H. E. CAMPBELL.

METAL WINDOW FRAME AND SASH.

APPLICATION FILED NOV. 13, 1916.

1,247,637.

Patented Nov. 27, 1917.

2 SHEETS—SHEET 1.

Fig. 1.

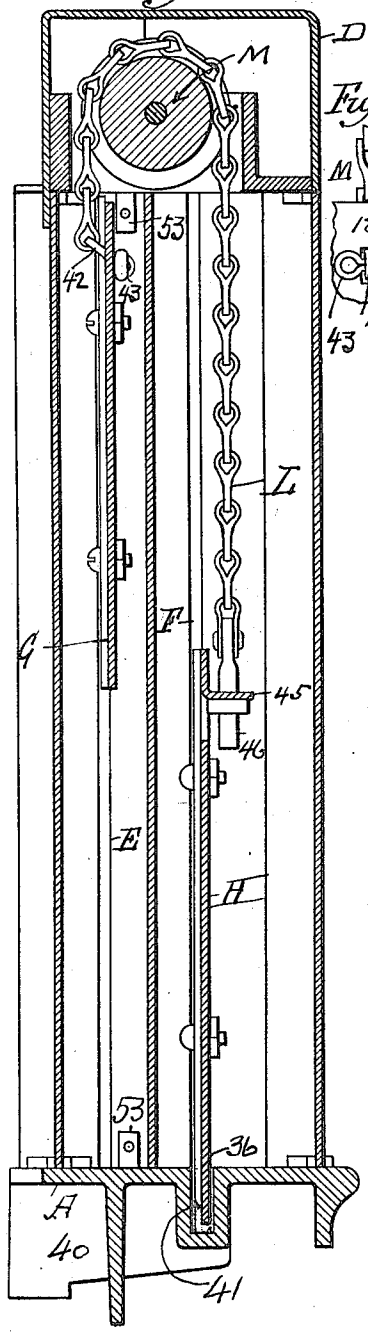


Fig. 10.

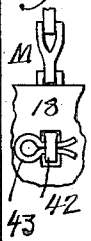


Fig. 2.

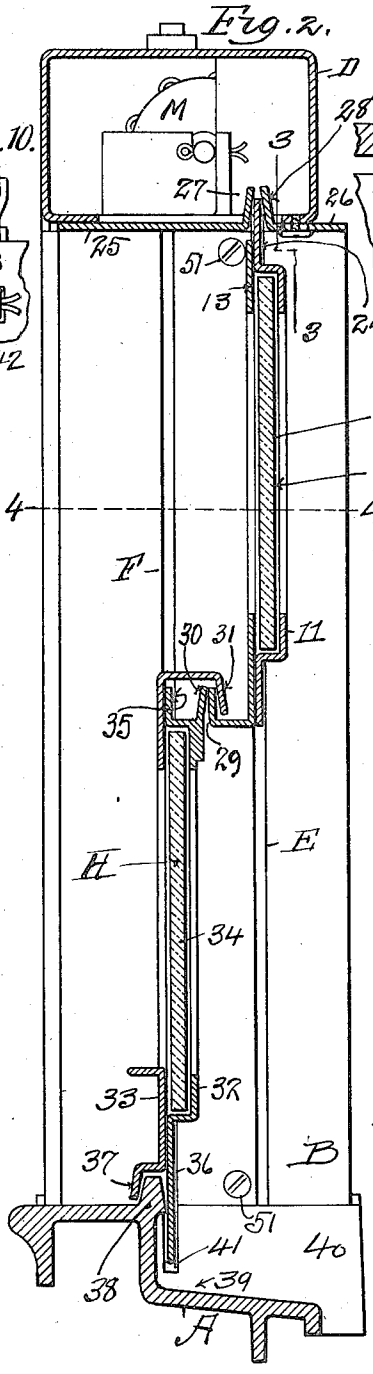
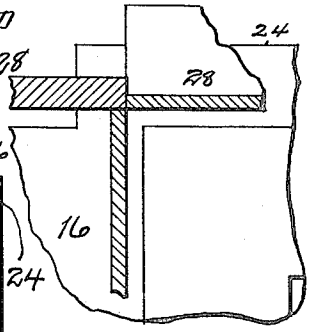


Fig. 3.



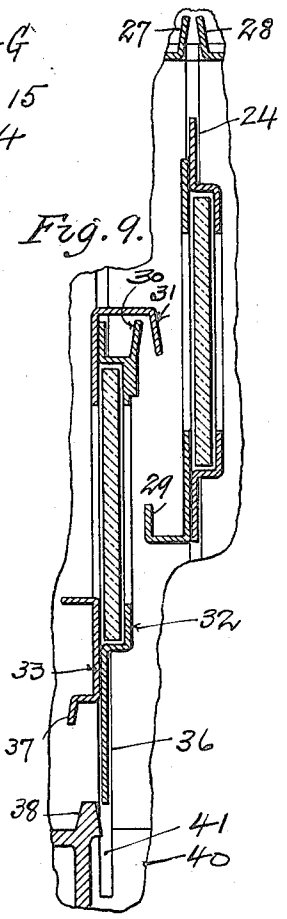


Fig. 9.

INVENTOR

Harry E. Campbell

BY Lane & Lemann

ATTORNEY

H. E. CAMPBELL.

METAL WINDOW FRAME AND SASH.

APPLICATION FILED NOV. 13, 1916.

1,247,637.

Patented Nov. 27, 1917

2 SHEETS—SHEET 2.

Fig. 8

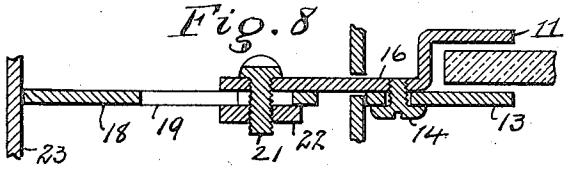


Fig. 7.

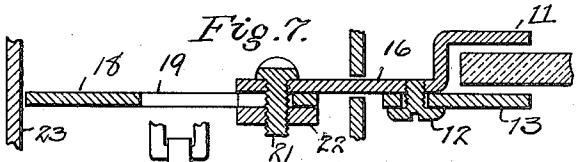


Fig. 5.

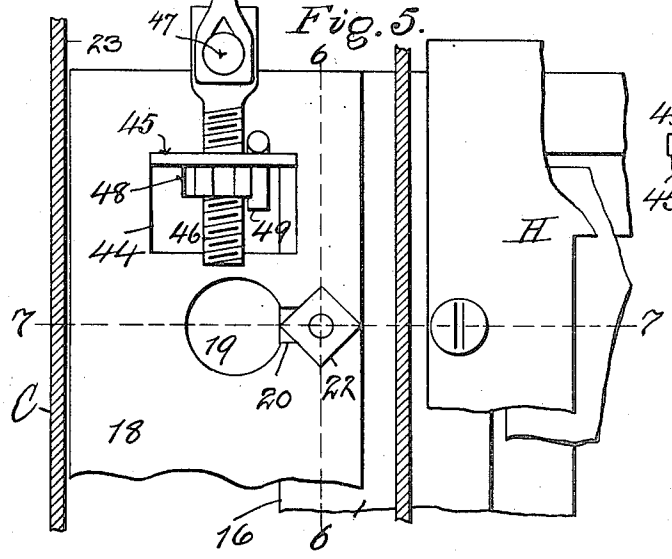


Fig. 6.

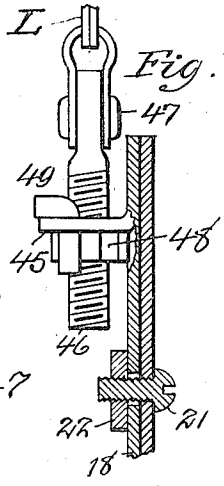
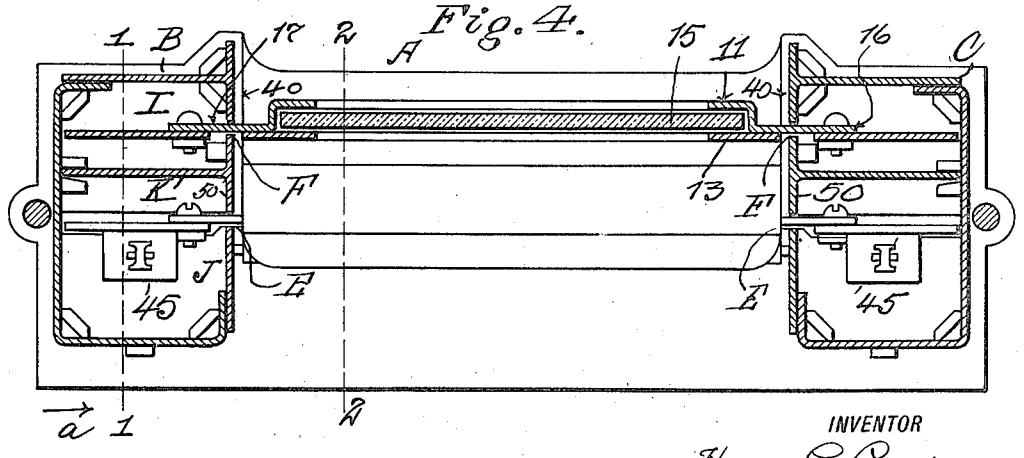


Fig. 4.



INVENTOR

Harry E. Campbell

BY

Earl Repass

Its ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY E. CAMPBELL, OF NEW YORK, N. Y.

METAL WINDOW FRAME AND SASH.

1,247,637. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed November 13, 1916. Serial No. 131,061.

To all whom it may concern:

Be it known that I, HARRY E. CAMPBELL, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented a certain new and useful Improvement in Metal Window Frames and Sashes, of which the following is a specification.

The invention relates to metal window-frames and sashes, and consists in the construction hereinafter set forth, whereby provision is made for the expansion of the sash, or sashes, due to temperature change, whereby the sashes are mutually counterbalanced, and whereby one of said counterbalanced sashes may be opened for ventilation purposes without causing an opening of the other sash. Other novel features of construction are also set out in the claims.

In the accompanying drawings—

Figure 1 is a vertical section of my window-frame and sashes on the line 1, 1, seen in the direction of the arrow *a*, of Fig. 4. Fig. 2 is a similar section on the line 2, 2 of Fig. 4. Fig. 3 is a section on the line 3, 3 of Fig. 2. Fig. 4 is a section on the line 4, 4 of Fig. 2. Fig. 5 is a detail view, showing a portion of one of the sash side rails with the expansion plate thereon, and the device for attaching the suspension chain to said plate, in elevation, the jamb walls being in vertical section. Fig. 6 is a section on the line 6, 6 of Fig. 5. Figs. 7 and 8 are sections on the line 7, 7 of Fig. 5, showing the expansion device in different positions. Fig. 9 is a vertical section of the sashes, a portion of the inner wall of one of the jambs and of the lintel and sill, this figure illustrating an adjustment of the sashes for ventilation purposes, as hereinafter explained. Fig. 10 is a detail view, showing in elevation the mode of attachment of the suspension chain to the lower sash.

Similar letters and numbers of reference indicate like parts.

The frame members comprise a metal sill A, two hollow jambs B, C resting thereon, and a box lintel D on said jambs. In the inner wall of each jamb are two parallel vertical slots E, F. G is the upper sash and H is the lower sash, said sashes being slidable in said frame.

The upper sash G is formed of a quadrangular member 11 of plate metal, having its inner portion bent twice at right angles. To member 11 is welded, as shown in Fig. 4, or secured by screws, as shown at 12, Fig. 7, a flat quadrangular member 13, also of plate metal. The two members 11 and 13 unitedly form the top, bottom and side rails of the sash frame, and receive between them the edges of the pane 15.

On each side rail of the sash G, and preferably integral therewith are laterally projecting plates 16, 17 which enter the oppositely disposed slots E in the jambs B, C. As the construction of the expansion joints, comprising each of the lateral plates 16, 17 is the same on both sides of the upper sash G and also on both sides of the lower sash H, an explanation of said construction for one joint will suffice for all four joints. Referring to Figs. 5, 7 and 8: 18 is a metal plate preferably equaling in vertical length the plate 16. In said plate are circular openings, (one of which is shown at 19), each of which communicates with a horizontal slot 20. A headed screw 21 passes through plate 16 and through the slot 20, and is secured by a nut 22. In assembling the parts, the nut is passed through the circular opening 19, after which the plate 18 is moved to bring the body of the screw 21 into the slot 20. The plate 18 is moved outwardly, or to the left of the drawing, Fig. 5, until its edge is separated by a small clearance from the outer wall 23 of the jamb C when the nut 22 is set up. The plates 16 and 18 are thus clamped together.

The object of this construction is to provide for lateral expansion of the sash due to atmospheric temperature or to a possible fire in the building. In northern climates, where the temperature may vary over a range of 125° Fah., or more, the expansion of a metal sash frame may cause serious deformation, with consequent bad fitting of the sash, unless provided for; and in event of an internal fire, this expansion may result in jamming. The operation of my joint is as follows—Figs. 7 and 8. The normal adjusted position of the parts may be as shown in Fig. 7. When the sash frame expands, the edge of plate 18 first moves into contact with jamb wall 23. Then the further expansion of the sash causes the plate 16 to slide upon plate 18, the clamping screw 22 moving in slot 20. In this way, the sash is permitted freely to expand later-

ally, as shown in Fig. 8. As the same construction is on the opposite side of the sash, the expansion is provided for on both sides.

Referring now more particularly to the upper sash G, there is a vertical, as well as a lateral, expansion of the frame: This I provide for by the following construction, Fig. 2. The member 11 is extended upward, as shown at 24. On the under side of the lintel D are secured two plates 25, 26, the opposing edges of which are flanged upward into the lintel and inclined to one another, as shown at 27, 28. The plate 24 enters between these flanges 26, 27, which bear resiliently upon its opposite faces. As the sash expands vertically upward, the plate 24 moves farther into the lintel, forcing the flanges 26, 27 farther apart, while said portions continue bearing on its sides and maintaining the close joint.

The part of member 13 which forms a portion of the lower rail of sash G is bent twice at right angles to produce an upwardly turned flange at 29, and this flange enters between two flanges 30, 31, mutually inclined, on the lower sash H—the construction of which will be described farther on. When the sash G is in closed position, as shown in Fig. 2, the flange 29 is resiliently engaged between flanges 30, 31, but as sash G expands downwardly, flange 29 is withdrawn, the flanges 30, 31 resiliently closing in—and, therefore, the joint is maintained, while the downward expansion of the sash is allowed. Thus I have provided for the expansion of the metal sash on all four edges—or, in other words, both laterally and vertically, and any danger of deformation or jamming of the sash due to temperature variations is eliminated.

The lower sash H, as I have said, has lateral expansion plates arranged, as already described, in connection with sash G, the plates similar to plates 16, 17 forming part of the side rails entering the jambs through the slots F. Therefore, the lateral expansion of this sash is taken care of in the same way as is that of sash G. The frame of sash H has two quadrangular members 32, 33 formed to produce a seat for the edges of the pane 34. The portion of the sash frame which constitutes the upper rail has on its upper side the two flanges 30 and 35. The flange 31 is produced by bending the top portion of member 33 over the flanges 35, 30, and then downwardly to form the flange 31 which coöperates with flange 30 and with flange 29 on the upper sash G, in the manner already described. Obviously, upward expansion of the lower sash H withdraws the flanges 30, 31 from the flange 29.

On the portion of the frame of lower sash H which forms the bottom sash rail, the member 32 is extended downwardly at 36, as shown in Figs. 1, 2, 3. The member 32 is bent twice at right angles to form the downwardly extending flange 37. When the sash is in closed position, as shown in Fig. 2, a flange 38 on the sill A enters between said flange 37 and the plate 36, and the plate 36 bears against the front or outer edge of the sill at the base of the flange 38, forming there a close joint.

The sill in front of flange 38 has a concavity 39, Fig. 2, at the ends of which are walls 40. In said end walls 40 are vertical recesses 41, Figs. 1, 2, 9, which open into said concavity, and also through the upper surfaces of the sill within the spaces thereon inclosed by the hollow jambs. Said recesses register with the lower ends of the vertical slots F. Therefore, the plate 36, when the sash H is closed, enters at its ends into said recesses 41. Between the bottoms of the recesses 41 and the lower edge of plate 36, and between the upper surface of the sill A and the lower edge of flange 37, there is a clearance. Therefore, the sash may expand downwardly in said clearance.

In this way, provision is made for both lateral and vertical expansion of the lower sash H, and hence, although I have two sashes slidable up and down in the same window-frame, expansion of these two sashes both vertically and laterally in that frame is made possible.

Each hollow jamb B, C is divided into two compartments, each pair of compartments being similar to those shown at I, J in jamb B by the partition K, so that the slots E, F communicate respectively with said compartments I, J. The lateral expansion devices of the upper sash G are in compartment I, and those of the lower sash H are in compartment J. In the construction shown, the sashes G and H mutually counterbalance one another. Because of this fact, I am enabled to make the compartments I, J of much less cross sectional area than if it were necessary to provide in each compartment a counter-weight for the sash entering the slot of that compartment. Hence I can reduce the front to rear width or thickness of the jamb, and produce a thinner window-frame occupying less space in the masonry opening, requiring less metal and of cheaper manufacture.

The suspension chains L pass respectively over single pulleys M journaled in the box lintel D. The ends of the chains are connected to the upper sash G in the following manner: The chain links are of U form, there being an eye in each arm of the U which receives the bend of the next U in succession. The body or bend portion of the end link 42, Figs. 1 and 10, is simply inserted through an opening in an extension plate 18 of the upper sash, and through the projecting loop of said link is passed a split

key 43. The opposite ends of the chains are connected to the lower sash H, as shown in Figs. 5 and 6, the construction being the same on both sides of the sash. A portion 44 of the plate 18 being suitably cut out on three sides, is bent outwardly to form a horizontal ledge 45 which has an opening to receive the screw 46. The head of the screw 46 is inserted between the arms of the last link in the chain, and a bolt 47 is passed through an opening in said head, and through the eyes on said arms. The screw being placed in the ledge opening, receives a nut 48, which nut has notches around its periphery to receive a locking pin 49 which is bent over at its upper end and is inserted through an opening in the ledge, so as to enter one of the nut notches. In order to adjust the sashes with reference to one another, the pin 49 is removed, when the nut 48 can be turned by any suitable means to raise or lower the screw, and when the desired adjustment is reached, the pin 49 is replaced, thus locking the nut. By this means I can provide, for example, for the complete closing of one sash simultaneously with the complete closing of the other.

In order to obtain convenient access to the adjusting nut, I make the removable middle sections 50, Fig. 4, of the inner walls of the jambs which lie between the slots E, F in said walls preferably integral with the partitions K, and secure the same in place by screws 51, Fig. 2, entering lugs 53 fixed within the jambs and fixed on the bottom of the lintel and on the sill. This removal of the middle section also affords access to the clamping screws 21 of the expansion devices in order to adjust the same.

Where two sashes, as ordinarily constructed, are counterbalanced one against the other, it is obviously not possible to open one without opening the other. This is especially disadvantageous when it is desired to lower the upper sash a short distance for purpose of ventilation. By the construction above described, this difficulty is removed, for—as shown in Fig. 9—while the lowering of the upper sash G causes a corresponding lifting of the lower sash H, the depending plate 36 on said lower sash still remains in contact with the sill flange 38, so that no open space between said plate and said flange results.

The recesses 41 in the sill A besides serving to receive the plate 36, also act as drainage openings for any water entering the jambs. As shown in Fig. 3, the plates 24 and 16 may be integral at the corners of the sash, and so form a continuous flange around said sash.

I claim:

1. A metal window-frame, comprising hollow jambs, each having a vertical slot in its inner wall, a metal sash slidable in said frame, and flat metal plates extending laterally from the side rails of said sash and entering said jamb slots, the outer edges of said plates being separated from the outer walls of said jambs for a predetermined distance sufficient to permit the free lateral expansion of said sash when heated, substantially as described.

2. The structure as specified in claim 1, in combination with vertical flat outer plates within said jambs, the outer edges of said plates being in proximity to the inner walls of said jambs and the inner edges overlapping said side rail plates for a predetermined distance sufficient to permit free lateral expansion of said sash, and means for slidably connecting said outer plates and said side rail plates, whereby upon the expansion of said sash due to heating thereof, said outer plates shall first make contact with said jamb walls, and second, said sash plates shall slide upon said outer plates.

3. A metal window-frame, a sash therein and flat plates extending from the top, bottom and side rails of said sash and entering said frame for a predetermined distance sufficient to permit of the movement of the outer edges of said plates, due to the expansion of said sash when heated, substantially as described.

4. A metal window-frame, comprising hollow jambs having vertical slots in their inner walls, a metal sash slidable in said frame, and flat plates extending outwardly from the sash rails and entering said jamb slots, the outer edges of said plates being free to move upon the expansion of said sash due to the heating thereof, substantially as described.

5. A metal window-frame, a metal sash slidable therein, and a flat plate extending from each side rail and from one cross rail of said sash and entering said frame; the outer edges of said plates being free to move outwardly upon the expansion of said sash due to heating thereof, substantially as described.

6. A metal window-frame, comprising hollow jambs and a hollow lintel, a metal sash slidable in said frame, a flat plate extending from each side rail of said sash and entering said jambs, and a flat plate extending from the top rail of said sash and entering said lintel; the outer edges of said plates being free to move outwardly upon the expansion of said sash due to heating thereof, substantially as described.

7. A metal window-frame, comprising hollow jambs and a hollow lintel, a metal sash slidable in said frame, flat plates integrally formed with said sash and extending from the side rails of said sash and entering said jambs, and a flat plate integrally formed with said sash, extending from the top rail of said sash and entering said lintel; the

outer edges of said plates being free to move outwardly upon the expansion of said sash due to heating thereof, substantially as described.

8. A metal window-frame, comprising hollow jambs and a hollow lintel, a metal sash slidable in said frame, flat plates extending from the side rails of said sash and entering said jambs, and a flat plate extending from the top rail of said sash and entering said lintel; the said plates being integral with said sash and forming a continuous flange on three sides thereof, the outer edge of said flange being free to move upon the expansion of said sash due to heating thereof, substantially as described.

9. A metal window-frame, comprising hollow jambs, a sill and a hollow lintel, two metal sashes slidable in said frame, flat plates extending from the side rails of said sashes and entering said jambs, a flat plate extending from the top rail of the upper sash and entering said lintel, a flat plate extending from the bottom rail of the lower sash and entering said sill, and overlapping plates respectively on the meeting rails of said sashes; the outer edges of said plates being free to move upon the expansion of said sash due to heating thereof, substantially as described.

10. A metal window-frame, comprising a hollow jamb having a vertical slot in its inner wall, a sash slidable in said frame, a flat plate laterally projecting from said sash and passing through said slot, an extension plate supported on said last-named plate and adjustable to approximate its outer vertical edge to the inner surface of said jamb, the said extension plate having an opening and a horizontal slot communicating therewith, a headed and threaded bolt passing through said plates and received in said slot, and a nut on the protruding threaded portion of said bolt and adapted to pass through said plate opening, whereby said plates may be assembled by first passing said nut through said opening and then moving said extension plate to bring said bolt into said slot, and whereby the clamping pressure between said plates may be regulated to permit of the sliding movement of the sash plate upon said extension plate due to the lateral expansion of said sash dependent upon heating thereof, substantially as described.

11. A window-frame, two counterbalancing upper and lower sashes vertically slidable therein, and means on one of said sashes for closing the aperture between said sash and said frame due to the opening of the other sash for a predetermined distance.

12. A window-frame, two counterbalancing upper and lower sashes vertically slidable therein, a sill, and means on the lower rail of the lower sash extending below said sill surface for closing the opening between said sash and said sill due to the lowering of the upper sash for a predetermined distance.

13. A metal window-frame, two counterbalancing sashes vertically slidable therein, a sill, and a depending plate on the lower rail of one of said sashes disposed in sliding contact with the front of said sill.

14. A metal window-frame, two counterbalancing sashes vertically slidable therein, a sill, an upwardly extending longitudinal flange on said sill, and a depending plate on one of said sashes in front of and in sliding contact with said flange.

15. A metal window-frame, comprising a lintel, two hollow jambs, each having vertical slots in its inner wall, two counterbalancing sashes slidable in said frame, plates laterally projecting from said sashes and entering said jambs through said slots, and a suspension device for said sashes; the said suspension device being connected to said sash plates and wholly inclosed in said lintel and said jambs.

16. A metal window-frame, comprising a lintel, two hollow jambs, each having vertical slots in its inner wall, two counterbalancing sashes slidable in said frame, plates laterally projecting from said sashes and entering said jambs through said slots, a suspension device for said sashes, the said suspension device being connected to said sash plates and wholly inclosed in said lintel and said jambs, and means on the projecting plates of one of said sashes for varying the length of said suspension means between the points of attachment thereof.

17. A metal window-frame, comprising two hollow jambs, each having vertical slots in its inner wall, two counterbalancing sashes slidable in said frame, plates laterally projecting from said sashes and entering said jambs through said slots, suspension pulleys above said jambs, and flexible suspension means passing over said pulleys and connecting the projecting plates of one sash to the projecting plates of the other sash.

18. A metal window-frame, comprising a lintel, two hollow jambs, each having vertical slots in its inner wall, two counterbalancing sashes slidable in said frame, plates laterally projecting from said sashes and entering said jambs through said slots, a suspension device for said sashes, the said suspension device being connected to said sash plates and wholly inclosed in said lintel and said jambs, adjustable means on the projecting plates of one of said sashes for varying the length of said suspension means between the points of attachment thereof, and means for locking said last-named means in adjusted position.

19. A metal window-frame, comprising hollow jambs, each having a vertical slot in

its inner wall, and a sill formed with end walls and a concavity on its front side extending longitudinally between said walls, and in said walls vertical recesses registering with said jamb slots and opening into said concavity and into the space inclosed by said jambs, a sash, laterally extending plates on the side rails of said sash entering said jamb slots, and a downwardly extending plate on the lower rail of said sash entering said concavity and said sill recesses.

20. A metal window-frame, comprising hollow jambs, each having a vertical slot in its inner wall, a sill, an upwardly extending longitudinal flange on said sill, the said sill having a concavity in front of said flange, and vertical recesses in the walls at each end of said concavity, the said recesses opening into said concavity and into the space inclosed by said jambs, a sash, laterally extending plates on the side rails of said sash entering said jamb slots, and a downwardly extending plate on the lower rail of said sash entering said concavity and said recesses and bearing against the front of said flange.

21. A metal window-frame, comprising hollow jambs and a sill, each of said jambs having its inner wall formed in three sections with vertical slots between them, means for removably securing said middle section, and mutually counterbalanced sashes slidably received in said slots.

In testimony whereof I have affixed my signature in presence of two witnesses.

HARRY E. CAMPBELL.

Witnesses:
GERTRUDE T. PORTER,
MAY T. MCGARRY.