June 27, 1961 W. G. RIEBLING 2,990,012

MARINE WINDOWS AND CONTROL MECHANISM THEREFOR

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FIG. 1

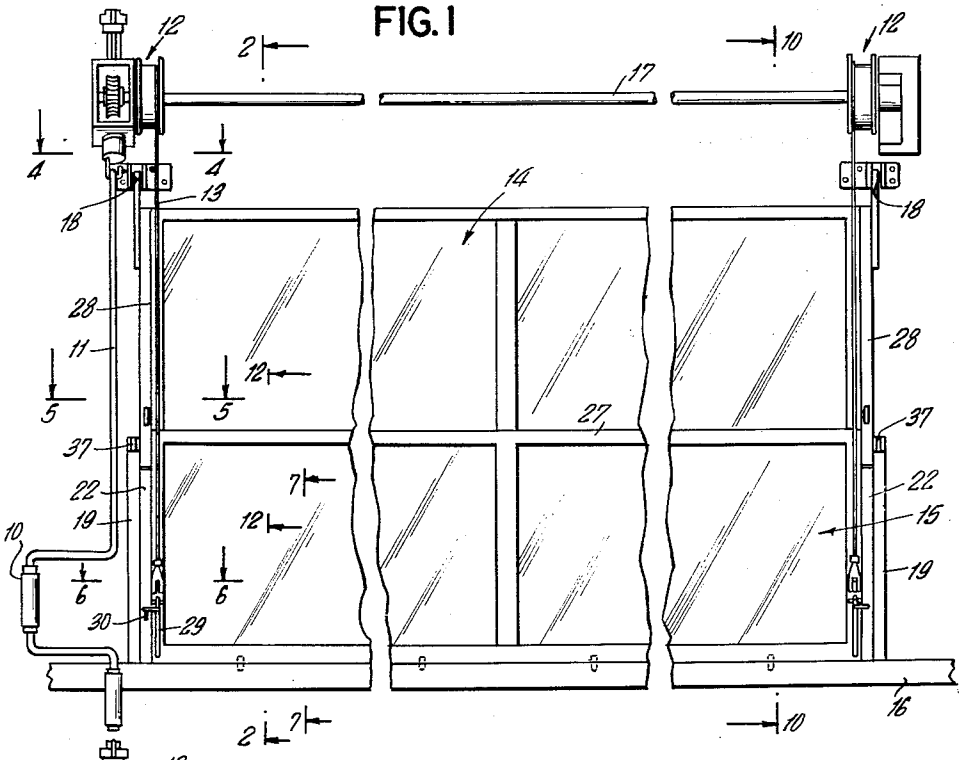
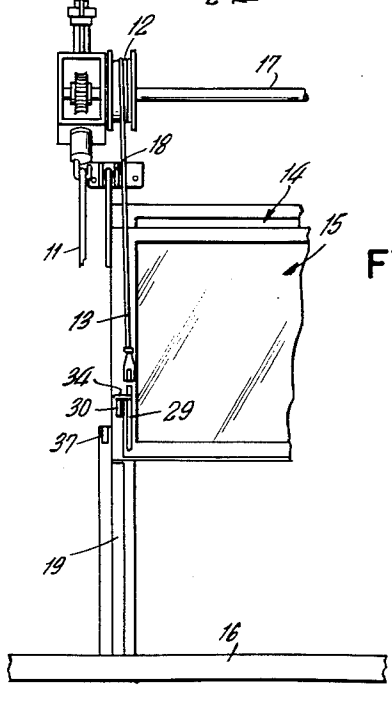


FIG. 9



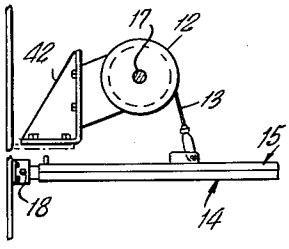


FIG. 10



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FIG. 3

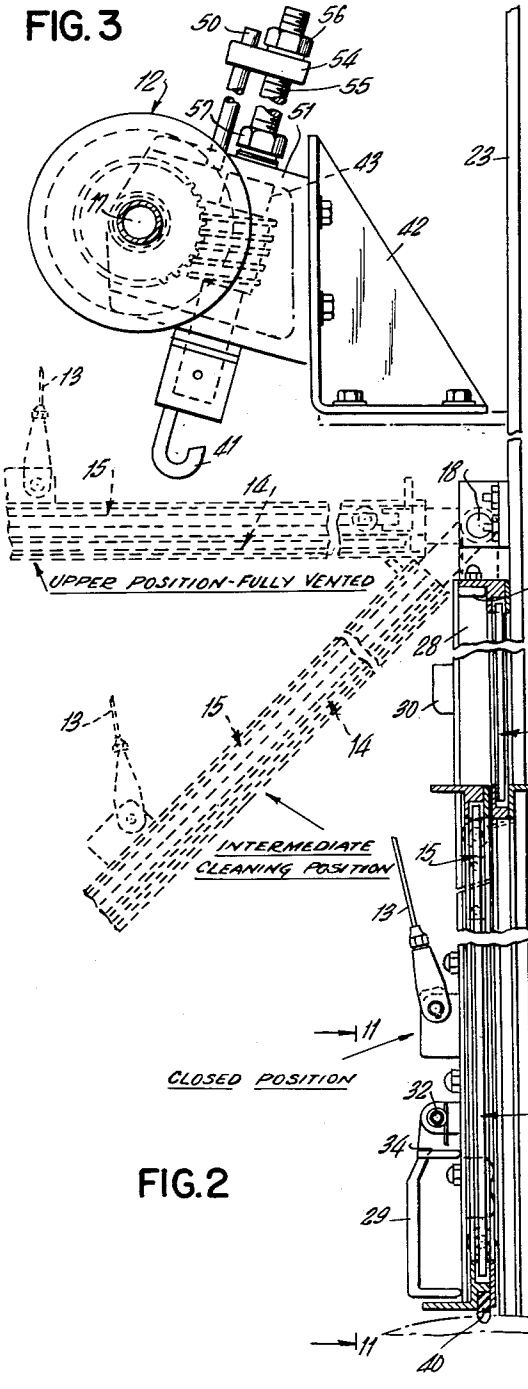


FIG. 2

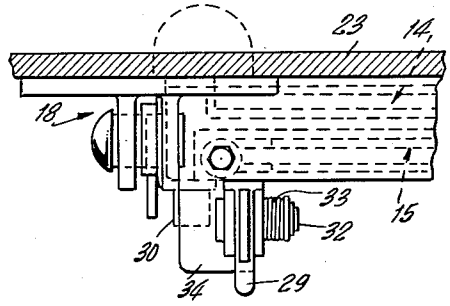


FIG. 4

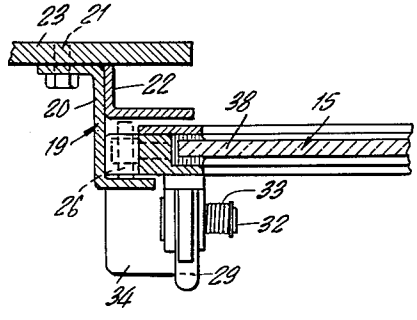


FIG. 6

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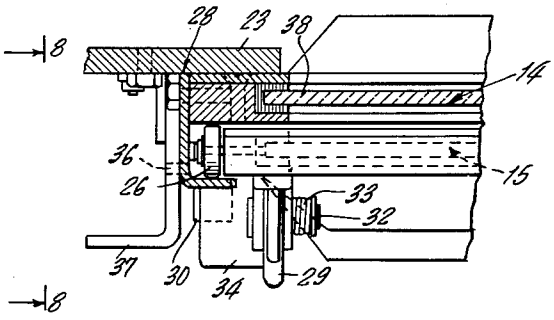


FIG. 5

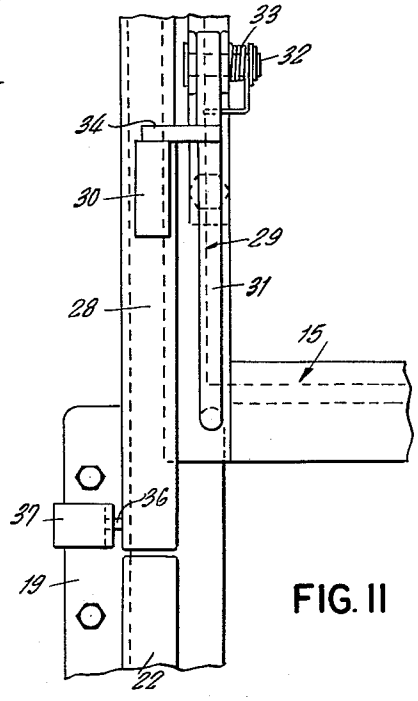


FIG. 11

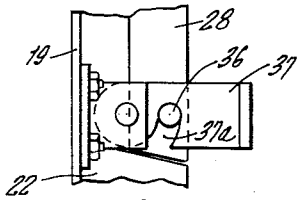


FIG. 8

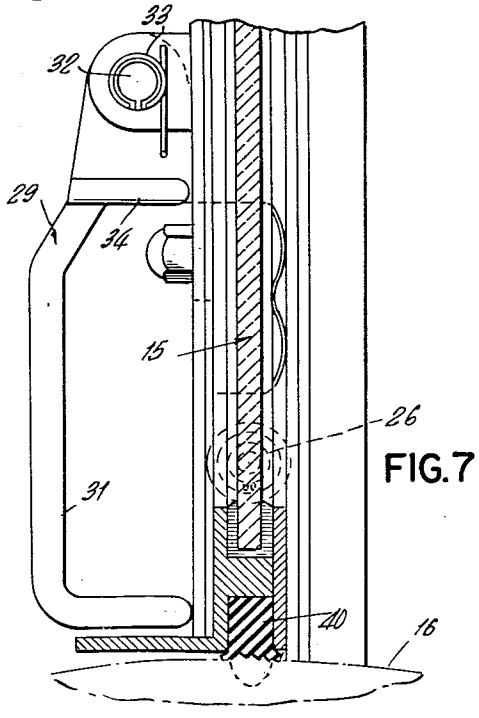


FIG. 7

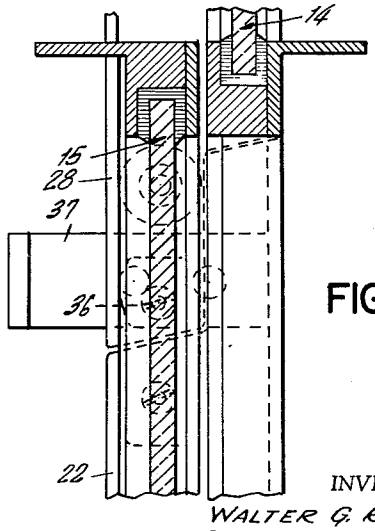


FIG. 12

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2,990,012

MARINE WINDOWS AND CONTROL MECHANISM THEREFOR

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Filed June 5, 1959, Ser. No. 818,449
4 Claims. (Cl. 160—193)

This invention relates to movable window constructions and is particularly directed to windows or windshields for enclosing the decks of luxury liners or other water going vessels in such a manner that the windows can be individually stored in a remote position out of range of the heads of people on the deck, and be rapidly operated to enclose the entire deck or portions thereof or be adjusted to a partially opened position, as desired.

One feature of the invention is to provide means for opening and closing such windows from inboard the ship.

Another feature is to provide such movable windows that may effectively seal the deck portions against rain or other inclement weather.

Still another feature is to provide such a construction that is relatively lightweight whereby the individual panels can be easily maneuvered and controlled by manual means without the need for motors or other apparatus frequently needed to open and close windows and windshields of this type.

Still another feature is to provide such a window construction that is supported by and guided by the handrails and vertical columns normally made a part of the deck construction, and to enable the windows to be moved into a remote storage position thus leaving the handrails and the areas between the outer columns of the deck completely free and clear when the windows are removed.

Still another feature is to provide adjustable stops for limiting the movement of the control means to avoid possible damage thereto.

Still another feature of the invention is to provide means for moving the windows free of their guide channels, enabling the normally outer surfaces of the window panels to be individually cleaned while being located at or near their normal storage position.

Another feature is to provide such a window construction that is rugged, and once adjusted, does not require further adjustment or more than nominal lubrication over sustained periods whereby the entire apparatus can be exposed to salt water atmospheres and the effect of heavy rainstorms and winds without continuous attention beyond normal cleaning.

Another feature is to provide such a structure which in either the stored or operating position is not accessible to other than authorized personnel, thereby to avoid injury to passengers or other inexperienced persons.

Another feature is to provide an operating mechanism workable from the deck of the ship, thus avoiding the necessity for moving ladders and similar elevating means in order to maneuver the windows from one position to another.

Another feature of the invention is to permit variable and individual adjustment of the windows from a fully opened to a fully closed position, thereby providing varying degrees of ventilation in each section of the windshield structure without adversely affecting the support or the rigidity of the remaining sections of the window enclosure.

Still another feature is to provide manually controllable latches and catches for retaining each of the various window sections in their respective adjusted positions to enable individual control by an operator.

These features and many attendant advantages will be

more readily comprehended by those skilled in the art after a detailed consideration of the following description of one preferred embodiment of the invention taken with the accompanying drawings wherein:

FIGURE 1 is a front elevational view of a single two-panel window unit according to one preferred embodiment of the invention, and illustrating the window panels in closed position.

FIGURE 2 is a vertical section taken along lines **2—2** of FIGURE 1, with the sash moved to the storage position shown in dotted lines.

FIGURE 3 is an enlarged side elevation of the elevating mechanism of FIGURE 1.

FIGURE 4 is a cross-sectional view and partial plan view taken along lines **4—4** of FIGURE 1.

FIGURE 5 is a cross-sectional view similar to FIGURE 4 and taken along lines **5—5** of FIGURE 1.

FIGURE 6 is a cross-sectional view similar to FIGURE 4 and taken along lines **6—6** of FIGURE 1.

FIGURE 7 is an enlarged vertical sectional view and partial side elevation taken along lines **7—7** of FIGURE 1 for better illustrating a portion of the preferred mechanism.

FIGURE 8 is an enlarged side elevation of a portion of the mechanism viewed along lines **8—8** of FIGURE 5.

FIGURE 9 is a partial front elevation, similar to FIGURE 1, and showing the lower window panel in raised position.

FIGURE 10 is a partial side elevational view and partial vertical section similar to FIGURE 2, showing the window panels in stored position taken on the line **10—10**, FIGURE 2.

FIGURE 11 is an enlarged front elevational view of a portion of the mechanism viewed along lines **11—11** of FIGURE 2, and

FIGURE 12 is an enlarged side section of a portion of the panel structure as viewed along lines **12—12** of FIGURE 1.

Referring now to the drawings for a detailed consideration of one preferred embodiment of the invention, the preferred windshield or window enclosure generally comprises a plurality of two sectional window units in side-by-side arrangement, each individual unit being of the form as shown in FIGURE 1. Each of these units may be individually opened, closed, and stored by rotative manipulation of a hand crank **10** integrally fastened to an elongated rod **11** which serves to operate a pulley mechanism **12** and cable **13** for raising and lowering the window sections.

In FIGURE 1 showing the windshield in closed position, both the upper window section **14** and lower window section **15** are vertically disposed, one below the other, to enclose the space between the guardrail or handrail **16** fastened to the ship's deck and the ceiling or other covering over the deck (not shown).

To open the window units, the operator rotatively manipulates the handcrank **10** and operating rod **11**, which, through suitable gearing hereinafter described with respect to FIGURE 3, rotates the shaft **17** to turn the pair of pulleys **12** and wind the cables **13** thereon, thereby vertically raising the lower section or panel **15** of the window unit. Continued operation of the crank **10** vertically raises the lower panel **15** upwardly until it is positioned substantially in alignment with the upper panel **14**, as best shown in FIGURE 9, at which time the window is half opened.

When the two panels have been brought together in vertical alignment, a stop member **39**, (FIGURE 2) is engaged; this stop member **39** on rail **28** which is connected to upper panel **14** is later described in connection with FIGURE 2 and in connection with the description of the

operation of the novel window. Further upward reeling of the cable **13** serves to pivot both panels together about a pivoted support **18** positioned above the upper panel **14**, whereby the panels **14** and **15** are rotated together inboard to the horizontal position as shown in dotted lines in FIGURES 2 and 10. This pivotal displacement not only fully opens the window units, but additionally stores the units in a horizontal position far above the heads of passengers walking on the deck below, thereby providing substantially no interference with activities being performed on the ship. Furthermore in the stored position under the roof or ceiling above the deck, the window sections **14** and **15** occupy what is otherwise unused space quite remote from danger of breakage of glass or other injury to the passengers; and since the crank **10** (with its associated operating rod **11**) is preferably removably connected to the drive for the pulley mechanism **12**, the glass paneled window units are substantially immune from unauthorized handling or manipulation, thereby further insuring the utmost in safety.

To properly support the lower glass panel section **15** when in its closed position and to provide a track or runway to permit its being slidably raised upwardly or downwardly therein, a pair of guide rails **19** are provided on opposite sides of each such lower panel and are suitably fastened to the handrail **16** or to vertical posts extending therefrom to the roof or ceiling (not shown) and normally forming a part of the ship's construction. However, as shown in FIGURES 1, 9, and 10, such guide supports may only extend upwardly to the height of the lower panel **15**, since after this panel **15** has been raised to the level of the upper panel **14**, it is necessary that both panels **14** and **15** hinge inwardly about pivots **18** to the horizontal stored position shown in FIGURE 10 or to an intermediate angular position, such as that shown in dot-dash lines in FIGURE 2.

To provide for this guided support only during the vertical upward travel of lower panel **15**, the guide rails **19** are preferably made in a composite U-shaped configuration as shown in FIGURE 6. Each guide may be formed of a first angle member **20** having a generally Z-shaped cross-section and having one flanged portion bolted or otherwise fastened to the bulkhead **23** at **21**, and a second angle member **22** having an L-shaped cross-section welded or otherwise fastened thereto and with its flanged portion being spaced from that of the Z-shaped angle member to provide a U-channel therebetween as shown. To reciprocally slide within this U-shaped channel, the lower window panel **15** may be provided with rollers **26** along both its sides adapted to slidably engage the walls of the channel member **19**, thereby to easily ride up and down within the channel formed by the flanged members.

Since the rigid guide channels **19** do not extend upwardly along the sides beyond the top **27** of the lower window panel **15**, when in its closed position, it is necessary that the upper window panel **14** receive support from the lower panel **15** to prevent its tilting about pivots **18**, and yet be slidably connected thereto to permit the lower panel **15** to reciprocally travel alongside thereof. To provide this non-tiltable sliding support between the two panels, the upper panel **14** is provided with a pair of L-shaped brackets **28**, one on each opposite side thereof and extending lengthwise along both sides thereof, as best shown in FIGURE 5, with the gap between a plate attached to the bulkhead **23**, and the outer flange of the bracket **28** large enough to accommodate both the upper and lower panels **14** and **15**, as shown. Thus as the lower panel **15** is raised upwardly from its closed position, it is at first slidably supported in its lower vertical positions by the U-guide rails **22** (FIGURE 6) rigidly fastened to the bulkhead **23**, and in moving upward it enters the U-shaped gap between the brackets **28** section of the sash fastened to the upper panel **14** (FIGURE 5). In continuing upward the lower panel enters further into the channel area formed within the bracket **28** attached to upper panel **14** until the upper and lower panels are aligned. In this position, the sides of lower panel **15** have entirely left the confines of the lower guide rails **19** and are fully within the U-channel area formed within the bracket **28** attached to upper window panel **14**. Consequently when the lower window section **15** has moved upwardly into alignment with the upper window panel **14**, it has left the confines of the U-shaped guide rail **19** and the channel member **22** attached to the bulkhead and entered slide area formed within the brackets **28** fastened to the upper window panel **14**, whereby the upper and lower panels **14** and **15** are bracketed together and may tilt about the pivots **18** as described above.

FIGURE 11 illustrates in front view the vertical alignment of the guide rails **19** and channel **22** with the L-shaped bracket **28** fastened to the sides of the upper window panel, thereby enabling the sides of the lower panel **15** to be guided by the lower channel **22** and the upper bracket **28**, as it moves upward into alignment with the upper panel to a partially opened position.

After the lower window panel **15** has been raised to the level of the upper panel **14** as shown in FIGURE 9, it is desired that stop means be provided to prevent the lower panel **15** from sliding downwardly again should the crank lever **10** be released or if it is desired to have both panels in this partially opened position. For this purpose there is provided on the outside side frame of the lower panel **15** a spring closed dog member **29** which is adapted to mate with a cam faced stopblock member **30** fastened to the outer side of bracket **28** attached to the upper window panel **14**, all as shown in enlarged view in FIGURE 11.

As shown in FIGURE 2 and in the enlarged side view of FIGURE 7, the dog member **29** is comprised of a hand gripping handle portion **31** that is vertically disposed along the side frame of the lower panel **15** and pivotally connected thereto by a pin **32**. A coiled torsion spring **33** is provided, one end of which is secured to the dog member **29** with the opposite end being attached to bracket **32*a*** which supports the pin **32**. Spring **32** drives the latch extension or stop **34** of the dog member **29** into engagement with cam or stop block member **30**. Flat plate portion or latch **34** extends transverse to handle portion **31** as shown in side view in FIGURE 7, in front view in FIGURE 11, and in top view in FIGURES 4 and 6. Plate portion or latch **34** rides upward over the cammed surface **30*a*** of stopblock member **30** as the lower panel **15** reaches vertical alignment with the upper window panel **14** and thereafter provides a stop or lock means to prevent any downward movement of the lower panel **15** until the dog is manually released. FIGURES 9 and 11 show the dog **29** and stopblock **30** in engaging position wherein the transverse plate portion or latch **34** of the dog is resting on the upper shoulder of the stopblock **30**. Since the dog member **29** is maintained in this position by the torsion spring **33**, the stop means may be manually disengaged to enable downward travel of window panel **15** by merely lifting the handle portion **31** of the dog against the action of the spring **33** to raise its plate portion **34** away from stop **30** thereby disengaging the dog and stop between the two window panels. Thus after the lower panel **15** has been raised to the level of the upper window panel **14**, the dog **29** and stopblock **30** prevent the lower panel **15** from downward movement until the dog is manually operated to disengage its plate member **34** from the upper shoulder of stopblock **30**.

Since the upper window panel **14** is supported only by the pivot means **18**, it is desired to provide manully operable latch means to releasably prevent its tilting movement about the pivot **18** until it is desired to raise the panels to a horizontal stored position. As best shown in FIGURES 5, 8 and 11, such latch means may be provided by employing outstanding pins **36** projecting laterally from the L-shaped brackets **28** attached to upper panel **15**, which pins **36** are engageable into a suitably

formed, arcuate slot 37*a* in a pivotable latch bar 37, rotatably supported by each guide rail 19.

Thus, the upper window panel 14 are manually latched to the top of the guide rails 19 by means of latch bars 37 to prevent any movement of the upper panel 14, thereby rigidly holding the panel 14 in place during raising or lowering movements of the lower panel 15. As the lower panel is raised into alignment with upper window panel 14, the dog 29 on the lower panel and the stop block 30 on the upper panel engage to prevent further movement, thereof. To fully open the window units and store the window panels 14 and 15 in the horizontal position of FIGURE 10, it is necessary to then manually raise the latch bars 37 on both sides of the panel 15 out of engagement with the pins 36 carried by upper panel brackets 28. When latch means 37 are released, further rotation of crank 10 will cause the cables 13 to draw the lower end of panel 15 upwardly; since panel 15 can no longer move upwardly in a vertical translatory manner, but is connected to the guide members of upper panel 14 which in turn are pivoted at 18, 18, then panels 15 and 14 both rotate together inwardly about the pivots 15 with their lower ends moving upwardly to the horizontal or stored position thereby providing full opening of the vent as shown in FIGURE 2. This is made possible by the fact that brackets 42 support pulleys 12 substantially inboard of the plane of the vent which the window panels 14, 15 protect and thereby, on further raising of cables 13 make possible the provision of a component of force in an inward and upward direction.

An important feature of the invention is thereby realized: Both panels 14 and 15 may be swung by a member of the crew to the intermediate position shown in dotted lines in FIGURE 2 where they may then readily be manipulated to clean the outer surfaces from the inboard position, thereby making it unnecessary to provide means external of the craft for cleaning the exterior window areas.

As best shown in FIGURES 5 and 6 each of the panels 14 and 15 is comprised of glass panes mounted within rigid but lightweight frame members with suitable insulating and shock absorbing material about the edges of the glass to absorb shock. provide a liquid seal, and provide thermal insulation. The top portion of the upger guide bracket 28 for receiving and guiding the lower panel 15 as it is raised, is also provided with a rubber bumper 39 (FIGURE 2) serving as an upper stop to prevent further upward travel of the lower panel 15. The bottom edge of the lower panel 15 is also provided with a rubber seal member 40 (FIGURE 2) serving the purpose both of cushioning the abutment of the lower panel 15 against the handrail 12 as well as sealing the joint against wind and rain.

The lower rubber seal and pin arrangement at the bottom of the lower sash or panel 15 not only locate the lower sash relative to the rail but also serve the important function of preventing moisture from entering between the rail and the lower sash. The bottom edge of the rubber seal 40 has teeth or serrations 40*a* therein to grip the handrail 16.

As generally discussed above, the upward and downward vertical movement of the lower panel 15, and the rotational movement of both panels is controlled by the pair of cables 13, each of which is suitably attached to a different side of the lower panel frame 15, as best shown in FIGURE 2.

As best shown in FIGURES 1 and 3, the upper ends of cables 13 pass around the pulleys 12 mounted to be rotated by a shaft 17 which is driven by a worm drive mechanism, as shown, whose drive gear is manually rotatable by the crank rod 11 detachably engaging a hook 41. The worm drive mechanism is supported by a suitable angle bracket 42 affixed at or near the ceiling above the ships deck all as best shown in FIGURE 1.

To provide an adjustable stop for limiting the movement of the cables 13 in either direction, the worm drive mechanism of FIGURE 3 is preferably provided with adjustable stops limiting the movement of the worm drive shaft 43. Such stop means is shown at the upper portion of FIGURE 3 and comprises a slide rod 50 which is stationarily secured to the bracket 51 in which the worm shaft 43 is journalled. Bracket 51 is in turn secured to member 42. Slide nut 54 has one opening (not shown) which fits over the rod 50 and is slidable with respect thereto and has a second threaded opening in threading engagement with threaded extension 55 of worm shaft 43. As worm shaft 43 rotates, its threaded extension 55 also rotates; and since nut 54 is prevented from rotating by its engagement with slide rod 50, the slide nut 54 moves along the threaded extension 55 in a direction corresponding with the direction of rotation. Two adjustably positioned stop nuts, 56, 57 are provided at opposite ends of threaded extension 55. These nuts 56, 57 may, if desired, be locked against accidental movement out of position in any suitable manner as by for instance stop nuts.

When the worm shaft 43 has turned sufficiently in one direction to raise the windows to the fully vented position of FIGURE 2, then slide nut 54 will engage one of the stop nuts 56, 57 at one end of threaded extension 55 and prevent further rotation of worm shaft 43. This will prevent the raising of the windows to a position where the ceiling might be marred and will prevent excessive tension on the cables 13.

When the worm shaft 43 has turned sufficiently to lower the window 15 fully to the closed position of FIGURE 1, then slide nut 54 will engage the other of the stop nuts 56, 57 and prevent further rotation of worm shaft 43. This will prevent excessive slack in cables 13.

Although this invention has been described in connection with an exemplary embodiment thereof, it is to be understood that variations in its application and modifications in its construction and arrangement may be made within the broader spirit and scope of the invention as described in the appended claims.

What is claimed is:

1. A movable window construction comprising an upper and a lower window panel that are disposed one above the other when in closed position, means guiding the lower panel to permit its reciprocally sliding upwardly and downwardly alongside the upper panel, the upper panel having a pair of parallel flanged brackets attached to the sides thereof, the lower panel having a pair of rotatable rollers attached to the sides thereof, the rollers being adapted to individually engage the parallel flanges of the brackets to guide the lower panel during the elevation thereof, said lower panel guiding means and said guiding means on the upper panel being aligned when both panels are disposed in the vertical position, stop means partially on the upper panel and partially on the lower panel to prevent downward movement of the lower panel when the lower panel is raised into substantial alignment with the upper panel guide means on the upper panel for receiving and guiding the lower panel as it is raised and lowered alongside the upper panel, the stop means including a bracket fixedly attached to the upper panel, a cam-faced stop block attached to the bracket, said stop means including a flat latching element including a latching portion, adapted to engage the stop block to retain the lower panel in the latched position, the stop block cam enabling the latching portion of the latching element to be moved out of engagement with the stop block, while the lower panel is elevated, a coiled torsion spring operative to normally retain the latching element of the stop means in engagement with the stop block attached to the upper panel, the spring being adapted to force the latch plate into engagement with the stop block, when the lower panel is elevated to a predetermined position, said latching element being manually disengageable to enable downward movement of the lower

panel, relative to the upper panel, a pair of pivot pins, pivotally supporting the upper panel for tilting about a horizontal axis, and means for vertically raising the lower panel into substantial alignment with the upper panel and then tilting the upper and lower panels together to a horizontally stored position, means for normally preventing the tilting of the upper panel about said horizontal axis during vertical movement of the lower panel, including a manually operable pivoted latch, each of said latches having an arcuate slot therethrough adapted to receive a latch pin attached to the upper panel, said means for vertically raising the lower panel including a manually operable cable and pulley, the cable having one end thereof attached to the lower panel, a manually operable drive mechanism engaging the end of the cable opposite that attached to the window panel, and manually operable crank means detachably connected to the drive mechanism and operable from a position remote from said drive mechanism to actuate said drive mechanism.

2. An adjustable window construction for enclosing the space between the handrail of the deck and the roof thereabove in a water going vessel, comprising, a plurality of two part window units in side by side arrangement along said handrail, each comprising an upper panel pivotally supported by the vessel proximate the roof thereof for movement from a substantially vertical position perpendicular to the deck to a horizontal position substantially parallel to the roof and proximate thereto, a lower panel movable upwardly and downwardly alongside and below the upper panel when the upper panel is disposed in vertical position, guide means supported by the vessel above the handrail for guiding the upward and downward movement of the lower panel from a position immediately above the handrail to a position below the upper panel, and secondary guide means supported by the upper panel for engaging the lower panel as it is raised above the lower guide means, thereby to enable vertical movement of the lower panel to a position substantially alongside the upper panel, but preventing pivotal movement between the upper and lower panels, the lower panel having a pair of rotatable rollers attached thereto, at the sides thereof, the rollers being adapted to engage the guide means fitted to the upper panel, to facilitate the vertical movement of the lower panel, the bottom of the lower panel having a compressible seal member attached thereto, the seal member having means formed thereon, adapted to engage the hand rail to seal the area between the handrail and the lower panel, means for enabling the lower panel to be raised from the handrail to a vertical position substantially alongside the upper panel and thence to enable pivoting movement of the upper and lower panels together to a substantially horizontal position under the roof, manually disengageable means for normally fastening the upper panel to said guide means to prevent pivoting thereof, said manually disengageable means including a pair of pivoted latches, each of said latches having an arcuate slot therethrough, adapted to receive and engage a pin attached to the upper panel, manually disengageable stop means for preventing further movement of the lower panel when it is positioned substantially alongside of the upper panel, spring means operative to retain the manually disengageable stop means in engagement with the upper panel, the manually disengageable stop means including a bracket fixedly attached to the upper panel, a cam-faced stop block attached to the bracket, said manually disengageable stop means including a latching member having a flat latching portion adapted to engage the stop block to retain the lower panel in the latching position, the stop block cam enabling the latching portion of the latching member to be moved out of engagement with the stop block, while the lower panel is elevated, the spring means being adapted to force the latching portion of the latching member into engagement with the stop block, when the lower panel is elevated to a predetermined position, said elevating means including a cable having one end thereof attached to the lower panel, a rotatable pulley on a shaft located above the pivot of the upper panel and inboard therefrom, and a manually operable drive mechanism supported by the vessel proximate the upper deck thereof and engaging the opposite end of said cable, and manually operable crank means detachably connected to the drive mechanism and being operable from a position near the deck to actuate said drive mechanism, drive means for raising and lowering said lower panel; said lower panel being engaged with the upper panel when in substantial registry therewith; further operation of the drive means after interengagement of the panels causing said panels to pivot inwardly toward a substantially horizontal position about the pivotal mounting of the upper panel, the means for driving the cable pulley to raise and lower the lower panel, including a worm and worm wheel, said worm having stop members associated therewith to halt the operation thereof in one direction before excessive opening movement is imparted to the lower window panel and in the opposite direction before excessive slack occurs in the cable, said stop means comprising a threaded extension of the worm, stop members spaced from each other on said extension and a slide nut movable along said threaded extension, means barring rotation of said slide nut with respect to said extension; said worm being halted in its rotation in either direction when the slide nut engages a stop.

3. In a two panel movable window unit for enclosing a vertical area and being operable to a position substantially fully removed from the area, an upper and lower window panel, guide means on the upper panel for receiving and guiding the lower panel for reciprocal movement substantially alongside the upper panel, whereby the panels may be vertically positioned one above the other, with the lower panel being reciprocally movable from a position below the upper panel to a position substantially alongside the upper panel, support means below the upper panel for slidably engaging the lower panel in positions below the upper panel, the upper panel having a pair of parallel flanged brackets attached thereto, the lower panel having a pair of rotatable rollers attached thereto, at opposite sides thereof, the rollers being adapted to individually engage the parallel flanges of one bracket attached to the upper panel to guide the lower panel, thereby to facilitate elevation of the lower panel relative to the upper panel, and pivot means supporting the upper panel for rotation about an axis above the upper panel, whereby the lower panel may be reciprocally moved from a position below the upper panel to a position substantially alongside the upper panel and both panels may then be rotated about said axis to a position substantially fully removed from said area, a stop means supported by the guide means on the upper panel for preventing the lower panel from passing above the upper panel during its reciprocal movement, and manually disengageable stop means partially supported on the lower panel and partially on the upper panel for preventing the lower panel from further movement downward when it has reached a position substantially alongside the upper panel, the manually disengageable stop means including a bracket fixedly attached to the upper panel, a cam-faced stop block attached to the bracket, said manually disengageable stop means including a latching element, having a flat latching portion integral therewith, the latching portion of said latching element being adapted to engage the stop block to retain the lower panel in the latched position, the stop block cam enabling the latching portion of the latching element to be moved out of engagement with the stop block, while the lower panel is elevated, a coiled torsion spring operative to normally retain the latching element of the stop means in engagement with the upper panel, the torsion spring being adapted to force the latching portion of the latching element into engagement with the stop block, when the lower panel reaches a position substantially alongside the upper panel,

detachable latch means partially carried by the support means and partially by the upper panel to normally prevent rotation of the upper panel about said axis, means attached to the support member pivotally supporting the latch means, means attached to the upper panel adapted to retain the latch means in the latching position, said latch means having an arcuate slot therein, adapted to receive and grip the latch retaining means attached to the upper panel, drive means positioned above said axis for raising and lowering the lower panel and for rotating both panels about said axis, said lower panel being engaged with the upper panel when in substantial registry therewith; further operation of the drive means after interengagement of the panels causing said panels to pivot inwardly toward a substantially horizontal position about the pivotal mounting of the upper panel, said drive means comprising a cable connected to the lower panel and a rotatable pulley on a shaft located above the pivot of the upper panel, and inboard therefrom; means for driving the pulley including a worm and worm wheel, said worm having a stop member associated therewith to halt the operation thereof in one direction before excessive opening movement is imparted to the window panels and in the opposite direction before excessive slack occurs in the cable, said stop means comprising a threaded extension of the worm, stop members spaced from each other on said extension and a slide nut movable along said threaded extension, means barring rotation of said slide nut with respect to said extension; said worm being halted in its rotation in either direction when the slide nut engages a stop.

4. A movable window construction comprising an upper panel and a lower panel; said lower panel being translatable vertically from a position below said upper panel to a position in substantial registry with said upper panel to vent the lower portion of the window opening, the upper panel having a pair of parallel flanged brackets attached to the sides thereof, the lower panel having a pair of rotatable rollers attached to the sides thereof, the rollers being adapted to individually engage the parallel flanges of one bracket, to guide the lower panel during the elevation thereof, said upper panel being pivotally mounted at its upper end and being movable from a vertical position where it closes the upper portion of the window opening to an inward substantially horizontal position; said lower panel being movable with the upper panel when in substantial registry therewith; the window opening being then fully vented; said panels being movable together to an intermediate position where they are accessible for cleaning the outer surfaces thereof, drive means for raising and lowering said lower panel; said lower panel being

engaged with the upper panel when in registry therewith; further operation of the drive means after interengagement of the panels causing said panels to pivot inwardly toward a horizontal position about the pivotal mounting of the upper panel, a stop member fixedly attached to the upper panel, a stop means supported by the guide means on the upper panel for preventing the lower panel from passing above the upper panel during its reciprocal movement, and manually disengageable latching means partially supported on the lower panel and partially on the upper panel adapted to engage said stop means for preventing the lower panel from further movement downward when it has reached a position substantially alongside the upper panel, torsion spring means fitted to said manually disengageable latching means adapted to normally retain the latching means in engagement to the stop means attached to the upper panel, detachable latch means partially carried by the support means and partially by the upper panel to normally prevent rotation of the upper panel about said axis, the stop means including a bracket fixedly attached to the upper panel, a cam-faced stop block attached to the bracket, said latching means including a flat latching portion, adapted to engage the stop block, to retain the lower panel in the latched position, the stop block cam enabling the flat latching portion of the latching means to be moved out of engagement with the stop block, while the lower panel is elevated, the torsion spring means being adapted to force the flat latching portion of the latching means into engagement with the stop block, when the lower panel reaches a position substantially alongside the upper panel, said drive means comprising a cable connected to the lower panel and a rotatable pulley on a shaft located above the pivot of the upper panel and inboard therefrom; means for driving the pulley, said drive means including a worm and worm wheel, said worm having stop members associated therewith to halt the operation thereof in one direction before excessive opening movement is imparted to the window panels, and in the opposite direction before excessive slack occurs in the cable, said stop means comprising a threaded extension of the worm, stop members spaced from each other on said extension and a slide nut movable along said threaded extension, means barring rotation of said slide nut with respect to said extension; said worm being halted in its rotation in either direction when the slide nut engages a stop.

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