This invention relates to improvements in double-hung windows and appertains particularly to such windows designed for combined vertical sliding and inward swinging movements.

An object of the invention is to provide a sliding and hinging double-hung window structure suitable for manufacture of wood or metal and that is neat and compact; allows of double glazing; is readily installable in place of the usual sashes such as are operated by springs, weights and pulleys, or other types of sash balances; and in which standard type weather stripping may be used between the window and frame.

A further object of the invention is to provide a sliding and hinging double-hung window in which the stiles of each sash are made in two parts, hinged together at the bottom for lateral separation and interlocking at their junction in a weather-proof joint, so that the sash proper may be hinged inwards while the outer parts of the side stiles remain vertical.

A further object of the invention is the provision of a sliding and hinging double-hung window in which the sash has a two part stile hingedly connected at the bottom and wherein a novel and normally concealed stile lock recessed in the top of the outer stile part falls gravitationally to one side or the other to alternatively lock the sash against lateral hinging on the stile against rainwater relative to the frame.

A still further object of the invention is the provision of an improved double-hung window of the nature and for the purpose set forth that will allow the glazed sash to be hinged inwards so that the outside of the window can be cleaned from the interior of the building where it is horizontally supported at the convenient height of the sill, without interfering with exterior fixed screens and being capable of manufacture at reasonable cost is thereby rendered commercially desirable.

To the accomplishment of these and related objects as shall become apparent as the description proceeds, the invention resides in the construction, combination and arrangement of parts as shall be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the claims hereunto appended.

The invention will be best understood and can be more clearly described when reference is had to the drawings forming a part of this disclosure wherein like characters indicate like parts throughout the several views.

In the drawings:

Figure 1 is an inside elevation of a preferred embodiment of the instant double-hung hinged window;

Figure 2 is an enlarged transverse horizontal section, as taken on line 2—2 of Figure 1, looking in the direction indicated by the arrows;

Figure 3 is an enlarged vertical transverse section, as taken on the line 3—3 of Figure 1, but with the top sash lowered and the lower sash hinged inwards;

Figure 4 is a perspective view of the special stile lock;

Figure 5 is a composite vertical, transverse section of the present combined sliding and hinging double-hung window structure is hardly discernable from the usual non-hinging type, having no exposed or projecting hinges, locks or extraneous fittings; the novel stile lock engageable with either the hinging sash part or the guide channel of the frame, the straight bar hinges connecting the sash sections, and the support arms for the opened sash panels being all flush recessed and concealed.

The window here shown has a frame 1 set in the usual window opening consisting of a sill 2, header 3 and opposite side jambs 4, the side panels and header having laterally spaced strips 5 defining the edges of the guide channels. It will be noted, however, that the outer guide channel in the side jambs 4, i.e., the outer part of the sliding sash, is stepped inwardly as at 4c in Figure 2. A lower sliding sash 6 and upper sliding sash 7 are mounted in the frame 1, the latter sash being a little narrower on account of the inward stepping of the frame guide channel.

Each sash consists of a spaced pair of side stiles 8 slidable in the guide channels of the frame 1 and an intermediate glazed panel section 9 consisting of the usual top, bottom and side rails and a contained pane of glass. The intermediate glazed panel or section 9 is hingedly connected at the bottom to its opposite pair of side stiles 8 by a straight bar hinge 10 whose attaching plates 10a are recessed in confronting faces of the stile and sash and secured as by the wood screws 10b. A stepped weather-proof joint 11 occurs along the engaging edges of the hinging sash panel 9 and the stiles 8.

When the sash panel is hinged inwards, the stiles remain vertical in the frame guide channels and hold the sash panel in a horizontal position by support arms 12 each consisting of a pair of pivotally attached metal straps 12a and 12b, the upper and outer of which pivotally connects by its free end to the stile and the inner one to the sash panel; the former will preferably have an elongated slot 12c at its pivotal anchorage to allow of limited slipping of the two piece arm 12 when folded, will lie in an accommodating shallow vertically elongated notch 13 in the stile 8, or confronting companion notches may be formed in both the stile and sash.

A special locking device hereinafter referred to is accommodated in a vertically disposed trough extending across the top of each stile 8 from side to side and preferably near the front. Here shown clearly in Figure 4, a relatively thin flat lock plate 14 of unusual contour is pivotally mounted on a transverse pin 15 in an open ended U-shaped pocket 16 the opposite arms of which are flanged outwardly and secured to the top of the stile with their upper surfaces flush therewith. Another channel-like pocket 17, with arms similarly flanged, is mounted flush in a vertical trough in the top of the sash panel 9 at each of the opposite side edges thereof, such pockets being normally aligned with an opening relative to the lock pocket in the stile for communication therewith and proportioned to receive the lock plate 14 when nested therein so that the upper side of said lock plate is flush with the top of said pocket 17 and projecting just beyond the inner end of the pocket 17 where a thumb notch 18 is provided as a continuation of the trough to enable a grip of the lock to be obtained for releasing the same. Another lock plate-receiving pocket 19 in the form of a rectangular mortise-type housing is set flush in a recessed seat in each guide channel of the frame at a level just above the top of the sashes when in pre-arranged lowered position, such as seen in Figure 4. The pocket housing has a face plate 20 projecting as an attaching flange at top and bottom by which it is secured in the sash guide in the jamb and is provided centrally with a vertically elongated slot afford-
ing access to its interior and with which the lock plate pocket 16 can be brought into aligned registry. The lock plate 14 when in normal sash-locking position has a flat top from which the underside of the free end redescends at a sharp angle to provide a lip that extends into the thumb notch 18 while its other or pivotal end declines outwardly at about 45° affording projection of the lock plate 14 through 90° in the channel housing 19 in which a vertical position so that a slight raising of the sash, and stile, acts to trap the sharp pointed lip on the free end of the lock plate in the housing behind the top of the slot in the front plate while the lowering of the sile frees such trapped end and then causes the lock plate to be thrown clear of the frame pocket as the inclined lower end with the 45° bevel engages the bottom of the front plate slot.

In Figures 5 and 6, the same invention is shown incorporated in a metal window structure consisting generally of double-hung lower and upper metal sashes 6a and 7a sliding in a metal frame assembly comprising a sill 2a, header 3a and side jambs 4a. Each sliding window section similarly has an opposite pair of stile posts 8a and an intermediate sash section 9c hingedly connected at the bottom by hinges 10a. The same type of novel lock plate 14a is likewise mounted in the top of the stiles for securing the glazed sash against inward hinging or swinging through 90° in the channel housing the guide channel of the jamb and the same kind of hinged support arms 12a to be provided to hold the inwardly hinged sash panels in horizontal position for cleaning.

This metal window is preferably constructed of light, durable, non-ferrous or at least non-melting material such as aluminum, brass, bronze or the like. The frame parts are each shown as composed of inner and outer members with a fibre strip 21 at the juncture of the complementary frame parts across the top and down the jambs serving as a spacer between the guide channels for upper and lower sashes, and a fibre insert 22 in the sill between upturned flanges of the companion sill parts that is straddled by the bottom cross rail of the lower sash 6a.

In the composite sliding sashes, the stile posts 8a are of solid form with an offset forwardly facing lip 8b to provide a weather-proof joint for overlapping engagement of the tops similarly configured having an offset lip 9b on the outer sides of the hingebale sash panels 9a which may be of extruded form with an open or hollow core 9c. The edge of the glazed rectangular opening defined by the sash has a double hinged shoulder 9d forming a groove in its inner edge to accommodate one pane 9g in a groove in its outer deeper side and compresses the other pane 9h between its inner face and the outer face of the inner shoulder of the sash. Screws 23 are employed to hold the fibre strips to the frame parts and also in connecting the glazing members 9f to the sash panels 9g while between the channel-dividing fibre strips 21 and the frame and/or the stile posts or sashes and also between the double glazing member 9f and both the inner pane 9h and the sash 9g respectively, recess-carried felt strips 24 are employed for insulation and vibration dampening.

In use, these combined sliding and hinging double-hung windows, constructed of either wood or metal will be found most convenient, since they permit of the permanent installation of outside screens besides affording such easy access to the outside surface of the windows for washing. To hinge the glazed panel section of the sash inwards, as for washing, the lower sash is raised to clear the sill, the stile lock is released, and swung through approximately 90° into the jamb pocket housing with which it will be or should be brought into substantial registry and the glazed or inner sash panel is then hinged inwardly, being supported in the bottom transverse guide rails or support arms at the side. The upper sash should be lowered to a point slightly above the lower sash so that it may be hinged into a superposed horizontal position spaced just a little above the lower sash, in which position the stile lock of the upper sash should be in horizontal registry with its jamb lock housing. To enable the glazed panel of the upper sash to swing inwards through the space between the stile posts of the lower sash into such superposed horizontal position as described, the stile posts of the upper sash are either thicker or the guide channel is inwardly offset so that the glazed panel section of the upper sash is narrower than the spacing of the stile of the lower sash.

From the foregoing description taken in connection with the accompanying drawings, it will be manifest that a double-hung window is provided that will fulfill all the necessary requirements of such a device, but as many changes could be made in the above description and design and apparently widely different embodiments of the invention may be constructed within the scope of the appended claims, without departing from the spirit or scope thereof, it is intended that all matters contained in the said accompanying specification and drawings shall be interpreted as illustrative and not in a limiting or restrictive sense.

What I claim as new and desire to secure by Letters Patent is:

1. In a double-hung window structure, the combination with the window frame having the usual pair of sash channels and wherein the outer channels for the upper sash are set and the housing for the glazed panel section of each channel including an cam channel for in each channel approximately midway of the height thereof, of a pair of sashes slidable therein, each sash consisting of a spaced pair of side stiles and an intermediate glazed panel section hingedly connected near the bottom to said side sashes, the upper side being narrower than the lower sash for accommodation in the inwardly stepped sash channels in the frame by having its intermediate glazed panel section only of reduced width, at least one side sash of each sash having a vertically disposed trough extending across the top thereof and opening toward both sides, said panel section and the pair of sashes being respectively adapted to hold the sash parts in co-planar relation and said lock member being movable out of said panel section on one side, freeing the same for hinging relation, and into engagement with the laterally positioned recessed seat in the window frame.

2. A double-hung window structure comprising, in combination with a frame having the usual pair of sash channels and with the outer channels for the upper sash stepped inwardly and said channels provided with a horizontally recessed seat in the base of each sash channel just above level with the top of each sash when in predetermined lowered position; a pair of sliding sashes, each sash consisting of a spaced pair of side stiles and a glazed panel section hingedly connected near the bottom to said side sashes, the glazed panel section of the upper sash being narrower than the glazed panel section of the lower sash and swingable through between the side stiles of the lower sash, at least one side sash of each sash having a vertically disposed trough extending across the top thereof and opening towards both sides, said panel section also having a vertical trough in the top thereof and opening toward the stile; and a lock member permanently mounted in the trough in the top of said stile and normally engaged in concealed position in the trough in the top of said panel section with its upper side substantially flush with the top of said sash and the lower side being adapted to hold the sash parts in co-planar relation and said lock member being movable out of said panel section on one side, freeing the same for hinging relation, and into engagement with the laterally positioned recessed seat in the window frame.
of the frame includes a mortise-type housing set therein flush with the base of the channel, said housing having means associated therewith for holding said lock plate against accidental dislodgement when the stile is at the upward limit of its allowed movement and to throw said lock plate clear when the stile is lowered.

4. A double-hung window structure in which the sashes are hinged comprising a metal frame provided with the usual sash channels and wherein the outer channels for the upper sash are stepped inwardly; glazed upper and lower metal sashes sliding therein, each sash comprising a pair of spaced individual stile posts, an intermediate panel section hingedly connected at the bottom to each of said stile posts, and a glazing member fitted in said panel section, the panel section of the upper sash being narrower than the panel section of the lower sash and hingeable between the stile posts of the lower sash; a vertically hinging, gravity closing stile lock mounted within the top of said stile posts and selectably engageable with the top of said panel section or said metal frame about midway of the height of said frame; and wherein the stile posts are all of like width and of solid metal and the intermediate panel section defining a rectangular opening is of hollow extruded form with a stepped shoulder on the edge about the opening and the glazing member applied to the outer side of the panel and seating in the stepped opening defining edge compresses a pane between the inner side of said glazing member and the panel section shoulder.

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