G. H. FORSYTH.

METAL WINDOW CONSTRUCTION.

APPLICATION FILED FEB. 1, 1907.

941,018.

Patented Nov. 23, 1909.

2 SHEETS—SHEET 1.

Fig. 1.

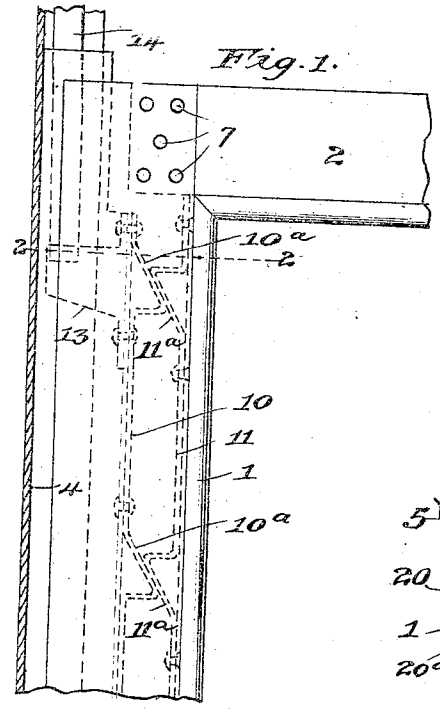


Fig. 6.

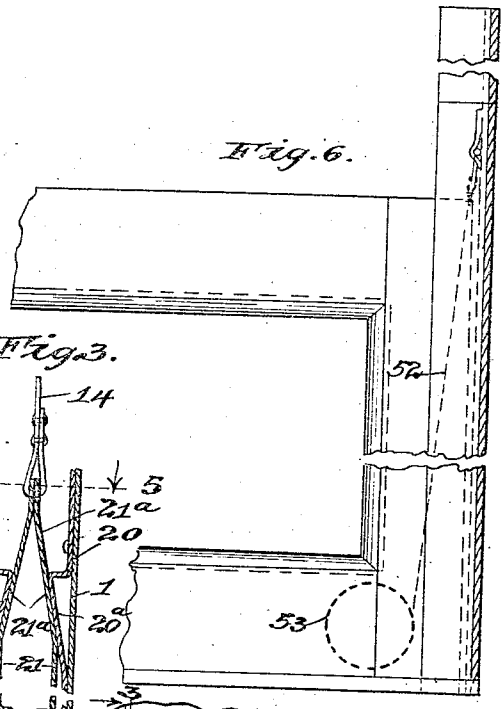


Fig. 3.

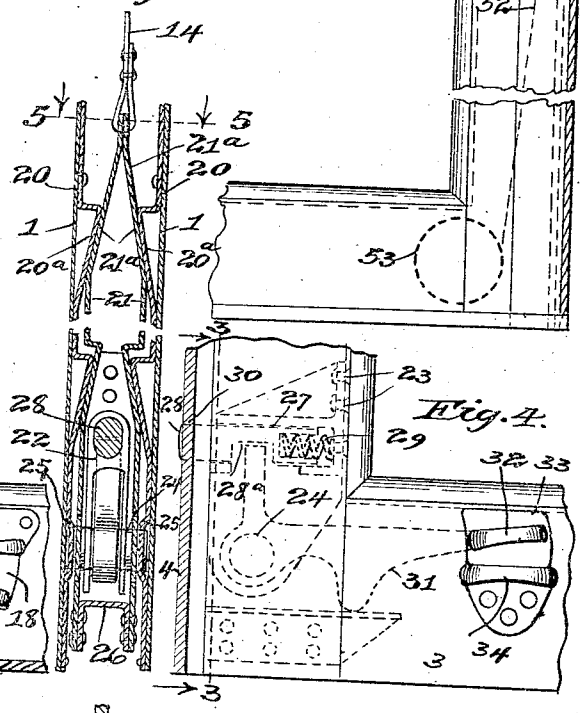


Fig. 4.

Fig. 2.

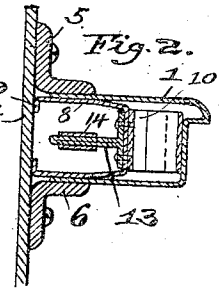
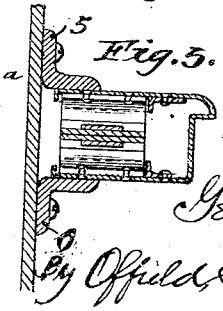


Fig. 5.



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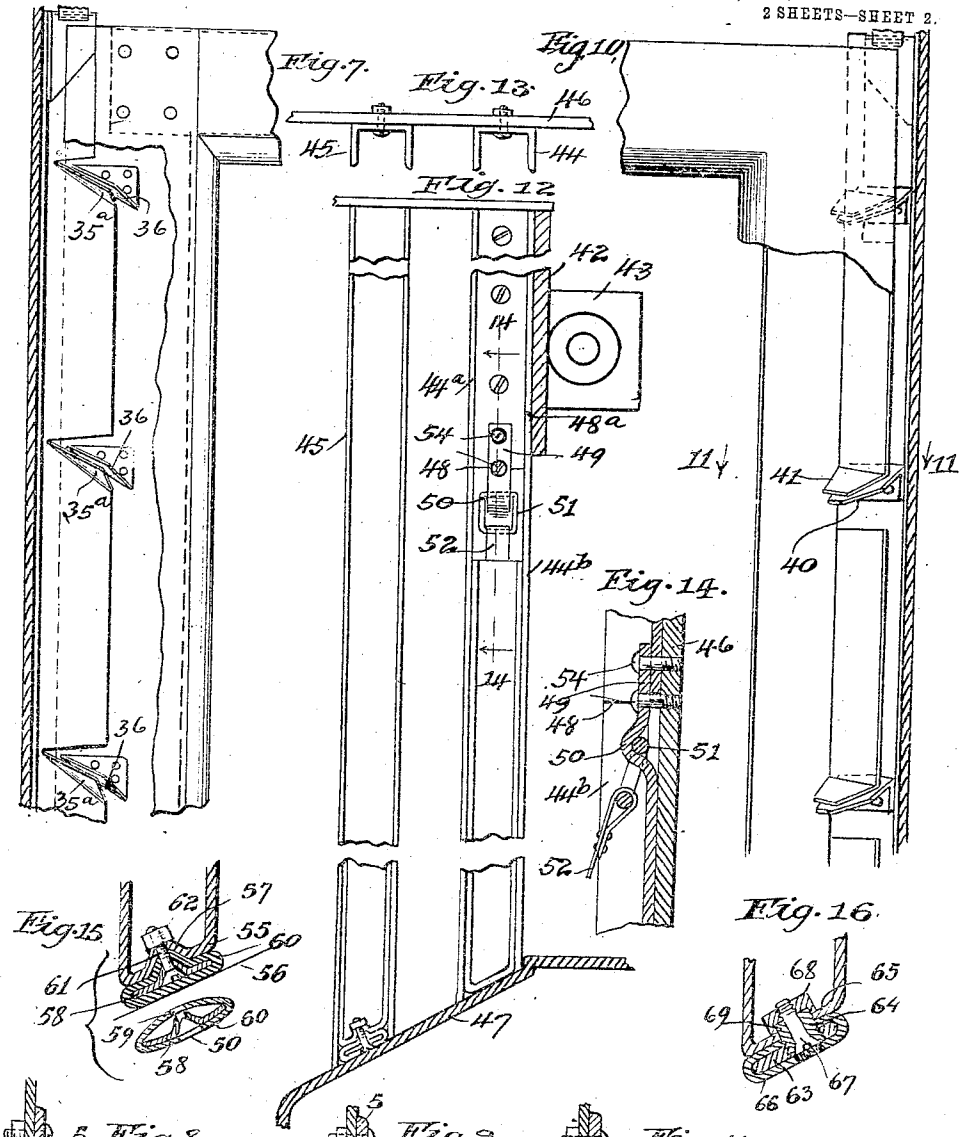
2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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METAL-WINDOW CONSTRUCTION.

941,018. Specification of Letters Patent. Patented Nov. 23, 1909.

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To all whom it may concern:

Be it known that I, GEORGE H. FORSYTH, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Metal-Window Constructions, of which the following is a specification.

This invention relates to metal window constructions and has reference more particularly to improved means for producing a tight fit between a window sash and its guides which nevertheless permits a free opening and closing movement of the sash without binding; and among the leading objects of the invention may be mentioned to provide means, preferably automatic, for adjusting and effecting a tight fit of the sash in its own plane, for adjusting the sash in a direction transverse to its own plane, and for adjusting the sash in both directions together; to provide means for releasing the window in any adjusted position, said means preferably operating in conjunction with the fit-adjusting means; to provide a construction of window guide facilitating the ready withdrawal and insertion of the sash and sash balance relatively to the window opening; to provide a cushioning means for the sash tending to soften jars imparted to the sash during operation and at the same time helping to exclude dust; and in other minor respects which will hereinafter appear to improve in general upon window constructions of this type.

My invention will be readily understood when considered in connection with the accompanying drawings showing practical embodiments of the several features in which the invention may be said to reside; and referring to said drawings,—

Figure 1 is a side elevational view of a portion of a metal window sash and its guide, illustrating means adapted to automatically adjust the sash in its own plane whereby to secure a tight fit at any position of the sash, and illustrating also a means for releasing the sash in any adjusted position; Fig. 2 is a cross-sectional view on the line 2—2 of Fig. 1; Fig. 3 is a vertical sectional view in a plane transverse to and through the sash stile, illustrating a form of my improvements adapted to automatically adjust the sash in a direction transverse thereto, and showing also a positive lock for the sash, the section being taken on the line 3—3 of Fig. 4; Fig. 4 is a fragmentary elevational view of the structure illustrated in Fig. 3; Fig. 5 is a cross-sectional view on the line 5—5 of Fig. 3, looking downwardly; Fig. 6 is a side elevational view of a portion of a sash and its guide, illustrating my novel two-piece construction of sash guide facilitating the insertion of a window, a portion of its guide and the sash balance; Fig. 7 is a fragmentary elevational view, with the inner side of the hollow stile broken away, of an embodiment of my invention designed to effect a simultaneous widthwise and crosswise adjustment of the sash relatively to its guides; Fig. 8 is a top plan view of Fig. 7; Fig. 9 is a cross-sectional view through a sash and stile and its guide, illustrating the application of independent means for effecting both a widthwise and transverse adjustment of the sash relatively to its guide; Fig. 10 is an elevational view, partly broken away, showing a means for adjusting the sash bodily simultaneously both widthwise and transversely of its own plane; Fig. 11 is a cross-sectional view on the line 11—11 of Fig. 10; Fig. 12 is a sectional elevation, broken out, of one side of a double window casing, more particularly illustrating my novel two-piece construction of sash guide facilitating the insertion of the window, a portion of its guide and the sash balance; Fig. 13 is a cross-sectional view illustrating the channel guides shown in Fig. 11; Fig. 14 is a vertical sectional view, somewhat enlarged, on the line 14—14 of Fig. 12; Fig. 15 is a cross-sectional view through the lower portion of the lower sash bar, showing one form of cushioning strip applied thereto; and Fig. 16 is a similar view showing a novel form of construction of cushioning strip and fastening means therefor.

Referring to the drawings, 1 may designate the stile, and 2 and 3 the upper and lower cross-bars, respectively, of a hollow sheet metal sash, and 4 may indicate the side post of the window opening, to which are suitably secured the strips 5 and 6 forming between them, with the faces of the wall 4, the usual guide-groove of the sash. In the construction of the sash, the ends of the upper and lower cross-bars 2 and 3 are inset and lapped under the ends of the stile and secured thereto as by rivets 7 so as to present flush inner and outer faces or sides through the sash. Slidably mounted within the channel-shaped stile 1 is a correspondingly chan-

nel-shaped member 8, the open side of which projects slightly beyond the open side of the member 1, and directly engages the bottom wall of the groove, preferably by inturned lips 9.

Secured to the transverse member of the channel 8 is a strip 10 having formed thereon a series of suitably spaced cam inclines 10^a, that are adapted for coöperation with a corresponding series of similarly inclined cam members 11^a formed in or on a strip 11 secured to the inner transverse member of the stile 1. There is also secured to or formed in the lower end of the strip 10 a substantially horizontal projection 12 forming one member of a releasing device, as hereinafter more particularly described. On the opposite side of the transverse member of the channel 8 at or near its upper end is secured a bracket 13, to which is suitably secured a tape 14 that extends upwardly to the drum of a suitable spring-actuated sash balance (not shown).

Pivotally mounted within the lower cross-bar 3 at 15 is a bell-crank thumb lever 16, one arm of which is adapted to engage the projection 12, while the other arm has a pinch-handle 17 extending through a slot 18 in the face of the bar and adapted to coöperate with the stationary pinch-handle 19 secured to the bar; so that by pressing the pinch-handles 17 and 19 together, the short arm of the lever bears down upon the projection 12 and thereby raises the sash relatively to the adjusting channel-strip 8, thus throwing the sash relatively to its guides so that the same may be freely moved up and down. On the other hand, it will be observed that the normal upward pull on the adjusting strip 8 by the sash balance tends, through the coöperating inclines 10^a and 11^a to adjust the sash in its own plane to a snug fit with the surface 4 constituting the abutments of the guide-grooves, thus preventing the introduction of dirt, moisture, cold air and the like at such points. It will also be observed that the normal upward pull on the adjusting strip 8, acting through the projection 12 and operating lever 16, and counteracted by the weight of the sash, normally maintains the pinch-handles 17 and 19 in separated or operative position, ready to release the sash. This same principle of operation is carried out in the mechanism illustrated in Figs. 3, 4 and 5, adapted to effect a transverse adjustment of the side walls of the stile relatively to the guide-strips 5 and 6 forming the lateral members of the sash-guide. In this form of the invention, there are secured to the inner sides of the side walls of the stile strips 20 having inclined portions 20^a that engage and coöperate with transversely elastic yielding inclined or wedge-shaped members 21^a of an adjusting strip 21 lying between the strips 20. The upper end of the adjusting strip 21 is connected by a tape 14 to the sash balance, as already mentioned; and the action of the parts is such that the upward pull of the sash balance on the adjusting strip 21, acting against the gravity of the sash in the opposite direction, through the coöperating inclines 21^a and 20^a, acts to distend or spread apart the side walls of the stile into a tight fit with the side walls of the guide. In this connection I have also illustrated a device in the nature of a positive lock which may secure the sash in closed position or in any desired open position. This mechanism includes a hollow casting 22 that is secured to the inner transverse wall of the stile as by rivets 23, and has formed in its depending side walls a bearing for a short transverse spindle 24, the ends of which spindle also have a bearing in inset portions 25 of the strips 20; but said spindle does not extend through the side walls of the stile itself. The spindle can be inserted in place by simply separating the side walls of the stile and the strips 20 secured thereto before insertion into the guide sufficiently to enable the insertion of the spindle into its bearings. The lower end portions of the sides of the strip 21 are slotted to straddle the spindle 24, so that the latter will not interfere with the relative vertical sliding movement between the strip 21 and the strips 20; and the lower ends of the sides of strip 21 are united by a transverse channel strip 26 secured between them, which strip 26 extends a slight distance into the lower bar 3 to form one member of a releasing device, as more particularly hereinafter described. The bracket 22 also has formed therein a pocket 27 lying in the plane of the sash and accommodating a sliding bolt or plunger 28, which plunger is normally pushed outwardly by a coil spring 29 to engage any one of a series of holes 30 that may be formed at suitable points in the guide-plate or strip 4. As a releasing device for the plunger 28 I employ an elbow lever 31 pivoted on the spindle 24, the shorter arm of said lever extending and engaging a notch 28^a in the under side of the plunger 28, while the longer arm of said lever extends into the bar 3 and is provided with a pinch-handle 32 extending through a slot 33 in the face of the bar and coöperating with a stationary pinch-handle 34 secured to the bar. The operation of the adjusting strip 21 in this form of the invention is similar to that already described in connection with Figs. 1 and 2; while the compression of the pinch-handles 32 and 34 serves to both retract the locking bolt 28 and release the adjusting strip 21 to permit the free rising and falling movement of the sash.

In Figs. 7, 8 and 9 I have shown a construction adapted to effect adjustment and

a tight fit of the sash in its guide both in the plane of the sash and in a direction transverse thereto; Figs. 7 and 8 showing a single means for accomplishing both of these adjustments; and Fig. 9 showing two coöperating means for this purpose. Referring first to the construction disclosed in Figs. 7 and 8, 35 designates the adjusting member in the form of a channel-strip, herein shown as having its closed side engaging the bottom of the sash-guide. From the side walls of the channel-strip 35 are cut and bent inwardly at intervals triangular-shaped tongues 35^a, the characteristic feature of these members being that they are inclined both in and transversely to the plane of the sash; and 36 designates a coöperating series of tongues secured to the inner surfaces of the side walls of the stile, and correspondingly inclined both in and transversely to the plane of the sash. From this it will readily be seen that a downward movement of the sash relatively to the adjusting strip, by reason of the downwardly sliding movement of the tongues 36 over the tongues 35^a effects an outward thrust of the adjusting strip into the guide-groove in the plane of the sash by virtue of the inclination of the members 35^a and 36 in the plane of the sash, and also effects an outward thrust of the side walls of the stile into snug engagement with the guide-strips 5 and 6 by virtue of the inclination of the projections in a direction transverse to the plane of the sash and guide. The adjusting strip 35 is connected through tape 14 to a spring-actuated sash balance, as hereinabove suggested. In the construction disclosed in Fig. 9, the adjustment of the sash in its own plane is effected by the means disclosed in Figs. 1 and 2; and the lateral or transverse adjustment is effected by means consisting of a V-shaped strip 37 secured to the bottom wall of the guide-groove longitudinally thereof, its positively inclined walls being slidingly engaged by inturned flanges 38^a on the adjusting strip 38.

Figs. 10 and 11 illustrate a further modification, somewhat upon the principle of the construction shown in Figs. 7 and 8 in that it effects a snug fit of the sash against both the bottom and side walls of the guide-groove; but, so far as the side fit is concerned, operating to force the sash bodily toward one (preferably the outer) guide-strip. In this construction I employ an adjusting strip 39 in the form of a light angle-bar slidably engaging the bottom and inner side wall of the guide-groove, as shown in Fig. 11; said strip having secured thereto at proper intervals obliquely and downwardly extending tongues 40 which, like the tongues described in Figs. 7 and 8, are inclined both in and transversely to the plane of the stile 1; and overlying the tongues 40 and coöperating therewith are correspondingly inclined tongues 41 that are bent inwardly from an inwardly turned oblique vertical extension 1^a of the stile. From the foregoing construction it will be seen that the upward pull of the adjusting strip 39 coöperating with the gravity of the sash, through the tongues 40 and 41, acts to force the adjusting strip 39 into snug engagement with the bottom and inner side walls of the groove, and at the same time acts to throw the stile bodily laterally against and into a snug fit with the outer guide-strip 5.

Figs. 6, 12 and 14 illustrate that feature of my invention which relates to a novel construction of sash guide-strip facilitating the introduction of the sash and its balance in place in the window opening; this feature being more particularly, although not exclusively, designed for use in connection with car windows. In Fig. 12 I have indicated at 42 a part of the fixed interior finish of the wall of a car above the window opening, 43 designating the usual shade roller secured thereto. 44 and 45 designate as entireties, a pair of parallel channel guide-strips secured to the post 46 of the window opening; 47 designating the usual sloping sill at the lower margin of the window opening. In accordance with my invention the sash-guide 44 is made in two parts; an upper part 44^a and a lower part 44^b. The horizontal joint 48 (Fig. 12) at the meeting ends of the two parts is offset through the inner side wall of the guide, as shown at 48^a, and from the metal forming the bottom or transverse wall of the strip 44^b at its upper end is cut and pressed inwardly a tongue 49 having at its base an inward bulge 50 (Fig. 14) adapted to engage a wire loop 51 to which is connected the tape 52 of a sash balance 53 mounted in the sash (Fig. 6). The tongue 49 overlies the lower end of the rear wall of the upper guide section 44^a, and is secured by screws 54 passed through said tongue and the underlying wall of the guide-member 44^a and tapped into the post 46. It will be seen that by reason of this construction the upper section 44^a can first be secured in place, and the lower section 44^b, with the sash balance tape properly connected thereto, can then, with the sash, be inserted directly in place from the inside of the car, and the screws 54 secured in place. The sash can then be run up into the upper guide section, and the lower guide-section then suitably secured. This construction greatly facilitates the application of the sash-guides and the assembling of the sash and its balance in proper relation to said guides, especially in the case of car windows where the full height of the window opening its not available for the frontwise insertion of the sash and its guides.

In Figs. 15 and 16 I have illustrated, in

two forms, an improvement in means for cushioning the descent of the sash onto the sill; the chief characteristic feature of this improvement residing in a construction which prevents the cushioning device from being readily displaced laterally owing to the slant or inclination at which the lower edge of the sash engages the sill. Referring to Fig. 15, 55 may designate the lower end of the lower sash bar, and 56 the line of the sill engaged thereby. The sash bar, herein shown as hollow, has a depression 57 formed in its lower face; and 58 designates a metal strip, preferably of slightly concavo-convex form in cross-section, and having formed longitudinally thereof an apertured protuberance 59 corresponding to the groove or depression 57 in the sash bar. An envelop of rubber, which may be simply a rubber tube 60 is stretched thereover, as shown in the lower member of the group view, Fig. 15, and this is secured to the lower margin of the sash bar as by flat-headed screws 61 passed through the registering apertures of the interfitting portions 57 and 59 and drawn up by nuts 62, which stretches and compresses the rubber snugly upon the strip 58, and also straightens the elastic strip 58, thus forming a spring nut-lock. The engagement of the protuberant and reëntrant parts 59 and 57, respectively, offsets and resists any sliding or squeezing effect tending to laterally displace the cushioning strip when the window is dropped suddenly or hard upon the sill. In Fig. 16 is shown a modified construction designed to secure the same result. In this case a plain metal strip 63, having threaded apertures is engaged by one or more longitudinally bored studs 64 having smooth inner ends passing through holes in the cross-head 65 of the sash bar; said strips being surrounded by a rubber sleeve or covering 66. The outer end of the stud 64 is countersunk and receives a flat-headed screw 67, the threaded end of which is engaged and drawn tight by a nut 68 having a countersunk face 69 adapted to receive and center the inner end of the stud 64. Strip 63 may also be of the concavo-convex form, if desired, as described in connection with Fig. 15.

It will be observed that in those forms of adjusting devices wherein the adjusting strips are normally drawn upwardly as by a superposed sash balance, as in Figs. 1, 7 and 11, where these devices are applied on both sides of the sash, any canting or tipping of the sash in its own plane is automatically prevented by reason of the fact that the sash and its inclines act as an automatic equalizer of any inequalities of pull on the two sides of the sash; it being evident that if the pull on one side is stronger than on the other owing to a greater tension or a difference in length of tape, the sash will shift slightly edgewise away from the adjusting device having the stronger pull or shorter length of tape until equilibrium is established.

I claim:

1. The combination with a sash and a sash guide, of a sash balance, and means brought into action by the latter for adjusting the sash relatively to the guide both in the plane of the sash and in a direction transverse thereto.

2. The combination with a sash and a sash guide, of a sash balance, and means brought into action by the latter for automatically adjusting the sash relatively to the guide both in the plane of the sash and in a direction transverse thereto.

3. The combination with a sash and a sash guide, of a sash balance, and means contained within the sash and brought into action by the sash balance for adjusting the sash relatively to the guide.

4. The combination with a sash having a hollow stile, and a sash guide, of a sash balance, and means contained within said hollow stile and brought into action by the sash balance for adjusting the sash relatively to the guide.

5. The combination with a sash and a sash guide, of a sash balance, and means brought into action by the latter for forcing the sash into intimate contact with a plurality of the walls of the guide.

6. The combination with a sash and a sash guide, of a sash balance, and means brought into action by the latter for forcing the sash into elastic engagement with its guide.

7. The combination with a sash having a hollow stile and a sash guide, of cam means within the sash stile serving to press the sides of the stile into intimate engagement with coöperating surfaces of the guide.

8. The combination with a sash and a sash guide, of cam means operating to produce an intimate contact of a plurality of surfaces of the guide with an element of the sash.

9. The combination with a sash and a sash guide, of cam means within the sash operating to produce an intimate contact of a plurality of surfaces of the guide with an element of the sash.

10. The combination with a sash and a sash guide, of elastic cam means for forcing an element of the sash into engagement with its guide.

11. The combination with a sash and a sash guide, of elastic cam means normally operating to force an element of the sash into engagement with the guide, and means for rendering said cam means inactive.

12. The combination with a sash and a sash guide, of cam means normally operating to force an element of the sash into engagement with the guide, a positive lock

for the sash; and means operating both to release said lock and render inactive said cam means, substantially as described.

13. The combination with a sash, of a transversely resilient concavo-convex cushioning strip, and fastening screws or bolts passed through said strip into the edge of the sash.

14. The combination with a sash, of a cushioning device for the lower edge thereof comprising a transversely resilient concavo-convex strip and an envelop or covering of cushioning material, and fastening screws or bolts passed through said strip and envelop into the edge of said sash.

15. The combination with a window casing, of a transversely divided guide-strip for a window sash, comprising an upper part adapted to be secured to the casing preliminary to the introduction of the sash and located above the sash when the latter is in lowered position, and a lower part adapted to be applied to the sash and introduced with the latter to operative position and secured therein after raising the sash into engagement with the upper part of said guide-strip, the parts of said guide-strip being formed with an offset joint at their meeting ends.

16. The combination with a window casing, of a transversely divided guide-strip for a window sash, comprising an upper part adapted to be secured to the casing preliminary to the introduction of the sash and located above the sash when the latter is in lowered position, and a lower part adapted to be applied to the sash and introduced with the latter to operative position and secured therein after raising the sash into engagement with the upper part of said guide-strip, one of said parts having an integral offset connecting strip adapted to be secured to the adjacent end of the other of said parts.

17. The combination with a sash having a recess in its lower edge, of a cushioning device attached thereto, said cushioning device comprising a strip and an envelop of flexible cushioning material adapted to be stretched on and conform to the cross-sectional contour of said strip during the attaching of the strip to the sash.

18. The combination with a sash and a sash-guide, of a cam device coöperating with a sash to force the latter both transversely of and in the plane of the sash into snug engagement with the guide, and means for supporting said cam device at any adjusted height relatively to the sash-guide.

19. The combination with a sash and a sash-guide, of a plurality of superposed cams coöperating with the sash to force the latter transversely into snug engagement with a side wall of the guide, means connecting said cams with each other, and means for supporting said connected cams at any adjusted height relatively to the sash-guide.

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