STORM PANEL APPARATUS

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ABSTRACT

The present invention relates to a storm panel apparatus for double-hung style windows and a method for installing the same. In particular, the invention is a reusable, unbreakable, temporary replacement window panel apparatus that installs into the existing window frame from the inside of the dwelling. The present invention is resistant to shock and wind load, such as during hurricanes and tropical storms. Furthermore, the invention provides an economical replacement panel that completely removes the hazards of broken glass and provides superior protection from windborne debris and unauthorized entry from outside the window.
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CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority from provisional application Ser. No. 60/556,547 filed Mar. 26, 2004, which is hereby incorporated entirely herein by reference.

FIELD OF THE INVENTION

[0002] The present invention relates to a storm panel apparatus for double-hung style windows and a method for installing the same. In particular, the invention is a reusable, unbreakable, temporary replacement window panel apparatus that installs into the existing window frame from the inside of the dwelling.

BACKGROUND

[0003] Violent storms cause significant personal injury and property damage each year. One of the main hazards during such storms is the danger presented by broken glass. High winds can propel glass shards through the air and cause serious personal injury.

[0004] Furthermore, riots may also present the risk of personal injury and property damage. A broken window will allow intrusion of the elements or thieves.

[0005] Many approaches to prevent these hazards have been attempted. Plywood or other building material nailed over the windows offers limited protection. This method suffers, however, from several disadvantages. First, tools are necessary to cut the material and nail it to the outside of the structure. Such materials are often in short supply before a storm. Second, nailing the material over the outside of a window located high above the ground presents a personal safety risk, especially if the threatening event is already in progress. Third, the large, flat, sheets of plywood have the potential to become life-threatening windborne projectiles in hurricane force winds.

[0006] More sophisticated efforts have been devised to provide removable or retractable protection for windows. For example, U.S. Pat. No. 6,161,605 to Pena describes a foldable device and method for protecting double-hung windows. The Pena '605 patent utilizes protective panels that fit in the outer grooves of the window frame. The panels are held in place using opposing straps that run above and below the primary window pane and fasten inside the window. One drawback to the Pena '605 patent, however, is that it requires the primary window to function. In the event of a violent impact on the Pena device, there is a chance that the primary window will be broken, necessitating window replacement.

[0007] Another example is U.S. Pat. No. 6,546,681 to Trundle for an aluminum and plastic combination accordion storm shutter. This device, however, requires tools to install and is a permanent fixture outside of the primary window. Furthermore, the Trundle '681 patent requires an operator outside the structure on which it is installed to open and close the shutter.

[0008] Yet another example is U.S. Pat. No. 5,911,660 to Watson for a storm window panel. The Watson '660 patent utilizes interlocking tiles supported by a complex plurality of metal mounting bars. The mounting bars require a time consuming assembly of fasteners, including bolts and nuts, on the exterior of the window frame.

[0009] Yet another example is U.S. Pat. No. 6,286,579 to Gottschalk for a retractable storm shade system. The Gottschalk '579 patent includes a housing mounted on the upper external portion of the window frame. A reinforced fabric material is stored on a roller within the housing. The fabric is pulled from the housing and attached to raised members permanently attached to the bottom portion of the window sill. The Gottschalk '579 patent is designed to allow light penetration and ventilation, and thus is not likely to withstand the violent forces of hurricanes, tornadoes, or riots. Furthermore, the Gottschalk '579 patent requires external mounting hardware and installation.

[0010] Yet another example is U.S. Pat. No. 5,560,164 to Ahrens for inside shields for windows. The Ahrens '164 patent discloses a complex installation procedure for interior shields that protect windows and doors. The shields form a watertight seal between the shields and the window to prevent the intrusion of water. The Ahrens '164 patent, however, fails to prevent the breakage of the primary window, thus leaving the hazards presented by broken glass intact.

[0011] In addition to the shortcomings of these patents, some conventional storm window coverings use steel storage enclosures on the outside of the structure. These enclosures will rust over time and become unsightly, especially if located near a saltwater environment. The corrosion of the internal parts of the conventional storm window coverings will further render their use difficult, if not impossible. Similarly, enclosures made of plastic will deteriorate under the ultraviolet rays of the sun and may break under the stress of high winds or vandalism.

[0012] Thus, there is a need for a temporary, break-resistant replacement window panel apparatus that is easily installed in the event of a storm or riot. There is a further need for a temporary replacement window panel apparatus that installs without tools from inside the building. In addition, there is a need for an economical replacement window panel apparatus that completely removes the hazards of broken glass and provides superior protection from windborne debris and unauthorized entry.

SUMMARY OF THE INVENTION

[0013] It is an object of the present invention to provide a temporary replacement window panel apparatus that outperforms glass in impact tests and wind loads.

[0014] It is further an object of the present invention to provide a temporary replacement window panel apparatus that is resistant to violent forces of nature such as hurricanes, tornadoes, and windborne debris associated with these and other storms.

[0015] It is further an object of the present invention to provide a temporary replacement window panel apparatus that is resistant to forced entry.

[0016] It is further an object of the present invention to provide a temporary replacement window panel apparatus that is convenient to install and remove from inside the building, thus avoiding any natural or man-made hazards outside.
It is further an object of the present invention to provide a temporary replacement window panel apparatus that uses the existing window hardware.

It is further an object of the present invention to provide a temporary replacement window panel apparatus that requires no tools to install or remove and is easily stored when not in use.

It is further an object of the present invention to provide a temporary replacement window panel apparatus that protects the window frame.

It is further an object of the present invention to provide a temporary replacement window panel apparatus that is unbreakable (i.e., break-resistant) and energy efficient.

It is further an object of the present invention to provide a system for easily replacing, within the existing window frame, conventional glass pane windows with storm window panels.

It is further an object of the present invention to provide a method for quickly interchanging conventional glass pane windows with temporary storm window panels from within a building structure.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 depicts a modern double-hung window assembly.

FIG. 2 depicts a removable window sash and glass pane of a modern double-hung window assembly.

FIG. 3 depicts the installation of a break-resistant window panel apparatus.

FIG. 4 depicts a modern double-hung window assembly with one break-resistant window panel apparatus installed.

FIG. 5 depicts a cross-sectional diagram of the break-resistant window panel apparatus.

DETAILED DESCRIPTION

The invention is a temporary replacement storm panel apparatus that outperforms glass in impact and wind load tests. The invention includes a multi-layered, reinforced panel constructed of metal, plastic, and foam materials that is particularly useful for preventing personal injury and property damage resulting from storms or riots.

A typical double-hung window assembly 10 shown in FIG. 1 includes a window frame 11, at least one moveable window sash 12, a sash rail 13, and at least one glass pane 14. Modern double-hung window sashes 12 are designed to tilt to the inside of a building or dwelling (arrow, FIG. 1). As shown in FIG. 2, the window sash 12 can be removed (arrow) along a sash guide 15 and safely stored.

In one aspect, the invention is a temporary replacement window panel apparatus for double-hung windows. FIGS. 3 and 4 show the replacement window panel apparatus 16 of the present invention. In a typical embodiment, the replacement window panel apparatus 16 is installed using the sash guide 15. The sash guide 15 further fits within or along a sash rail 13. The sash 12 surrounding the replacement window panel apparatus 16 includes the same hardware typically found in a primary window sash 12, such as a handle 17, a lock 18, and a mechanism for engaging the sash guide 15. The engagement mechanism may be a pin 19 for engaging the sash guide 15 and maintaining sash 12 alignment within the sash rail 13. The engagement mechanism may also be a tab or flange, or any suitable projection installed by a window manufacturer to engage the sash guide 15. Alternatively, the engagement mechanism may be a channel-shaped sash guide to accommodate the window sash.

It will be understood that the term “replacement window panel apparatus” as used herein refers to a replacement window pane and its corresponding sash surrounding the pane. The term “window panel” as used herein does not include the outer window frame, unless specifically stated otherwise.

In a related aspect, the invention is a replacement double-hung window system having glass pane windows 14 and temporary replacement window panels 16 described herein. In this regard, the glass pane windows 14 and temporary replacement window panels 16 are fully interchangeable and typically include the same mechanisms for locking into the window frame 11. The replacement double-hung window system may be manufactured and sold as a complete unit. Alternatively, the replacement window panels 16 may be manufactured and marketed as a retrofit kit. Specifically, the glass pane windows 14 and the temporary replacement window panels 16 are interchangeable within a window frame 11 as circumstances require (e.g., hurricanes and tropical storms).

The replacement window panel apparatus 16 is further illustrated in FIG. 5. The replacement window panel apparatus 16 includes a metal or break-resistant plastic surface (i.e., skin) 20. The skin 20 surrounds an inner core 21 filled with foam insulation, such as spray foam, foam rubber, or foam board insulation, or other suitable insulation material known to those of ordinary skill in the art. The inner core 21 functions to absorb energy from impacts and thereby protect the window frame 11 from damage.

In this manner, the replacement window panel apparatus 16 is of multi-layer construction of break-resistant materials and shock-absorbing materials. The break-resistant material may be metal skin and the shock-absorbing material may be foam material. In a typical embodiment, the break-resistant metal skin surrounds the shock-absorbing foam material. In another typical embodiment, the shock-absorbing material is an inner layer positioned between two break-resistant outer layers.

Alternatively, an additional layer 22 of metal or plastic may be included between the skin 20 and the inner core 21. This additional layer 22 may be positioned adjacent to the skin 20 (i.e., either nearer the outside or nearer the inside) or positioned within the inner core 21 (i.e., surrounded by foam material). This additional layer 22 not only increases security, but also increases energy efficiency and impact resistance of the replacement window panel apparatus 16.

Those having ordinary skill in the art will appreciate that the window panel may also be formed from a solid rubber or vinyl material. Rubber compounds possessing sufficient integrity to withstand standard impact and wind
load tests are well known in the art. These compounds include, but are not limited to, silicone rubber and urethane rubber. Custom rubber compounds incorporating polyester fibers or other reinforcement fibers are also well known in the art.

[0037] Metal materials include, for example, aluminum or steel. The metal may further be plated, painted, or otherwise coated to provide resistance to corrosion, resistance to fading as a result of exposure to ultraviolet rays, and resistance to blunt force impact from storm debris or violent acts.

[0038] Plastic materials include, but are not limited to, fiberglass, fiberglass-reinforced nylon, glass-filled nylon, glass-filled polypropylene, polyester, and vinyl.

[0039] In addition, the surface of the replacement window panel apparatus 16 or window sash 12 facing outward may include brackets or channels for mounting a shock and wind resistant panel to cover the replacement window pane and the window frame.

[0040] The replacement window panel apparatus 16 may further include a viewer for a person inside the structure to observe outside the structure. The viewer may include, for example, a wide angle periscope viewer.

[0041] The temporary replacement storm panel apparatus of the present invention is designed to pass the typical windborne debris impact test. The first component of this test is the “Missile Impact Test,” which includes either large or small projectile impacts. The Large Missile Impact Test includes two impacts by a two-inch by four-inch timber weighing nine pounds and traveling at 50 feet per second. One impact point is in the center of the specimen (i.e., window) and the other is within six inches of a specimen corner. The Small Missile Impact Test includes thirty impacts by a steel ball or roofing gravel weighing two grams and traveling at 80 feet per second. Ten impacts are in the center of the specimen, ten impacts are on a long edge of the specimen, and ten impacts are near a specimen corner.

[0042] The second component of the windborne debris impact test is the cyclic pressure test, which includes thousands of inward and outward cycles of wind pressure. The specific wind pressure applied depends upon the building code in which the specimen will be installed. Three separate specimens (e.g., three identical windows from a given manufacturer) must pass the test by demonstrating no tear or crack longer than five inches or no opening larger than three inches in diameter.

[0043] Another structural performance measurement of a window is the Design Pressure Test. The Design Pressure Test assigns performance class numbers (one positive number and one negative number) based on the pounds of force per square foot used to determine the structural (i.e., wind) test pressure. The positive “DP” number is the standard for wind blowing at the structure. The negative “DP” number is the standard for the vacuum pressure on the opposite side of the structure. The temporary replacement storm panel apparatus of the present invention is designed to possess “DP” numbers of at least +50/-50, preferably at least +75/-75 (i.e., +100/-100).

[0044] Although the invention has been explained in relation to its preferred embodiments, it will be understood that various modifications thereof will become apparent to those skilled in the art upon reading the specifications. Therefore, it will be understood that the invention disclosed herein covers such modifications as fall within the scope of the appended claims. Like numbers refer to like elements throughout the drawings and specification.

[0045] In another aspect, the invention is a method for providing a temporary replacement window panel apparatus in a structure. Modern double-hung window assemblies are designed such that the window sashes and corresponding glass panes tilt inward relative to the structure in which they are installed (FIG. 1). Modern double-hung window assemblies are further designed such that the primary window sash and glass pane are removed easily by sliding them from the sash guide (FIG. 2).

[0046] The method of the invention includes installing a break-resistant temporary window panel apparatus in place of the primary window sash and glass pane from the inside of the structure. FIGS. 3 and 4 depict the installation of the unbreakable temporary window panel apparatus using the same sash guide used by the primary window sash and glass pane. The method of the present invention further provides that no additional parts or special tools are needed.

[0047] In the specifications and drawings, typical embodiments of the invention have been disclosed. Specific terms have been used only in a generic and descriptive sense, and not for purposes of limitation. Furthermore, such terms as “upward,” “downward,” “front,” “back,” “forward,” “rearward,” “top,” “bottom,” “outward,” “inward,” and the like are used for convenience and are not to be construed as limiting.

The scope of the invention is set forth in the following claims.

1. A double-hung window replacement, comprising:
substantially parallel horizontal sash members and substantially parallel vertical sash members that define a substantially rectangular window sash having an interior, said vertical sash members comprising sash guide engagement means; and
a window panel positioned within the interior of and bordered by said window sash, said window panel comprising a multi-layer construction of break-resistant materials and shock-absorbing materials.

2. A double-hung window replacement according to claim 1, wherein said horizontal and vertical sash members are constructed of metal.

3. A double-hung window replacement according to claim 1, further comprising a lock on at least one said horizontal sash member.

4. A double-hung window replacement according to claim 1, further comprising at least one bracket attached to at least one said vertical window sash, said bracket being useful for mounting a wind-resistant panel.

5. A double-hung window replacement according to claim 1, wherein said multi-layer construction of break-resistant materials and shock-absorbing materials comprises an inner layer of shock-absorbing material positioned between two break-resistant outer layers.

6. A double-hung window replacement according to claim 5, wherein said multi-layer construction of break-resistant materials and shock-absorbing materials further comprises an internal reinforcement layer for increasing energy effi-
ciency and impact resistance, said internal reinforcement layer positioned within said break-resistant outer layers.

7. A double-hung window replacement according to claim 6, wherein said additional layer comprises metal.

8. A double-hung window replacement according to claim 6, wherein said additional layer comprises plastic.

9. A double-hung window replacement according to claim 1, wherein said multi-layer construction of break-resistant materials and shock-absorbing materials comprises a break-resistant metal skin surrounding shock-absorbing foam materials.

10. A double-hung window replacement system, comprising:

glass pane windows; and

temporary replacement window panels comprising a multi-layer construction of break-resistant materials and shock-absorbing materials;

wherein said glass pane windows and said temporary replacement window panels are interchangeable within a window frame.

11. A double-hung window replacement system according to claim 10, wherein said multi-layer construction of break-resistant materials and shock-absorbing materials comprises break-resistant metal skin surrounding shock-absorbing foam materials.

12. A double-hung window replacement system according to claim 10, wherein said multi-layer construction of break-resistant materials and shock-absorbing materials comprises a break-resistant plastic skin surrounding shock-absorbing foam materials.

13. A method for providing a temporary double-hung window replacement within a building structure, comprising the steps of:

removing a glass-pane window from a window frame; and

installing a temporary replacement window panel apparatus into the window frame by sliding the panel into the frame and tilting the panel upward into the frame;

wherein the steps of removing the primary window sash and installing the temporary replacement window panel are performed from the inside of the building structure.

14. A method for providing a temporary double-hung window replacement within a building structure according to claim 13, wherein the step of installing the temporary replacement window panel apparatus into the window frame comprises locking the temporary replacement window panel apparatus to the frame.

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