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VERTICAL OPENING SASH

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ABSTRACT OF THE DISCLOSURE

This relates to windows in general and in particular, to
a mounting assembly for a window unit whereby such
unit may be moved in a direction normal to the plane
of the glazing to a window frame of particular construction;
to the particular construction of a window unit and to a
seal between a window frame and a window unit.

Windows in the walls of buildings are mounted to lie
normally in a vertical plane in a closed position and ac-
accordingly the movement of a window mounted in ac-
cordance with the present invention, from a window
closed to a window open position and vice versa would
be in a substantially horizontal direction with the glass
remaining in a substantially vertical plane.

For convenience of description the term window frame
used herein refers to the portion fixed to the wall in sur-
rounding relation with respect to a window opening there-
in and the term window unit refers to the movable por-
tion insertable into the window opening and includes a
sub-frame and a glazing portion.

Cleaning the exterior surface of the glazing is often a
problem in extremely high office buildings and this is
greatly facilitated when the outer surface of the glazing
can be reached and cleaned from the interior of the build-
ing. Double glazing, however, as is normally used re-
sults in rather heavy window units. Also in modern build-
ings large quantities of glass are used and the size in most
cases renders them extremely difficult to handle. It ac-
cordingly has been a problem due to weight and eco-
nomics from quantities involved to mount windows to be
movable and as a result most buildings use fixed window
units.

It is obvious from the size of window units involved
that when movable mounted they must be counterbal-
anced. Lack of a suitable assembly for this purpose has
also probably accounted for installing fixed window units.
Another factor contributing to the present construc-
tion practice includes the lack of a suitable seal between
the window frame and the movable window unit.

It is an object of the present invention to provide a
combined counterbalance and mounting assembly for a
window unit.

A still further object of the present invention is to pro-
vide a combined window mounting and counterbalance
assembly concealed during a window closed position.

A still further object of the present invention is to pro-
vide a mounting for a window unit whereby the glazing
remains in a substantially vertical position in a window
open and a window closed position.

A still further object of the present invention is to pro-
vide means for mounting a window whereby the window
unit is entirely removed from the window frame in an
open position and thereby provides access to the exterior
surface of the glazing around the entire periphery of the
window unit.

A still further object is to provide a window unit of par-
ticular construction and a window frame each of particu-
lar construction.

A still object is to provide a window unit and window
frame and a pair of seals interposed therebetween around
the periphery thereof adjacent respectively the interior
and exterior surface of the window glazing.

In accordance with one aspect of the present invention,
there is provided a mounting assembly for a window unit
movably to mount the latter upon a suitable structure
wherein such window unit remains in a substantially ver-
tical plane during movement from a window closed to a
window open position. This permits the access to the ex-
terior glazing surface, i.e. the side of the window unit
adjacent the window frame in a window open position
from the opposite side around substantially the entire peri-
ophery of the window unit.

In a further aspect of the present invention there is
provided a mounting assembly securable to a window unit
and a window frame respectively at spaced positions ad-
jaer the marginal edge of the window unit and disposed
in such a position as to be concealed in a window closed
position.

In a still further aspect of the present invention there
is provided a window seal consisting of an interfitting
channel and groove on respective parts of the frame and
window unit with a gasket therebetween, such groove and
channel being continuous adjacent the outer periphery of
the window unit.

In a still further aspect of the present invention there
is provided a window unit and a window frame having a pair
of seals interposed therebetween about the periphery there-
of adjacent respectively the inner and outer surfaces of
the glazing.

The invention is illustrated by way of example in the
accompanying drawings wherein:

FIG. 1 is a vertical front elevational view of a window
unit mounted on a frame in accordance with the present
invention;

FIG. 2 is a side elevational view of the window and
frame illustrated in FIG. 1 but wherein the window is
horizontally moved to the right of the frame;

FIG. 3 is a vertical elevational view of a portion of
the means for securing the window to the frame and il-
lustrating with means of adjusting tension to provide vari-
ous counter-balances for the window;

FIG. 4 is a detailed vertical cross-sectional view along
section 4—4 of FIG. 1 showing a window and frame
constructed in accordance with the present invention
mounted in a window opening of a wall and wherein such
window is in a closed position;

FIG. 5 is similar to FIG. 4 but in somewhat less detail
illustrating, in phantom, the window in an open position;

FIG. 6 is a cross-sectional view taken along section
5—5 of FIG. 1;

FIG. 7 is an oblique view illustrating a modified means
of mounting a window unit to a frame in accordance with
the present invention;

FIG. 8 is an oblique view of a further modified means
of mounting a window unit to a frame in accordance with
the present invention and;

FIG. 9 is an oblique view of a still further modified
means of mounting a window unit to a frame in accord-
ance with the present invention;

FIG. 10 is a cross-section along section 10—10 of FIG.
3; and

FIG. 11 is a partial vertical sectional view illustrating
a modified seal between the window unit and the frame.

The drawings illustrate a window assembly which in-
cludes a window frame, a window unit and a mounting
assembly for securing the window unit to the frame in
such a manner as to permit relative movement with re-
spect thereto. The window illustrated is a complete win-
dow, however it will be apparent hereinafter that various
features are also applicable to ventilating type windows
used in conjunction with window units having a fixed
portion.
Referring now in detail to the drawings, shown therein is a window assembly consisting of a window unit 10 pivotally secured to a frame 11 by a pair of mounting assemblies 12 and 13. The window unit 10 includes a double glazed portion 14A of the insulating type and a subframe 14B. The glazing may be of the type identified by the trademark "Twinwall," wherein two sheets of glass are held in spaced relation by a suitable peripheral frame. The frame 11, as will be seen hereinafter, is preferably multipart consisting of members of extruded aluminum and the mounting assemblies, which also provide for counteralignances consists of a pair of arms interconnected by a torsion bar.

The window unit 10 consists of the previously mentioned glazing portion 14A and a sub-frame 14B, the latter being assembled from extruded aluminum sections. The sub-frame (see FIG. 4) includes members 16 and 17 detachably secured together and cooperating clampingly to engage the peripheral edge of the glazing portion.

The member 16 extends around the periphery of the glazing portion and is channel shaped in cross-section having a pair of spaced flanges 18 and 19 projecting outwardly to the web 20 but in spaced relation with respect thereto. The web 27 of member 17 and the flange 18 of member 16 may be detachably secured together face-to-face as by bolts, screws or the like and if desired, a neoprene or the like gasket may be interposed therebetween to provide a thermal barrier. The flange 29 and glazing retainer 21 are spaced apart to define a groove 30 therebetween to receive the marginal edge of the glazing. A sealing compound 29A is interposed between the flange 29 and the adjacent surface of the glazing portion 14A.

It is obvious from the foregoing that the groove 30 may vary in width to accommodate various thickness of glazing by either variously positioning the glazing retainer 21 with respect to the web 20 or alternatively positioning selected spacers between the abutting flange and web of members 16 and 17. From FIG. 4 it will be noted that the flange 19 of member 16 projects outwardly laterally beyond the member 17 and the purpose of this will become more apparent hereinafter.

The window frame 11 (see FIGS. 4 and 5) consists of a pair of solid extruded aluminum members 40 and 50 detachably secured together. The member 40 consists of a first flange 41 and a second flange 42 disposed substantially at right angles to one another with a further flange portion 43 directed normal to the latter intermediate its ends. The flange 42 terminates at the marginal edge in a groove 44 and as will be seen hereinafter cooperates with a flange on member 50 detachably secured thereto which bears a surface of the glazing portion adjacent the peripheral edge thereof.

The member 17 includes spaced flanges 25 and 26 projecting from a web 27 to define a channel 28 and a flange 29 projecting from the flange 26 in a direction parallel to the web 27 but in spaced relation with respect thereto. The web 27 of member 17 and the flange 18 of member 16 may be detachably secured together face-to-face as by bolts, screws or the like and if desired, a neoprene or the like gasket may be interposed therebetween to provide a thermal barrier. The flange 29 and glazing retainer 21 are spaced apart to define a groove 30 therebetween to receive the marginal edge of the glazing. A sealing compound 29A is interposed between the flange 29 and the adjacent surface of the glazing portion 14A.

The member 16 extends around the periphery of the glazing portion and is channel shaped in cross-section having a pair of spaced flanges 18 and 19 projecting outwardly to the web 20 but in spaced relation with respect thereto. The web 27 of member 17 and the flange 18 of member 16 may be detachably secured together face-to-face as by bolts, screws or the like and if desired, a neoprene or the like gasket may be interposed therebetween to provide a thermal barrier. The flange 29 and glazing retainer 21 are spaced apart to define a groove 30 therebetween to receive the marginal edge of the glazing. A sealing compound 29A is interposed between the flange 29 and the adjacent surface of the glazing portion 14A.

The member 40 includes a first flange 41 parallel to and in spaced relation with respect to flange 41 and a further flange 52 normal thereto and directed towards the flange 42 of member 40. The flange 52 terminates in an outwardly directed flange 53 adapted to fit into the groove 44 of member 50 and members 40 and 50 may be interposed therebetween in a selected position. The member 50 includes a flange 54 disposed intermediate the marginal edges of flange 52 and projecting therefrom is an inwardly turned
longitudinal axis of the torsion bar and receives a pivot pin. A pair of pins P are secured to the web 20 of the window sub-frame member 16. These pins are located on opposite sides of the window unit at a position intermediate the flanges 18 and 19.

Pins P pivotally mount the free end of the arms 80 and 81 of mounting assembly 13 to the window unit. Similar pins P' are secured to the window frame and project through apertures adjacent the free end of arms 80 and 81 of the mounting assembly 12.

Alternatively pins may be secured to the arms and project outwardly therefrom to fit into apertures in the respective ones of window frame 11 and window sub-frame 14.

The flanges 43 and 54 of the window frame abut respectively flange 19 and fit into groove 28 of the sub-frame of the window unit and together in a window closed position form a closed channel C extending about the periphery of the window. Assembly 13 and the upper assembly 12 are disposed within the channel C. In the closed position, the torsion bar 82 of the mounting assemblies 13 and 12 are disposed respectively along the lower and the upper edges of the window unit while the arms are disposed along the vertical edges thereof.

In FIG. 5, the window assembly is shown (in phantom) in an open position and in such open position it is evident that the window frame forms a substantially solid bar; however, it is conceivable that a spiral spring, a flat bar or elongated coil type arrangement could be used to accomplish the same result. A spiral spring for example may be enclosed in a tube the latter providing means for rigidly securing the mounting assembly to the window unit or window frame, whichever the case may be. The only requisite is that the torsion bar not only provide means of biasing the window to a closed position but also provide a mounting rigidity to retain the window unit in a selected plane. The only movement permitted in the connection between the torsion bar and the window or frame is oscillatory motion about the longitudinal axis of the torsion bar.

As further alternatives, the window unit may be pivotally secured to the frame in a variety of ways.

Referring to FIG. 8, the window unit 10 is pivotally secured to the frame 11 by a pair of mounting assemblies 200. Each of the mounting assemblies consists of a substantially L-shaped member having a torsion bar 201 and an arm 202 secured thereto adjacent one end thereof. The arm 202 of one mounting assembly is pivotally secured to the frame 11 while the torsion bar 201 is secured to the upper edge of the window unit comprising blocks 83 and 85. In the lower mounting assembly 200, the torsion bar 201 is secured to the frame by mounting blocks 83 and 85 while the arm 202 is pivotally secured at its free end to the window unit.

In this type of installation it is obvious that a certain amount of twisting force will be imposed upon the window unit; however, this could be readily compensated for in the design of the window sub-frame.

A further alternative mounting is illustrated in FIG. 7 wherein only a single mounting assembly 13 is used. In this embodiment the torsion bar portion 82 is mounted on the window frame 11 by two mounting blocks 83 and two mounting blocks 85 while the free ends of the arms 80 and 81 are pivotally secured to marginal vertical edges of the window unit 10. Pivotal attachment, as will be obvious, is disposed at a position vertically above the center of gravity of the window. By such arrangement, the window unit remains suspended freely in a vertical position in an open position. The torsion bar may be mounted in a manner as described with reference to FIG. 4 and the effective length of the torsion bar may be varied to accommodate for various weights of window units.

In FIG. 9 there is illustrated a still further modified means of mounting the window unit to the frame. In this embodiment the window unit 10 is secured to the frame 11 by a mounting assembly 300. The mounting assembly 300 consists of a pair of torsion arms 301 and 302 extending from and interconnected by a bar 303. The tor-
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7. A window assembly comprising a window frame, a window unit and a mounting assembly securing said window unit to said window frame, said mounting assembly comprising a torsion bar, a pair of spaced parallel arms projecting outwardly from said torsion bar adjacent opposed ends thereof, means securing said torsion bar to said window frame and means for pivotally securing the free end of each arm to the window frame along the length of the torsion bar and means for pivotally securing the free end of each arm to the window frame.

8. A window assembly as defined in claim 7 wherein said mounting assembly includes an additional torsion bar having a pair of spaced parallel arms projecting therefrom, said additional torsion bar being secured to the window unit along an edge opposite to the marginal edge of the window frame to which the other torsion bar is secured and similarly including a journal and restraining block disposed in spaced relation along the length of the torsion bar, the free ends of each of the arms being pivotally secured to said window frame.

9. A window assembly as defined in claim 8 wherein the window frame and window unit each include a pair of flanges thereon disposed in abutting relation in a window closed position to define a channel circumferentially enclosing the window frame and said channel means for pivotally securing the free end thereof to the window unit at a position vertically above the center of gravity thereof, said torsion bar being secured to the window frame along one edge thereof by a journal and a restraining block disposed in spaced relation along the length of the torsion bar, said journal being located intermediate the arm and the restraining block.

11. A window assembly adapted to be mounted substantially in a vertical plane comprising a window frame including a spaced lower and upper pair of parallel members interconnected by a pair of spaced side parallel vertical members to define a window opening, each of said members comprising a pair of shaped metallic members detachably joined together and having a flange projecting inwardly, said flange terminating at a marginal edge in a seal engaging member; a window unit including a glazed portion and a sub-frame, the latter comprising a pair of extruded aluminum members detachably secured together and having a thermal barrier interposed therebetween, said sub-frame having a groove receiving said seal engaging member of the glazed portion, a seal disposed in said groove and interposed between the window frame and window unit, said sub-frame having a further outwardly directed flange in spaced relationship with respect to said groove and mounting means disposed therebetween, said mounting means comprising a torsion bar secured to the lower member and having a pair of arms projecting therefrom to be disposed adjacent opposed marginal edges of the closing unit, means for securing the torsion bar to the lower member comprising a pair of bearings disposed respectively one adjacent each arm and permitting free rotational movement of the torsion bar and means disposed intermediate said bearings for securing said torsion bar rigidly to said lower member of the frame, said means being relatively movable along a selected length of the torsion bar and means for pivotally securing the free end of each of the arms to the sub-frame to be
concealed behind said further flange of the sub-frame in a window closed position.

12. A window assembly as defined in claim 11 including a further mounting means comprising a torsion bar secured to the window sub-frame adjacent the upper end of the window unit and having a pair of arms projecting downwardly therefrom and pivotally secured at the free ends thereof to the window frame.

13. A window assembly comprising:
   (a) a window frame including a member circumscribing a window opening and having a pair of flanges projecting unequal distances thereinto, said flanges being disposed in spaced relation in a direction normal to the plane of said opening,
   (b) a window unit including a glazing portion and a sub-frame circumscribing said glazing portion, said sub-frame having a pair of flanges projecting outwardly therefrom and disposed to be substantially in abutting relationship with respective one of the window frame flanges in a window closed position, the flanges on the window frame and the sub-frame defining a channel circumscribing the window unit in a window closed position, and
   (c) a mounting assembly securing said window unit to said window frame, and disposed in said channel in a window closed position, said mounting comprising:
      (i) a torsion bar,
      (ii) a pair of spaced, parallel arms projecting outwardly from said torsion bar adjacent opposed ends thereof,
      (iii) means securing said torsion bar to said window frame along one edge of the latter including a journal and restraining block disposed in spaced relation along the length of the torsion bar, and
      (iv) means pivotally securing the free end of each arm to respective ones of opposed marginal edges of the window unit.

14. A window assembly as defined in claim 13 including a cooperating tongue and groove on respective ones of associated flanges of the window unit, window frame and a gasket interposed therebetween in a window closed position, said tongue and groove and gasket extending about the entire periphery of said window unit.

15. A window assembly comprising a window frame having a spaced lower and upper pair of members inter-connected by a pair of spaced side members to define a window opening, a window unit and means for mounting said window unit to said frame selectively to open and close the opening, said window unit, in an open position, being removed from the plane of the window opening, said mounting means comprising an elongated torsion spring having an arm secured thereto and projecting therefrom to be disposed at an angle corresponding to the angle between the lower member of the frame and an associated adjacent side member, means securing said torsion spring to the window unit including restraining means and journal means disposed in spaced relation along the length of said torsion spring, said journal means preventing relative rotation of said window unit and torsion spring except about the longitudinal axis of the torsion spring, and means pivotally securing the free end of the arm to one of the spaced side members to provide for relative pivotal movement of the arm and the side member about an axis parallel to the longitudinal axis of the torsion spring.

16. A window assembly as defined in claim 15 wherein said mounting means includes a torsion bar having an arm projecting from one end of said bar and being disposed substantially at right angles thereto.

17. A window assembly as defined in claim 15 wherein the torsion spring is an elongated torsion bar non-circular in cross-section throughout at least a portion of the length thereof, and the means for securing said torsion spring to the window unit consists of a journal disposed adjacent the arm permitting free rotation of the torsion bar with respect to said window unit and a restraining block preventing relative rotation between a portion of the length of the torsion spring and said window unit detachably secureable to the spring and movable therealong to vary the effective length of the spring, said journal and restraining block being disposed in spaced relationship along said torsion bar.

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