

A WINDOW APPARATUS

Technical Field

5 The present invention relates to windows. In particular the present invention relates to a window apparatus which allows easier cleaning of the entire inner and outer surfaces of an attached window pane.

Background of the Invention

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Prior art windows include at least one frame to which a pane of glass or similar transparent sheet of material is fitted. The casement is typically mounted within a fixed window frame such that the casement is able to swing or slide relative to the fixed window frame between an open and a closed position.

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The above-described prior art is problematic in that the outward-facing surface of a window pane mounted to a frame is not easily accessible for cleaning from within a building as a cleaner situated within the building must precariously lean out of the window in order to reach the entire outward-facing surface of the window pane to properly effect cleaning. This is particularly dangerous where the window is located on the higher levels of a high-rise building as it is hazardous for a cleaner to extend any part of their body out of the window since there is an increased risk that the cleaner may accidentally fall out.

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Certain attempts at addressing this problem have involved the use of improved cleaning implements fitted with extendible handles so as to permit a cleaner to reach the entire outward surface of a window pane whilst alleviating the extent to which he or she must lean out of the window. However, the use of such cleaning implements in this manner is also dangerous in that, if accidentally dropped, a person situated below may be injured by a falling implement.

Professional window cleaners have also been employed to clean the windows of buildings from the outside using scaffolding or abseiling equipment. However, the cost of employing such professionals and equipment in this manner is neither practical nor cost-effective where only a small number of windows on a building need to be cleaned.

Summary of the Invention

The present invention seeks to provide a window apparatus which makes it more convenient for a person situated within a building to clean the outward-facing surface of a window pane attached to the window apparatus.

In a first broad form, the present invention provides a window apparatus including:

- a fixed frame having an inward-facing side and an outward-facing side;
- at least one outer-frame having an inward-facing side and an

outward-facing side;

- at least one inner-frame;

wherein the at least one outer-frame is movably mounted to the fixed frame and the at least one inner-frame is rotatably mounted to the
5 outer-frame.

Typically, the at least one outer-frame is rotatably mounted to the fixed frame using at least one hinge. Preferably more than one hinge is used to mount the outer-frame securely to the fixed frame. Typically, the hinge is
10 a frictional stay arm.

Preferably, the at least one outer-frame is rotatable relative to the fixed frame between at least an open position and a closed position. Preferably, when the at least one outer-frame is in the closed position, the outer-
15 frame and the fixed frame are substantially parallel.

Also, preferably, the at least one outer-frame is rotatable in a range of around 90° relative to the fixed frame. It would be evident to a person skilled in the art that the outer-frame may rotate by more than 90° relative
20 to the fixed window frame.

Preferably, the at least one outer-frame is rotatable on the outward-facing side of the fixed frame only.

25 Preferably, the at least one inner-frame is rotatably mounted to the at

least one outer-frame using at least one hinge. More preferably, the hinge is a frictional stay arm. Alternatively a pivot pin may be used which allows the rotational movement between the inner and outer frames.

- 5 Preferably, the at least one inner-frame is rotatable relative to the at least one outer-frame between at least an open position and a closed position.

Preferably, the at least one inner-frame is rotatable in a range of around 90° relative to the at least one outer-frame so as to allow the inner-frame
10 to rotate inwardly into the building to an extent that would enable easy access to the outer-surface of a window pane for cleaning from within the building. It would be evident to a person skilled in the art that the inner-frame may rotate more than 90° relative to the outer-frame.

- 15 Preferably, the at least one inner-frame is rotatable only on the inward-facing side of the at least one outer-frame.

Preferably, when the at least one inner-frame is in the closed position, the at least one inner-frame is substantially parallel with the at least one
20 outer-frame.

Preferably, the fixed frame, the at least one outer-frame and the at least one inner-frame are rectangular-shaped. It would be evident to a person skilled in the art that any number of different shapes may be employed in
25 forming the inner-frame, outer-frame and fixed frame. Also preferably, the inner-frame nests neatly within the outer-frame and the outer-frame

5 nests neatly within the fixed frame when in the closed position.

Preferably, a pane of transparent material is mounted to the at least one inner-frame.

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Preferably a primary locking means is included for releasably securing the at least one outer-frame to the fixed frame. Also, preferably, the primary locking means is a handle lock. The handle lock is preferable as it provides both a handle to grip when opening or closing the outer-frame,
10 as well as having a locking feature. It is clear that in alternative embodiments, a separate lock and handle may be used in combination instead.

Preferably the present invention includes a secondary locking means for
15 releasably securing the at least one inner-frame to the at least one outer-frame. More preferably, the secondary locking means is a handle lock commonly known to persons skilled in the art.

Preferably a rod is pivotally coupled to the at least one outer-frame
20 wherein the rod provides a cleaner situated within the building with greater torque in rotating the outer-frame inwardly and outwardly relative to the fixed frame. Typically, one end of the rod is pivotally coupled to an outer portion of the outer-frame. A free-end of the rod is releasably clamped to the outer-frame when not in use.

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In a second broad form, the at least one outer-frame is slidably mounted

to the fixed frame and is able to slide between at least an open position and a closed position. Also preferably, the at least one outer-frame is slidably mounted along a lateral axis of the fixed frame. Typically, the at least one outer-frame is slidably mounted to the fixed frame along at least one track.

In a third broad form, the fixed frame accommodates a plurality of outer-frames. It would be readily apparent to a person skilled in the art that the number of outer-frames a fixed frame may be adapted to accommodate will vary depending amongst other things upon the dimensions of the outer-frames, the fixed frame, as well as individual user requirements.

In a further broad form, the present invention provides a window apparatus including:

- a fixed frame having an inward-facing side and an outward-facing side;
- at least one outer-frame having an inward-facing side and an outward-facing side;
- at least one inner-frame;

wherein the at least one outer-frame is movably mounted to the fixed frame and the at least one inner-frame is rotatably mounted to the outer-frame substantially along a vertical side of the inner-frame and the corresponding outer-frame.

In yet another broad form, the present invention provides a window apparatus including:

- a fixed frame having an inward-facing side, an outward-facing side, and an aperture;
- at least one outer-frame having an inward-facing side and an outward-facing side slidably mounted to the fixed frame between
5 at least an open position and a closed position;
- at least one inner-frame rotatably mounted to the at least one outer frame;

wherein when the outer-frame is in the closed position, the outer-frame substantially covers the entire fixed frame aperture.

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In yet another broad form, the present invention provides a window apparatus including:

- a fixed frame having an inward-facing side and an outward-facing side;
- 15 - at least one outer-frame having an inward-facing side and an outward-facing side;
- at least one inner-frame;

wherein the at least one outer-frame is slidably mounted to the fixed frame and the at least one inner-frame is rotatably mounted to the outer-
20 frame.

Brief Description of Drawings

The present invention will become more fully understood from the
25 following detailed description of a preferred but non-limiting embodiment

thereof, described in connection with the accompanying drawings,
wherein:

- 5 - Figure 1 is a perspective drawing of a first embodiment of the
 present invention showing an inner-frame inwardly rotated relative
 to its corresponding outer-frame and an outer-frame outwardly
 rotated relative to the fixed frame.
- 10 - Figure 2 is a front view of the first embodiment of the present
 invention showing a pair of outer-frames rotatably mounted to a
 fixed frame, and a pair of inner-frames rotatably disposed in their
 closed positions relative to their corresponding outer-frames.
- 15 - Figure 3 is an 'A-A' sectional drawing of a first embodiment of the
 present invention.
- Figure 4 is a 'B-B' sectional drawing of the first embodiment of the
 present invention.
- 20 - Figure 5 shows a profile of a first embodiment of an outer-frame.
- Figure 6 shows a profile of a first embodiment of an inner-frame.
- 25 - Figure 7 shows a magnified view of one embodiment of a pivot end
 of a rod pivotally coupled to an outer-frame.

Figure 8 shows a magnified view of one embodiment of a free-end of a rod releasably clamped to the outer-frame when not in use.

5 Figure 9 shows a perspective view of a second embodiment of the present invention in which a pair of outer-frames are slidably mounted to the fixed frame.

Modes for Carrying out the Invention

10 A first embodiment of the present invention (1) is shown in Figure 1 including a fixed frame (2), a first and second outer-frame (3,3') rotatably mounted to the fixed frame (2) by primary frictional stay arms (9), and first and second inner-frames (4,4') rotatably mounted to the outer-frames (3,3') by secondary frictional stay arms (10). Figure 1 further shows
15 secondary handle locks (5,5') for releasably securing the inner-frames (4,4') to their respective outer-frames (3,3'). The outer-frames (3,3') include primary handle locks (6,6') which allow the outer-frames (3,3') to be releasably secured to the fixed frame (2) when the outer-frames (3,3') are disposed in their closed positions. Also, in the present embodiment,
20 panes of glass (12,12') are mounted within each inner-frame (4,4') using techniques known to persons skilled in the art.

The fixed frame (2) is fitted to the wall of a building using standard techniques known to persons skilled in the art such that the inward-facing
25 side (14) of the fixed frame (2) is adjacent to the inside of the building. The outward-facing side (15) of the fixed frame (2) is adjacent to the outside of the building.

The outer-periphery of the fixed frame (2) is rectangular-shaped and a vertical beam (16) projects across the fixed frame (2) to define two symmetrical rectangular openings in which corresponding outer-frames (3,3') will snugly nest when rotated into their closed positions. When the outer-frames (3,3') are in the closed position, the planar surfaces of the outer-frames (3,3') are substantially parallel to the planar surface of the fixed frame (2). When in their closed positions, the outer-frames (3,3') may be releasably secured to the fixed frame (2) using primary handle locks (6,6') which are mounted to the outer-frames (3,3').

Secondary frictional stay arms (10) join the inner-frames (4,4') to their corresponding outer-frames (3,3') at the upper and lower corners respectively in a hinging relationship. The inner-frames (4,4') are also rectangular-shaped and adapted to snugly nest within their corresponding outer-frames (3,3') when disposed in their closed positions.

The protruding portions at the outer edges of each outer-frame (3,3') abut against the fixed frame (2) when in their closed positions and the primary frictional stay arms (9) limit the rotational angle of the outer-frames (3,3') to 90° relative to the fixed frame (2).

Secondary handle locks (5,5') are used in this embodiment to secure the inner-frames (4,4') to their respective outer-frames (3,3'). The secondary handle locks (5,5') are mounted to the inner-frames (4,4') so as to allow releasable fastening of each of the inner-frames (4,4') to their respective outer-frames (3,3') when the inner frames (4,4') are disposed in their

closed positions. The inner-frames (4,4') are able to swing freely relative to their corresponding outer-frames (3,3') when the secondary handle locks (5,5') are not locked.

- 5 In the present embodiment, the outer-frames (3,3') are able to rotate to a maximum of 90° from the closed position relative to the fixed frame (2) on the outward-facing side (15) of the fixed frame (2). It would be understood however by persons skilled in the art that alternative embodiments may allow the outer-frames (3,3') to rotate more than 90°
10 relative to the fixed frame (2) in both an outward-facing direction and an inward-facing direction relative to the fixed frame (2).

Figure 1 shows a rod (8) fixed to an outer region of an outer-frame (3,3'). Figure 7 further shows a pivot end (18) of the rod (8) which is pivotally
15 coupled to an outer-frame (3,3'). The rod (8) is able to rotate in a range of around 90° about a pivot (7) though it would be evident to a person skilled in the art that the rod (8) may rotate around a larger angle depending upon the specific requirements of the user. Figure 8 shows a free-end (19) of the rod (8) which can be gripped by a user in order to
20 push the window open or pull the window closed with greater torque. When not in use, the free-ends (19) of the rods (8) are securely fastened to the respective outer-frames (3,3') using clamps (13) as shown in Figure 8. Each clamp (13) includes a spring plunger (23) which assists in releasably securing the free end (19) of each rod (8). In this embodiment,
25 the rods (8) are made from a metal alloy surrounded by a rubber material.

Figure 9 shows a second embodiment of the present invention having a

pair of outer-frames (17,17') which are slidably mounted to the fixed frame (21). It will be readily understood by persons skilled in the art that the fixed frame (21) may accommodate any number of slidably-mounted outer-frames (17,17') depending, amongst other things, upon the specific user-requirements and/or dimensions of the fixed frame (21) and the outer-frames (17,17'). The outer-frames (17,17') are each slidably mounted to the fixed frame (21) along an upper track (20) and a lower track (20') adapted to slidably receive the upper edge (24) and lower edge (24') respectively of the outer-frames (17,17') in a manner well known to persons skilled in the art. The outer-frames (17,17') slide substantially parallel to one another and parallel to the planar surface of the fixed frame (21). Corresponding inner-frames (22,22') are rotatably mounted to the outer-frames (17,17').

Figure 9 also shows the outer-frames (17,17') in their closed positions such that the planar surfaces of the outer-frames (17,17') overlap and align with substantially the entire planar surface of the fixed frame (21). However, it will be understood by a person skilled in the art that in alternative embodiments of the present invention, the outer-frames (17,17') may not overlap and align with substantially the entire planar surface of the fixed frame (21) when the outer-frames are in their closed positions. When the outer-frames (17,17') are in their closed positions, the planar surfaces of the outer-frames are substantially parallel with the planar surface of the fixed frame (21). Similarly, when the inner-frames (22,22') are disposed in their closed positions relative to their corresponding outer-frames (17,17'), the planar surfaces of the inner frames (22,22') are substantially parallel to the planar surfaces of their corresponding outer-frames (17,17').

Also in the second embodiment, the inner-frames (22,22') are rotatably mounted to their corresponding outer-frames (17,17') using secondary frictional stay arms (10) in a similar manner as described above in
5 relation to the first embodiment. The secondary frictional stay arms (10) are used to rotatably connect the upper and lower corners of the outer-frames (17,17') to the corresponding upper and lower corners of the respective inner-frames (22,22'). Hence, in this second embodiment, a total of four frictional stay arms are used to rotatably mount the inner
10 frames (22,22') to their corresponding outer-frames (17,17').

As in the first embodiment, the inner-frames (22,22') in the second embodiment may be releasably secured to the outer-frame (17,17') using secondary handle locks (5,5') and the outer-frames may be releasably
15 secured to the fixed frame (21) using primary handle locks (25).

Those skilled in the art will appreciate that the invention described herein is susceptible to variations and modifications other than those specifically described without departing from the scope of the invention. All such
20 variations and modification which become apparent to persons skilled in the art, should be considered to fall within the spirit and scope of the invention as broadly hereinbefore described. It is to be understood that the invention includes all such variations and modifications. The invention also includes all of the steps and features, referred or indicated
25 in the specification, individually or collectively, and any and all combinations of any two or more of said steps or features.

Throughout this specification and the claims which follow, unless the

context requires otherwise, the word "comprise", and variations such as "comprises" or comprising", will be understood to imply the inclusion of a stated integer or step or group of integers or steps but not the exclusion of any other integer or step or group of integers or steps. In this regard, in
5 construing the claim scope, an embodiment where one or more features is added to any of the claims is to be regarded as within the scope of the invention given that the essential features of the invention as claimed are included in such an embodiment.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A window apparatus including:

- a fixed frame having an inward-facing side and an outward-facing side;
- 5 - at least one outer-frame having an inward-facing side and an outward-facing side;
- at least one inner-frame;

wherein the at least one outer-frame is rotatably mounted to the fixed frame using at least a frictional stay arm and the at least one inner-frame is rotatably mounted to the outer-frame.

10 2. A window apparatus as claimed in claim 1 wherein the at least one outer-frame is slidably mounted to the fixed frame.

3. A window apparatus as claimed in claim 2 wherein the at least one outer-frame is slidably mounted to the fixed frame such that the planar surface of the at least one outer-frame slides
15 substantially parallel to the planar surface of the fixed frame.

4. A window apparatus as claimed in claims 2 to 3 wherein the at least one outer-frame is able to slide relative to the fixed frame between at least an open position and a closed position.

20 5. A window apparatus as claimed in claims 2 to 4 wherein the at least one outer-frame is slidably mounted to the fixed frame along at least one track.

6. A window apparatus as claimed in claim 1 wherein the at least one outer-frame is
25 rotatable relative to the fixed frame between at least an open position and a closed position.

7. A window apparatus as claimed in claim 6 wherein the at least one outer-frame is rotatable in an outward-facing direction.

8. A window apparatus as claimed in claim 7 wherein the at least one outer-frame is rotatable in an outward-facing direction in a range of around 90° relative to the fixed frame and wherein the planar surface of the at least one outer-frame and the planar surface of the fixed frame are substantially parallel when the outer-frame is in the closed position.

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9. A window apparatus as claimed in any one of the preceding claims wherein the at least one inner-frame is rotatably mounted to the at least one outer-frame using at least a frictional stay arm.

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10. A window apparatus as claimed in claim 1 wherein the at least one inner-frame is rotatable relative to the at least one outer-frame between at least an open position and a closed position.

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11. A window apparatus as claimed in claim 1 wherein the at least one inner-frame is rotatable within a range of around 90° relative to the at least one outer-frame.

12. A window apparatus as claimed in claim 1 wherein the at least one inner-frame is rotatable on the inward-facing side of the at least one outer-frame only.

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13. A window apparatus as claimed in claim 1 wherein the at least one inner-frame is substantially parallel with the at least one outer-frame when the inner-frame is in the closed position.

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14. A window apparatus as claimed in claim 1 wherein the fixed frame, the at least one outer-frame and the at least one inner-frame are rectangular-shaped.

15. A window apparatus as claimed in claim 1 wherein a pane of transparent material is mounted to the at least one inner-frame.

16. A window apparatus as claimed in any one of the preceding claims including a handle lock for releasably securing the at least one outer-frame to the fixed frame.

17. A window apparatus as claimed in any one of the preceding claims including a secondary locking means for releasably securing the at least one inner-frame to the at least one outer-frame.

18. A window apparatus as claimed in claim 17 wherein the secondary locking means is a handle lock.

19. A window apparatus as claimed in any one of claims 6 to 18 wherein a rod is pivotally coupled to an outer portion of the at least one outer-frame.

20. A window apparatus as claimed in claim 19 wherein the rod pivots relative to the outer-frame in a range of around 90°.

21. A window apparatus as claimed in any one of claims 19 to 20 wherein a free end of the rod is releasably securable to the outer-frame.

22. A window apparatus as claimed in claim 21 wherein the free end of the rod is releasably securable to the outer-frame using a clamp.

23. A window apparatus as claimed in claim 1 wherein the at least one outer-frame is movably mounted to the fixed frame and the at least one inner-frame is rotatably mounted to the outer-frame substantially along a vertical side of the inner-frame and the corresponding outer-frame.

24. A window as claimed in claim 1 wherein the fixed frame further includes an aperture.

25. A window as claimed in claim 1 wherein the at least one outer-frame slidably mounted to the fixed frame between at least an open position and a closed position and wherein the at least one inner-frame rotatably mounted to the at least one outer-frame.

5 26. A window as claimed in claims 24-25 wherein the outer-frame substantially covers the entire fixed frame aperture when the outer-frame is in the closed position.