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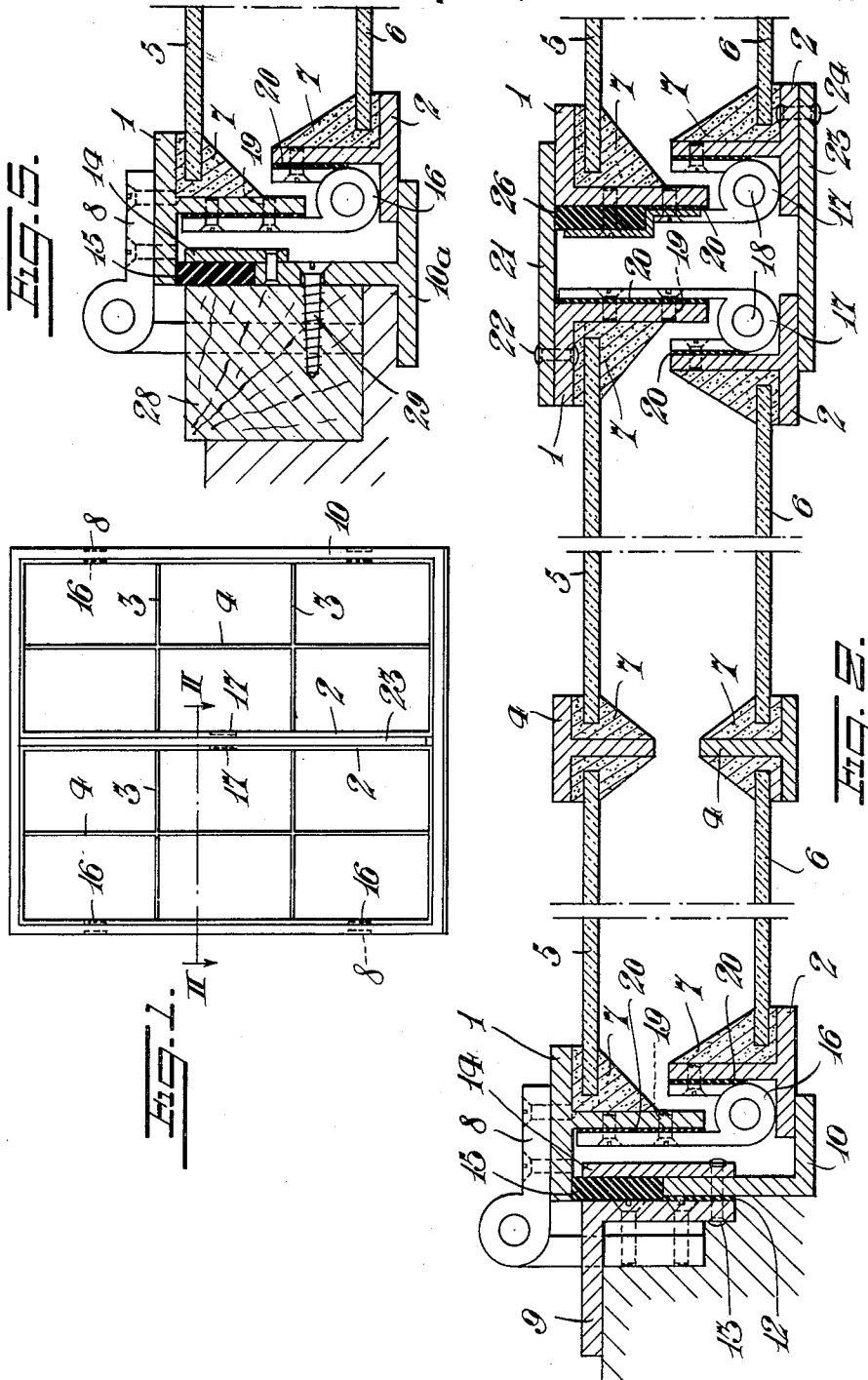
S. LEWERENTZ

1,934,546

WINDOW HAVING FRAMES AND METAL SASHES

Filed Sept. 22, 1931

2 Sheets-Sheet 1



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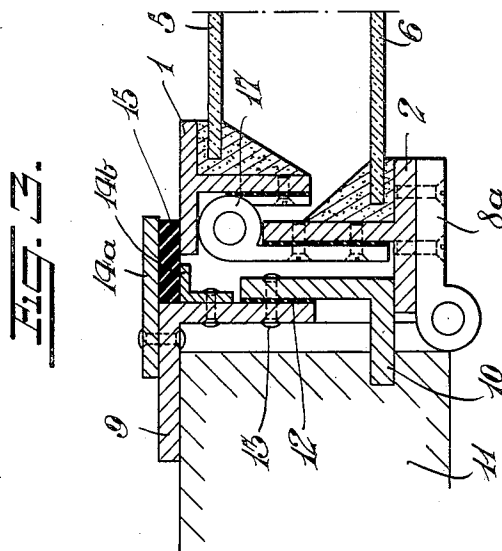
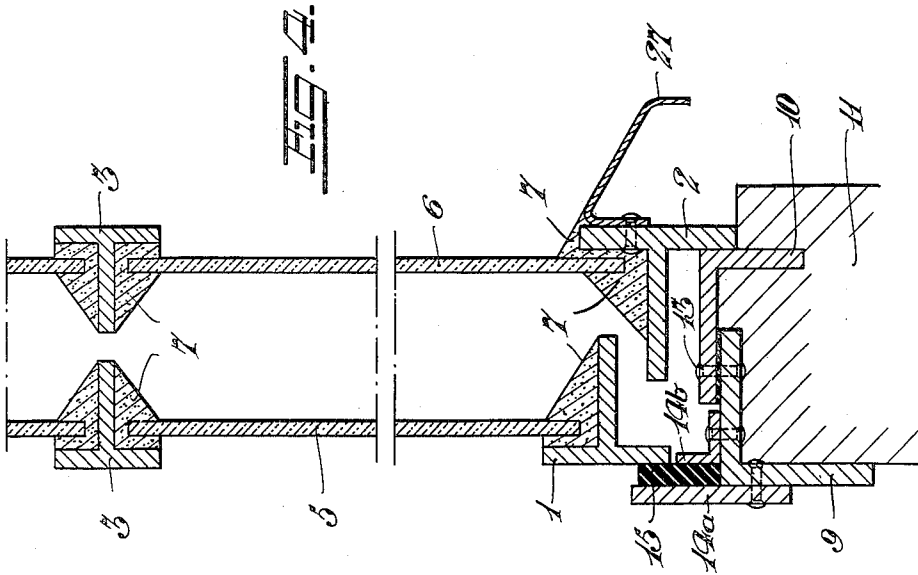
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UNITED STATES PATENT OFFICE

1,934,546

WINDOW HAVING FRAMES AND METAL
SASHES

Sigurd Lewerentz, Stockholm, Sweden

Application September 22, 1931, Serial No.
564,445, and in Sweden December 19, 1930

6 Claims. (Cl. 189—69)

This invention relates to windows having a stationary frame and double or triple glass-panes set in sashes or casements of metal. It is well-known that such windows suffer from the drawback that in cold weather the metal parts will rapidly cool on their inner sides, thus causing humidity to condense and possibly also to freeze on the inner side which faces the room.

The chief object of this invention is to remove such a drawback and to minimize the transmission of heat and coldness from the outer side of the window to the inner side thereof.

Another object of this invention is to render it possible to use panes in metal sashes also in cold climates, while insulating the two sashes of a wing from each other by means of a heat-insulating layer of air. A further object is to construct the window in such manner that there is no direct metal connection between the outer side and the inner side of the window.

With this and other purposes in view the invention consists, chiefly, in this, that the metal sashes or casements, one placed inside the other, are arranged at a distance from each other leaving a heat-insulating air-space between them and are joined exclusively by one or more hinges, whose total length is only a fraction of the periphery of the corresponding sashes or casements. By preference, heat-insulating and possibly also tightening inserts are placed between said stationary frame and the inner of said metal sashes engaging said frames and also between said hinges and said metal frame and said sashes. Thus the metal pieces are insulated from each other, so that no direct metallic connection or path between the outer side and the inner side of the window is at hand. Such windows having all metal sashes or casements in accordance with the invention may, therefore, advantageously be used also in cold climates.

Two embodiments of the invention are shown in the annexed drawings.

Fig. 1 shows an elevation of a window, seen from the outside, having metal sashes or casements in accordance with the invention, opening inwards.

Fig. 2 is a horizontal section on the line II—II in Fig. 1 through the window frame and sashes.

Fig. 3 shows a horizontal section through the frame and sash of another window in accordance with the invention, opening outwards.

Fig. 4 is a vertical section through the lower part of the same window as shown in Fig. 3. Fig. 5 shows a modification.

Referring now to Figs. 1 and 2 of the drawings,

1 and 2 indicate metallic frames, for instance, made of T-iron and L-iron, 1 being the inner sashes or casements and 2 the outer sashes or casements. One outer sash and one inner sash form together a pair, which may be opened as a wing. The sashes are provided with horizontal window bars 3 and vertical window bars 4, also made of T-iron. In the fields thus formed the glass plates 5 and 6 are set by means of putty 7.

The inner sashes 1 are by means of hinges 8 hinged to the stationary window frame, which consists of an inner frame 9 and an outer frame 10, both made of angle iron. The inner frame 9 is secured to the wall 11. A layer or insert 12 of a heat-insulating material is placed between the adjacent flanges of the angle-irons 9 and 10, said irons being rigidly secured to each other by means of rivets 13, screws, or the like or by welding. The rivets 13 also serve to secure a flat metal bar 14, which clamps a strip 15 of felt, rubber, or a similar material. When the window is closed, this strip 15 engages the inner sash or casement, and thus tightens the slight opening between said sash 1 and the stationary window frame to prevent draught.

The corresponding inner and outer sashes 1, 2 in each pair or wing are joined by connecting hinges 16 at those of their vertical sides which are adjacent to the stationary frame. Similar connecting hinges 17 join the inner and outer sashes in each pair at their vertical edges in the centre of the window. The hinges 16 should be permanently attached to the sashes, but the connection effected by the hinges 17 can be broken, for instance, by extracting the bolt 18 of the latter hinges so as to permit the inner sash of the wing to be turned on the hinges 16 in relation to the outer sash. After this operation the inner sides of the glass plates between the outer and the inner sashes are accessible for cleaning.

The connecting hinges 16, 17 are secured to the sashes by means of screws 19 or rivets or the like and a layer 20 of a heat-insulated material is inserted between the plates or wings of the hinges and the adjacent sash. At the vertical central line of the window one of the sashes 1, viz. the left one in Figs. 1 and 2, is provided with a flat metal bar 21 secured to the sash by rivets 22. A similar flat metal bar 23 is secured to the outer sash 2 of the opposite (right) wing of the window. The bars 21 and 23 form rabbet ledges abutting against the opposite wing of the window when the window is closed.

At the inner right-hand sash 1 in Fig. 2 a Z-shaped iron 25 is secured to clamp a strip 26

of felt, rubber or the like having substantially the same purpose as the strip 15.

It is understood that a vertical section through the upper or lower sides of the window, i. e. through the lintel and sill and the adjacent portions of the sashes, will be quite similar to the section shown to the left in Fig. 2 except of the hinges. At the outer side of the outer sash a metal plate acting as a water drip may be provided at the lower (sill) member of the sash.

It is obvious that the inner sashes are connected with the corresponding outer sashes of the pairs by the connecting hinges 16, 17 only but in all other points are separated from them by a heat-insulating space of air. The total length of the connecting hinges is only a small fraction of the length of the periphery of the corresponding sashes, so that the transmission of heat and coldness via the hinges is very low. The inner sashes are connected with the stationary metal frame by the hinges 8 only but at all other places separated from it by the heat-insulating strips 15. The heat-insulation is at the hinges effected by the layers 20 of an insulating material inserted between the plates of the hinges and the metal frame and the sashes. Likewise the outer and the inner parts of the metal window frame are separated by a heat-insulating layer 12. Consequently there is no direct metallic connection between the outer and the inner sides of the window and, therefore, the heat insulation is very good and much superior to that of windows having double metal sashes of the conventional type.

The strips 15 and 26 form a tight or sealing weather strip between the inner sashes and the window frame and between the two adjacent vertical sides of the inner sashes. Thus, the air in the room cannot enter the spaces between the glass plates and any condensation of humidity is prevented and draught eliminated. The strips 15 also serve as a heat insulation between the window frame and the inner sashes.

Also the hinges 8 may be insulated from the inner sashes and from the window frame by interposed layers of an insulating material.

In the modified embodiment shown in Figs. 3 and 4 the window sashes or wings open outwards. The hinges 8a on which the connected outer and inner sashes turn as a single wing are in this case secured to the outer sashes 2 and to the frame 9, 10. The strip 15 of felt, rubber or the like is clamped between a flat metal (iron) bar 14a and an angle iron 14b, said members 14a and 14b being secured to the angle iron 9 by rivets or the like. At the lower horizontal or sill member of the outer sash 2 a water drip 27 of sheet metal is secured. As mentioned above such water drip may also be provided in the embodiment shown in Figs. 1 and 2.

In other respects the embodiment shown in Figs. 3 and 4 is similar to that shown in Figs. 1 and 2 and similar parts carry the same reference characters.

In the modification shown in Fig. 5, which is a cross-section similar to that shown to the left in Fig. 2, the stationary metal window frame is formed by a T-iron 10a. An insulating frame 28 of wood is secured to the frame 10a by means of screws 29 and forms a heat-insulation on the inside of the metal frame 10a. In other respects the construction is similar to that shown in Figs. 1 and 2 and the corresponding parts carry the same reference characters.

The invention may be applied to double windows of other types than those shown and also to

windows having three or more sashes with glass plates, placed one outside the other. The window may have only one wing or, in fact, any number of wings desired.

What I claim is:—

1. In windows having a stationary window frame of metal, at least one outer metal sash, an equal number of inner metal sashes, arranged in pairs with said outer sashes and at a distance from the latter to form a heat-insulating space of air between the sashes of each pair, one or more hinges between the outer and the inner sashes of each pair on two opposite sides of said sashes, said hinges on one of the sides being detachable from at least one of said sashes, the total length of all of said hinges being equal to a small fraction of the length of the periphery of the corresponding sashes, and heat-insulating strips between said metal frame and said inner sashes engaging said frames.

2. In windows having a stationary two-part window frame of metal, a heat-insulating layer between said parts of said frame, a number of outer metal sashes, an equal number of inner metal sashes, arranged in pairs with said outer sashes and at a distance from the latter to form a heat-insulating space of air between the sashes of each pair, one or more hinges between the outer and the inner sashes of each pair on two opposite sides of said sashes, said hinges on one of the sides being detachable from at least one of said sashes, the total length of all of said hinges being equal to a small fraction of the length of the periphery of the corresponding sashes, and heat-insulating strips between said metal frame and said inner sashes engaging said frames.

3. In windows having a stationary two-part window-frame of metal, a heat insulating layer between said parts of said frame, at least one outer metal sash, at least one inner metal sash arranged inside said outer sashes to form wings, hinges between the sashes of each wing on two opposite sides thereof to keep the sashes of the wing at a distance from each other to form a heat-insulating space of air between them, the total length of said hinges being only a minor fraction of the length of the periphery of the corresponding wing, a detachable connection between said hinges on one side of said wings and at least one of the sashes of the wing, heat-insulating layers between said hinges and said sashes, other hinges between said wings and said window frame, and heat-insulating inserts between said metal frame and said inner sashes.

4. In a window having a stationary window frame, at least one outer metal sash, for each outer sash an inner metal sash arranged in pair with said outer sash to form a wing, hinges between the sashes of each wing on two opposite sides thereof to keep said sashes of said wing at a sufficient distance from each other to form a heat-insulating layer of air between the metallic parts of said sashes at all points around the periphery thereof, the total length of said hinges being only a minor fraction of the length of the periphery of said sash, and other hinges between said frame and each of said wings.

5. In a window having a stationary window frame, at least one outer metal sash, for each outer sash an inner metal sash arranged in pair with said outer sash to form a wing, hinges between the sashes of each wing at a sufficient distance from each other to form a heat-insulating layer of air between the metallic parts

of said sashes at all points around the periphery thereof, the total length of said hinges being only a minor fraction of the length of the periphery of said sash, heat-insulating inserts between said hinges and said sashes to avoid any unbroken metallic path from the outer side to the inner side of said window, and other hinges between said frame and each wing.

6. In a window, in combination, a stationary metal window frame having an outer and an inner part, a heat-insulating insert between said parts of said frame, a number of outer metal sashes, an equal number of inner metal sashes arranged in pairs with said outer sashes, hinges

between the outer and the inner sashes of each pair on two opposite sides of said sashes to keep the two sashes of each pair at a sufficient clear distance from each other around the whole periphery thereof, the space of air between them giving an efficient heat insulation to prevent substantial transmission of heat between said sashes, extractable bolts in said hinges on one side of said pair, said hinges occupying only a small fraction of the total length of the periphery of said sashes, and other hinges between said sashes and said frame.

SIGURD LEWERENTZ.

15	90
20	95
25	100
30	105
35	110
40	115
45	120
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70	145
75	150