent No. 655,332. In each case the sash is automatically moved in the opening direction and is moved by the hand of the operator into the closed position, and the sash is locked in such position against the tendency to automatically open. These holding means, seen in Fig. 8, also differ from those seen in Patent No. 655,332, in that the movable bars which are spring pressed against the sash are connected together, as shown, and may be simultaneously moved by a single handle, such as is indicated in cross section in Fig. 2, if desired, or otherwise. In this construction seen in Fig. 8 the sash does not move entirely below the sill, when fully opened, but its upper portion remains slightly above the sill, as indicated by dotted lines, showing the position of the handle c when the window is open, its position being seen in full lines when the window is closed.

In Fig. 8 B' is the frame and A² is the movable sash. The frame is provided with fixed or stationary stop beads, as b^3 , to form the exterior portions of the guideway in which the sash moves and with movable portions, as G, which are spring pressed against the sash and tend to wedge against the sash in a well known manner, so that as the sash moves in the opening direction it is wedged and held against further movement in that direction. These portions G are connected together by a portion G⁶, as shown. These

movable portions G of the holding means are each preferably composed of a bar g fixedly secured to the window frame to which are pivotally attached two or more links, as shown, the free ends of which links are pivotally attached to a bar g' , as shown, and a spring or springs g^2 . These bars g' may be moved against the stress of the springs g^2 , in any desired manner. I prefer in practice to employ the means shown in Patent 655,332, with the locking devices there shown, but any other desired form, or similar means and devices may be employed, by which the sash may be released by a single hand of the operator, or other devices and means may be used, if desired. The movable portion of the holding means shown in Fig. 8 may be manually operated by two different means. One of these means consists of levers, as g^4 , which are pivoted to the bars g and each engages with a pin g^5 , attached to bar g' . This lever g^4 may be provided at its free end with a stud and knob to form a handle to take hold of and move the same in a direction to move the bar g' away from engagement with sash A² and release it from the holding action of bar g' . It is to be understood that each side edge of the sash is to be provided with a similar movable bar g' and co-acting parts, as are shown in this Fig. 8. Each movable bar g' connects with an elbow lever g^6 , which is pivotally mounted to the window frame, as shown. These elbow levers g^6 are pivotally connected with the movable sill portion, G³, of the holding means at g^7 , as shown. By this means the movement of the bars g' upwardly and away from the sash moves the sill portion of the holding means away from and out from under the sash A² and permits it to drop downwardly into the open position. The sash may be moved into the closed position by taking hold of the handle c and moving it upwardly until the sill portion moves in under the sash and locks it against gravity, in the closed position, as shown. Instead of using the levers g^4 to move the bars g' away from the sash A², a handle, as indicated in Fig. 2, may be employed. As the bars g' and movable sill portion G⁶ are connected together, as shown, the movement of such sill portion necessarily moves the bars and releases the sash both from the locking action of sill G⁶ and the holding action of bars g' .

In Fig. 9 the counterbalancing or automatic opening or closing means are somewhat differently arranged relatively to the sash than what is the case in the construction shown in Figs. 1, 2, 3, and 4, the remaining parts being substantially the same in construction, arrangement and mode of operation.

Where the structure, as for instance a railway car, has thin walls and space is some-

what limited it is an advantage to so locate the counterbalancing or automatic operating means as to not interfere with the movement of the sash in opening and closing the window, and yet obtain substantially all of the advantages of the present invention. In order that such means may successfully handle sash, such as are used at the present time, many times weighing from 40 to 75 pounds each, the spring rollers, and the springs within the rollers, have to be of a considerable diameter, in some cases as much as three and a half inches, and such rollers with the necessary space for the sash to pass by the roller occupy a considerable space, and sometimes more than the ordinary construction of cars will permit.

In the construction illustrated in Fig. 9 the advantages of mounting the counterbalancing or automatic operating means are attained within a space sufficient to receive the roller and permit it to freely rotate, and it is possible to locate such roller at a point in the structure where a slight thickening of the side wall of the structure can be more easily done and the space be less valuable than is the case if such roller be located about where they are shown mounted in preceding figures of the drawings.

As seen in Fig. 9 the roller portion d of the means D^2 is mounted adjacent to the floor of the structure, and out of the way of the sash as it moves to open the window. Adjacent to and slightly beneath the sill portion of the window a small roller d^2 forming a portion of the automatic operating or actuating means D^2 is journaled in bearings, so as to freely turn therein, and in such relation to the sash and cloth band, d' , (or other flexible connecting means between the sash and spring roller,) that the spring roller d and band d' co-act with the sash in substantially the same way, as in preceding constructions, to produce the same result. These means D^2 consist of the spring roller d the flexible connecting means d' and roller d^2 over which means d' pass to connect with the sash A^2 , as shown. The movable portion G' of the sash holding means may be of the form seen in Figs. 1, 2 and 3, the sill portion i , of such means, being shaped as seen, if desired, or otherwise.

Instead of shaping the lower edge of the sash as seen in preceding figures so as to be substantially held in the closed position by a wedging action of the parts such edge may be shaped otherwise, as for instance as seen in Fig. 10, so that the sash may be moved out of the plane it occupies when closed without lifting it to any substantial extent and thereby enable the stress of the spring of the roller of the operating means to move it from such plane, notwithstanding the action of gravity, upon the movement of the movable portion of the holding

means away from the sash and permit it to drop a short distance by the action of gravity and until the stress of the spring in the roller will sustain the weight of the sash. Otherwise the operation of the parts is the same in this construction of Fig. 10 as it is in the construction shown in Figs. 1, 2, 3 and 4.

It is always desirable that a "water tight" joint be provided at the bottom edge of the sash, so that it be difficult for water to be driven by the force of the wind into and through the joint between the sash and sill and consequently into the interior portion of the structure. In some of the preceding figures of the drawings the sill is given a decided incline downward and outward and the lower outer portion of the sash is given a shape substantially corresponding with that of the sill, so that gravity will tend to exclude and also to remove the water which may be driven in up the incline of the sill.

In the construction shown in Fig. 10 a yielding substance is interposed between the sash and sill, so that the joint may be sufficiently "water tight" without materially lifting up the sash, when moving it from the closed position into one where it may move downward and past the sill upon which it rested when in the closed position. This yielding substance may be constructed and applied in any desired manner, as for instance, as a solid strip of india rubber, or similar material, or in the form of a yielding metal strip suitably arranged to yield and snugly fit the sill portion upon which the sash rests when closed, or of a combination of rubber and metal, or of other similar materials.

In Fig. 10 a U shaped piece of sheet metal is employed to which is attached a strip of india-rubber so that the india-rubber is interposed as seen in Fig. 13 between the metal bar and sill of the window frame, when the window is closed, thus forming water excluding means. The sash A^4 is movable in the frame B^2 , as before explained, and the operating means D^3 is connected with the sash substantially as before. The movable portion G^2 of the sash holding means is spring pressed toward the sash with a force that overcomes the pulling action of the operating means D^3 so that the sash may be firmly held in the closed position by such holding means, the sill portion j' , being shaped so as to sustain or lock the sash against gravity when in the closed position as shown. The U bar a is attached to the sash with its open end inward, as shown, and it is provided with strip, a' , of india-rubber, or of cloth and rubber, as shown. The weight of the sash is sufficient to bring the rubber strip into close and intimate contact with the sill, and the sash can move from the closed position without materially lifting the

same. If desired any other form of yielding cushion may be provided for the sash so as to exclude water, dirt and cold, as for instance a solid strip or bar of india-rubber, as indicated in Fig. 12.

A joint provided with a weather strip may be formed, as seen in Fig. 11, where the sash A^s is movable in the frame B^s , and the operating means D^s are so connected and arranged relatively to the sash, that such means always have substantially the same lifting action upon the sash, buffer springs, as K , being arranged above the sash to force the sash down upon its seat upon the sill after they have been compressed by the momentum of the sash in closing.

A recess is formed in the sill to receive the weather strip m and bar n by which such strip is fastened to the sill with the free edge of the strip extending upwardly so as to be engaged by the beveled portion of the sash and forced over into the position shown when sash A^s is in its closed position.

Metal strips, as J , may be attached to the side edges of the sash, as indicated in dotted lines in Fig. 11, by screws, one strip at each side edge. These strips or bars J extend downwardly some little distance and at their lower ends open slots are formed in which a metal bar j is received. To this bar one end of a flexible band of material is attached as indicated, such bar being below the axis of the spring roller of operating means D^s so as to continue to lift upon the sash when in position to close the window. The metal bar n forms a seat upon which the sash can rest and be sustained or locked against gravity and held in position by the movable portion G^s of the sash holding means. The buffer springs, as K , hold the sash to its seat as does gravity in some of the preceding constructions. These buffer springs also assist in overcoming the momentum of the sash without a too sudden stopping thereof.

In Fig. 12 a construction is shown in which the window is automatically closed upon simply releasing the sash, when in the open position, notwithstanding the sash is moved into a different plane from that in which it moved while closing to bring it into the closed position, and also that the sash is moved beyond the lifting action of the spring roller connected therewith.

The sash A^s is movable in frame B^s as in preceding constructions, the holding means G^s operating generally, if desired, as in the construction shown in Figs. 1, 2, 3 and 4. The sash operating means D^s are arranged, as shown, and act generally upon the sash in moving it up and down substantially as in preceding constructions, but have a different action in moving the sash from its plane or planes of movement to the plane it occupies when closed, from what such means have, as heretofore shown, by reason of be-

ing mounted as shown, relatively to the sash.

As shown in Fig. 12 a bar m' of india-rubber is affixed to the lower edge of the sash upon which the sash rests when in the closed position, the bar being in close and intimate contact with the uppermost portion of the sill. The flexible material of means D^s is connected with the sash A^s by means of the bar j' in any suitable manner to firmly engage therewith. The means D^s are arranged relatively to the sash so as to pull it from the plane in which it moves when entering and leaving the pocket or recess E^s into the plane it occupies when closed, as shown.

In order to move sash A^s from the position seen in Fig. 12 to a position where it will pass down by the sill of frame B^s and means D^s a suitable catch or catches are employed one form of which is shown. This catch O consists of a lever o pivotally mounted upon the sill portion i^s of the movable sash holding means G^s . This lever o is provided with a depending detent portion o^s , beveled at its forward end so as to engage with the striking plate o' , attached to the sash A^s , as shown, be lifted upwardly and into position to engage therewith, as the sill portion i^s is moved into the position shown, which is after the sash has been placed in position for the striking plate o' to receive the detent o^s , such detent engaging with the striking plate, as shown, by gravity or a suitable spring as desired.

When the sash is to be opened the sill portion i^s of the holding means G^s is moved outwardly in a direction away from the sash and as detent o^s has engaged with the striking plate o' the sash is moved with it until the bar m' has moved out of contact with the sill of frame B^s , when gravity causes sash A^s to drop down until the stress of the spring of means D^s sustains the weight of the sash, the striking plate dropping downwardly with the sash away from and out of engagement with detent or catch o' . When the sash is in this position the hand of the operator placed on the top of the sash can easily force the sash against the stress of the spring of means D^s , into the pocket E^s , so as to admit of the sill portion i^s , of the holding means G^s , to pass over the inner top edge of the sash, somewhat as seen in Fig. 3, when it will be held in the open position until means G^s is moved to release it. When so released the stress of the spring of such means D^s may return the sash to the fully closed position, the momentum the sash acquires carrying it upward from the position where means D^s cease to lift it to the point where it is free to move over the sill of the frame B^s . The momentum will naturally carry the sash somewhat beyond this point, but gravity causes it to drop down and rest

upon the sill, as shown, the means D^5 pulling it forward into position to so drop down. The stress of the spring of means D^5 tends to hold the lower portion of the sash in its closed position, and also tightly against the fixed portion b^{10} , of the sash holding means, thus aiding in excluding dirt and cold air.

In Fig. 11 it will be observed that buffer springs are combined with the sash and automatic operating means in such manner that the sash may rest upon the sill of the window frame as is the case in some of the other constructions shown in the drawings, the force of the buffer springs overcoming the stress of the spring or springs of the roller of operating means D^4 , and a "water tight" joint may be made at the bottom of the sash, the same as where gravity acts to firmly seat the sash upon the sill of the frame. The means employed, whether gravity or buffers, are other than the automatic operating means connected with the sash. Also that in each case the sash is more or less supported by some portion of the holding means when in the closed position.

Different terms have been used when referring to or describing the "automatic operating means" mentioned in the claims. The term used in the claims is intended to include all those used in the specification, for the only difference between counterbalancing and automatic operating means is in the adjustment of the tension or stress of the spring or springs of the roller composing a part of such means. The spring or springs of such a roller may be adjusted so as to just counterbalance, partially counterbalance, or wholly overcome the weight of the sash as the constructor sees fit without materially changing the character of the action of the roller upon the sash. It is also to be observed that the automatic operating means may be arranged so as to automatically operate to open the window as in the construction shown in Fig. 8, or to close the window by a lifting action upon the sash sufficient to overcome its weight and cause it to move into the closed position, or to simply balance the weight of the sash, but when the sash moves downward, as here shown, to open the window, the stress or tension of the spring or springs of the roller tends to lift the sash regardless of the position such spring or springs occupy relatively to the sash itself, whether it be that seen in Figs. 1, 2, 3 and 4, that seen in Fig. 8, that in Fig. 9, that in Fig. 11, or that seen in Fig. 12. Also that in each of the constructions shown there is a more or less sidewise pull upon the sash by such means when the sash is in the closed position.

In each of the constructions shown the automatic actuating or operating means act upon the sash, with an increasing force, as

the sash moves in the opening direction, thus storing up additional power to act during the closing of the window. In all but one, Fig. 11, of such constructions these means cease to exert a lifting action upon the sash before it has reached the closed position. In all of the constructions shown the sash moves, in opening and closing the window, in a guideway formed of fixed and movable portions. These movable portions move to hold the sash closed and to permit it to move in the guideway, and, as thus formed, the guideway holds the sash tightly, excludes dirt and cold and prevents rattling, when the window is closed. Also in each construction means are provided which lock or sustain the sash in position against gravity and such means are other than the automatic actuating or operating means, and may serve the purpose and also assist in excluding water, dirt and cold at the bottom of the sash, and coacting with other means in accomplishing a unitary result, as particularly pointed out in some of the claims forming a portion of this specification.

Different embodiments of my invention have been shown in the drawings, but I do not wish to limit my invention to these specific forms, and desire to include all such as have their parts combined together so as to co-act in substantially the manner hereinbefore set forth, and particularly pointed out in the claims annexed hereto.

What I claim as new is:—

1. In a window the combination, substantially as set forth, of a sash, a guideway therefor a portion of which is movable relatively to another portion to hold the sash tightly therein and permit it to move freely in opening the window, and automatic operating means connected to the sash a portion of which is mounted outside of its path of movement to act thereon with increasing force as the sash moves in the opening direction.

2. In a window the combination, substantially as set forth, of a sash, a guideway therefor a portion of which is movable relatively to another portion to hold the sash tightly therein and permit it to move out of the plane it normally occupies into a different plane in which it moves when opening and closing the window, and automatic operating means connected with the sash a portion of which is mounted outside of its path of movement to act thereon with increasing force as the sash moves in the opening direction.

3. In a window the combination, substantially as set forth, of a frame, a sash movable therein means adapted to tightly hold the sash in the frame and permit it to move freely therein for opening and closing the window, and automatic operating means a

portion of which is connected with the sash and another portion is mounted at one side of the path of movement of the sash in opening the window, which mounted portion is adapted to exert force on the sash in substantially two directions, one at an angle to the other, when the sash is adjacent to its closed position.

4. In a window the combination, substantially as set forth, of a sash, means adapted to hold the sash closed and to release the same, and automatic actuating means having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point where such means exerts force to move the sash from one plane to another, when in the closed position, and exerts force to move it vertically, when opening and closing the window.

5. In a window the combination, substantially as set forth, of a sash, means adapted to hold the sash closed and to release the same, and automatic actuating means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point where such means cease to exert a lifting force upon the sash when near the closed position.

6. In a window the combination, substantially as set forth, of a sash, means adapted to hold the sash closed and to release the same, and automatic actuating means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto above the central portion of such mounted part, when in the closed position.

7. In a window the combination, substantially as set forth, of a sash, means adapted to hold the sash closed and to release the same, and automatic actuating means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point to exert force thereon in different directions at different periods of its movement.

8. In a window the combination, substantially as set forth, of a sash, a guideway therefor portions of which are movable toward and away from the sash in a direction transverse to the plane of its movement in opening and closing the window, and automatic operating means mounted to a fixed portion of the window and connected to the sash to apply force thereto in a direction transverse to the plane it occupies when in the closed position and permitting the sash to move at the side of a portion of such means as it moves in the opening operation.

9. In a window the combination, substantially as set forth, of a sash, a guideway therefor portions of which, one at each side of the window, are mounted to engage with

the same side of the sash and move relatively to the opposite portions of such guideway to hold it tightly therein and permit the sash to move freely when the window is to be opened or closed, and automatic operating means connected to the sash and mounted outside of its path of movement and acting thereon with increasing force as the sash moves in the opening direction.

10. In a window the combination, substantially as set forth, of a sash, a guideway therefor portions of which are pivotally mounted to engage with the same side of the sash at opposite edge portions thereof and move relatively thereto in the same direction in opening and closing the window, and automatic operating means connected to the sash and mounted outside of its path of movement and acting thereon with increasing force as the sash moves in the opening direction.

11. In a window the combination, substantially as set forth, of a sash, a guideway therefor a portion of which is movable relatively to another portion to hold the sash tightly therein and permit it to move in a different plane in opening and closing the window from what it occupies when in the closed position, and automatic operating means connected to the sash and mounted outside of its path of movement and acting thereon with increasing force as the sash moves in the opening direction.

12. In a window the combination, substantially as set forth, of a sash, means adapted to engage with the lower portion of the sash and lock it against the action of gravity when closed, means adapted to be moved to release the sash, and automatic actuating means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point to exert a lifting action thereon for a major portion only of its movement in opening and closing.

13. In a window the combination, substantially as set forth, of a sash, means adapted to move and engage with the lower portion of the sash and lock it against the action of gravity when closed, spring pressed parts adapted to engage with the sash and hold it closed, and automatic means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point to exert a lifting section thereon for a major portion only of its movement in opening and closing.

14. In a window the combination, substantially as set forth, of a sash movable in substantially two directions, holding means therefor, a portion of which is movable in substantially one of the directions the sash moves, and means attached to such portion

of the holding means and engaging with the sash causing it to move in the opening direction, as such portion moves, until such means are automatically disengaged from the sash.

15. In a window the combination, substantially as set forth, of a sash, means adapted to engage with the lower portion of the sash and lock it against the action of gravity, means, other than the operating means, adapted to exert force and tending to hold the sash against the locking means, and automatic actuating means, having a portion mounted at one side of the path of movement of the sash and another portion connected thereto at a point to exert a lifting action thereon for a major portion only of its movement in opening and closing.

16. In a window the combination, substantially as set forth, of a sash, means for holding the sash in the closed position and permitting it to be moved therefrom, and automatic operating means mounted adjacent to the sash and connected therewith in such manner as to tend to move it in the closing direction with a decreasing force as the closed position is reached and thereby permit the operating means to be overcome and the sash to be moved in the opposite direction.

17. In a window the combination, substantially as set forth, of a sash, means for holding the sash in the closed position and permit it to be moved therefrom, and automatic operating means mounted adjacent to the sash and connected therewith in such a manner as to automatically move it into approximately its closed position and then to act thereon in a direction to hold the sash against the sill to exclude dirt and currents of air.

18. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and permit it to move therein, automatic operating means connected with the sash and exerting its force thereon in the closing direction, and means adapted to engage with the upper portion of the sash and lock it against the action of the operating means.

19. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and permit it to move therein, automatic operating means connected with the sash and exerting its force thereon in the closing direction, and means attached to the movable portion of the guideway and adapted to engage with the upper portion of the sash and lock it against the action of the operating means.

20. In a window the combination, sub-

stantially as set forth, of a sash, means for holding the sash tightly in the closed position a portion of which is movable for opening and closing the window, automatic operating means mounted adjacent to the sash and connected therewith, water excluding means, and separate means tending to move the sash in the opening direction and into engagement with such excluding means.

21. In a window the combination, substantially as set forth, of a sash, holding means therefor, portions of which are connected together and movable by the grasping of a single part to permit the sash to move in opening and closing, operating means automatically controlling the movement of the sash in one direction, and means, other than the operating and holding means, tending to hold the sash in engagement with the sill of the window, when in the closed position.

22. In a window the combination, substantially as set forth, of a sash, holding means therefor, portions of which are movable, means adapted to yieldingly press such sash against fixed portions of the holding means, when in the closed position, and yield, when the window is opened, means fixed in position over which the sash may pass and be received in closing the window, and operating means automatically controlling the movement of the sash and adapted to permit the sash to rest against such fixed means, when in the closed position.

23. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and permit it to move therein, automatic operating means connected with the sash and exerting its force thereon in the closing direction, and means adapted to move with the movable portion of the guideway and partially close the opening in which the sash moves in opening and closing.

24. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and permit it to move therein, automatic operating means connected with the sash and exerting its force thereon in the closing direction, and means adapted to move with the movable portion of the guideway and partially close the opening in which the sash moves when in either the opened or closed position.

25. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and permit it to move therein, automatic operating means connected with the sash and exerting its force thereon in the closing direction, and means adapted to

move over the upper edge of the sash when in the open position and lock it against the action of the operating means.

26. In a window the combination, substantially as set forth, of a sash, means adapted to hold the sash closed and to release the same, automatic operating means connected with the sash and exerting force thereon in the closing direction, and means adapted to move over the upper edge of the sash and substantially close the opening in which it moves, when in the open position.

27. In a window the combination, substantially as set forth, of a sash, a guideway therefor, a portion of which is movable relatively to another portion to hold the sash closed and to permit it to move therein, automatic operating means connected with the sash and exerting force thereon in a closing direction, and means attached to and movable with the movable portion of the guide-

way and adapted to move over the upper edge of the sash and substantially close the opening in which it moves, when in the open position.

28. In a window the combination, substantially as set forth, of a sash, a guideway therefor composed of two portions one of which is movable relatively to the other to hold the sash tightly therein when in the closed position and permit it to change its position from one plane to another in moving to its open position, and automatic actuating means mounted adjacent to the sash and connected therewith in such a manner as to act thereon in a direction tending to move the sash transversely to its normal closed position.

OLIVER M. EDWARDS.

Witnesses:

EDNA LADD,

LULU A. TONER.