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INWARDLY DEMOUNTABLE SOUNDPROOF SASH WINDOW

The present invention relates to a soundproof sash window having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, with the interior sash demountable from the window frame toward the interior side.

In a soundproof sash having a pair of overlapping interior and exterior sashes, when both sashes are closed, they are firmly engaged with weatherstrips carried on the header, sill and side jambs of a window frame, while the meeting stile of one sash is firmly engaged with a weatherstrip carried on the meeting stile of the other sash. Thus, the sound insulation and watertightness of the sash window are secured. However, in order to avoid interference between the sashes and the weatherstrips during opening and closing operation of the sashes, the sashes are arranged to run in closely spaced planes which are spaced from the plane of the weatherstrips toward the exterior side of the sash window. More particularly, in view of the necessity of preventing the exterior sash from dragging the interior sash due to interference therebetween, the exterior sash while running is spaced a greater distance from the weatherstrip. It is, therefore, necessary to pull or displace the exterior sash toward the interior side to force the exterior sash

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against the weatherstrips after the exterior sash comes to its closed position.

Conventionally, the exterior sash includes two slide blocks attached to the bottom rail adjacent the meeting stile and the abutment stile so as to astride a bottom guide rail provided on the sill. During the movement of the exterior sash, the slide blocks are slidably engageable with the bottom guide rail to limit the displacement of the exterior sash in the direction perpendicular to the plane of the sash window. The displacement-limiting effect attained jointly by the slide blocks and the bottom guide rail increases with a decrease in the spacing between the slide blocks and the bottom guide rail. This means that an attempt to increase the running stability of the exterior sash involves the necessity of reducing the amount of inward pull or displacement of the exterior sash from its closed position. In this instance, however, due to the necessity of securing the airtightness in the closed condition of the sash window, the distance between the exterior sash and the weatherstrips cannot be enlarged. Accordingly, it occurs likely that the interior sash is dragged by the exterior sash while moving.

On the other hand, to enlarge the amount of inward pull or displacement of the exterior sash, the spacing between the exterior side surface of the bottom guide rail

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5 and the slide blocks must be enlarged. However, if this
spacing is enlarged, the exterior sash while being moved is
permitted to displace toward the exterior side by a distance
equal to the enlarged spacing. Accordingly, the displace-
ment-limiting effect attainable by the bottom guide rail and
the slide blocks is small and, hence, the running stability
of the exterior sash is deteriorated.

With the foregoing drawbacks of the prior art in
view, an object of the present invention is to provide a
10 soundproof double sliding sash window having structural
features which enable stable running of the sashes during
opening and closing operation and firm engagement between
the sashes and weatherstrips when the sashes are closed.

In brief, a soundproof double sliding sash window
15 according to the present invention includes first and second
slide blocks fixedly mounted on a bottom rail at positions
aligned with an abutment stile and a meeting stile, respec-
tively, and slidable along an interior side surface of an
exterior bottom guide rail of a sill when the exterior sash
20 is running the exterior bottom guide rail. Each of the
slide blocks has a slide portion projecting toward the
interior side of the sash window. The sill has a horizontal
guide plate extending longitudinally thereof and projecting
exteriorly therefrom toward the slide portions of the slide
25 blocks. During the movement of the exterior sash, the slide

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blocks are slidable along the interior side surface of the exterior bottom guide rail and the guide plate of the sill to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. The guide
5 plate has first and second cutout recesses formed at positions corresponding in position to the abutment stile and the meeting stile of the exterior sash being closed so as to receive the slide portions of the slide blocks when the exterior sash is pulled or displaced toward the interior
10 side.

The guide plate projects exteriorly from a vertical face plate of the sill which is located below an interior bottom guide rail provided for movement of an interior sash. The slide portion of each of the first and second slide
15 blocks projects from the interior side of the corresponding slide block and is slidable along the guide plate. While the exterior sash is running along the exterior bottom guide rail, the slide blocks are slidably guided between the interior side surface of the exterior bottom guide rail and
20 the guide plate. By virtue of the engagement between the respective slide portions of the slide blocks and the guide plate, the displacement of the exterior sash in a direction toward the interior of the sash window is limited. Conversely, the displacement of the exterior sash in a direc-
25 tion toward the exterior side of the sash window is limited

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by the engagement between the interior side surface of the exterior bottom guide rail and the slide blocks. The displacement of the exterior sash in the direction perpendicular to the plane of the sash window is thus limited by the guide plate and the exterior bottom guide rail. Consequently, the exterior sash is able to run stably and smoothly.

The first and second recesses of the guide plate are formed at positions which correspond respectively to the position of the slide portion of the first slide block and the position of the slide portion of the second slide block that are assumed when the exterior sash is closed. With the recesses thus formed, after the slide blocks come to their closed positions, they can be displaced toward the interior side by a distance which is equal to the depth of the recesses. Accordingly, the amount of inward pull or displacement of the exterior sash is enlarged with the result that a firm engagement between the exterior sash and the mating weatherstrips is insured.

The above and other objects, features and advantages of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example. In the drawings:--

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FIG. 1 is a fragmentary perspective view showing the relation between an exterior sash and a sill of a sound-proof sash window according to the present invention;

FIG. 2 is a vertical cross-sectional view of the sash window showing the exterior sash while running;

FIG. 3 is a plan view of FIG. 2;

FIG. 4 is a vertical cross-sectional view of the sash window showing the exterior sash when closed;

FIG. 5 is a plan view of FIG. 4; and

FIG. 6 is a front elevational view showing the arrangement of weatherstrips attached to the exterior side of a window frame of the sash window.

The present invention will be described below in greater detail with reference to an embodiment shown in the accompanying drawings.

A soundproof sash window according to the invention includes, as shown in FIGS. 2 and 3, a window frame 1, and a pair of relatively horizontally movable, overlapping interior and exterior sashes 5 and 6 mounted within the window frame 1. The interior sash 5 is slidably supported between a pair of vertically opposed, interior top and bottom guide rails 41 and 23 (FIG. 2) projecting respectively from a header 4 and a sill 2 of the window frame 1. Similarly, the exterior sash 6 is slidably supported between a pair of vertically opposed, exterior top and bottom guide rails 42

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and 25 (FIG. 2) projecting respectively from the header and the sill 2 and spaced exteriorly from the interior top and bottom guide rails 41, 23. When closed, the interior and exterior sashes 5, 6 are firmly engaged with weatherstrips 10 - 15 carried on exterior surfaces of the window frame 1. The interior sash 5 is demountable from the window frame 1 toward the interior side of the sash window. The sash window has structural features which improve the running stability of the exterior sash 6 and the tightness of engagement between the exterior sash 6 and the mating weatherstrips 11, 13, 15 when the exterior sash 6 is closed.

The sill 2 of the window frame 1 includes a horizontal depth plate 21 on which the interior bottom guide rail 23 is provided for sliding movement of the interior sash 5. The sill 2 further has a vertical face plate 22 disposed below the interior bottom guide rail 23 and extends downwardly from the depth plate 21. The face plate 22 includes a horizontal guide plate 24 projecting therefrom toward the exterior side of the sash window. The guide plate 24 is engageable with first and second slide blocks 7, 8 during the opening and closing operation of the exterior sash 6. As shown in FIG. 2, the guide plate 24 lies in a horizontal plane extending parallel to, and located vertically centrally between, a pair of parallel spaced horizontal plates 641, 641 projecting interiorly from a lower

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portion of a bottom rail 64 of the exterior sash 6. The guide plate 24, as shown in FIG. 3, extends along a longitudinal portion of the sill 2 within which an abutment stile 61 and a meeting stile 62 of the exterior sash 6 are movable. The guide plate 24 thus arranged prevents the slide blocks 7, 8 from displacing toward the interior side. The guide plate 24 has two cutout recesses 241, 241 for receiving respectively therein the first and second slide blocks 7, 8 when the exterior sash 6 is closed. The recesses 241, 241 are formed at positions which correspond in position to the abutment stile 61 and the meeting stile 62, respectively, of the exterior sash 6 being closed. With the recesses 241, 241 thus provided, the exterior sash 6 can be pulled or displaced toward the interior side.

The first and second slide blocks 7, 8 are fixedly mounted on the bottom rail 64 of the exterior sash 6 at positions aligned respectively with the abutment stile 61 and the meeting stile 62 of the exterior sash 6, as shown in FIG. 1. The slide blocks 7, 8 are disposed astride the exterior bottom guide rail 25 of the sill 2 and slidable along an interior side surface of the exterior bottom guide rail 25. As shown in FIG. 2, the lower ends of the first and second slide blocks 7, 8 (only the second slide block 8a being shown) are shaped such that during the sliding movement of the exterior sash 6, the lower ends of the slide

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blocks 7, 8 are engageable only with the interior side
surface of the exterior bottom guide rail 25 while keeping a
clearance between themselves and the exterior side surface
of the exterior bottom guide rail 25. Due to the engagement
5 between the slide blocks 7, 8 and the interior side surface
of the exterior bottom guide rail 25, the exterior sash 6
while running is prevented from displacing toward the exte-
rior side. When located at the closed position, the exteri-
or sash 6 is displaceable from a path of running only in a
10 direction toward the interior side. Each of the slide
blocks 7, 8 is firmly fitted in a hollow interior space of a
corresponding one of the abutment stile 61 and the meeting
stile 62.

The slide blocks 7, 8 have slide portions 71, 81
15 projecting from the interiorly facing surfaces of the abut-
ment stile and meeting stile 61, 62 and engageable with the
guide plate 24. By virtue of the engagement between the
slide portions 71, 81 and the guide plate 24, the exterior
sash 6 while running is prevented from displacing toward the
20 interior side. After the exterior sash 6 is moved to its
closed position, it is pulled or displaced toward the inte-
rior side by means of a pull-in block (not shown) and a
crescent lock 9 during which time the slide portions 71, 81
of the slide blocks 7, 8 are received in the recesses 241,
25 241 formed in the guide plate 24.

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The horizontal plates 641, 641 project from the interior side of the bottom rail 64 of the exterior sash 6 and lie in vertically spaced planes extending parallel to and spaced from the plane of the guide plate 24 with a space therebetween. The slide block 7 disposed on the abutment stile 61 side is attached to the abutment stile 61 with the slide portion 71 gripped between the horizontal plate 641, 641. As shown in FIG. 1, the slide portion 71 of the slide block 7 projects from one end of the pair of horizontal plates 641, 641 toward the side jamb 3 (which is the left side as illustrated in FIG. 3). The projecting portion of the slide portion 71 is beveled to form a beveled surface 711 which faces obliquely toward the interior side of the sash window. When the exterior sash 6 is closed, the beveled surface 711 of the slide portion 71 is firmly engaged with a beveled surface 171 of a corner weatherstrip 17 disposed on the sill 2 adjacent to the left side jamb 3, as shown in FIG. 5. The beveled surface 171 is complementary in contour to the shape of the beveled surface 711. With this firm engagement between the beveled surfaces 711 and 171, the sound insulation and airtightness at a lower portion of the bottom rail 64 are considerably improved. Furthermore, since one end of the pair of horizontal plates 641, 641 is closed by the slide portion 71, the exterior sash 6 can be opened and closed with safety and is slightly

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in appearance and, hence, has a high design value.

When the exterior sash 6 is closed, the upper horizontal plate 641 is firmly engaged with the weatherstrip 13 provided on the sill 2, as shown in FIG. 4.

5 The slide block 7 disposed on the abutment stile 61 side includes, as shown in FIGS. 1 and 3, an engagement strip 72 which is engageable with a pull-in member or plate 31 projecting from the left side jamb 3 toward the abutment stile 61. The pull-in member 31 and the engagement strip 72
10 are engageable with each other to pull or displace the exterior sash 6 from the closed position toward the interior side of the sash window. At least one of an exteriorly facing engagement surface 721 of the engagement strip 72 and an interiorly facing contact surface 311 of the pull-in
15 member 31 is beveled or slated from the exterior side toward the interior side when viewed in a direction from an open position toward the closed position of the exterior sash 6. With the contact surfaces 721, 311 thus profiled, as the exterior sash 6 advances from the position of FIG. 3 which
20 is shortly ahead of the closed position, toward the closed position, the engagement strip 72 of the slide block 7 first engages the pull-in member 31 and then is gradually displaced toward the interior side by the pull-in member 31. With this displacement of the slide block 7, the exterior
25 sash 6 is pulled or displaced toward the interior side.

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FIGS. 2 and 3 illustrate the exterior sash 6 while running along a path. As described above, the exterior sash 6 is closed while being displaced from the running path toward the interior side. This is done by virtue of the engagement between the engagement strip 72 and the pull-in member 31 which takes place when the exterior sash 6 approaches the closed position. Then, the crescent sash lock 9 is fastened whereby the inward pull or displacement of the exterior sash is completed, as shown in FIGS. 4 and 5. In this instance, the slide portions 71, 81 of the respective slide blocks 7, 8 are received in the recesses 241, 241, respectively, in the guide plate 24. The upper horizontal plate 641 of the bottom rail 64 and the slide portion 71 of the slide block 7 are firmly engaged with the weatherstrip 13 and the corner weatherstrip 17, respectively, thereby securing the airtightness between the bottom rail 64 and the sill 2 and between the bottom rail 64 and the left side jamb 3. Similarly, When the slide portion 81 of the slide block 8 is received in the recess 241 of the guide plate 24, a weatherstrip 18 carried on the meeting stile 62 of the exterior sash 6 is firmly engaged with the meeting stile 52 of the interior sash 5, thereby securing the airtightness between the meeting stile 62 of the exterior sash 6 and the meeting stile 52 of the interior sash 5.

When the crescent sash lock 9 is fastened, the

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interior sash 5 is pulled or displaced interiorly together with the exterior sash 6. The interior and exterior sashes 5, 6 thus displaced are firmly engaged with the weatherstrips 10, 12, 12 and the weatherstrips 11, 13, 15, respectively.

When the interior and exterior sashes 5, 6 are closed as shown in FIG. 4, their top rails 53, 63 are firmly engaged respectively with the first and second weatherstrips 10, 11 which are carried on the exterior surface of an interior top guide rail 41 of the header 4 in vertical juxtaposition and extend in the longitudinal direction of the interior top guide rail 41. Similarly, the respective bottom rails 54, 64 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the third and fourth weatherstrips 12, 13 which are carried on the exterior surface of the vertical face plate 22 of the sill 2 in vertical juxtaposition and extend in the longitudinal direction of the face plate 22. On the other hand, the respective abutment stile 51, 61 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the fifth and sixth weatherstrips 14, 15 which are carried on the side jambs 3, 3, respectively, to face toward the exterior side and extend in the longitudinal direction of the side jambs 3. Similarly, the weatherstrip 18, which is carried on the interior surface of the meeting stile 62 of the exterior

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sash 6 and extends along the length of the meeting stile 62 is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5. With this arrangement of seals, sufficient sound insulation and waterproofing are secured between the sashes 5, 6 and the window frame 1.

As shown in FIG. 2, the bottom rail 54 of the interior sash 5 has an exterior vertical plate 541 downwardly projecting therefrom. Since the distance H_1 between a lower end of the exterior vertical plate 541 and an upper end of the interior bottom guide rail 23 of the sill 2 is smaller than the amount of allowable vertical displacement of the interior sash 5 (which is determined by a smaller one of the distance H_2 between the top rail 53 and the header 4 measured at an upper end of the top rail 53 and the distance H_3 between the top rail 53 and the header 41 measured at the lower end of the interior top guide rail 41), the interior sash 5 can be removed from the window frame 1 toward the interior side of the sash window. To remove the interior sash 5, the interior sash 5 is lifted up into the space between the top rail 53 and the header 4, and while keeping this condition, the interior sash 5 is pulled interiorly in such a manner as to turn the interior sash 5 about its upper edge.

The first and second weatherstrips 10, 11 with which the top rails 53, 63 are firmly engaged, respectively,

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are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 411, 412, respectively, formed longitudinally in the interior top guide rail 41 of the header 4. The pockets 411, 412 open toward the exterior side of the header 4, so that the weatherstrips 10, 11 received in the pockets 411, 412 are faced exteriorly. Similarly, the third and fourth weatherstrips 12, 13 respectively engageable with the bottom rails 54, 64 are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 221, 222, respectively, formed longitudinally in the vertical face plate 22 of the sill 2. The pockets 221, 222 open toward the exterior side of the sill 2, so that the weatherstrips 12, 13 received in the pockets 221, 222 are faced exteriorly.

The weatherstrips 10, 12 respectively received in the pockets 412, 222 for sealing engagement with the interior sash 5 are located inwardly of the weatherstrips 11, 13 which are respectively received in the pockets 411, 221 for sealing engagement with the exterior sash 6. As shown in FIG. 6, the weatherstrips 10, 11 and the weatherstrips 12, 13 extend along the interior top guide rail 41 and the face plate 22, respectively, over a length which is at least equal to the length of the top and bottom rails 53, 54; 63, 64 of the interior and exterior sashes 5, 6. As shown in FIG. 4, the weatherstrip 10 and the weatherstrip 12 are engaged with an upwardly projecting exterior vertical plate

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531 of the top rail 53 and the downwardly projecting exterior vertical plate 541 of the bottom rail 54, respectively. Similarly, the weatherstrip 11 and the weatherstrip 13 are engaged with the interiorly projecting horizontal plate 631 of the top rail 63 and the upper horizontal plate 641 of the bottom rail 64, respectively.

FIG. 6 diagrammatically shows the arrangement of the weatherstrips 10 - 15 mounted on the exterior surfaces of the window frame 1 along an inner peripheral edge of the window frame 1. The weatherstrip 10 provided for engagement with the top rail 53 of the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51 of the interior sash 5, and a substantially central portion of the header 4 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. Similarly, the weatherstrip 11 provided for engagement with the top rail 63 of the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61 of the exterior sash 6, and the substantially central portion of the header 4 where the meeting stile 62 overlaps with the meeting stile 52 of the interior sash 5. At the substantially central portion of the header 4, the weatherstrips 10, 11 are integrally connected together. The joint portion between the weatherstrips 10, 11 has an exteriorly facing surface which is sealingly engageable with upper end por-



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tions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6.

Likewise the weatherstrips 10, 11 on the top rail side, the weatherstrips 12, 13 on the bottom rail side have
5 a length which is equal to the length of the bottom rails 54, 64 of the interior and exterior sashes 5, 6. The weatherstrip 12 provided for engagement with the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51, and a substantially central portion
10 of the sill 2 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. The weatherstrip 13 provided for engagement with the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61, and the substantially central portion of
15 the sill 2. The weatherstrips 12, 13 are integrally connected together at the substantially central portion of the sill 2. The joint portion between the weatherstrips 12, 13 has an exteriorly facing surface with which lower end portions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6 are firmly engageable.
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As shown in FIG. 3, the side jamb 3 which is engageable with the abutment stile 51 of the interior sash 5 has a longitudinal groove or pocket 321 opening exteriorly for receiving therein the weatherstrip 14. Similarly, the
25 side jamb 3 engageable with the abutment stile 61 of the

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exterior sash 6 has a longitudinal groove or pocket 322 opening exteriorly for receiving therein the weatherstrip 15. The weatherstrips 14, 15 are fitted in the pockets 321, 322, respectively, and face toward the exterior side of the sash window.

The pocket 321 formed in the side jamb 3 (which is the right side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 14 received in this pocket 321 lies in substantially the same vertical plane as the weatherstrips 10, 11, 12, 13 and is engageable with a side flange or plate 511 projecting from the exterior side of the abutment stile 51 toward the side jamb 3 which is the right side in FIG. 3. With this arrangement of the pocket 321, the continuity between the weatherstrip 14 and the weatherstrips 10 - 13 is secured. Similarly, the pocket 322 formed in the side jamb 3 (which is the left side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 15 received in the pocket 322 is engageable with a side flange or plate 511 projecting from the interior side of the abutment stile 61 toward the side jamb 3 so as to secure the continuity between the weatherstrip 15 and the weatherstrips 10 - 13. When the interior and exterior sashes 5, 6 are pulled or displaced toward the interior side, as shown in FIG. 5, the abutment stiles 51, 61 are firmly engaged with the weatherstrips 14, 15, respectively, thereby securing the

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airtightness and watertightness between the sashes 5, 6 and the corresponding side jambs 3.

The weatherstrip 15 adapted to be engaged with the abutment stile 61 of the exterior sash 6 is somewhat displaced toward the exterior side from the common vertical plane of the weatherstrips 10 - 14. However, as shown in FIG. 6, the weatherstrip 15 is connected at its upper end with the weatherstrip 11 by means of the corner weatherstrip 16 and, at its lower end, with the weatherstrip 13 by means of the corner weatherstrip 17. With the corner weatherstrips 16, 17 thus provided, the continuity between the weatherstrip 15 and the weatherstrip 11 and also between the weatherstrip 15 and the weatherstrip 13 can be maintained.

As shown in FIG. 3, the meeting stile 62 of the exterior sash 6 has a longitudinal groove or pocket 621 formed in an interior surface thereof and opening toward the interior side to receive therein the weatherstrip 18. When the interior and exterior sashes 5, 6 are pulled or displaced interiorly, as shown in FIG. 5, the weatherstrip 18 fitted in the pocket 621 is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5 to secure the airtightness and watertightness between the interior and exterior sashes 5, 6.

By virtue of the weatherstrips 10 - 15 provided along the inner peripheral edge of the window frame 1 and

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the weatherstrip 18 acting between the respective meeting
stiles 52, 62 of the interior and exterior sashes 5, 6, the
sash window has sufficient airtightness and watertightness
and is able to isolate the interior side of the sash window
5 from the interior side.

As described above, a soundproof sash window of the
invention includes first and second slide blocks mounted on
a bottom rail of an exterior sash at positions aligned with
a meeting stile and an abutment stile, respectively, of the
10 exterior sash and slidable along an exterior bottom guide
rail of a sill when the exterior sash is running on and
along the exterior bottom guide rail. The slide blocks each
have a slide portion projecting from an interior side of the
corresponding slide block. The sill has a guide plate
15 projecting interiorly therefrom in confronting relation to
the slide portions of the slide blocks. During the sliding
movement of the exterior sash, the slide blocks are slidably
guided between an interior side surface of the exterior
bottom guide rail and the guide plate to limit the displace-
20 ment the exterior sash in the direction perpendicular to the
plane of the sash window. With this limited displacement,
the exterior sash can move stably and smoothly.

In addition, the guide plate has first and second
recesses in which the respective interiorly projecting slide
25 portions of the first and second slide blocks are received

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when the exterior sash is closed. With the recesses thus provided, After the exterior sash arrives at its closed position, it can be displaced toward the interior side by a distance which is equal to the depth of the recesses. It is 5 therefore possible to enlarge the amount of inward pull or displacement of the exterior sash and improve the tightness of engagement between the exterior sash and the mating weatherstrips.

Obviously, various minor changes and modifications 10 of the present invention are possible in the light of the above teaching. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

15 There follows a list of parts shown in the drawings:-

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Parts List

- 1: window frame
- 2: sill of 1
- 5 3: side jamb of 1
- 4: header of 1
- 5: interior sash
- 6: exterior sash
- 7: first slide block mounted on 61 adjacent 64
- 10 8: second slide block mounted on 62 adjacent 64
- 9: crescent sash lock
- 10: weatherstrip
- 11: weatherstrip
- 12: weatherstrip
- 15 13: weatherstrip
- 14: weatherstrip
- 15: weatherstrip
- 16: (corner) weatherstrip between 11 and 15
- 17: (corner) weatherstrip between 13 and 15
- 20 18: weatherstrip on 62
- 21: horizontal depth plate of 2
- 22: vertical face plate of 2 depending from 21
- 23: interior bottom guide rail formed on 21 for 5
- 24: horizontal guide plate projecting exteriorly from 22
- 25 31: pull-in member projecting from 3 for engagement with 72

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- 41: interior top guide rail formed on 4 for 5
42: exterior top guide rail formed on 4 for 6
51: abutment stile of 5
52: meeting stile of 5
5 53: top rail of 5
54: bottom rail of 5
61: abutment stile of 6
62: meeting stile of 6
63: top rail of 6
10 64: bottom rail of 6
71: slide portion of 7 projecting from the exterior surface
of 61 toward 24 for sliding engagement with 24
72: engagement strip of 7 engageable with 31
81: slide portion of 8 projecting from the exterior surface
15 of 62 toward 24 for sliding engagement with 24
171: beveled surface of 17 engageable with 711 of 71
221: pocket formed in 22 of 2 for receiving therein 12
222: pocket formed in 22 of 2 for receiving therein 13
241: exteriorly opening recess formed in 24 for receiving
20 therein 7, 8 to permit 6 to be pulled interiorly
311: (interiorly facing) contact surface of 31
321: pocket formed in 3 of 51 side for receiving therein 14
322: pocket formed in 3 of 61 side for receiving therein 15
411: pocket formed in 41 of 4 for receiving therein 10
25 412: pocket formed in 41 of 4 for receiving therein 11

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- 511: outwardly projecting side plate of 51
531: upwardly projecting, exterior plate of 53
541: downwardly projecting, exterior horizontal plate of 54
611: outwardly projecting side plate of 61
5 621: pocket in the exterior surface of 52 for receiving 18
631: interiorly projecting plate of 63
641: (a pair of parallel spaced) horizontal plates
projecting interiorly from a lower portion of 64
711: beveled surface of 71 engageable with 171 of 17
10 721: (exteriorly facing) contact surface of 72

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CLAIMS:

1. A soundproof double sliding sash window of the type having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, wherein said interior and exterior sashes are slidably supported respectively between a pair of opposed interior top and bottom guide rails formed respectively on a header and a sill of the window frame and between a pair of opposed exterior top and bottom guide rails formed respectively on the header and the sill, wherein said interior and exterior sashes, when closed, are firmly engaged with weatherstrips carried on exteriorly facing surfaces of said window frame, and wherein said interior sash is demountable from said window frame toward the interior side of said sash window, characterized in that said window frame includes a vertical face plate disposed below said interior bottom guide rail for guiding therealong said interior sash, and a guide plate projecting from said face plate toward the exterior side of said sash window, that said exterior sash includes first and second slide blocks fixedly mounted on a bottom rail of said exterior sash at positions aligned respectively with an abutment stile and a meeting stile of said exterior sash, said first and second slide blocks being slidable along an interior side surface of said exterior bottom guide rail for guiding therealong said exterior sash,



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that said first and second slide blocks respectively have first and second slide portion projecting from an interior side thereof and slidable along said guide plate, that said guide plate has first and second cutout recesses formed at-

5 positions corresponding in position to said abutment stile and said meeting stile, respectively, of said exterior sash being closed for receiving respectively therein said first and second slide portions of said first and second slide blocks, that during the movement of said exterior sash, said

10 first and second slide blocks are engageable with said guide plate and said interior side surface of said exterior bottom guide rail to limit the displacement of said exterior sash toward the interior side and the exterior side of said sash window, and when said exterior sash is disposed in its

15 closed position, said first and second slide blocks are displaced toward the interior side with their slide portions received in said first and second cutout recesses.

2. A soundproof double sliding sash window according to claim 1, wherein said bottom rail includes a pair of

20 parallel spaced horizontal plates projecting from an interior side thereof, and said first slide portion is gripped between said horizontal plates and projects from one end of said pair of horizontal plates toward a side jamb of said window frame with which said abutment stile is engageable.

25 3. A soundproof double sliding sash window accord-



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ing to claim 2, wherein said guide plate lies in a plane extending parallel to, and disposed centrally between, the respective planes of said horizontal plates.

4. A soundproof double sliding sash window according to claim 2, wherein said first slide portion has a beveled surface facing obliquely toward said side jamb and the interior side of said sash window, said window frame includes a corner weatherstrip disposed on said sill adjacent said side jamb and has a beveled surface complementary in contour to the shape of said beveled surface of said first slide portion, and said beveled surface of said first slide portion is firmly engageable with said beveled surface of said corner weatherstrip when said exterior sash is closed.

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Figure (3) to 2,000,000

ABSTRACT

INWARDLY DEMOUNTABLE SOUNDPROOF SASH WINDOW

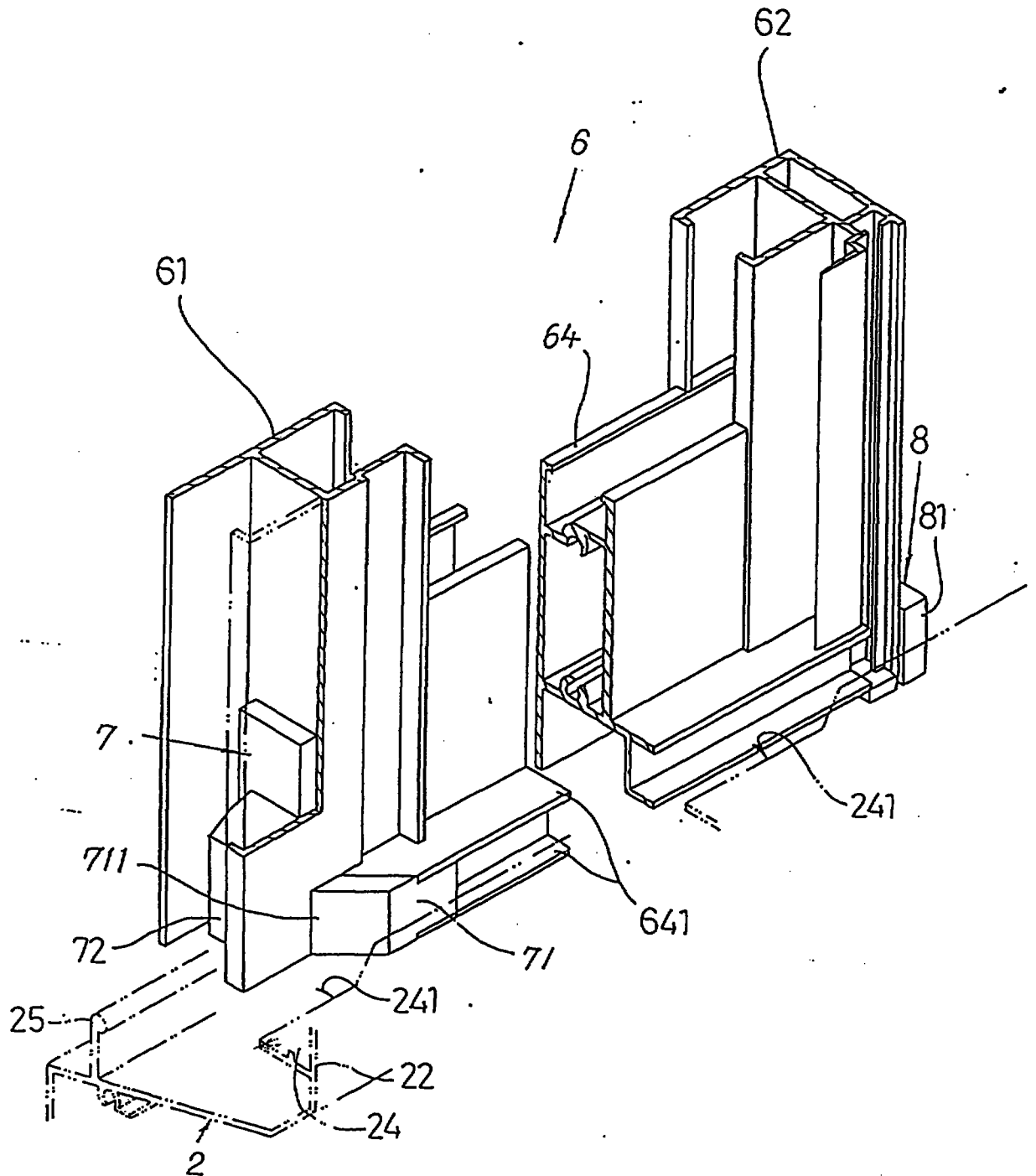
A soundproof sash window including an exterior sash (6) having first and second slide blocks (7, 8) mounted on a bottom rail (64) at positions aligned with an abutment stile (61) and a meeting stile (62), respectively, and slidably movable along a bottom guide rail (25) of a sill (2) when the exterior sash is running. Each of the slide blocks has a slide portion (71, 81) projecting toward the interior side of the sash window. The sill has a horizontal guide plate (25) extending longitudinally thereof and projecting exteriorly therefrom toward the slide portions of the slide blocks. During the movement of the exterior sash, the slide blocks are slidable along an interior side surface of the bottom guide rail and the guide plate to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. The guide plate has first and second cutout recesses (241, 241) formed at positions corresponding in position of the abutment stile and the meeting stile of the exterior sash being closed so as to receive the slide portions of the slide blocks.

(Figure 1)



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FIG. 1



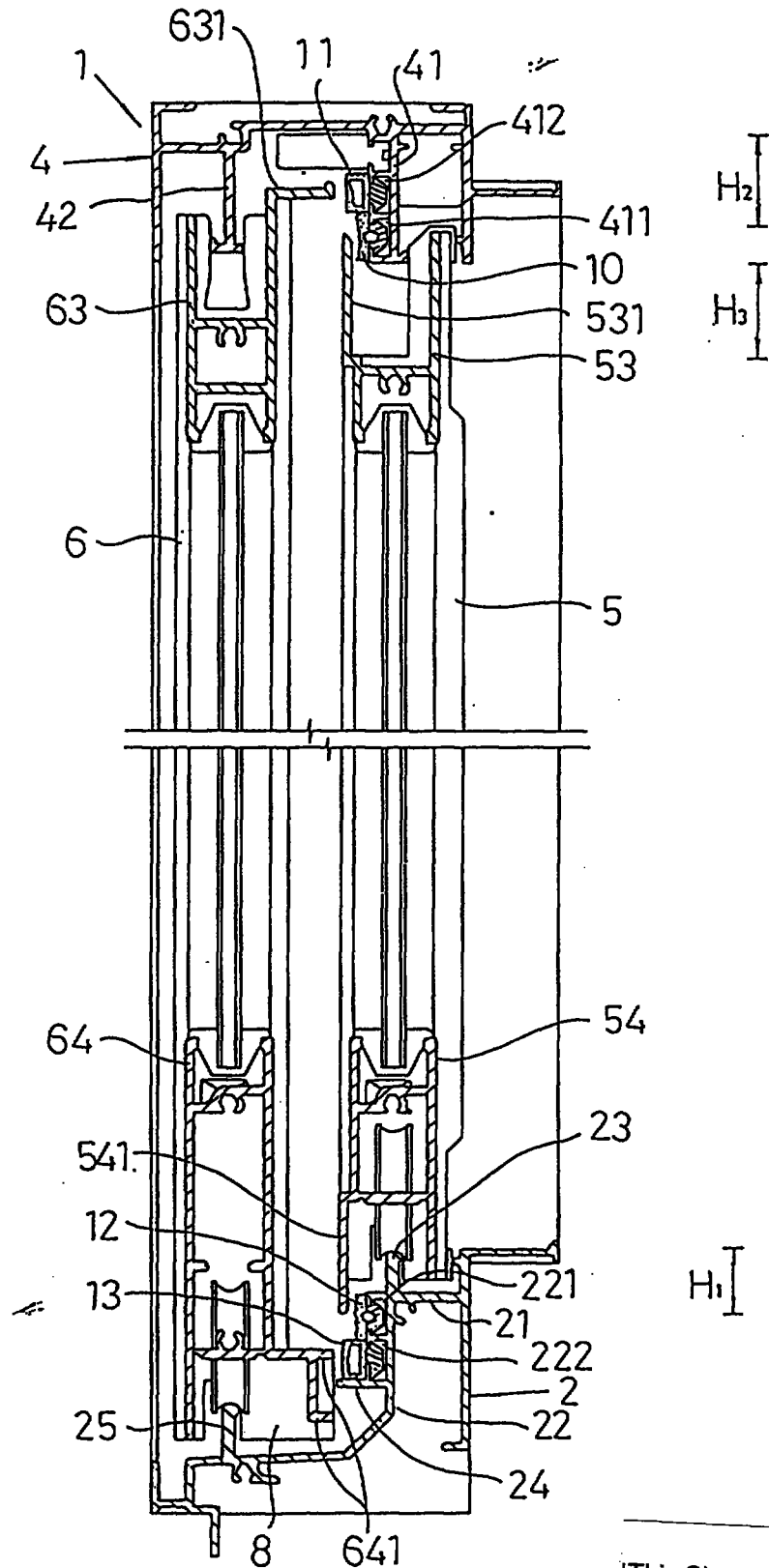
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FIG. 2



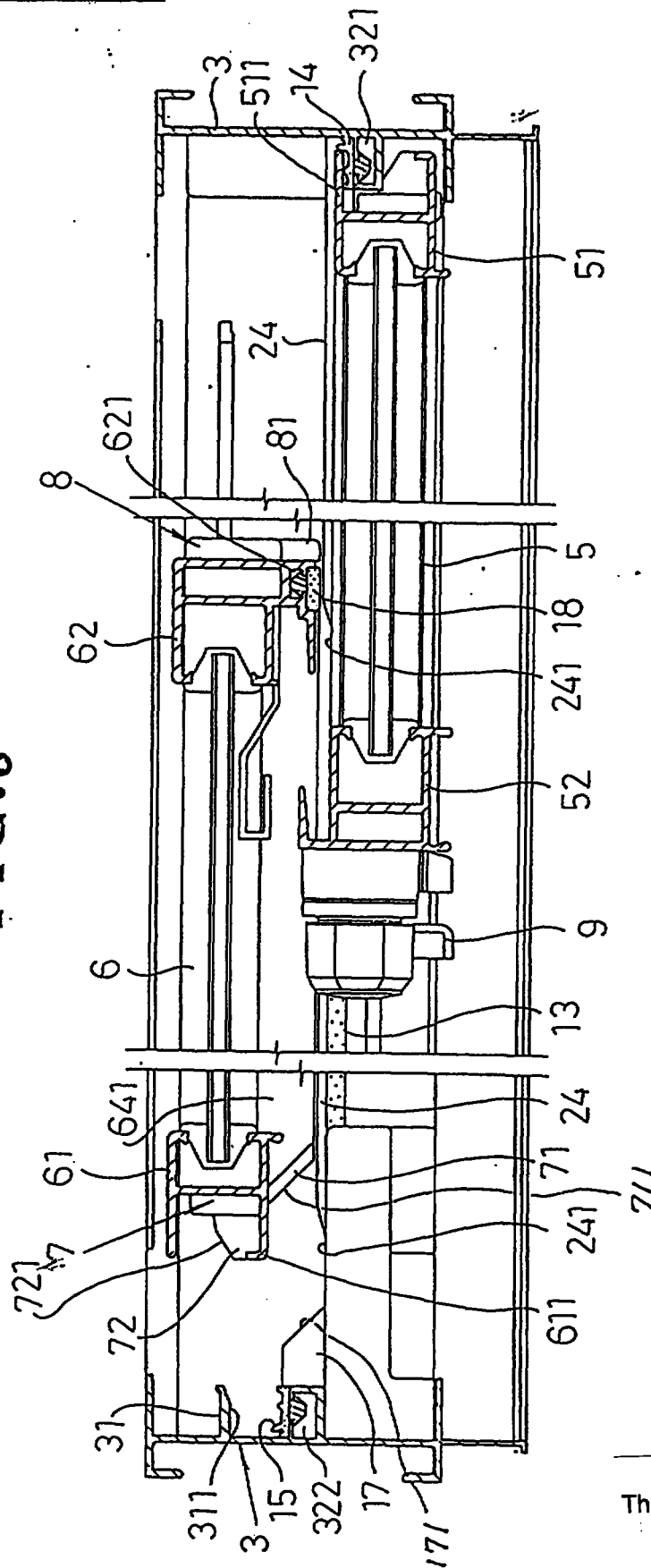
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FIG. 3



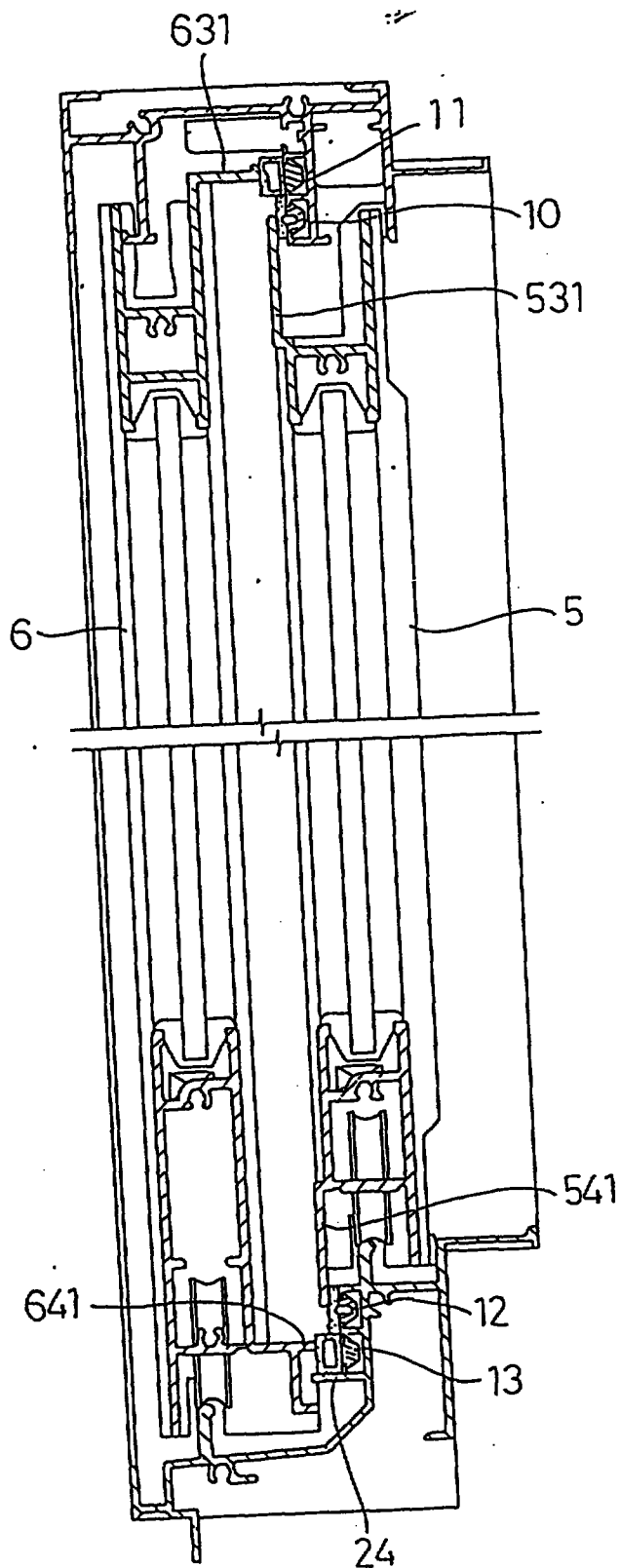
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FIG. 4



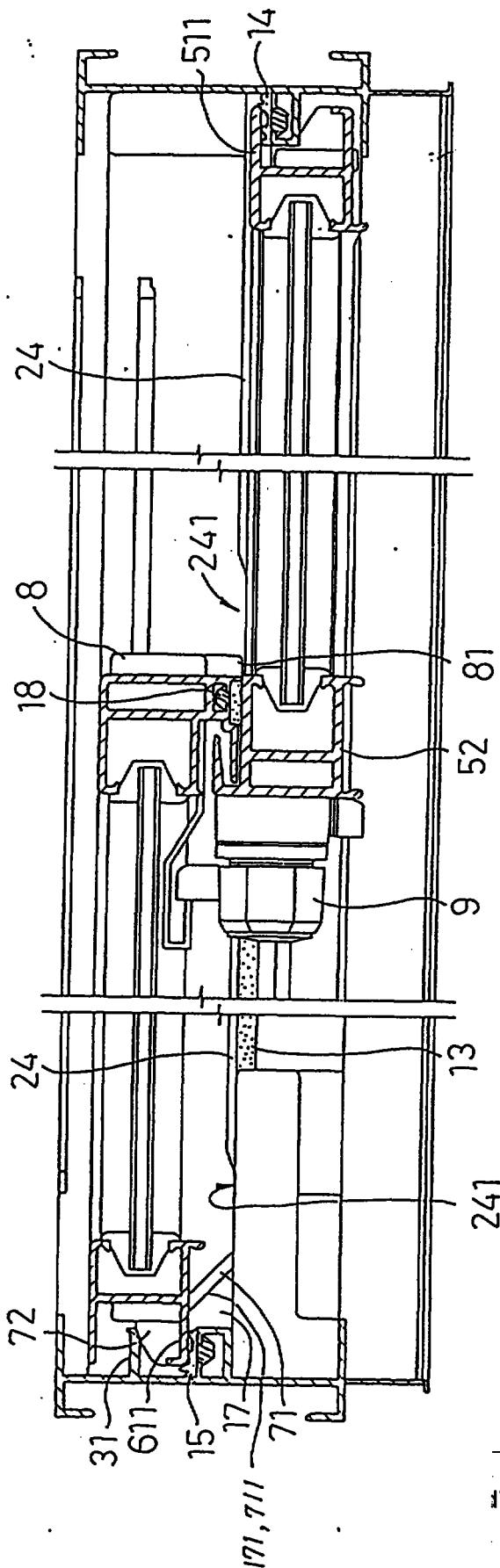
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FIG. 5



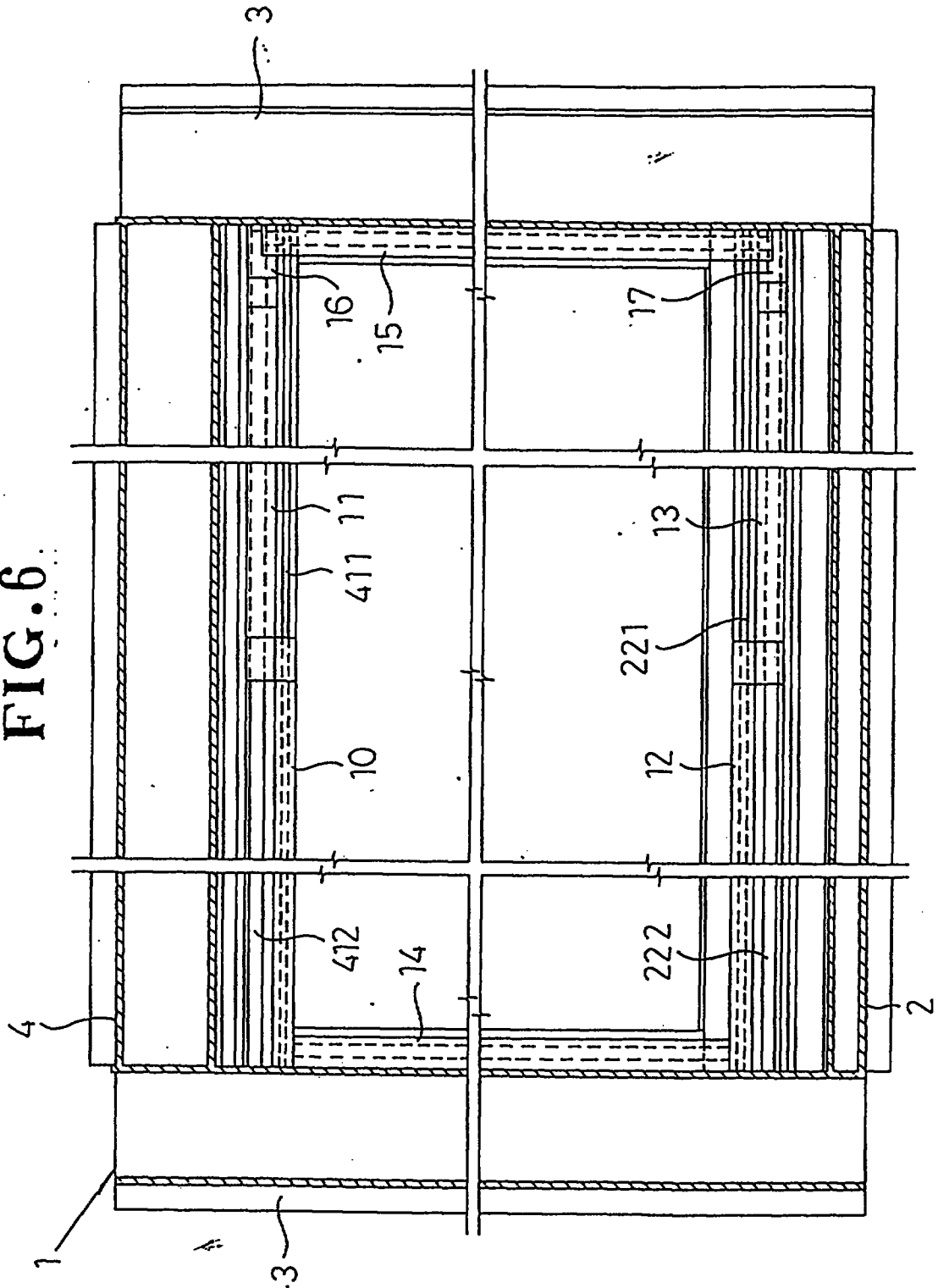
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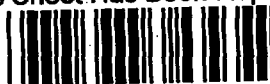
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FIG. 6



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S P E C I F I C A T I O N

INWARDLY DEMOUNTABLE SOUNDPROOF SASH WINDOW

The present invention relates to a soundproof sash window having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, with the interior sash demountable from the window frame toward the interior side.

In a soundproof sash having a pair of overlapping interior and exterior sashes, when both sashes are closed, they are firmly engaged with weatherstrips carried on the header, sill and side jambs of a window frame, while the meeting stile of one sash is firmly engaged with a weatherstrip carried on the meeting stile of the other sash. Thus, the sound insulation and watertightness of the sash window are secured. However, in order to avoid interference between the sashes and the weatherstrips during opening and closing operation of the sashes, the sashes are arranged to run in closely spaced planes which are spaced from the plane of the weatherstrips toward the exterior side of the sash window. More particularly, in view of the necessity of preventing the exterior sash from dragging the interior sash due to interference therebetween, the exterior sash while running is spaced a greater distance from the weatherstrip. It is, therefore, necessary to pull or displace the exterior sash toward the interior side to force the exterior sash

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against the weatherstrips after the exterior sash comes to its closed position.

Conventionally, the exterior sash includes two slide blocks attached to the bottom rail adjacent the meeting stile and the abutment stile so as to astride a bottom guide rail provided on the sill. During the movement of the exterior sash, the slide blocks are slidably engageable with the bottom guide rail to limit the displacement of the exterior sash in the direction perpendicular to the plane of the sash window. The displacement-limiting effect attained jointly by the slide blocks and the bottom guide rail increases with a decrease in the spacing between the slide blocks and the bottom guide rail. This means that an attempt to increase the running stability of the exterior sash involves the necessity of reducing the amount of inward pull or displacement of the exterior sash from its closed position. In this instance, however, due to the necessity of securing the airtightness in the closed condition of the sash window, the distance between the exterior sash and the weatherstrips cannot be enlarged. Accordingly, it occurs likely that the interior sash is dragged by the exterior sash while moving.

On the other hand, to enlarge the amount of inward pull or displacement of the exterior sash, the spacing between the exterior side surface of the bottom guide rail

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and the slide blocks must be enlarged. However, if this spacing is enlarged, the exterior sash while being moved is permitted to displace toward the exterior side by a distance equal to the enlarged spacing. Accordingly, the displacement-limiting effect attainable by the bottom guide rail and the slide blocks is small and, hence, the running stability of the exterior sash is deteriorated.

With the foregoing drawbacks of the prior art in view, an object of the present invention is to provide a soundproof double sliding sash window having structural features which enable stable running of the sashes during opening and closing operation and firm engagement between the sashes and weatherstrips when the sashes are closed.

In brief, a soundproof double sliding sash window according to the present invention includes first and second slide blocks fixedly mounted on a bottom rail at positions aligned with an abutment stile and a meeting stile, respectively, and slidable along an interior side surface of an exterior bottom guide rail of a sill when the exterior sash is running the exterior bottom guide rail. Each of the slide blocks has a slide portion projecting toward the interior side of the sash window. The sill has a horizontal guide plate extending longitudinally thereof and projecting exteriorly therefrom toward the slide portions of the slide blocks. During the movement of the exterior sash, the slide

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blocks are slidable along the interior side surface of the exterior bottom guide rail and the guide plate of the sill to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. The guide plate has first and second cutout recesses formed at positions corresponding in position to the abutment stile and the meeting stile of the exterior sash being closed so as to receive the slide portions of the slide blocks when the exterior sash is pulled or displaced toward the interior side.

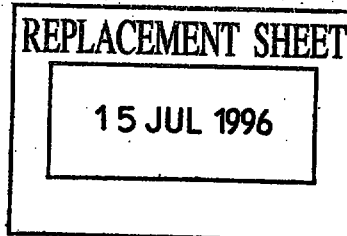
The guide plate projects exteriorly from a vertical face plate of the sill which is located below an interior bottom guide rail provided for movement of an interior sash. The slide portion of each of the first and second slide blocks projects from the interior side of the corresponding slide block and is slidable along the guide plate. While the exterior sash is running along the exterior bottom guide rail, the slide blocks are slidably guided between the interior side surface of the exterior bottom guide rail and the guide plate. By virtue of the engagement between the respective slide portions of the slide blocks and the guide plate, the displacement of the exterior sash in a direction toward the interior of the sash window is limited. Conversely, the displacement of the exterior sash in a direction toward the exterior side of the sash window is limited

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by the engagement between the interior side surface of the exterior bottom guide rail and the slide blocks. The displacement of the exterior sash in the direction perpendicular to the plane of the sash window is thus limited by the guide plate and the exterior bottom guide rail. Consequently, the exterior sash is able to run stably and smoothly.

The first and second recesses of the guide plate are formed at positions which correspond respectively to the position of the slide portion of the first slide block and the position of the slide portion of the second slide block that are assumed when the exterior sash is closed. With the recesses thus formed, after the slide blocks come to their closed positions, they can be displaced toward the interior side by a distance which is equal to the depth of the recesses. Accordingly, the amount of inward pull or displacement of the exterior sash is enlarged with the result that a firm engagement between the exterior sash and the mating weatherstrips is insured.

The above and other objects, features and advantages of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example. In the drawings:--

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FIG. 1 is a fragmentary perspective view showing the relation between an exterior sash and a sill of a sound-proof sash window according to the present invention;

FIG. 2 is a vertical cross-sectional view of the sash window showing the exterior sash while running;

FIG. 3 is a plan view of FIG. 2;

FIG. 4 is a vertical cross-sectional view of the sash window showing the exterior sash when closed;

FIG. 5 is a plan view of FIG. 4; and

FIG. 6 is a front elevational view showing the arrangement of weatherstrips attached to the exterior side of a window frame of the sash window.

The present invention will be described below in greater detail with reference to an embodiment shown in the accompanying drawings.

A soundproof sash window according to the invention includes, as shown in FIGS. 2 and 3, a window frame 1, and a pair of relatively horizontally movable, overlapping interior and exterior sashes 5 and 6 mounted within the window frame 1. The interior sash 5 is slidably supported between a pair of vertically opposed, interior top and bottom guide rails 41 and 23 (FIG. 2) projecting respectively from a header 4 and a sill 2 of the window frame 1. Similarly, the exterior sash 6 is slidably supported between a pair of vertically opposed, exterior top and bottom guide rails 42

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and 25 (FIG. 2) projecting respectively from the header and the sill 2 and spaced exteriorly from the interior top and bottom guide rails 41, 23. When closed, the interior and exterior sashes 5, 6 are firmly engaged with weatherstrips 10 - 15 carried on exterior surfaces of the window frame 1. The interior sash 5 is demountable from the window frame 1 toward the interior side of the sash window. The sash window has structural features which improve the running stability of the exterior sash 6 and the tightness of engagement between the exterior sash 6 and the mating weatherstrips 11, 13, 15 when the exterior sash 6 is closed.

The sill 2 of the window frame 1 includes a horizontal depth plate 21 on which the interior bottom guide rail 23 is provided for sliding movement of the interior sash 5. The sill 2 further has a vertical face plate 22 disposed below the interior bottom guide rail 23 and extends downwardly from the depth plate 21. The face plate 22 includes a horizontal guide plate 24 projecting therefrom toward the exterior side of the sash window. The guide plate 24 is engageable with first and second slide blocks 7, 8 during the opening and closing operation of the exterior sash 6. As shown in FIG. 2, the guide plate 24 lies in a horizontal plane extending parallel to, and located vertically centrally between, a pair of parallel spaced horizontal plates 641, 641 projecting interiorly from a lower

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portion of a bottom rail 64 of the exterior sash 6. The guide plate 24, as shown in FIG. 3, extends along a longitudinal portion of the sill 2 within which an abutment stile 61 and a meeting stile 62 of the exterior sash 6 are movable. The guide plate 24 thus arranged prevents the slide blocks 7, 8 from displacing toward the interior side. The guide plate 24 has two cutout recesses 241, 241 for receiving respectively therein the first and second slide blocks 7, 8 when the exterior sash 6 is closed. The recesses 241, 241 are formed at positions which correspond in position to the abutment stile 61 and the meeting stile 62, respectively, of the exterior sash 6 being closed. With the recesses 241, 241 thus provided, the exterior sash 6 can be pulled or displaced toward the interior side.

The first and second slide blocks 7, 8 are fixedly mounted on the bottom rail 64 of the exterior sash 6 at positions aligned respectively with the abutment stile 61 and the meeting stile 62 of the exterior sash 6, as shown in FIG. 1. The slide blocks 7, 8 are disposed astride the exterior bottom guide rail 25 of the sill 2 and slidable along an interior side surface of the exterior bottom guide rail 25. As shown in FIG. 2, the lower ends of the first and second slide blocks 7, 8 (only the second slide block 8a being shown) are shaped such that during the sliding movement of the exterior sash 6, the lower ends of the slide.

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blocks 7, 8 are engageable only with the interior side surface of the exterior bottom guide rail 25 while keeping a clearance between themselves and the exterior side surface of the exterior bottom guide rail 25. Due to the engagement between the slide blocks 7, 8 and the interior side surface of the exterior bottom guide rail 25, the exterior sash 6 while running is prevented from displacing toward the exterior side. When located at the closed position, the exterior sash 6 is displaceable from a path of running only in a direction toward the interior side. Each of the slide blocks 7, 8 is firmly fitted in a hollow interior space of a corresponding one of the abutment stile 61 and the meeting stile 62.

The slide blocks 7, 8 have slide portions 71, 81 projecting from the interiorly facing surfaces of the abutment stile and meeting stile 61, 62 and engageable with the guide plate 24. By virtue of the engagement between the slide portions 71, 81 and the guide plate 24, the exterior sash 6 while running is prevented from displacing toward the interior side. After the exterior sash 6 is moved to its closed position, it is pulled or displaced toward the interior side by means of a pull-in block (not shown) and a crescent lock 9 during which time the slide portions 71, 81 of the slide blocks 7, 8 are received in the recesses 241, 241 formed in the guide plate 24.

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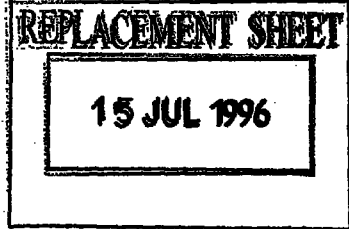
The horizontal plates 641, 641 project from the interior side of the bottom rail 64 of the exterior sash 6 and lie in vertically spaced planes extending parallel to and spaced from the plane of the guide plate 24 with a space therebetween. The slide block 7 disposed on the abutment stile 61 side is attached to the abutment stile 61 with the slide portion 71 gripped between the horizontal plate 641, 641. As shown in FIG. 1, the slide portion 71 of the slide block 7 projects from one end of the pair of horizontal plates 641, 641 toward the side jamb 3 (which is the left side as illustrated in FIG. 3). The projecting portion of the slide portion 71 is beveled to form a beveled surface 711 which faces obliquely toward the interior side of the sash window. When the exterior sash 6 is closed, the beveled surface 711 of the slide portion 71 is firmly engaged with a beveled surface 171 of a corner weatherstrip 17 disposed on the sill 2 adjacent to the left side jamb 3, as shown in FIG. 5. The beveled surface 171 is complementary in contour to the shape of the beveled surface 711. With this firm engagement between the beveled surfaces 711 and 171, the sound insulation and airtightness at a lower portion of the bottom rail 64 are considerably improved. Furthermore, since one end of the pair of horizontal plates 641, 641 is closed by the slide portion 71, the exterior sash 6 can be opened and closed with safety and is slightly

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in appearance and, hence, has a high design value.

When the exterior sash 6 is closed, the upper horizontal plate 641 is firmly engaged with the weatherstrip 13 provided on the sill 2, as shown in FIG. 4.

The slide block 7 disposed on the abutment stile 61 side includes, as shown in FIGS. 1 and 3, an engagement strip 72 which is engageable with a pull-in member or plate 31 projecting from the left side jamb 3 toward the abutment stile 61. The pull-in member 31 and the engagement strip 72 are engageable with each other to pull or displace the exterior sash 6 from the closed position toward the interior side of the sash window. At least one of an exteriorly facing engagement surface 721 of the engagement strip 72 and an interiorly facing contact surface 311 of the pull-in member 31 is beveled or slanted from the exterior side toward the interior side when viewed in a direction from an open position toward the closed position of the exterior sash 6. With the contact surfaces 721, 311 thus profiled, as the exterior sash 6 advances from the position of FIG. 3 which is shortly ahead of the closed position, toward the closed position, the engagement strip 72 of the slide block 7 first engages the pull-in member 31 and then is gradually displaced toward the interior side by the pull-in member 31. With this displacement of the slide block 7, the exterior sash 6 is pulled or displaced toward the interior side.



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FIGS. 2 and 3 illustrate the exterior sash 6 while running along a path. As described above, the exterior sash 6 is closed while being displaced from the running path toward the interior side. This is done by virtue of the engagement between the engagement strip 72 and the pull-in member 31 which takes place when the exterior sash 6 approaches the closed position. Then, the crescent sash lock 9 is fastened whereby the inward pull or displacement of the exterior sash is completed, as shown in FIGS. 4 and 5. In this instance, the slide portions 71, 81 of the respective slide blocks 7, 8 are received in the recesses 241, 241, respectively, in the guide plate 24. The upper horizontal plate 641 of the bottom rail 64 and the slide portion 71 of the slide block 7 are firmly engaged with the weatherstrip 13 and the corner weatherstrip 17, respectively, thereby securing the airtightness between the bottom rail 64 and the sill 2 and between the bottom rail 64 and the left side jamb 3. Similarly, When the slide portion 81 of the slide block 8 is received in the recess 241 of the guide plate 24, a weatherstrip 18 carried on the meeting stile 62 of the exterior sash 6 is firmly engaged with the meeting stile 52 of the interior sash 5, thereby securing the airtightness between the meeting stile 62 of the exterior sash 6 and the meeting stile 52 of the interior sash 5.

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interior sash 5 is pulled or displaced interiorly together with the exterior sash 6. The interior and exterior sashes 5, 6 thus displaced are firmly engaged with the weatherstrips 10, 12, 12 and the weatherstrips 11, 13, 15, respectively.

When the interior and exterior sashes 5, 6 are closed as shown in FIG. 4, their top rails 53, 63 are firmly engaged respectively with the first and second weatherstrips 10, 11 which are carried on the exterior surface of an interior top guide rail 41 of the header 4 in vertical juxtaposition and extend in the longitudinal direction of the interior top guide rail 41. Similarly, the respective bottom rails 54, 64 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the third and fourth weatherstrips 12, 13 which are carried on the exterior surface of the vertical face plate 22 of the sill 2 in vertical juxtaposition and extend in the longitudinal direction of the face plate 22. On the other hand, the respective abutment stile 51, 61 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the fifth and sixth weatherstrips 14, 15 which are carried on the side jambs 3, 3, respectively, to face toward the exterior side and extend in the longitudinal direction of the side jambs 3. Similarly, the weatherstrip 18, which is carried on the interior surface of the meeting stile 62 of the exterior

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sash 6 and extends along the length of the meeting stile 62 is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5. With this arrangement of seals, sufficient sound insulation and waterproofing are secured between the sashes 5, 6 and the window frame 1.

As shown in FIG. 2, the bottom rail 54 of the interior sash 5 has an exterior vertical plate 541 downwardly projecting therefrom. Since the distance H_1 between a lower end of the exterior vertical plate 541 and an upper end of the interior bottom guide rail 23 of the sill 2 is smaller than the amount of allowable vertical displacement of the interior sash 5 (which is determined by a smaller one of the distance H_2 between the top rail 53 and the header 4 measured at an upper end of the top rail 53 and the distance H_3 between the top rail 53 and the header 41 measured at the lower end of the interior top guide rail 41), the interior sash 5 can be removed from the window frame 1 toward the interior side of the sash window. To remove the interior sash 5, the interior sash 5 is lifted up into the space between the top rail 53 and the header 4, and while keeping this condition, the interior sash 5 is pulled interiorly in such a manner as to turn the interior sash 5 about its upper edge.

The first and second weatherstrips 10, 11 with which the top rails 53, 63 are firmly engaged, respectively,

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are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 411, 412, respectively formed longitudinally in the interior top guide rail 41 of the header 4. The pockets 411, 412 open toward the exterior side of the header 4, so that the weatherstrips 10, 11 received in the pockets 411, 412 are faced exteriorly. Similarly, the third and fourth weatherstrips 12, 13 respectively engageable with the bottom rails 54, 64 are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 221, 222, respectively, formed longitudinally in the vertical face plate 22 of the sill 2. The pockets 221, 222 open toward the exterior side of the sill 2, so that the weatherstrips 12, 13 received in the pockets 221, 222 are faced exteriorly.

The weatherstrips 10, 12 respectively received in the pockets 412, 222 for sealing engagement with the interior sash 5 are located inwardly of the weatherstrips 11, 13 which are respectively received in the pockets 411, 221 for sealing engagement with the exterior sash 6. As shown in FIG. 6, the weatherstrips 10, 11 and the weatherstrips 12, 13 extend along the interior top guide rail 41 and the face plate 22, respectively, over a length which is at least equal to the length of the top and bottom rails 53, 54; 63, 64 of the interior and exterior sashes 5, 6. As shown in FIG. 4, the weatherstrip 10 and the weatherstrip 12 are engaged with an upwardly projecting exterior vertical plate

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531 of the top rail 53 and the downwardly projecting exterior or vertical plate 541 of the bottom rail 54, respectively. Similarly, the weatherstrip 11 and the weatherstrip 13 are engaged with the interiorly projecting horizontal plate 631 of the top rail 63 and the upper horizontal plate 641 of the bottom rail 64, respectively.

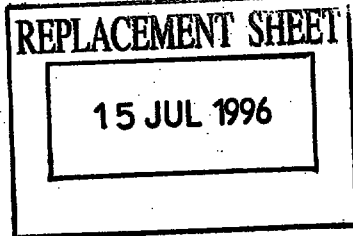
FIG. 6 diagrammatically shows the arrangement of the weatherstrips 10 - 15 mounted on the exterior surfaces of the window frame 1 along an inner peripheral edge of the window frame 1. The weatherstrip 10 provided for engagement with the top rail 53 of the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51 of the interior sash 5, and a substantially central portion of the header 4 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. Similarly, the weatherstrip 11 provided for engagement with the top rail 63 of the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61 of the exterior sash 6, and the substantially central portion of the header 4 where the meeting stile 62 overlaps with the meeting stile 52 of the interior sash 5. At the substantially central portion of the header 4, the weatherstrips 10, 11 are integrally connected together. The joint portion between the weatherstrips 10, 11 has an exteriorly facing surface which is sealingly engageable with upper end por-

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tions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6.

Likewise the weatherstrips 10, 11 on the top rail side, the weatherstrips 12, 13 on the bottom rail side have a length which is equal to the length of the bottom rails 54, 64 of the interior and exterior sashes 5, 6. The weatherstrip 12 provided for engagement with the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51, and a substantially central portion of the sill 2 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. The weatherstrip 13 provided for engagement with the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61, and the substantially central portion of the sill 2. The weatherstrips 12, 13 are integrally connected together at the substantially central portion of the sill 2. The joint portion between the weatherstrips 12, 13 has an exteriorly facing surface with which lower end portions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6 are firmly engageable.

As shown in FIG. 3, the side jamb 3 which is engageable with the abutment stile 51 of the interior sash 5 has a longitudinal groove or pocket 321 opening exteriorly for receiving therein the weatherstrip 14. Similarly, the side jamb 3 engageable with the abutment stile 61 of the

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exterior sash 6 has a longitudinal groove or pocket 322 opening exteriorly for receiving therein the weatherstrip 15. The weatherstrips 14, 15 are fitted in the pockets 321, 322, respectively, and face toward the exterior side of the sash window.

The pocket 321 formed in the side jamb 3 (which is the right side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 14 received in this pocket 321 lies in substantially the same vertical plane as the weatherstrips 10, 11, 12, 13 and is engageable with a side flange or plate 511 projecting from the exterior side of the abutment stile 51 toward the side jamb 3 which is the right side in FIG. 3. With this arrangement of the pocket 321, the continuity between the weatherstrip 14 and the weatherstrips 10 - 13 is secured. Similarly, the pocket 322 formed in the side jamb 3 (which is the left side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 15 received in the pocket 322 is engageable with a side flange or plate 511 projecting from the interior side of the abutment stile 61 toward the side jamb 3 so as to secure the continuity between the weatherstrip 15 and the weatherstrips 10 - 13. When the interior and exterior sashes 5, 6 are pulled or displaced toward the interior side, as shown in FIG. 5, the abutment stiles 51, 61 are firmly engaged with the weatherstrips 14, 15, respectively, thereby securing the

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airtightness and watertightness between the sashes 5, 6 and the corresponding side jambs 3.

The weatherstrip 15 adapted to be engaged with the abutment stile 61 of the exterior sash 6 is somewhat displaced toward the exterior side from the common vertical plane of the weatherstrips 10 - 14. However, as shown in FIG. 6, the weatherstrip 15 is connected at its upper end with the weatherstrip 11 by means of the corner weatherstrip 16 and, at its lower end, with the weatherstrip 13 by means of the corner weatherstrip 17. With the corner weatherstrips 16, 17 thus provided, the continuity between the weatherstrip 15 and the weatherstrip 11 and also between the weatherstrip 15 and the weatherstrip 13 can be maintained.

As shown in FIG. 3, the meeting stile 62 of the exterior sash 6 has a longitudinal groove or pocket 621 formed in an interior surface thereof and opening toward the interior side to receive therein the weatherstrip 18. When the interior and exterior sashes 5, 6 are pulled or displaced interiorly, as shown in FIG. 5, the weatherstrip 18 fitted in the pocket 621 is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5 to secure the airtightness and watertightness between the interior and exterior sashes 5, 6.

By virtue of the weatherstrips 10 - 15 provided along the inner peripheral edge of the window frame 1 and

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the weatherstrip 18 acting between the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6, the sash window has sufficient airtightness and watertightness and is able to isolate the interior side of the sash window from the interior side.

As described above, a soundproof sash window of the invention includes first and second slide blocks mounted on a bottom rail of an exterior sash at positions aligned with a meeting stile and an abutment stile, respectively, of the exterior sash and slidable along an exterior bottom guide rail of a sill when the exterior sash is running on and along the exterior bottom guide rail. The slide blocks each have a slide portion projecting from an interior side of the corresponding slide block. The sill has a guide plate projecting interiorly therefrom in confronting relation to the slide portions of the slide blocks. During the sliding movement of the exterior sash, the slide blocks are slidably guided between an interior side surface of the exterior bottom guide rail and the guide plate to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. With this limited displacement, the exterior sash can move stably and smoothly.

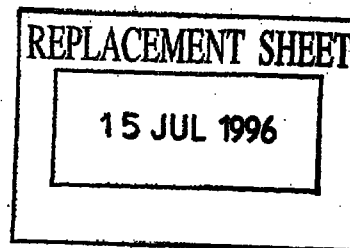
In addition, the guide plate has first and second recesses in which the respective interiorly projecting slide portions of the first and second slide blocks are received

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when the exterior sash is closed. With the recesses thus provided, After the exterior sash arrives at its closed position, it can be displaced toward the interior side by a distance which is equal to the depth of the recesses. It is therefore possible to enlarge the amount of inward pull or displacement of the exterior sash and improve the tightness of engagement between the exterior sash and the mating weatherstrips.

Obviously, various minor changes and modifications of the present invention are possible in the light of the above teaching. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

There follows a list of parts shown in the drawings:-

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Parts List

- 1: window frame
- 2: sill of 1
- 3: side jamb of 1
- 4: header of 1
- 5: interior sash
- 6: exterior sash
- 7: first slide block mounted on 61 adjacent 64
- 8: second slide block mounted on 62 adjacent 64
- 9: crescent sash lock
- 10: weatherstrip
- 11: weatherstrip
- 12: weatherstrip
- 13: weatherstrip
- 14: weatherstrip
- 15: weatherstrip
- 16: (corner) weatherstrip between 11 and 15
- 17: (corner) weatherstrip between 13 and 15
- 18: weatherstrip on 62
- 21: horizontal depth plate of 2
- 22: vertical face plate of 2 depending from 21
- 23: interior bottom guide rail formed on 21 for 5
- 24: horizontal guide plate projecting exteriorly from 22
- 31: pull-in member projecting from 3 for engagement with 72

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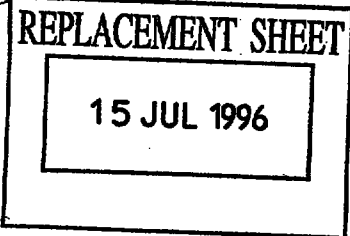
- 41: interior top guide rail formed on 4 for 5
- 42: exterior top guide rail formed on 4 for 6
- 51: abutment stile of 5
- 52: meeting stile of 5
- 53: top rail of 5
- 54: bottom rail of 5
- 61: abutment stile of 6
- 62: meeting stile of 6
- 63: top rail of 6
- 64: bottom rail of 6
- 71: slide portion of 7 projecting from the exterior surface
of 61 toward 24 for sliding engagement with 24
- 72: engagement strip of 7 engageable with 31
- 81: slide portion of 8 projecting from the exterior surface
of 62 toward 24 for sliding engagement with 24
- 171: beveled surface of 17 engageable with 711 of 71
- 221: pocket formed in 22 of 2 for receiving therein 12
- 222: pocket formed in 22 of 2 for receiving therein 13
- 241: exteriorly opening recess formed in 24 for receiving
therein 7, 8 to permit 6 to be pulled interiorly
- 311: (interiorly facing) contact surface of 31
- 321: pocket formed in 3 of 51 side for receiving therein 14
- 322: pocket formed in 3 of 61 side for receiving therein 15
- 411: pocket formed in 41 of 4 for receiving therein 10
- 412: pocket formed in 41 of 4 for receiving therein 11

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- 511: outwardly projecting side plate of 51
- 531: upwardly projecting, exterior plate of 53
- 541: downwardly projecting, exterior horizontal plate of 54
- 611: outwardly projecting side plate of 61
- 621: pocket in the exterior surface of 52 for receiving 18
- 631: interiorly projecting plate of 63
- 641: (a pair of parallel spaced) horizontal plates
projecting interiorly from a lower portion of 64
- 711: beveled surface of 71 engageable with 171 of 17
- 721: (exteriorly facing) contact surface of 72

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CLAIMS:

1. A soundproof double sliding sash window of the type having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, wherein said interior and exterior sashes are slidably supported respectively between a pair of opposed interior top and bottom guide rails formed respectively on a header and a sill of the window frame and between a pair of opposed exterior top and bottom guide rails formed respectively on the header and the sill, wherein said interior and exterior sashes, when closed, are firmly engaged with weatherstrips carried on exteriorly facing surfaces of said window frame, and wherein said interior sash is demountable from said window frame toward the interior side of said sash window, characterized in that said window frame includes a vertical face plate disposed below said interior bottom guide rail for guiding therealong said interior sash, and a guide plate projecting from said face plate toward the exterior side of said sash window, that said exterior sash includes first and second slide blocks fixedly mounted on a bottom rail of said exterior sash at positions aligned respectively with an abutment stile and a meeting stile of said exterior sash, said first and second slide blocks being slidable along an interior side surface of said exterior bottom guide rail for guiding therealong said exterior sash,

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that said first and second slide blocks respectively have first and second slide portion projecting from an interior side thereof and slidable along said guide plate, that said guide plate has first and second cutout recesses formed at positions corresponding in position to said abutment stile and said meeting stile, respectively, of said exterior sash being closed for receiving respectively therein said first and second slide portions of said first and second slide blocks, that during the movement of said exterior sash, said first and second slide blocks are engageable with said guide plate and said interior side surface of said exterior bottom guide rail to limit the displacement of said exterior sash toward the interior side and the exterior side of said sash window, and when said exterior sash is disposed in its closed position, said first and second slide blocks are displaced toward the interior side with their slide portions received in said first and second cutout recesses.

2. A soundproof double sliding sash window according to claim 1, wherein said bottom rail includes a pair of parallel spaced horizontal plates projecting from an interior side thereof, and said first slide portion is gripped between said horizontal plates and projects from one end of said pair of horizontal plates toward a side jamb of said window frame with which said abutment stile is engageable.

3. A soundproof double sliding sash window accord-



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ing to claim 2, wherein said guide plate lies in a plane extending parallel to, and disposed centrally between, the respective planes of said horizontal plates.

4. A soundproof double sliding sash window according to claim 2, wherein said first slide portion has a beveled surface facing obliquely toward said side jamb and the interior side of said sash window, said window frame includes a corner weatherstrip disposed on said sill adjacent said side jamb and has a beveled surface complementary in contour to the shape of said beveled surface of said first slide portion, and said beveled surface of said first slide portion is firmly engageable with said beveled surface of said corner weatherstrip when said exterior sash is closed.



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ABSTRACT

INWARDLY DEMOUNTABLE SOUNDPROOF SASH WINDOW

A soundproof sash window including an exterior sash (6) having first and second slide blocks (7, 8) mounted on a bottom rail (64) at positions aligned with an abutment stile (61) and a meeting stile (62), respectively, and slidably movable along a bottom guide rail (25) of a sill (2) when the exterior sash is running. Each of the slide blocks has a slide portion (71, 81) projecting toward the interior side of the sash window. The sill has a horizontal guide plate (25) extending longitudinally thereof and projecting exteriorly therefrom toward the slide portions of the slide blocks. During the movement of the exterior sash, the slide blocks are slidable along an interior side surface of the bottom guide rail and the guide plate to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. The guide plate has first and second cutout recesses (241, 241) formed at positions corresponding in position of the abutment stile and the meeting stile of the exterior sash being closed so as to receive the slide portions of the slide blocks.

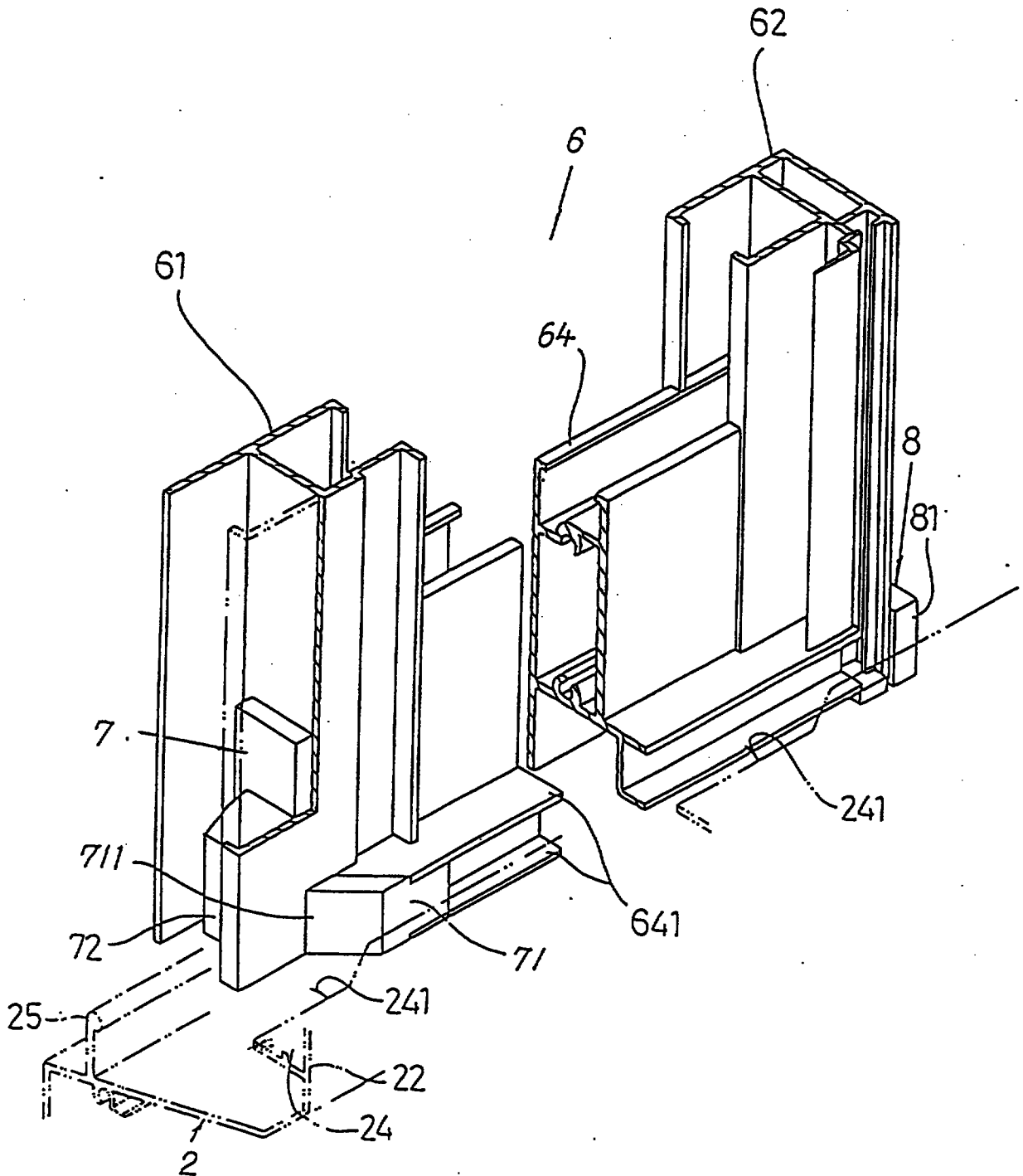
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FIG. 1



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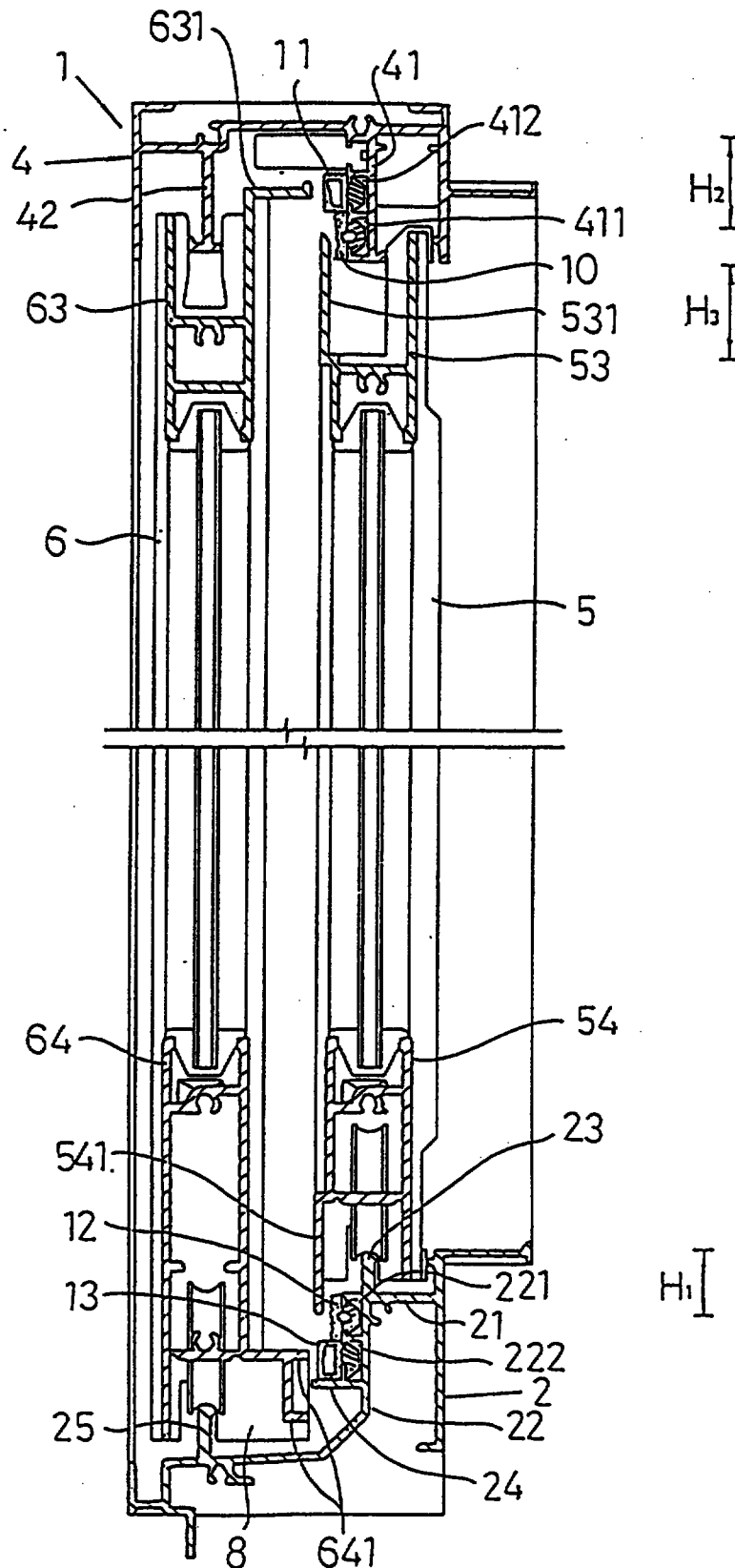


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FIG. 2



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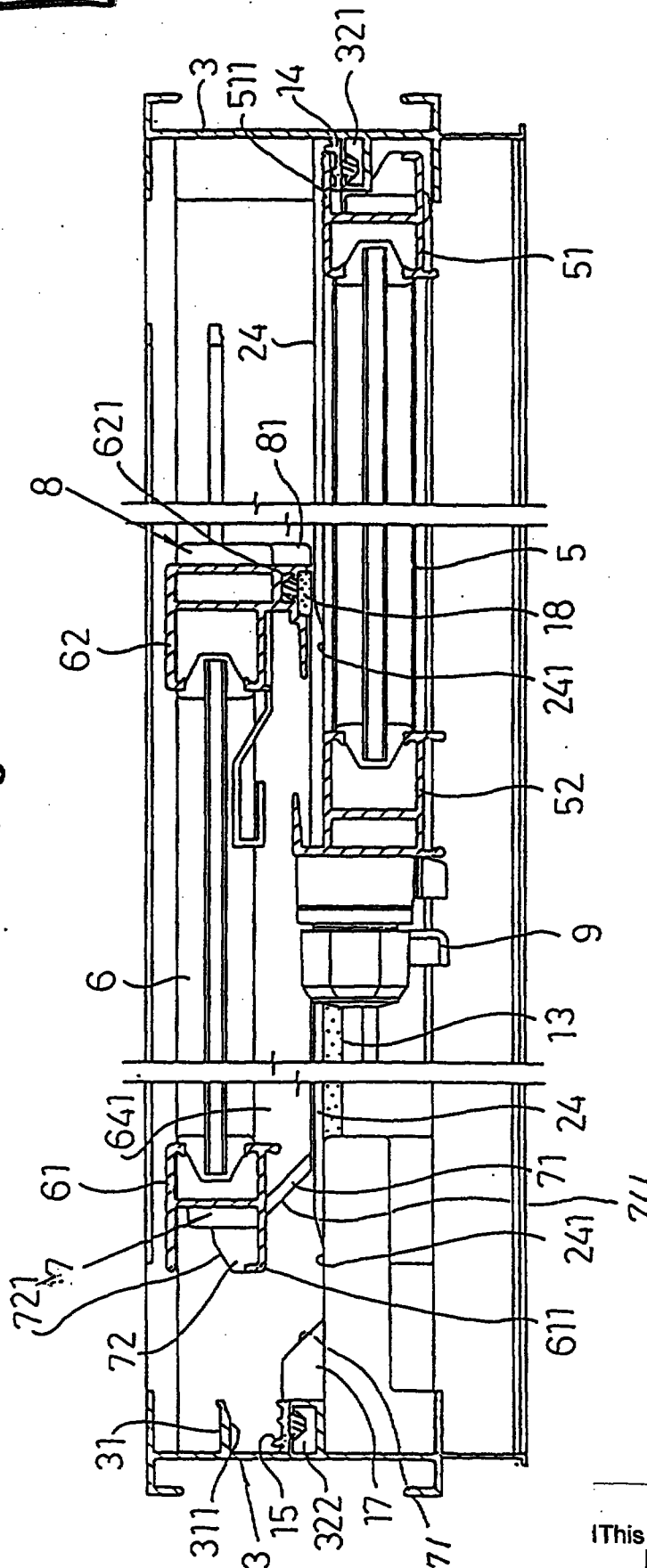


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FIG. 3



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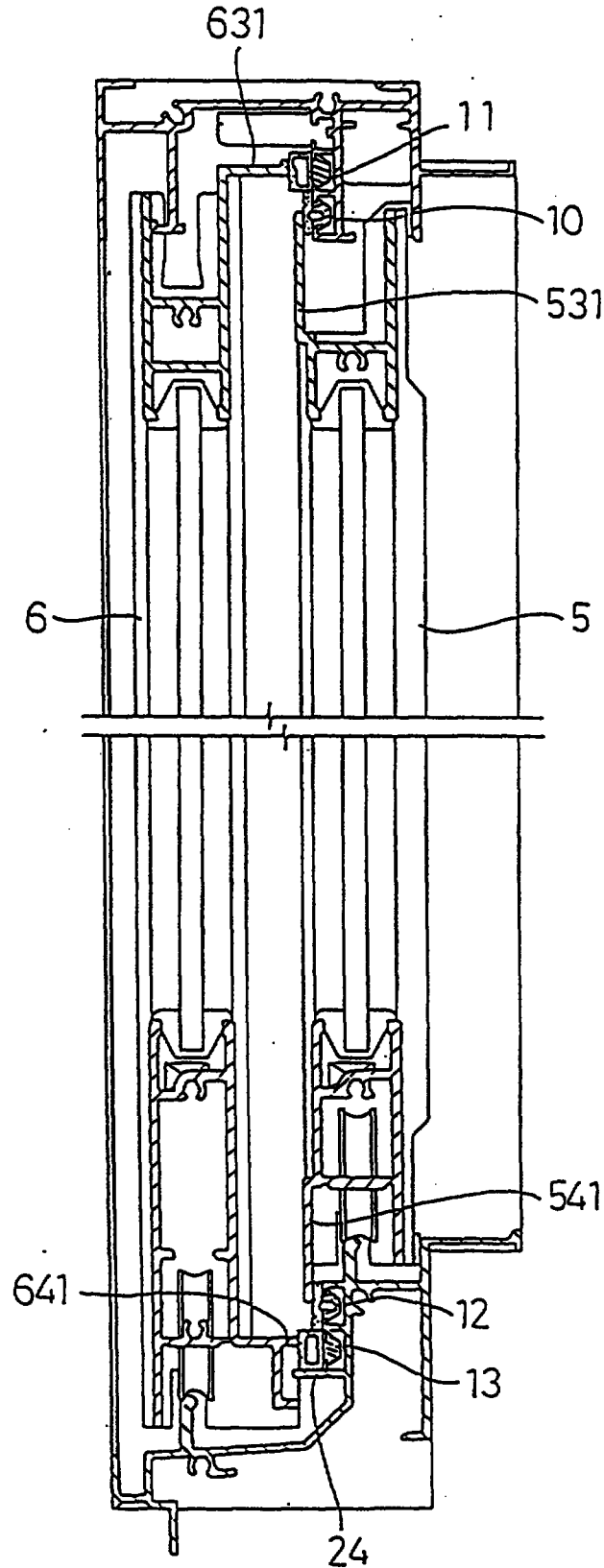
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FIG. 4



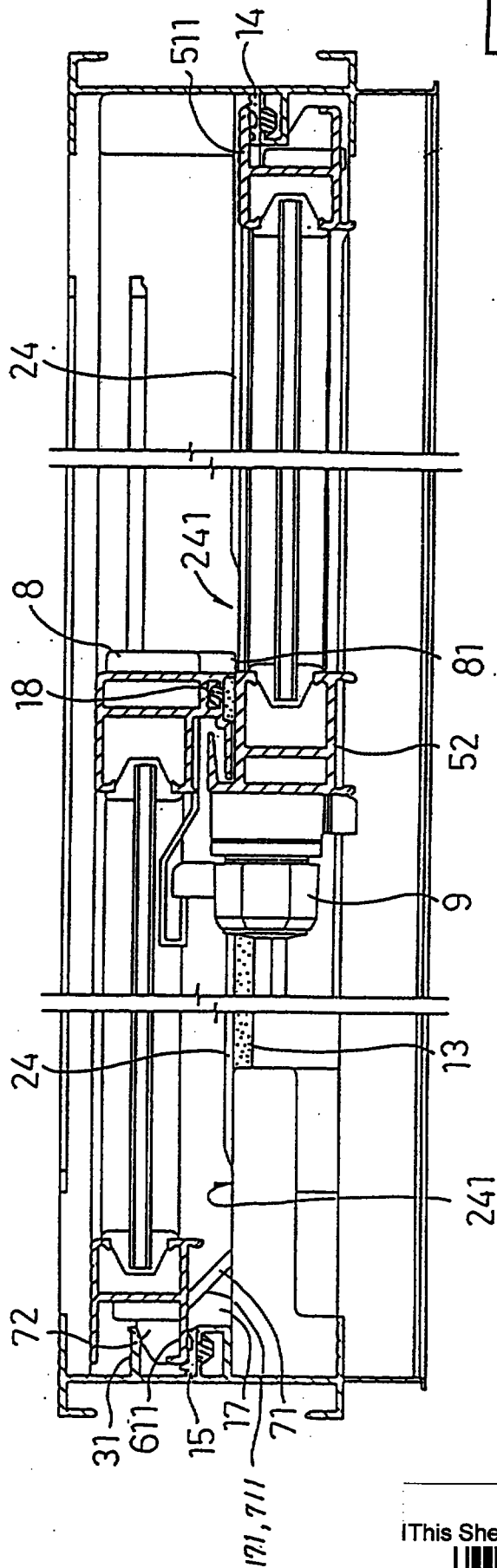
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FIG. 5



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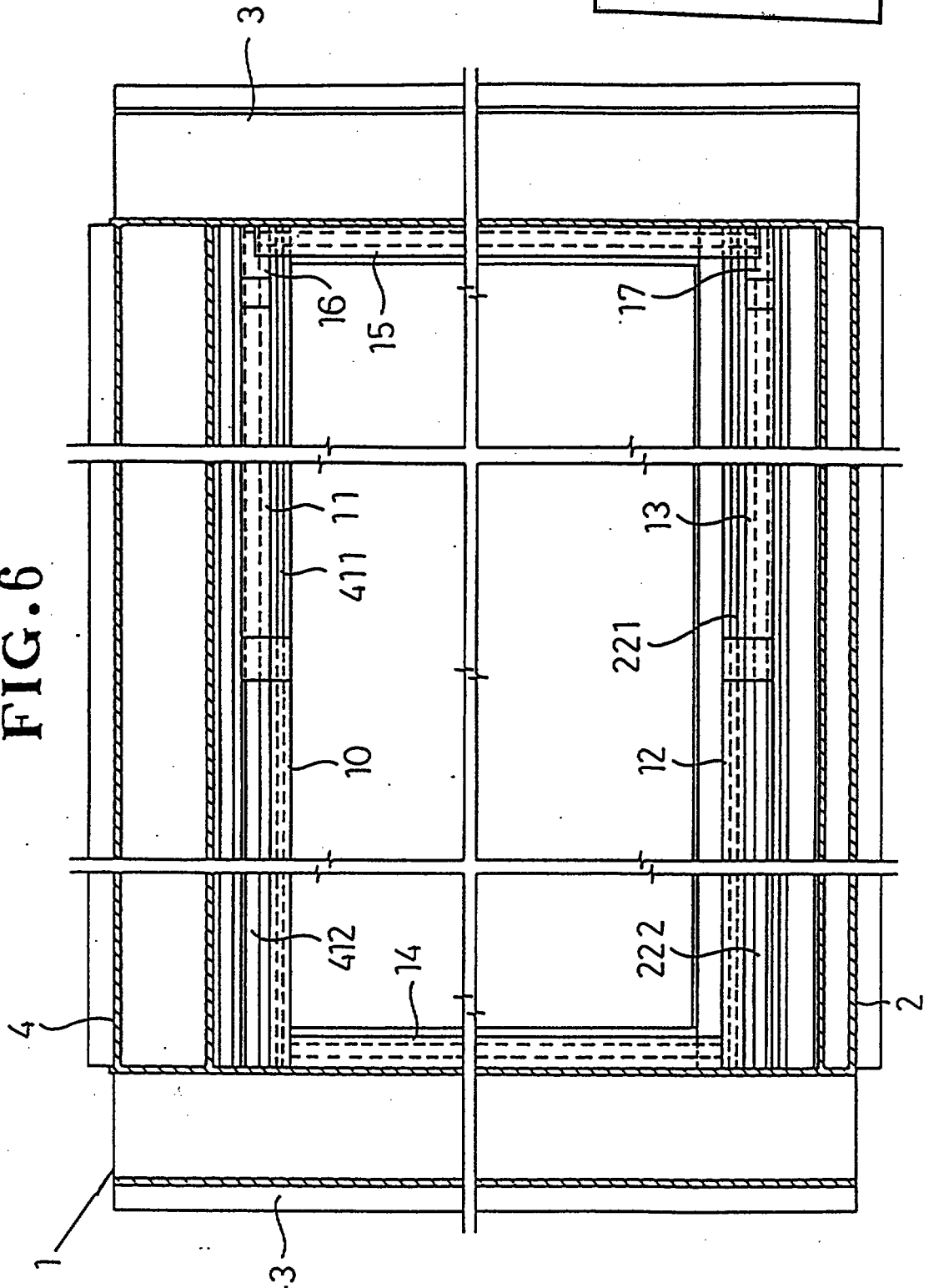


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S P E C I F I C A T I O N

INWARDLY DEMOUNTABLE SOUNDPROOF SASH WINDOW

The present invention relates to a soundproof sash window having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, with the interior sash demountable from the window frame toward the interior side.

In a soundproof sash having a pair of overlapping interior and exterior sashes, when both sashes are closed, they are firmly engaged with weatherstrips carried on the header, sill and side jambs of a window frame, while the meeting stile of one sash is firmly engaged with a weatherstrip carried on the meeting stile of the other sash. Thus, the sound insulation and watertightness of the sash window are secured. However, in order to avoid interference between the sashes and the weatherstrips during opening and closing operation of the sashes, the sashes are arranged to run in closely spaced planes which are spaced from the plane of the weatherstrips toward the exterior side of the sash window. More particularly, in view of the necessity of preventing the exterior sash from dragging the interior sash due to interference therebetween, the exterior sash while running is spaced a greater distance from the weatherstrip. It is, therefore, necessary to pull or displace the exterior sash toward the interior side to force the exterior sash

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against the weatherstrips after the exterior sash comes to its closed position.

Conventionally, the exterior sash includes two slide blocks attached to the bottom rail adjacent the meeting stile and the abutment stile so as to astride a bottom guide rail provided on the sill. During the movement of the exterior sash, the slide blocks are slidably engageable with the bottom guide rail to limit the displacement of the exterior sash in the direction perpendicular to the plane of the sash window. The displacement-limiting effect attained jointly by the slide blocks and the bottom guide rail increases with a decrease in the spacing between the slide blocks and the bottom guide rail. This means that an attempt to increase the running stability of the exterior sash involves the necessity of reducing the amount of inward pull or displacement of the exterior sash from its closed position. In this instance, however, due to the necessity of securing the airtightness in the closed condition of the sash window, the distance between the exterior sash and the weatherstrips cannot be enlarged. Accordingly, it occurs likely that the interior sash is dragged by the exterior sash while moving.

On the other hand, to enlarge the amount of inward pull or displacement of the exterior sash, the spacing between the exterior side surface of the bottom guide rail

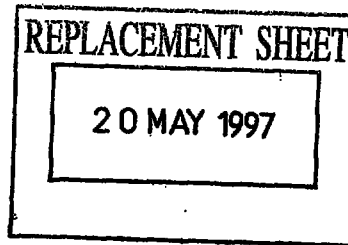
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and the slide blocks must be enlarged. However, if this spacing is enlarged, the exterior sash while being moved is permitted to displace toward the exterior side by a distance equal to the enlarged spacing. Accordingly, the displacement-limiting effect attainable by the bottom guide rail and the slide blocks is small and, hence, the running stability of the exterior sash is deteriorated.

With the foregoing drawbacks of the prior art in view, an object of the present invention is to provide a soundproof double sliding sash window having structural features which enable stable running of the sashes during opening and closing operation and firm engagement between the sashes and weatherstrips when the sashes are closed.

In brief, a soundproof double sliding sash window according to the present invention includes first and second slide blocks fixedly mounted on a bottom rail at positions aligned with an abutment stile and a meeting stile, respectively, and slidable along an interior side surface of an exterior bottom guide rail of a sill when the exterior sash is running the exterior bottom guide rail. Each of the slide blocks has a slide portion projecting toward the interior side of the sash window. The sill has a horizontal guide plate extending longitudinally thereof and projecting exteriorly therefrom toward the slide portions of the slide blocks. During the movement of the exterior sash, the slide



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blocks are slidable along the interior side surface of the exterior bottom guide rail and the guide plate of the sill to limit the displacement the exterior sash in the direction perpendicular to the plane of the sash window. The guide
5 plate has first and second cutout recesses formed at positions corresponding in position to the abutment stile and the meeting stile of the exterior sash being closed so as to receive the slide portions of the slide blocks when the exterior sash is pulled or displaced toward the interior
10 side.

The guide plate projects exteriorly from a vertical face plate of the sill which is located below an interior bottom guide rail provided for movement of an interior sash. The slide portion of each of the first and second slide
15 blocks projects from the interior side of the corresponding slide block and is slidable along the guide plate. While the exterior sash is running along the exterior bottom guide rail, the slide blocks are slidably guided between the interior side surface of the exterior bottom guide rail and
20 the guide plate. By virtue of the engagement between the respective slide portions of the slide blocks and the guide plate, the displacement of the exterior sash in a direction toward the interior of the sash window is limited. Conversely, the displacement of the exterior sash in a direc-
25 tion toward the exterior side of the sash window is limited

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by the engagement between the interior side surface of the exterior bottom guide rail and the slide blocks. The displacement of the exterior sash in the direction perpendicular to the plane of the sash window is thus limited by the guide plate and the exterior bottom guide rail. Consequently, the exterior sash is able to run stably and smoothly.

The first and second recesses of the guide plate are formed at positions which correspond respectively to the position of the slide portion of the first slide block and the position of the slide portion of the second slide block that are assumed when the exterior sash is closed. With the recesses thus formed, after the slide blocks come to their closed positions, they can be displaced toward the interior side by a distance which is equal to the depth of the recesses. Accordingly, the amount of inward pull or displacement of the exterior sash is enlarged with the result that a firm engagement between the exterior sash and the mating weatherstrips is insured.

The above and other objects, features and advantages of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred structural embodiment incorporating the principles of the present invention is shown by way of illustrative example. In the drawings:--

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FIG. 1 is a fragmentary perspective view showing the relation between an exterior sash and a sill of a sound-proof sash window according to the present invention;

FIG. 2 is a vertical cross-sectional view of the sash window showing the exterior sash while running;

FIG. 3 is a plan view of FIG. 2;

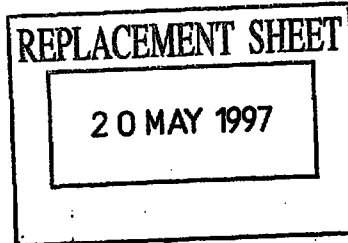
FIG. 4 is a vertical cross-sectional view of the sash window showing the exterior sash when closed;

FIG. 5 is a plan view of FIG. 4; and

FIG. 6 is a front elevational view showing the arrangement of weatherstrips attached to the exterior side of a window frame of the sash window.

The present invention will be described below in greater detail with reference to an embodiment shown in the accompanying drawings.

A soundproof sash window according to the invention includes, as shown in FIGS. 2 and 3, a window frame 1, and a pair of relatively horizontally movable, overlapping interior and exterior sashes 5 and 6 mounted within the window frame 1. The interior sash 5 is slidably supported between a pair of vertically opposed, interior top and bottom guide rails 41 and 23 (FIG. 2) projecting respectively from a header 4 and a sill 2 of the window frame 1. Similarly, the exterior sash 6 is slidably supported between a pair of vertically opposed, exterior top and bottom guide rails 42



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and 25 (FIG. 2) projecting respectively from the header and the sill 2 and spaced exteriorly from the interior top and bottom guide rails 41, 23. When closed, the interior and exterior sashes 5, 6 are firmly engaged with weatherstrips 10 - 15 carried on exterior surfaces of the window frame 1. The interior sash 5 is demountable from the window frame 1 toward the interior side of the sash window. The sash window has structural features which improve the running stability of the exterior sash 6 and the tightness of engagement between the exterior sash 6 and the mating weatherstrips 11, 13, 15 when the exterior sash 6 is closed.

The sill 2 of the window frame 1 includes a horizontal depth plate 21 on which the interior bottom guide rail 23 is provided for sliding movement of the interior sash 5. The sill 2 further has a vertical face plate 22 disposed below the interior bottom guide rail 23 and extends downwardly from the depth plate 21. The face plate 22 includes a horizontal guide plate 24 projecting therefrom toward the exterior side of the sash window. The guide plate 24 is engageable with first and second slide blocks 7, 8 during the opening and closing operation of the exterior sash 6. As shown in FIG. 2, the guide plate 24 lies in a horizontal plane extending parallel to, and located vertically centrally between, a pair of parallel spaced horizontal plates 641, 641 projecting interiorly from a lower

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portion of a bottom rail 64 of the exterior sash 6. The guide plate 24, as shown in FIG. 3, extends along a longitudinal portion of the sill 2 within which an abutment stile 61 and a meeting stile 62 of the exterior sash 6 are movable. The guide plate 24 thus arranged prevents the slide blocks 7, 8 from displacing toward the interior side. The guide plate 24 has two cutout recesses 241, 241 for receiving respectively therein the first and second slide blocks 7, 8 when the exterior sash 6 is closed. The recesses 241, 241 are formed at positions which correspond in position to the abutment stile 61 and the meeting stile 62, respectively, of the exterior sash 6 being closed. With the recesses 241, 241 thus provided, the exterior sash 6 can be pulled or displaced toward the interior side.

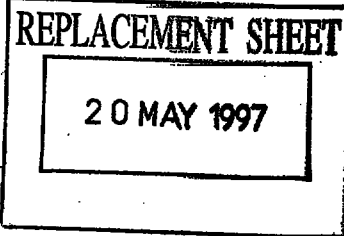
The first and second slide blocks 7, 8 are fixedly mounted on the bottom rail 64 of the exterior sash 6 at positions aligned respectively with the abutment stile 61 and the meeting stile 62 of the exterior sash 6, as shown in FIG. 1. The slide blocks 7, 8 are disposed astride the exterior bottom guide rail 25 of the sill 2 and slidable along an interior side surface of the exterior bottom guide rail 25. As shown in FIG. 2, the lower ends of the first and second slide blocks 7, 8 (only the second slide block 8a being shown) are shaped such that during the sliding movement of the exterior sash 6, the lower ends of the slide

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blocks 7, 8 are engageable only with the interior side surface of the exterior bottom guide rail 25 while keeping a clearance between themselves and the exterior side surface of the exterior bottom guide rail 25. Due to the engagement
5 between the slide blocks 7, 8 and the interior side surface of the exterior bottom guide rail 25, the exterior sash 6 while running is prevented from displacing toward the exterior side. When located at the closed position, the exterior sash 6 is displaceable from a path of running only in a
10 direction toward the interior side. Each of the slide blocks 7, 8 is firmly fitted in a hollow interior space of a corresponding one of the abutment stile 61 and the meeting stile 62.

The slide blocks 7, 8 have slide portions 71, 81
15 projecting from the interiorly facing surfaces of the abutment stile and meeting stile 61, 62 and engageable with the guide plate 24. By virtue of the engagement between the slide portions 71, 81 and the guide plate 24, the exterior sash 6 while running is prevented from displacing toward the
20 interior side. After the exterior sash 6 is moved to its closed position, it is pulled or displaced toward the interior side by means of a pull-in block (not shown) and a crescent lock 9 during which time the slide portions 71, 81 of the slide blocks 7, 8 are received in the recesses 241,
25 241 formed in the guide plate 24.



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The horizontal plates 641, 641 project from the interior side of the bottom rail 64 of the exterior sash 6 and lie in vertically spaced planes extending parallel to and spaced from the plane of the guide plate 24 with a space therebetween. The slide block 7 disposed on the abutment stile 61 side is attached to the abutment stile 61 with the slide portion 71 gripped between the horizontal plate 641, 641. As shown in FIG. 1, the slide portion 71 of the slide block 7 projects from one end of the pair of horizontal plates 641, 641 toward the side jamb 3 (which is the left side as illustrated in FIG. 3). The projecting portion of the slide portion 71 is beveled to form a beveled surface 711 which faces obliquely toward the interior side of the sash window. When the exterior sash 6 is closed, the beveled surface 711 of the slide portion 71 is firmly engaged with a beveled surface 171 of a corner weatherstrip 17 disposed on the sill 2 adjacent to the left side jamb 3, as shown in FIG. 5. The beveled surface 171 is complementary in contour to the shape of the beveled surface 711. With this firm engagement between the beveled surfaces 711 and 171, the sound insulation and airtightness at a lower portion of the bottom rail 64 are considerably improved. Furthermore, since one end of the pair of horizontal plates 641, 641 is closed by the slide portion 71, the exterior sash 6 can be opened and closed with safety and is slightly

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in appearance and, hence, has a high design value.

When the exterior sash 6 is closed, the upper horizontal plate 641 is firmly engaged with the weatherstrip 13 provided on the sill 2, as shown in FIG. 4.

5 The slide block 7 disposed on the abutment stile 61 side includes, as shown in FIGS. 1 and 3, an engagement strip 72 which is engageable with a pull-in member or plate 31 projecting from the left side jamb 3 toward the abutment stile 61. The pull-in member 31 and the engagement strip 72
10 are engageable with each other to pull or displace the exterior sash 6 from the closed position toward the interior side of the sash window. At least one of an exteriorly facing engagement surface 721 of the engagement strip 72 and an interiorly facing contact surface 311 of the pull-in
15 member 31 is beveled or slated from the exterior side toward the interior side when viewed in a direction from an open position toward the closed position of the exterior sash 6. With the contact surfaces 721, 311 thus profiled, as the exterior sash 6 advances from the position of FIG. 3 which
20 is shortly ahead of the closed position, toward the closed position, the engagement strip 72 of the slide block 7 first engages the pull-in member 31 and then is gradually displaced toward the interior side by the pull-in member 31. With this displacement of the slide block 7, the exterior
25 sash 6 is pulled or displaced toward the interior side.

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FIGS. 2 and 3 illustrate the exterior sash 6 while running along a path. As described above, the exterior sash 6 is closed while being displaced from the running path toward the interior side. This is done by virtue of the engagement between the engagement strip 72 and the pull-in member 31 which takes place when the exterior sash 6 approaches the closed position. Then, the crescent sash lock 9 is fastened whereby the inward pull or displacement of the exterior sash is completed, as shown in FIGS. 4 and 5. In this instance, the slide portions 71, 81 of the respective slide blocks 7, 8 are received in the recesses 241, 241, respectively, in the guide plate 24. The upper horizontal plate 641 of the bottom rail 64 and the slide portion 71 of the slide block 7 are firmly engaged with the weatherstrip 13 and the corner weatherstrip 17, respectively, thereby securing the airtightness between the bottom rail 64 and the sill 2 and between the bottom rail 64 and the left side jamb 3. Similarly, When the slide portion 81 of the slide block 8 is received in the recess 241 of the guide plate 24, a weatherstrip 18 carried on the meeting stile 62 of the exterior sash 6 is firmly engaged with the meeting stile 52 of the interior sash 5, thereby securing the airtightness between the meeting stile 62 of the exterior sash 6 and the meeting stile 52 of the interior sash 5.

When the crescent sash lock 9 is fastened, the

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interior sash 5 is pulled or displaced interiorly together with the exterior sash 6. The interior and exterior sashes 5, 6 thus displaced are firmly engaged with the weatherstrips 10, 12, 12 and the weatherstrips 11, 13, 15, respectively.

When the interior and exterior sashes 5, 6 are closed as shown in FIG. 4, their top rails 53, 63 are firmly engaged respectively with the first and second weatherstrips 10, 11 which are carried on the exterior surface of an interior top guide rail 41 of the header 4 in vertical juxtaposition and extend in the longitudinal direction of the interior top guide rail 41. Similarly, the respective bottom rails 54, 64 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the third and fourth weatherstrips 12, 13 which are carried on the exterior surface of the vertical face plate 22 of the sill 2 in vertical juxtaposition and extend in the longitudinal direction of the face plate 22. On the other hand, the respective abutment stile 51, 61 of the interior and exterior sashes 5, 6 are firmly engaged respectively with the fifth and sixth weatherstrips 14, 15 which are carried on the side jambs 3, 3, respectively, to face toward the exterior side and extend in the longitudinal direction of the side jambs 3. Similarly, the weatherstrip 18, which is carried on the interior surface of the meeting stile 62 of the exterior

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sash 6 and extends along the length of the meeting stile 62, is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5. With this arrangement of seals, sufficient sound insulation and waterproofing are
5 secured between the sashes 5, 6 and the window frame 1.

As shown in FIG. 2, the bottom rail 54 of the interior sash 5 has an exterior vertical plate 541 downwardly projecting therefrom. Since the distance H_1 between a lower end of the exterior vertical plate 541 and an upper
10 end of the interior bottom guide rail 23 of the sill 2 is smaller than the amount of allowable vertical displacement of the interior sash 5 (which is determined by a smaller one of the distance H_2 between the top rail 53 and the header 4 measured at an upper end of the top rail 53 and the distance
15 H_3 between the top rail 53 and the header 41 measured at the lower end of the interior top guide rail 41), the interior sash 5 can be removed from the window frame 1 toward the interior side of the sash window. To remove the interior sash 5, the interior sash 5 is lifted up into the space
20 between the top rail 53 and the header 4, and while keeping this condition, the interior sash 5 is pulled interiorly in such a manner as to turn the interior sash 5 about its upper edge.

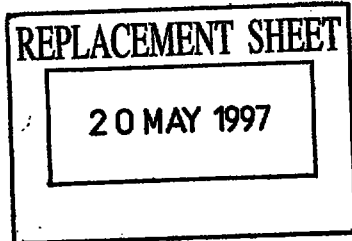
The first and second weatherstrips 10, 11 with
25 which the top rails 53, 63 are firmly engaged, respectively,

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are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 411, 412, respectively, formed longitudinally in the interior top guide rail 41 of the header 4. The pockets 411, 412 open toward the exterior side of the header 4, so that the weatherstrips 10, 11 received in the pockets 411, 412 are faced exteriorly. Similarly, the third and fourth weatherstrips 12, 13 respectively engageable with the bottom rails 54, 64 are fitted in a pair of parallel juxtaposed horizontal grooves or pockets 221, 222, respectively, formed longitudinally in the vertical face plate 22 of the sill 2. The pockets 221, 222 open toward the exterior side of the sill 2, so that the weatherstrips 12, 13 received in the pockets 221, 222 are faced exteriorly.

The weatherstrips 10, 12 respectively received in the pockets 412, 222 for sealing engagement with the interior sash 5 are located inwardly of the weatherstrips 11, 13 which are respectively received in the pockets 411, 221 for sealing engagement with the exterior sash 6. As shown in FIG. 6, the weatherstrips 10, 11 and the weatherstrips 12, 13 extend along the interior top guide rail 41 and the face plate 22, respectively, over a length which is at least equal to the length of the top and bottom rails 53, 54; 63, 64 of the interior and exterior sashes 5, 6. As shown in FIG. 4, the weatherstrip 10 and the weatherstrip 12 are engaged with an upwardly projecting exterior vertical plate



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531 of the top rail 53 and the downwardly projecting exterior vertical plate 541 of the bottom rail 54, respectively. Similarly, the weatherstrip 11 and the weatherstrip 13 are engaged with the interiorly projecting horizontal plate 631 of the top rail 63 and the upper horizontal plate 641 of the bottom rail 64, respectively.

FIG. 6 diagrammatically shows the arrangement of the weatherstrips 10 - 15 mounted on the exterior surfaces of the window frame 1 along an inner peripheral edge of the window frame 1. The weatherstrip 10 provided for engagement with the top rail 53 of the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51 of the interior sash 5, and a substantially central portion of the header 4 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. Similarly, the weatherstrip 11 provided for engagement with the top rail 63 of the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61 of the exterior sash 6, and the substantially central portion of the header 4 where the meeting stile 62 overlaps with the meeting stile 52 of the interior sash 5. At the substantially central portion of the header 4, the weatherstrips 10, 11 are integrally connected together. The joint portion between the weatherstrips 10, 11 has an exteriorly facing surface which is sealingly engageable with upper end por-

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tions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6.

Likewise the weatherstrips 10, 11 on the top rail side, the weatherstrips 12, 13 on the bottom rail side have a length which is equal to the length of the bottom rails 54, 64 of the interior and exterior sashes 5, 6. The weatherstrip 12 provided for engagement with the interior sash 5 extends between an inner surface of the side jamb 3 facing the abutment stile 51, and a substantially central portion of the sill 2 where the meeting stile 52 overlaps with the meeting stile 62 of the exterior sash 6. The weatherstrip 13 provided for engagement with the exterior sash 6 extends between an inner surface of the side jamb 3 facing the abutment stile 61, and the substantially central portion of the sill 2. The weatherstrips 12, 13 are integrally connected together at the substantially central portion of the sill 2. The joint portion between the weatherstrips 12, 13 has an exteriorly facing surface with which lower end portions of the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6 are firmly engageable.

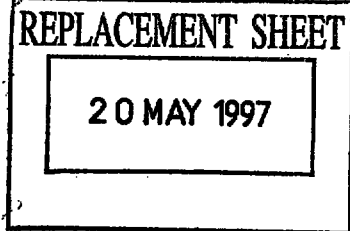
As shown in FIG. 3, the side jamb 3 which is engageable with the abutment stile 51 of the interior sash 5 has a longitudinal groove or pocket 321 opening exteriorly for receiving therein the weatherstrip 14. Similarly, the side jamb 3 engageable with the abutment stile 61 of the

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exterior sash 6 has a longitudinal groove or pocket 322 opening exteriorly for receiving therein the weatherstrip 15. The weatherstrips 14, 15 are fitted in the pockets 321, 322, respectively, and face toward the exterior side of the sash window.

The pocket 321 formed in the side jamb 3 (which is the right side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 14 received in this pocket 321 lies in substantially the same vertical plane as the weatherstrips 10, 11, 12, 13 and is engageable with a side flange or plate 511 projecting from the exterior side of the abutment stile 51 toward the side jamb 3 which is the right side in FIG. 3. With this arrangement of the pocket 321, the continuity between the weatherstrip 14 and the weatherstrips 10 - 13 is secured. Similarly, the pocket 322 formed in the side jamb 3 (which is the left side as illustrated in FIG. 3) is disposed in such a position that the weatherstrip 15 received in the pocket 322 is engageable with a side flange or plate 511 projecting from the interior side of the abutment stile 61 toward the side jamb 3 so as to secure the continuity between the weatherstrip 15 and the weatherstrips 10 - 13. When the interior and exterior sashes 5, 6 are pulled or displaced toward the interior side, as shown in FIG. 5, the abutment stiles 51, 61 are firmly engaged with the weatherstrips 14, 15, respectively, thereby securing the



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airtightness and watertightness between the sashes 5, 6 and the corresponding side jambs 3.

The weatherstrip 15 adapted to be engaged with the abutment stile 61 of the exterior sash 6 is somewhat displaced toward the exterior side from the common vertical plane of the weatherstrips 10 - 14. However, as shown in FIG. 6, the weatherstrip 15 is connected at its upper end with the weatherstrip 11 by means of the corner weatherstrip 16 and, at its lower end, with the weatherstrip 13 by means of the corner weatherstrip 17. With the corner weatherstrips 16, 17 thus provided, the continuity between the weatherstrip 15 and the weatherstrip 11 and also between the weatherstrip 15 and the weatherstrip 13 can be maintained.

As shown in FIG. 3, the meeting stile 62 of the exterior sash 6 has a longitudinal groove or pocket 621 formed in an interior surface thereof and opening toward the interior side to receive therein the weatherstrip 18. When the interior and exterior sashes 5, 6 are pulled or displaced interiorly, as shown in FIG. 5, the weatherstrip 18 fitted in the pocket 621 is firmly engaged with the exterior surface of the meeting stile 52 of the interior sash 5 to secure the airtightness and watertightness between the interior and exterior sashes 5, 6.

By virtue of the weatherstrips 10 - 15 provided along the inner peripheral edge of the window frame 1 and

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the weatherstrip 18 acting between the respective meeting stiles 52, 62 of the interior and exterior sashes 5, 6, the sash window has sufficient airtightness and watertightness and is able to isolate the interior side of the sash window
5 from the interior side.

As described above, a soundproof sash window of the invention includes first and second slide blocks mounted on a bottom rail of an exterior sash at positions aligned with a meeting stile and an abutment stile, respectively, of the
10 exterior sash and slidable along an exterior bottom guide rail of a sill when the exterior sash is running on and along the exterior bottom guide rail. The slide blocks each have a slide portion projecting from an interior side of the corresponding slide block. The sill has a guide plate
15 projecting interiorly therefrom in confronting relation to the slide portions of the slide blocks. During the sliding movement of the exterior sash, the slide blocks are slidably guided between an interior side surface of the exterior bottom guide rail and the guide plate to limit the displacement the exterior sash in the direction perpendicular to the
20 plane of the sash window. With this limited displacement, the exterior sash can move stably and smoothly.

In addition, the guide plate has first and second recesses in which the respective interiorly projecting slide
25 portions of the first and second slide blocks are received

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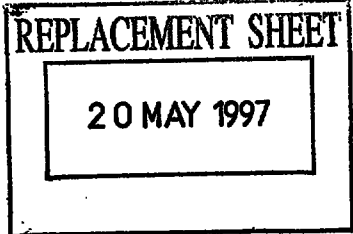
when the exterior sash is closed. With the recesses thus provided, After the exterior sash arrives at its closed position, it can be displaced toward the interior side by a distance which is equal to the depth of the recesses. It is
5 therefore possible to enlarge the amount of inward pull or displacement of the exterior sash and improve the tightness of engagement between the exterior sash and the mating weatherstrips.

Obviously, various minor changes and modifications
10 of the present invention are possible in the light of the above teaching. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

15 There follows a list of parts shown in the drawings:-

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Parts List

- 1: window frame
- 2: sill of 1
- 5 3: side jamb of 1
- 4: header of 1
- 5: interior sash
- 6: exterior sash
- 7: first slide block mounted on 61 adjacent 64
- 10 8: second slide block mounted on 62 adjacent 64
- 9: crescent sash lock
- 10: weatherstrip
- 11: weatherstrip
- 12: weatherstrip
- 15 13: weatherstrip
- 14: weatherstrip
- 15: weatherstrip
- 16: (corner) weatherstrip between 11 and 15
- 17: (corner) weatherstrip between 13 and 15
- 20 18: weatherstrip on 62
- 21: horizontal depth plate of 2
- 22: vertical face plate of 2 depending from 21
- 23: interior bottom guide rail formed on 21 for 5
- 24: horizontal guide plate projecting exteriorly from 22
- 25 31: pull-in member projecting from 3 for engagement with 72

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- 41: interior top guide rail formed on 4 for 5
- 42: exterior top guide rail formed on 4 for 6
- 51: abutment stile of 5
- 52: meeting stile of 5
- 5 53: top rail of 5
- 54: bottom rail of 5
- 61: abutment stile of 6
- 62: meeting stile of 6
- 63: top rail of 6
- 10 64: bottom rail of 6
- 71: slide portion of 7 projecting from the exterior surface
of 61 toward 24 for sliding engagement with 24
- 72: engagement strip of 7 engageable with 31
- 81: slide portion of 8 projecting from the exterior surface
- 15 of 62 toward 24 for sliding engagement with 24
- 171: beveled surface of 17 engageable with 711 of 71
- 221: pocket formed in 22 of 2 for receiving therein 12
- 222: pocket formed in 22 of 2 for receiving therein 13
- 241: exteriorly opening recess formed in 24 for receiving
- 20 therein 7, 8 to permit 6 to be pulled interiorly
- 311: (interiorly facing) contact surface of 31
- 321: pocket formed in 3 of 51 side for receiving therein 14
- 322: pocket formed in 3 of 61 side for receiving therein 15
- 411: pocket formed in 41 of 4 for receiving therein 10
- 25 412: pocket formed in 41 of 4 for receiving therein 11

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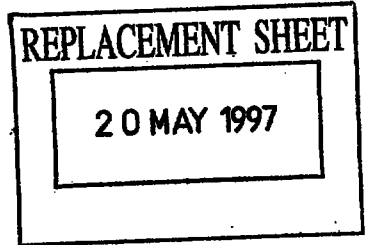
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- 511: outwardly projecting side plate of 51
- 531: upwardly projecting, exterior plate of 53
- 541: downwardly projecting, exterior horizontal plate of 54
- 611: outwardly projecting side plate of 61
- 5 621: pocket in the exterior surface of 52 for receiving 18
- 631: interiorly projecting plate of 63
- 641: (a pair of parallel spaced) horizontal plates
projecting interiorly from a lower portion of 64
- 711: beveled surface of 71 engageable with 171 of 17
- 10 721: (exteriorly facing) contact surface of 72

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CLAIMS:

1. A soundproof double sliding sash window of the type having a pair of relatively horizontally movable, overlapping interior and exterior sashes mounted within a window frame, wherein said interior and exterior sashes are slidably supported respectively between a pair of opposed interior top and bottom guide rails formed respectively on a header and a sill of the window frame and between a pair of opposed exterior top and bottom guide rails formed respectively on the header and the sill, wherein said interior and exterior sashes, when closed, are firmly engaged with weatherstrips carried on exteriorly facing surfaces of said window frame, and wherein said interior sash is demountable from said window frame toward the interior side of said sash window, characterized in that said window frame includes a vertical face plate disposed below said interior bottom guide rail for guiding therealong said interior sash, and a guide plate projecting from said face plate toward the exterior side of said sash window, that said exterior sash includes first and second slide blocks fixedly mounted on a bottom rail of said exterior sash at positions aligned respectively with an abutment stile and a meeting stile of said exterior sash, said first and second slide blocks being slidable along an interior side surface of said exterior bottom guide rail for guiding therealong said exterior sash,



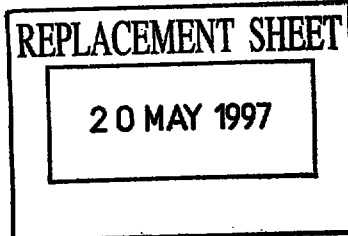
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that said first and second slide blocks respectively have first and second slide portion projecting from an interior side thereof and slidable along said guide plate, that said guide plate has first and second cutout recesses formed at positions corresponding in position to said abutment stile and said meeting stile, respectively, of said exterior sash being closed for receiving respectively therein said first and second slide portions of said first and second slide blocks, that during the movement of said exterior sash, said first and second slide blocks are engageable with said guide plate and said interior side surface of said exterior bottom guide rail to limit the displacement of said exterior sash toward the interior side and the exterior side of said sash window, and when said exterior sash is disposed in its closed position, said first and second slide blocks are displaced toward the interior side with their slide portions received in said first and second cutout recesses.

2. A soundproof double sliding sash window according to claim 1, wherein said bottom rail includes a pair of parallel spaced horizontal plates projecting from an interior side thereof, and said first slide portion is gripped between said horizontal plates and projects from one end of said pair of horizontal plates toward a side jamb of said window frame with which said abutment stile is engageable.

3. A soundproof double sliding sash window accord-





ing to claim 2, wherein said guide plate lies in a plane extending parallel to, and disposed centrally between, the respective planes of said horizontal plates.

4. A soundproof double sliding sash window according to claim 2, wherein said first slide portion has a beveled surface facing obliquely toward said side jamb and the interior side of said sash window, said window frame includes a corner weatherstrip disposed on said sill adjacent said side jamb and has a beveled surface complementary in contour to the shape of said beveled surface of said first slide portion, and said beveled surface of said first slide portion is firmly engageable with said beveled surface of said corner weatherstrip when said exterior sash is closed.

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REPLACEMENT SHEET

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FIG. 1

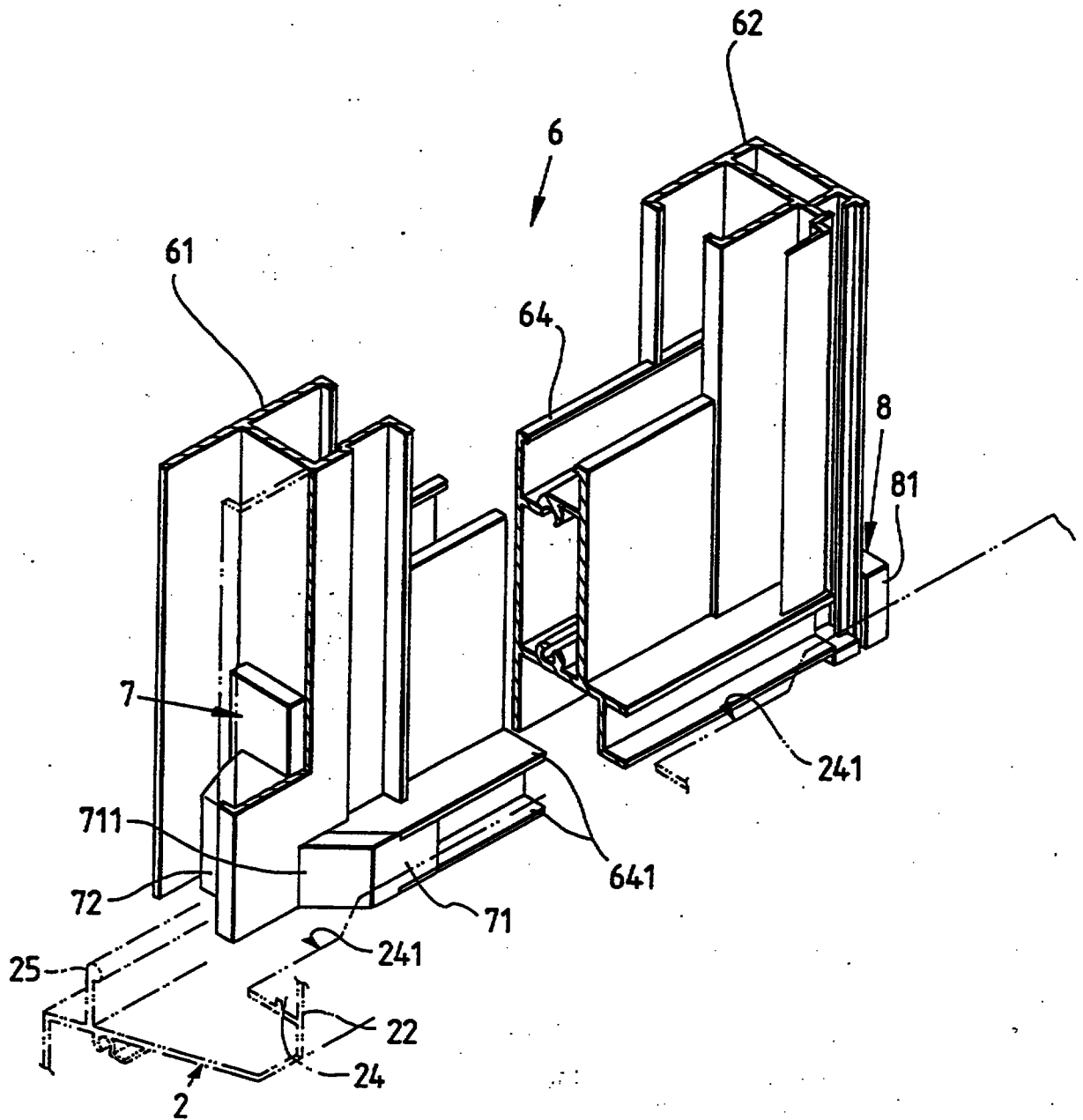


FIG. 2

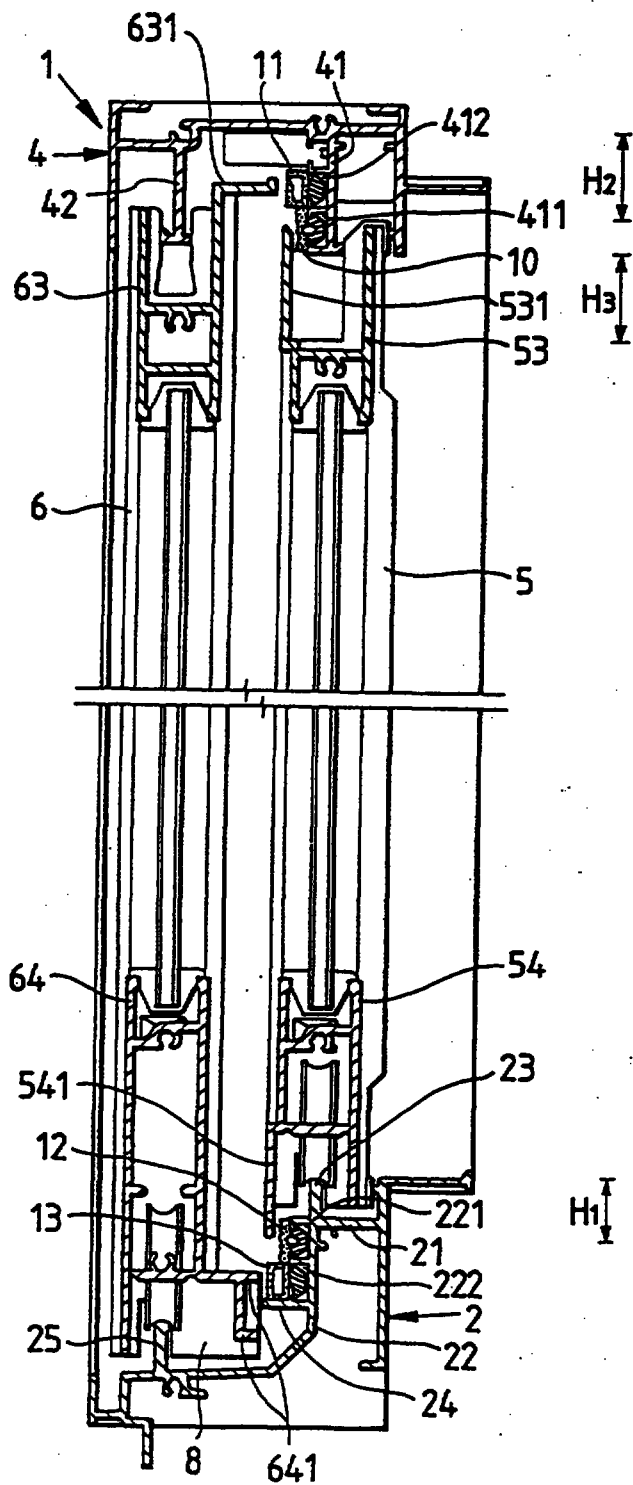
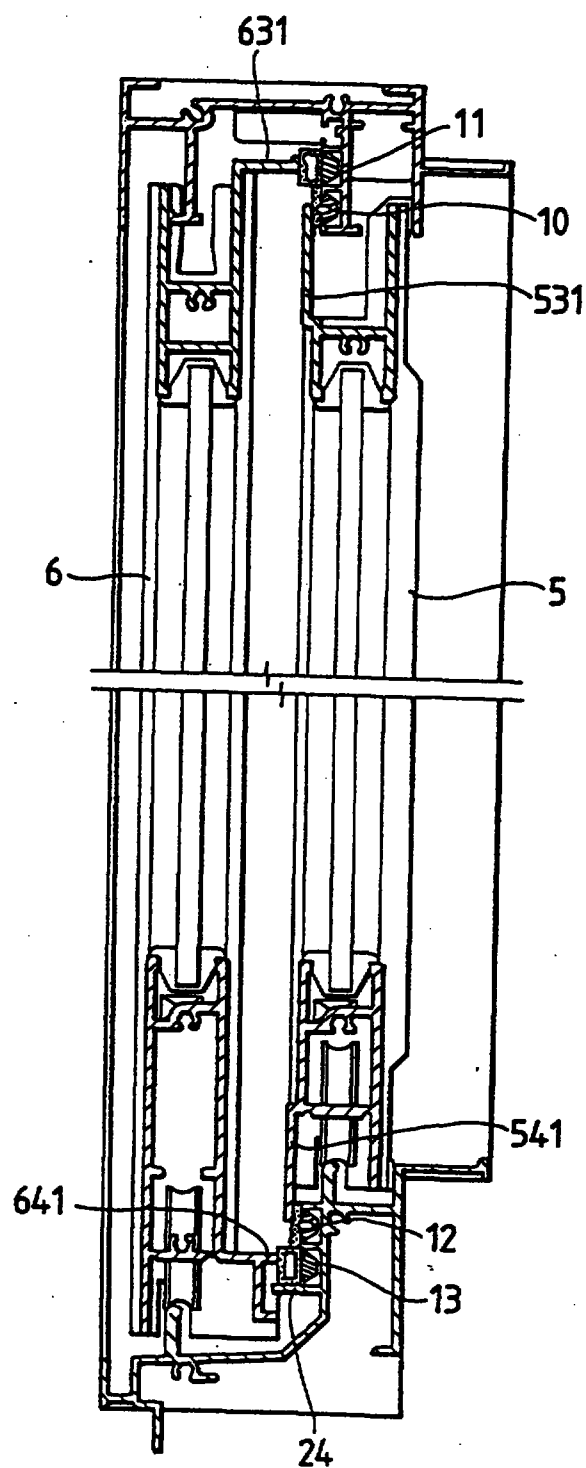


FIG. 4



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FIG. 5

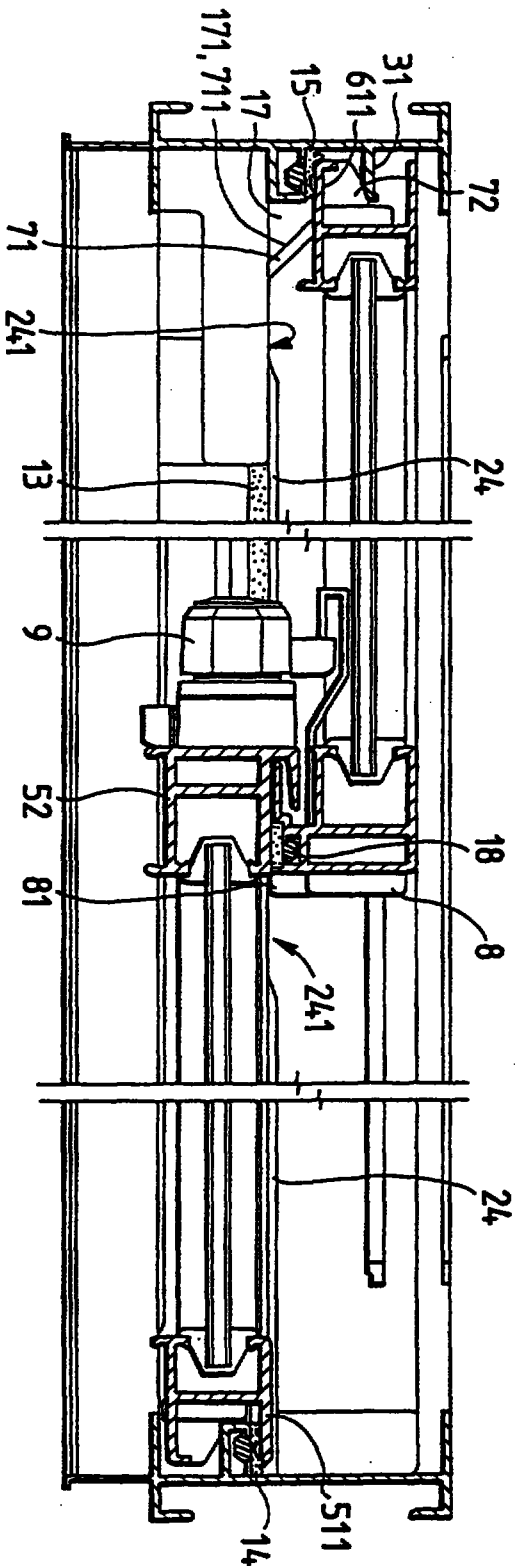


FIG. 6

