Sept. 27, 1949. H. W. HACKER 2,483,005

RECIPROCATING WINDOW

Filed Oct. 24, 1944

Fig. 1

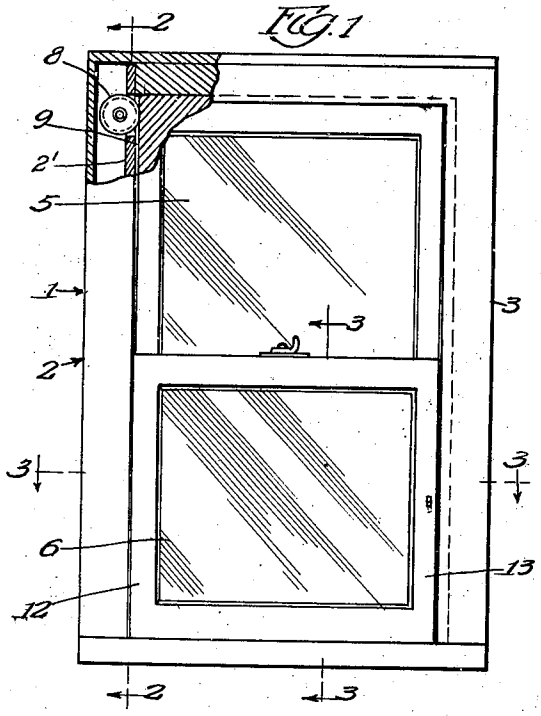


Fig. 2

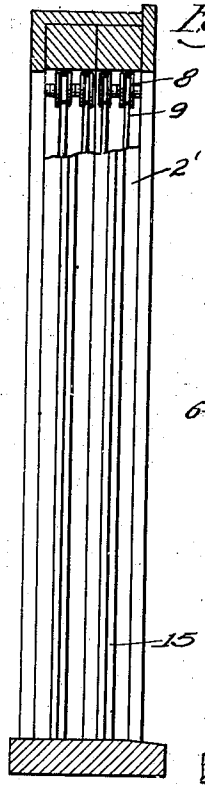


Fig. 4

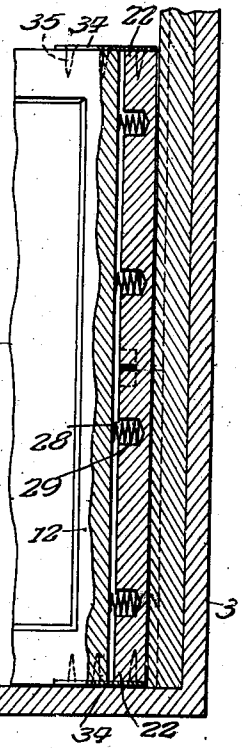


Fig. 3

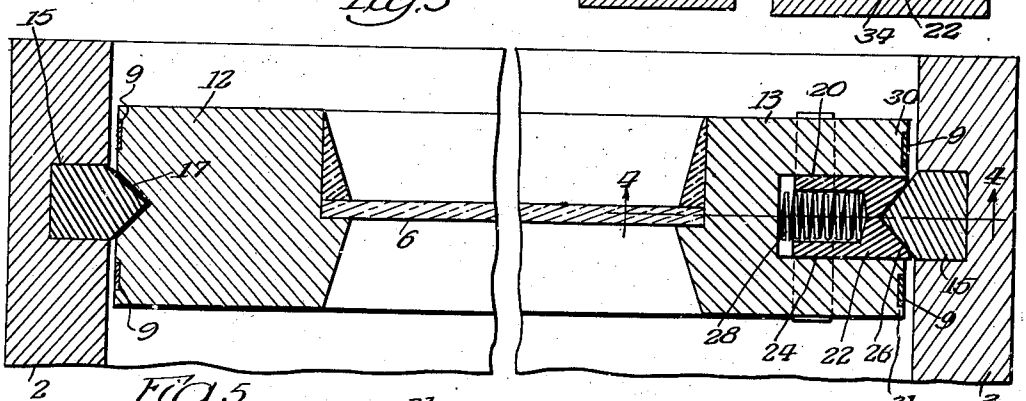


Fig. 5

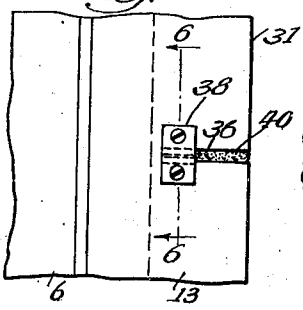


Fig. 6

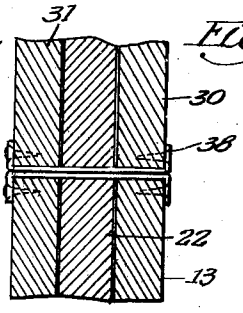
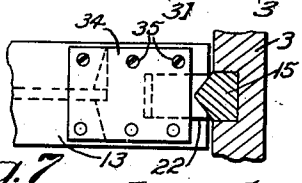


Fig. 7



Inventor
Horace W. Hacker
By Morris Spector,
Atty.

Patented Sept. 27, 1949 2,483,005

UNITED STATES PATENT OFFICE

2,483,005

RECIPROCATING WINDOW

Horace W. Hacker, La Grange, Ill.

Application October 24, 1944, Serial No. 560,134

5 Claims. (Cl. 20—54)

1

This invention relates to reciprocating windows, and more particularly to windows of the type wherein a reciprocating window sash or the frame within which a sash is mounted is of wood, or wherein both the sash and the frame are of wood.

In the manufacture of standard wooden windows certain variables affect the size of the parts in such a manner that it is well nigh impossible to produce and maintain a wooden window having fixed predetermined dimensions. This is due to the very nature of the wood. No wood is ever stable in dimension. All woods swell and shrink and warp when exposed to moisture, especially unequal exposure as between outside and inside. All woods swell, shrink and warp according to variations in atmospheric humidity, variations which range daily, seasonally and climatically from 20° to 100°, and especially to unequal exposure as between outside and inside. All woods shrink and warp with ageing and release of internal strains because the grain lies in directions crossing each other and the machined surfaces in infinite variety. Buildings settle and window frames go out of square. Due to these dimensional variables a reciprocating window may sometimes be too loose so as to permit an excessive amount of air leakage between the sash and the frame, and at other times the same window may be too tight so that the sash will bind in the frame and interfere with or even entirely prevent movement of the sash in the frame.

It is the principal object of the present invention to provide a window sash and frame construction wherein variables resulting from manufacturing conditions or ffom changing conditions after manufacture and installation of the complete window will not cause binding of the window sash under certain changed conditions and will not cause air leakage under opposite changed conditions. This object is accomplished by means of V-slides in the frame and mating V-slides in the sash, one of which is in the form of a spring pressed V-shoe, the spring pressed shoe being in the sash and in only one side of the sash, the opposite side of the sash being cut in the form of a V to match a fixed V in the adjacent jamb. The mating V-slides of the applicant's construction are true V's of exactly the same angle. They are sound mechanically as exemplified throughout the machine tool art. They are capable of containing, positioning and guiding the sash. They do not in any way depend upon any other contact of the sash to the frame.

The true V form reduces the number of frictional surfaces in guiding from the three of the channel commonly used to the two of the V here

2

proposed. The face sides of the sash of the present invention are free of contact or restriction. Thus any transverse swelling or shrinking of either sash or frame can have no influence to bind or to loosen.

Again, the spring pressure V-shoe in one side of the sash compensates automatically for swelling or shrinking of either sash or frame in the direction parallel to the plane of the window. Thus variable dimensions across the window can have no influence to bind or to loosen. This construction also protects the window from binding or loosening when, from whatever cause, the frame has gone out of square.

In the preferred embodiment of the present invention the spring pressed shoe is mounted in a longitudinally extending recess in the side of the sash. The recess is of considerable depth and the shoe makes a snug but not binding fit in it. Because of the depth of the recess and in order to avoid the need of an excessively thick sash structure means is provided for preventing spreading or closing of the shoe-receiving recess in the sash. This means may consist of one or more braces extending transversely through the recess and through the sash between the top and the bottom of the sash. The braces must, of course, be in non-interfering relation to the movable spring pressed shoe or shoes mounted in the sash.

The attainment of the above and further objects of the present invention will be apparent from the following specification taken in conjunction with the accompanying drawings forming a part thereof.

In the drawings:

Figure 1 is a front view of a window constructed in accordance with the present invention;

Figure 2 is a sectional view of the window frame taken along the line 2—2 of Figure 1;

Figure 3 is a sectional view taken along the line 3—3 of Figure 1;

Figure 4 is a view taken along the line 4—4 of Figure 3;

Figure 5 is a fragmentary view illustrating a bracing detail;

Figure 6 is a sectional view taken along the line 6—6 of Figure 5; and

Figure 7 is a plan view of the reenforcing plate at the top of a window sash.

Reference may now be had more particularly to the construction illustrated in the drawings. At 1 is indicated a window frame having jambs 2—3 forming the sides of a rectangular opening in which are mounted an upper window sash 5 and a lower window sash 6, the two sashes being each mounted for vertical reciprocating move-

ment in the frame independently of one another. The upper window sash is placed rearwardly of the lower window sash so that neither window sash interferes with the reciprocation of the other. The usual counterbalancing means are provided for the respective sashes, which may take the form of separate spring housings 8 mounted in the frame and each having a strap 9 extending downwardly and connected to the window sash, all in a manner well known in the art.

The window sash 6 is of a construction substantially the same as that of the sash 5, each being in the form of rectangular frame in which a glass window pane is mounted in the usual manner. The width of the sash 6 between the outer surfaces of its stiles 12—13 is substantially less than the width of the rectangular opening in the window frame 1, a considerable clearance being allowed between the sash and the frame so that the stiles 12—13 of the sash will not come in contact with the frame in the normal swelling or warping of the wood parts due to changing atmospheric or other conditions.

In each jamb 2—3 of the frame there is mounted a V-slide 15 for each sash. Each of the V-slides 15 extends vertically for substantially the full height of the frame opening, the two slides 15 on opposite sides of the frame constituting tracks or guides for the sash 6. Two other slides 15—15 constitute tracks for the sash 5. The stile 12 has a vertically extending V-shaped groove 17 formed therein which embraces the sides of the V-shaped slide 15. The angle of the V surfaces of the groove 17 is identical with the angle of the V surfaces of the slide 15. The slide 15 in cooperation with the groove 17 thus constitute cooperating male and female interfitting V-shaped members.

The opposite stile 13 of the sash 6 has, centrally thereof, a rectangular channel recess 20 formed therein which extends for the full height of the sash and is of a substantial depth. Within the channel is slidingly mounted a shoe 22. The shoe has flat opposite faces 24—24 which are parallel surfaces parallel to the sides of the channel 20 in the stile 13. The end of the shoe 22 has a V-shaped longitudinally extending groove 26 formed therein at an angle exactly the same as the angle of the V-shaped slide 15 that fits into the groove 26. The shoe 22 is pressed against the V-slide 15 by a series of coiled springs 28 each of which enters a circular bore 29 in the shoe and bears at one end against the shoe and at the other end against the surface of the sash within the channel recess 20. Because of the plurality of the springs 28 the pressure of the shoe 22 against the V-slide will be uniformly distributed throughout the length of the shoe. The spring pressure of the shoe 22 against its slide will force the entire sash in a direction leftward, as seen in Figure 3, so that the groove 17 is always maintained in firm sliding pressure engagement with its slide 15.

An important feature of the invention lies in the fact that the angle of the V of the slides or tracks 15 is exactly the same as the angle of the V-groove in the pressure shoe 22 and of the V-groove 17. Because of this arrangement there is surface contact between the shoes of the sliding sash and the stationary frame, with a uniformly distributed pressure between the slidable surfaces. This prevents binding of the sash in the frame and prevents air leakage at the contacting surfaces even though the spring pressure is not very great.

In order to prevent the sides 30—31 of the stile 13 from spreading due to the fact that the channel recess 20 has been cut in the stile, there is provided reenforcing means to prevent such spreading. This reenforcing means comprises a plate 34 at the top of the sash and a similar plate at the bottom, said plates being fastened in any desired manner as by screws 35 that enter into the top rail (or bottom rail as the case may be) and hold the sides 30—31 against spreading at the top and at the bottom of the sash. If the sash is of such height as to require additional reenforcement between the top and the bottom, a transverse saw cut 36 is formed in the stile 13 (but not completely through the stile) and a pair of thin flat metal straps or braces 38 is inserted into said saw cut groove, the opposite ends of each brace bearing against the outer opposite surfaces of the sash and being secured to and holding the parts 30—31 against spreading. The part of the brace-receiving groove towards the outer edge of the stile 13 may be filled as at 40 to prevent air leakage. The shoe 22 has a narrow cut therein the opposite sides of which embrace opposite sides of the reenforcing brace. While I have herein shown a brace 38 in the form of a pair of thin metal strips, this is merely illustrative of one form of bracing means, it being within the purview of the present invention to provide any other type of connection which will prevent spreading of the sides 30—31 of the channel 20.

From the description above given it is apparent that I have provided a window frame and sash construction wherein there is no possibility of binding of the slidable sash in the frame even though the wood of the frame or of the sash, or both, may swell, shrink or warp due to changing atmospheric or other conditions. Furthermore, since the width of the sash is necessarily made appreciably less than the width of the sash-receiving opening in the frame a sash constructed in accordance with the present invention need not be accurately made as to width and will nevertheless operate perfectly even though there is an appreciable error, on the side of undersize, in the construction of the frame as to its width.

In compliance with the requirements of the patent statutes I have here shown and described a preferred embodiment of my invention. It is, however, to be understood that the invention is not limited to the precise construction here shown, the same being merely illustrative of the principles of the invention. What is considered new and desired to be secured by Letters Patent is:

1. In combination, a window frame, a window sash slidably mounted in the frame, a slide member mounted in the frame and a pressure shoe member mounted in the sash and extending the full length of the sash, the pressure shoe member having a V-shaped groove and the slide member having a V-shaped projection entering the groove and of exactly the same angle as the groove so as to provide two flat surfaces of contact angular to each other between each side of the sash and the frame, said projection and groove extending lengthwise of the frame, and spring means between the sash and the pressure shoe member carried thereby for constantly urging it in pressure engagement with the slide member carried by the frame, said cooperating engaging flat surfaces of contact betwen the V-shaped projection and the corresponding groove constituting means for holding the sash against movement transversely of the frame, the width of the sash

being greater than the minimum width of the frame opening regardless of the position of the pressure shoe member to prevent removal of the sash transversely of the frame regardless of the position of the pressure shoe member in the sash.

2. In combination, a window frame, a window sash slidably mounted in the frame, a V-slide mounted in each side of the frame, said sash having a cooperating and mating V-slide in each side thereof and extending the full length of the sash, one of each set of cooperating slides being a male member and the other a female member, the angle of the V's in the sash being exactly the same as the angles of the V's in the frame, one of the slide members in the sash being fixed therein and the other slide member in the sash being movable therein towards and from the frame and constituting the female member of its set of cooperating slides, and spring means constantly urging said last mentioned slide member towards the frame, the cooperating surfaces of the mating slides being flat and in sliding surface to surface engagement with each other, said cooperating V surfaces of the mating slides constituting means for holding the sash against movement transversely of the frame, the width of the sash being greater than the minimum width of the frame opening regardless of the position of the V slide in the sash to prevent removal of the sash transversely of the frame regardless of the position of the V slide that is mounted in the sash.

3. A window sash adapted to be slidably mounted in a window frame, said sash having a shoe-receiving channel recess in one side of the sash and extending longitudinally of the sash for substantially the full length thereof, said channel recess being of a depth which is a substantial fractional part of the width of the sash wall, reinforcing means extending transversely through the channel recess and through the portions of the sash which form opposite side walls of the channel recess for preventing spreading or closing of the recessed portion of the sash, pressure shoe means extending substantially the full length of the recess and fitting snugly but freely between the sides of the recess and movable therein in a direction laterally of the sash and substantially embracing the reenforcing means, and spring means urging the pressure shoe means outwardly of the recess in a direction laterally of the sash.

4. A window sash adapted to be slidably mounted in a window frame, said sash having a shoe retaining channel recess in one side thereof extending longitudinally of the sash for substantially the full length thereof, said recess being of a depth which is a substantial fractional part of the width of the sash wall, reenforcing means extending transversely of the channel recess at the top and at the bottom of the sash for preventing spreading or closing of the walls of the recessed portion of the sash at the top and at the bottom of the sash, pressure shoe means extending substantially the full length of the recess and fitting snugly but freely between the sides of the recess and movable therein in a direction laterally of the sash, and spring means urging the pressure shoe means outwardly of the recess in a direction laterally of the sash.

5. In combination, a window frame, a window sash slidably mounted therein, at least one of said frame and sash being of wood, means for sealing against air leakage between the sliding surfaces of the sash and the frame, said means comprising a V slide mounted in each side of the frame, said sash having a cooperating and mating V slide in each side thereof and extending the full length of the sash, one of each set of cooperating slides being a male member and the other a female member, the angles of the V's in the sash being exactly the same as the angles of the V's in the frame, the V in one side of the sash being in the form of a floating shoe which constitutes the female member of one set of cooperating slides, and spring means bearing against the shoe and urging it to constant and uniform pressure engagement with the V slide carried by the frame, the cooperating surfaces of the mating slides being flat and in sliding surface to surface engagement with each other, said cooperating engaging V surfaces of the mating slides holding the sash against transverse movement outwardly of the frame, the width of the sash being greater than the minimum width of the frame opening regardless of the position of the floating shoe in the sash to prevent removal of the sash transversely of the frame regardless of the position of the floating shoe in the sash.

HORACE W. HACKER.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
106,634	Stine	Aug. 23, 1870
694,062	Kenny	Feb. 25, 1902
1,826,122	Brogie	Oct. 6, 1931
1,960,157	Kemp	May 22, 1934
2,203,427	Dautrick	June 4, 1940
2,276,123	Turner	Mar. 10, 1942